DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

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April 7, 2016

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

Dear Mr. Glenn:

SUBJECT: HOKU NUI MAUI COMMUNITY

With this letter, the County of Maui, Department of Housing and Human Concerns hereby transmits the Draft Environmental Assessment and Anticipated Finding of No Significant Impact (DEA-AFONSI) for the Hoku Nui Maui Community situated at TMK (2)2-4-012:005, and 039 through 046, in the Makawao District on the island of Maui for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, two copies of the DEA-AFONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

If there are any questions, please contact Buddy Almeida, Housing Administrator at (808) 270-7351.

Sincerely,

CAROL K. REIMANN
Director of Housing and Human Concerns

Enclosures
xc: Buddy Almeida, Housing Administrator
Charlene Shibuya, Munekiyo Hiraga

Office of Environmental Quality Control

February 2016 Revision

APPLICANT PUBLICATION FORM

Project Name:	Hoku Nui Maui Community
Project Short Name:	Hoku Nui Maui
HRS §343-5 Trigger(s):	Use of County Lands (Piiholo)
Island(s):	Maui
Judicial District(s):	Makawao
TMK(s):	(2) 2-4-012:005, and 039 through 046
Permit(s)/Approval(s):	HRS§201H-38 Affordable Housing Project
Approving Agency:	County of Maui, Department of Housing and Human Concerns
Contact Name, Email, Telephone, Address	Buddy Almeida, Buddy.Almeida@co.maui.hi.us (808) 270-7351 2200 Main Street, Suite 546 Wailuku, Hawai'i 96793
Applicant:	Hoku Nui Maui, LLC
Contact Name, Email, Telephone, Address	Joshua Chavez, chavezmaui@hotmail.com (808) 268-9726 P.O. Box 1347 Makawao, Hawai'i 96768
Consultant:	Munekiyo Hiraga
Contact Name, Email, Telephone, Address	Charlene Shibuya, planning@munekiyohiraga.com (808) 244-2015 305 High Street, Suite 104 Wailuku, Hawai'i 96793

Status (select one)	**Submittal Requirements**
_X__ DEA-AFNSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
____ FEA-FONSI	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
____ FEA-EISPN	Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.
____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the approving agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
____ FEIS	Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The approving agency simultaneously transmits to both the OEQC and the applicant a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
____ FEIS Statutory Acceptance	The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS

under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.

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

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

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

Project Summary

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

Applicant proposes the development of a comprehensively planned 258-acre sustainable agricultural community in Pi'iholo, Makawao District, Maui, utilizing the provisions of Section 201H-38, Hawai'i Revised (HRS), to support the inclusion of affordable housing for the project. Twenty-one (21) market homes and twenty-two (22) affordable homes are proposed. Majority of the housing units are clustered within 20-acres of the project area with the remaining 238-acres farm lot primarily dedicated to agriculture with support facilities such as a Farm Market and Commercial Kitchen to sell and process agricultural products. Other elements of the project are to incorporate a native habitat restoration area and integrate a hula halau facility to perpetuate Hawaiian cultural practices.

Related site improvements are to develop a drainage system to capture and retain stormwater runoff in a series of onsite retention ponds for irrigation. Also, subdivision road connections to Piiholo Road will provide vehicular access for the homes, agricultural activities, native habitat restoration, and hula halau facility use.

Draft Environmental Assessment

PROPOSED HOKU NUI MAUI COMMUNITY
(TMK (2) 2-4-012:005, 039 through 046)

Prepared for:

Hoku Nui Maui LLC

Approving Agency:

County of Maui,
Department of Housing and Human Concerns

April 2016

MUNEKIYO HIRAGA

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List of Acronyms

AFNSI	Anticipated Findings of No Significant Impact
ALISH	Agricultural Lands of Importance to the State of Hawai'i
AMI	Area Median Income
AIS	Archaeological Inventory Survey
ARS	Archaeological Reconnaisance Survey
BMP	Best Management Practice
CATV	Cable Television
CHAS	Comprehensive Housing Affordability Strategy
CFS	Cubic Feet Per Second
CPR	Condominium Property Regime
DAR	Division of Aquatic Resources
DBEDT	Department of Business Economic Development and Tourism
DLIR	Department of Labor and Industrial Relations
DLNR	Department of Land and Natural Resources
DOE	Department of Education
DWS	Department of Water Supply
EA	Environmental Assessment
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Findings of No Significant Impact
GPD	Gallons per Day
GPM	Gallons per Minute
HAR	Hawai'i Administrative Rules
HNMC	Hoku Nui Maui Community
HRS	Hawai'i Revised Statutes
HCZMP	Hawai'i Coastal Zone Management Program
ISWM	Integrated Solid Waste Management
LID	Low Impact Development
LOS	Level of Service
LSB	Land Study Bureau
MfC	Makawao Silty Clay
MG	Million Gallon
MGD	Million Gallons per Day
MIP	Maui Island Plan
MISC	Maui Invasive Species Committee
ML&P	Maui Land & Pineapple Company, Inc.
MLIBC	Maui Lanai Islands Burial Council
MRTDM	Maui Regional Traffic Demand Model
NRCS	Natural Resources Conservation Service
PER	Preliminary Engineering Report
RGB	Rural Growth Boundary
ROW	Right-of-Way
SHPD	State Historic Preservation Division

SIHP	State Inventory of Historic Places
SMA	Special Management Area
STB	Small Town Boundary
TIAR	Traffic Impact Analysis Report
TMK	Tax Map Key
UGB	Urban Growth Boundary
UHMC	University of Hawai'i Maui College
USDA	U. S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey

Executive Summary

Project Name:	Proposed Hoku Nui Maui Community
Type of Document:	Draft Environmental Assessment
Legal Authority:	Chapter 343, Hawai'i Revised Statutes
Anticipated Determination:	Finding of No Significant Impact (FONSI)
Applicable Environmental Assessment review "Trigger":	Use of County lands (for roadway intersection improvements)
Location:	Pi'iholo, Makawao District, Maui TMK (2) 2-4-012:005, 039 through 046
Landowner:	Hoku Nui Maui LLC
Applicant:	Hoku Nui Maui LLC P.O. Box 1347 Makawao, Hawai'i 96768 Contact: Joshua Chavez Telephone: (808) 268-9726
Approving Agency:	County of Maui Department of Housing and Human Concerns One Main Plaza, Suite 546 2200 Main Street Wailuku, Hawai'i 96793 Contact: Carol Reimann, Director Telephone: (808) 270-7805
Consultant:	Munekiyo Hiraga 305 High Street, Suite 104 Wailuku, Hawai'i 96793 Contact: Charlene Shibuya, Senior Associate Phone: (808) 244-2015
Project Summary:	Hoku Nui Maui LLC (Applicant) proposes the development of a comprehensively planned sustainable agricultural community near Makawao, Maui, Hawai'i.

The Applicant proposed to utilize the provisions of Section 201H, Hawai'i Revised Statutes (HRS), to support the provision of affordable housing for the project.

Utilizing best practices for sustainability, the proposed 258-acre Hoku Nui project incorporates housing and related components, in harmony with the project area's surroundings.

Market and affordable housing are key elements of the project. Of the 21 lots currently proposed, 20 lots are for a clustered housing development of 20 one-acre house lots. The remaining 238 acres will be a single farm lot which will remain dedicated to agriculture and native Hawaiian habitat in perpetuity. The proposed one-acre house lots will be developed under a condominium property regime (CPR) to allow for separate ownership of the market and affordable units. The remaining farm lot is proposed to contain one (1) market and two (2) affordable units for a total of 43 dwelling units. Minimum lot size requirements for lands zoned County "Agricultural" is two (2) acres. Therefore, the Applicant proposes to use Section 201H provisions of the Hawai'i Revised Statutes (HRS) to seek appropriate exemptions to enable the project as proposed.

Another element to support the agricultural components of the proposed sustainable community is the provision of a Farm Market and Commercial Kitchen to sell and process agricultural products. Farm operations will be comprised of livestock grazing and raising of cattle, sheep, goats, pigs, and chickens, using a regenerative agriculture approach to rotate animals throughout the pastures to build soil health and regenerate unhealthy soil for various crops. Other support features proposed are two (2) barn structures of approximately 2,500 square feet each and farm labor dwellings if warranted by demand.

Approximately 118 acres will be reserved for native habitat, open space, green ways, access laneways while other passively developed areas will be gulch zones,

potential stormwater detention basins, and lined/natural drainage swales.

The Applicant also seeks to integrate cultural elements as part of its master planning efforts with provisions for a hula halau facility on approximately three (3) acres. A land use exemption will be sought pursuant to Section 201H, HRS to allow the hula halau facility to be a part of the overall project.

The proposed Hoku Nui Maui Community is situated on approximately 258 acres of land identified as Tax Map Keys (2) 2-4-012:005, 039 through 046, Makawao District, Maui, Hawai'i. The project site abuts Pi'iholo Road near its intersection with Makawao Avenue. Vehicular access to the property will be provided via Pi'iholo Road. Properties on the eastern side of Pi'iholo Road are open agricultural lands owned by Maui Land & Pineapple Company, Inc. and Waiahiwi Ranch Land Company LLC. Below the northwest border of the project site is St. Joseph Catholic Church, school, and cemetery. Along the western border runs an unnamed gulch encumbered by a drainage reserve area adjacent to other similarly zoned agricultural properties. The southern end is bordered by the University of Hawai'i Haleakala Research Facility. About one-half mile east of the site is the central heart of Makawao Town.

Proposed drainage design criteria for this sustainable agricultural community is intended to minimize any alteration to the existing drainage patterns while collecting and storing stormwater runoff into seven (7) onsite detention basins. Natural grass swales will be used together with grated inlets and drainlines as necessary.

The property is located within the State Agricultural District. The property is designated "Agriculture" by the Makawao-Pukalani-Kula Community Plan and is County zoned "Agricultural".

Offsite road improvements along Pi'iholo Road associated with the proposed development constitutes use of public lands and is a trigger for the preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawai'i Revised Statutes (HRS) environmental

review requirements. As such, an Environmental Assessment (EA) was prepared in accordance with Chapter 343 HRS and Chapter 200 of Title 11, Hawai'i Administrative Rules (HAR).

The proposed project is being processed in accordance with Section 201H-38, HRS. Section 201H-38, HRS promotes the delivery of affordable housing by allowing the exemption of endorsed projects from *"...all statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, zoning, construction standards for subdivisions, development, and improvement of land and the construction of units thereon."*

I. PROJECT OVERVIEW

I. PROJECT OVERVIEW

A. PROJECT LOCATION, CURRENT LAND USE, AND OWNERSHIP

The applicant, Hoku Nui Maui LLC, is proposing the Hoku Nui Maui Community project on approximately 258 acres of land identified as Tax Map Keys (2) 2-4-012:005, 039 through 046 (hereafter identified collectively as "project site"), Pi'iholo, Makawao District, Maui, Hawai'i. See **Figure 1**. The project site was formerly pineapple fields and is currently used as pasture land. The project site abuts Pi'iholo Road near its intersection with Makawao Avenue. Access to the project will be via Pi'iholo Road. Properties on the eastern side of Pi'iholo Road are open agricultural lands owned by Maui Land & Pineapple Company, Inc. and Waiahiwi Ranch Land Company LLC. Adjacent to, and northwest of the project site is St. Joseph Catholic Church, school, and cemetery. Along the project site's western border runs an unnamed gulch encumbered by a drainage reserve area adjacent to other similarly zoned agricultural properties. The southern end of the property is bordered by the University of Hawai'i Haleakala Research Facility. Makawao Town is located approximately one-half mile to the east. See **Figure 2**.

The project site is located within the State Agricultural District and is designated as "Agriculture" by the Makawao-Pukalani-Kula Community Plan. County zoning for the property is "Agricultural".

B. BACKGROUND

The project site was owned by Maui Land & Pineapple Company, Inc. (ML&P) and used for commercial pineapple cultivation for the past 70 years. Pi'iholo South LLC previously purchased the property in 2005, which included 325 acres identified as TMK (2) 2-4-012:005 and 009. This entity subdivided the 325 acres into eleven (11) lots. In 2012, Hoku Nui Maui LLC purchased nine (9) of the eleven (11) lots which constitutes the approximately 258 acres in the proposed Hoku Nui Maui Community project.

C. PROPOSED ACTION

1. Housing

A key element of the project is its market and affordable housing. Of the 21 lots currently proposed, 20 lots are for a clustered housing development of 20, one-acre house lots. The remaining 238 acres will be a farm lot which will remain

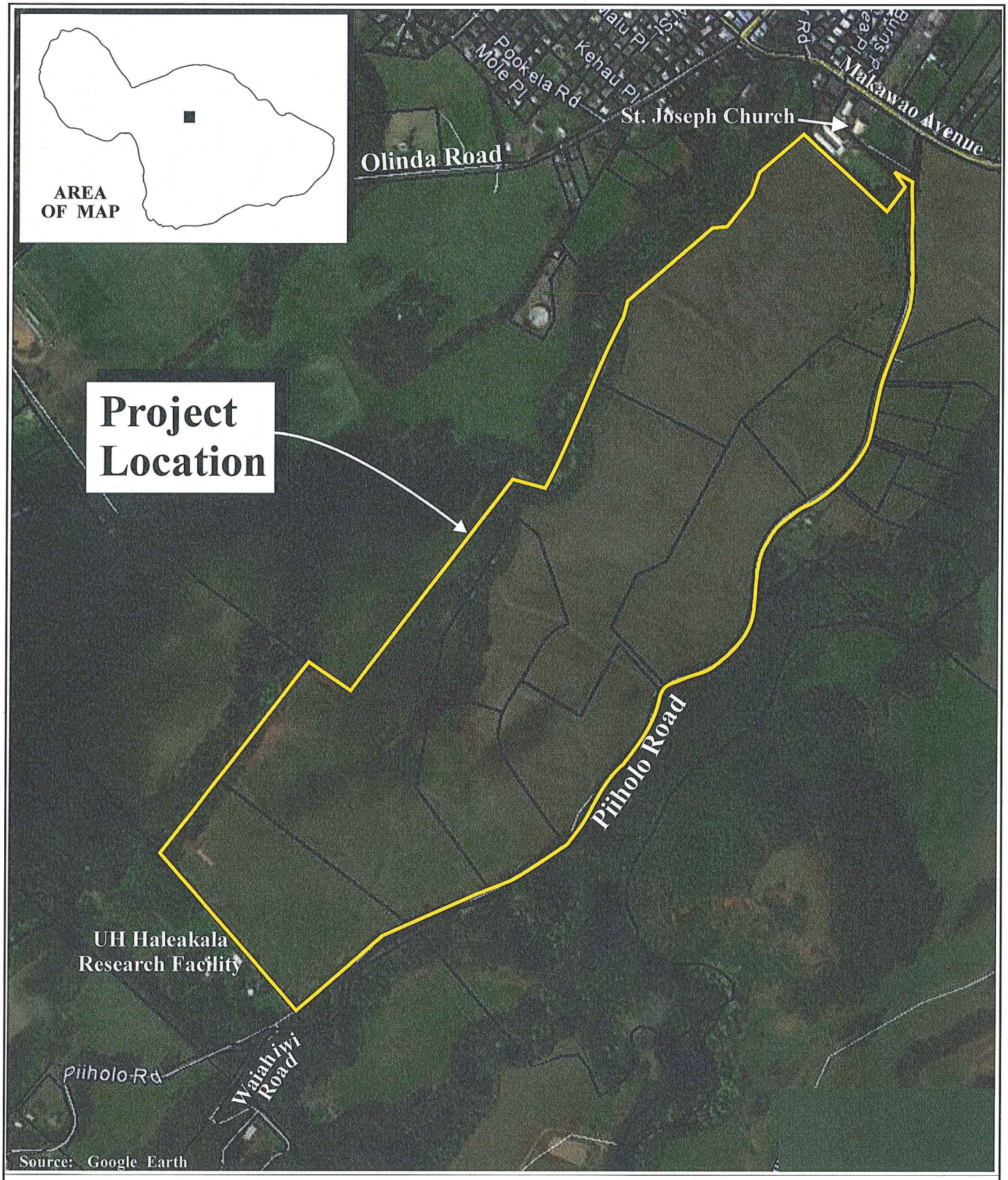


Figure 1 Proposed Hoku Nui Maui Community

Project Location Map

0 750 1500 3000 Feet

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

HokuNui\Piiholo Sustainable\ProjectLocation

Site Summary

Project Name: Hoku Nui Maui
Location: Makawao, Hawaii
TMK: 2-2-4-12-5 (39-46)
Total Aea: 258 acres
Existing Use(s): Vacant, undeveloped, livestock grazing
County Zoning: Agricultural
General Plan Land Use Designation: Agricultural
State Land Use: Agricultural
Moku: Hāmākua Poko
Ahupua'a: Makawao

Project Location

Waiohiwi Gulch

Public Access

Residential Access

Residential Access

Residential Access

Residential Access

Piiholo Road

Piiholo Road

Market & Maintenance

Residential Kauhale I

Residential Kauhale II

Residential Kauhale III

Riparian Corridor

OPEN PASTURE AREA

OPEN PASTURE AREA

OPEN PASTURE AREA

UH Haleakala Research Facility

St. Joseph's Church

Hula Halau

Makawao Town

Source: Hoku Nui Maui

Figure 2

Proposed Hoku Nui Maui Community

Conceptual Site Plan

NOT TO SCALE

Prepared for: Hoku Nui Maui LLC

MUNEKIYO HIRAGA

Hoku Nui\Piiholo Sustainable\Conceptual Site (REV)

dedicated to agriculture and native Hawaiian habitat in perpetuity. The cluster housing format helps to address housing needs to support agriculture, as well as to meet the needs of Maui's working families. The proposed one-acre house lots will include a main dwelling and an accessory dwelling. The main dwelling will be sold as a market unit, while the accessory dwelling will serve to meet the needs of those qualifying for affordable units. Each of the 20 one-acre lots will be developed under a condominium property regime (CPR) to allow for separate ownership of the market and affordable units. The remaining farm lot is proposed to contain one (1) market and two (2) affordable units for a total of 43 units. Preliminary designs for the housing units have been developed. Typical design concepts are depicted in **Figure 3** and **Figure 4**. Inasmuch as minimum lot size requirements for lands zoned County "Agricultural" is two (2) acres, the applicant proposes to utilize the Section 201H provisions of the Hawai'i Revised Statutes to seek appropriate exemptions which will enable the implementation of the project as proposed.

2. Farm Market and Commercial Kitchen

Encompassing an area of approximately one (1) acre, the location of the proposed Farm Market and Commercial Kitchen is shown on **Figure 5.** Hours of operation will be restricted to daylight hours, between 9:00 a.m. and 6:00 p.m., Monday through Friday. The market will display and sell agricultural products grown and processed within the Hoku Nui Maui Community (HNMC) project area or grown by other farmers in the County. The market and kitchen building structure will be approximately 6,000 square feet which includes interior and exterior lanai space. A parking lot meeting County code requirements will be developed. The commercial kitchen is proposed to primarily process agricultural products grown onsite for marketing on and off-site. The kitchen will be utilized by agricultural product producers within the HNMC and is anticipated to be an "on-demand" operation (i.e., kitchen use to be based on individual needs, rather than a fixed use schedule).

3. Hula Halau

The applicant seeks to integrate cultural elements as part of its master planning efforts. Towards this end, a hula halau facility is proposed to sustain this important cultural practice. The area encompassed by the hula halau is approximately three (3) acres, as shown in **Figure 6**. Halau Ke'alaokamaile is a 501c-3 non-profit and has been serving Maui County since 1980. The school focuses on the study of the Hawaiian cultural practices of dance, language, poetry,

Source: Hoku Nui Maui

Figure 3

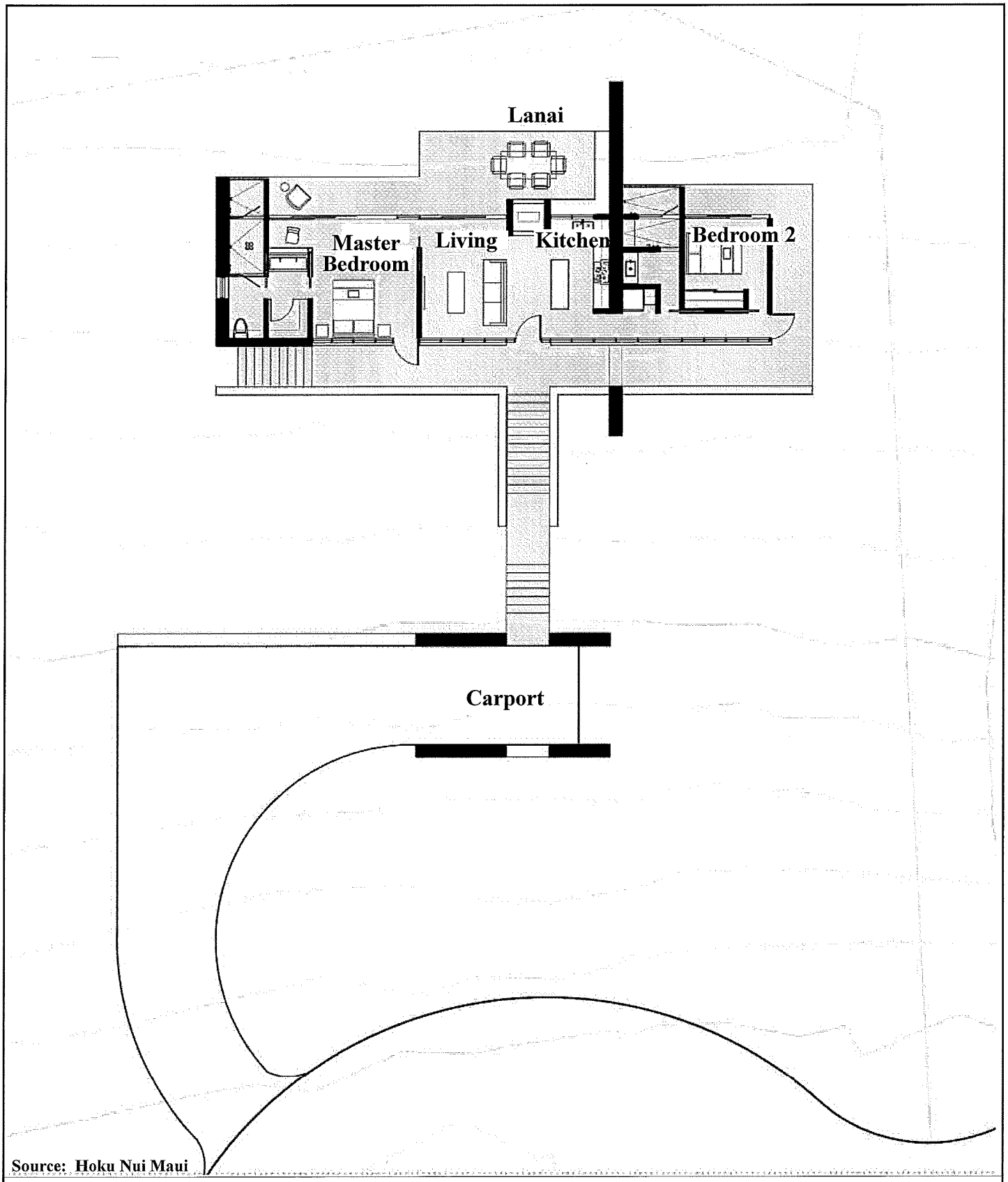
Proposed Hoku Nui Maui Community

Typical Market Housing Unit Floor Plan Concept

0 20 Feet
10 40

Prepared for: Hoku Nui Maui LLC

MUNEKIYO HIRAGA



Source: Hoku Nui Maui

Figure 4 Proposed Hoku Nui Maui Community

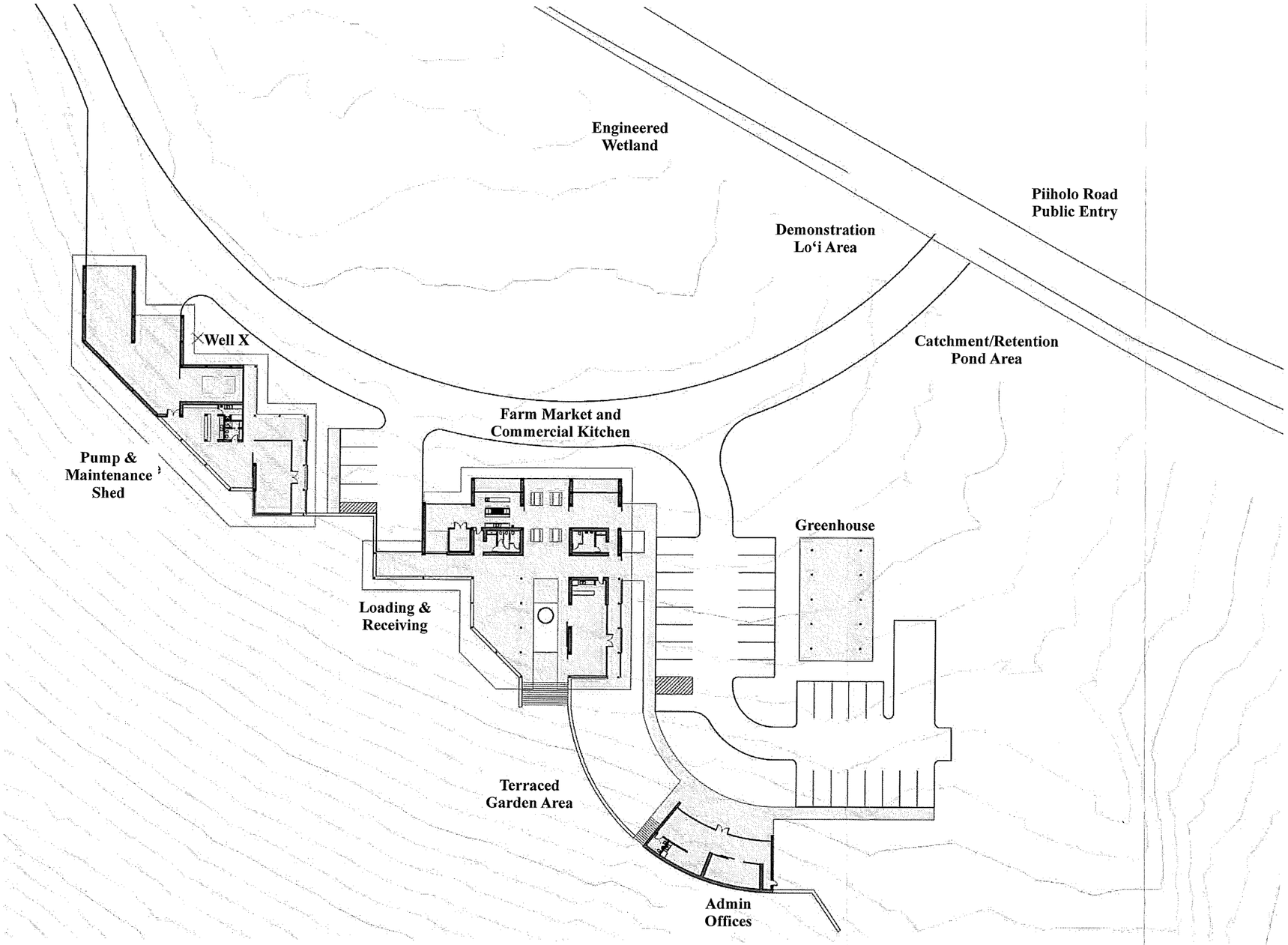
Typical Affordable Housing Unit Floor Plan Concept

0 20 Feet
10 40

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

Hoku Nui\Piiholo Sustainable\RenderingTypicalAffordableHousingUnit



Source: Hoku Nui Maui

Figure 5

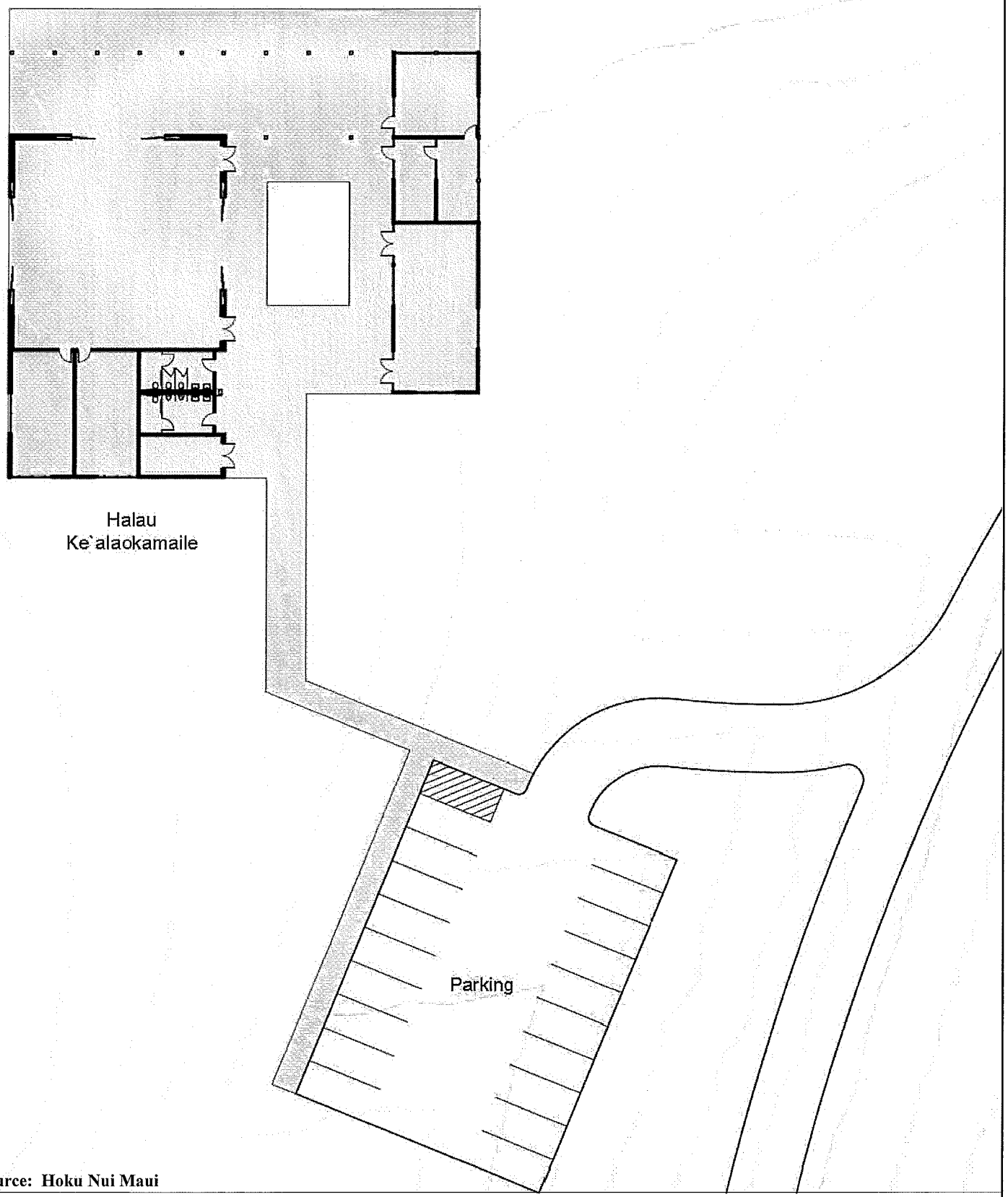
Proposed Hoku Nui Maui Community

Farm Market and Commercial Kitchen - Preliminary Site Plan

NOT TO SCALE

Prepared for: Hoku Nui Maui LLC

MUNEKIYO HIRAGA



Source: Hoku Nui Maui

Figure 6

Proposed Hoku Nui Maui Community

Hula Halau Preliminary Site Plan

0 20 Feet
10 40

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

chant and fine arts and currently has 140 students of all ages, ethnicities and economic backgrounds within the community.

Under the direction of kumu hula Keali'i Reichel, the halau has been recognized as one of the leading cultural resources in the state, winning numerous awards at the King Kamehameha Hula and Chant Competition (Honolulu) and the Merrie Monarch Competition (Hilo) over the years.

The principal halau facility will encompass approximately 3,600 square feet of building area to accommodate space of practice, storage and office facilities. A parking lot addressing County code requirements will be developed. Preliminarily, hours of operation for the halau are anticipated to be between 6 p.m. and 9 p.m. four (4) days a week. The facility is intended to accommodate up to 30 students and their supporters at one time.

4. Farm Operations

Livestock grazing is currently on 250 acres and will reduce to approximately 120 acres when development begins. The property will include cattle, sheep, goats, pigs, chicken broilers, and egg-layers that rotate throughout the pastures using a regenerative agricultural approach. This approach uses integrative, regenerative farm practices that help to build soil health and regenerate unhealthy soil. Two (2) barn structures of approximately 2,500 square feet each, are proposed to accommodate food crop and farm animal (chickens, sheep, goats, and cattle) operations. The specific locations of the permitted barn structures will be determined at a future time.

Farm labor dwellings, also permitted under Maui County Code 19.30A.050 with agricultural district, may be introduced if warranted by demand.

5. Native Habitat Restoration

Approximately 118 acres will be reserved for native habitat, open space, greenways, and access laneways (fruit and nut trees are proposed to line the access laneways, and sheep will be utilized to maintain and control understory grasses). Other passively utilized areas will be gulch zones, potential stormwater detention basins and lined/natural drainage swales.

6. Other Improvements

To support the project proposal, site and infrastructure improvements will be implemented to include roadway/access improvements, site grading, water, and wastewater systems development. While the envisioned infrastructure systems will be described further in the EA document, they include limited improvements to Pi'iholo Road and development of a production well from an existing well located onsite. A private wastewater treatment is also prepared to support the development.

An inadvertent burial found on December 16, 2003 on the edge of Pi'iholo Road (southeast corner of the present project area) was reinterred in a pit that is covered with fresh concrete with the Site Number 50-50-06-5501 inscribed on it. The site will be preserved in place and a buffer zone in accordance with a preservation plan approved by the State Historic Preservation Division (SHPD) will be implemented.

D. PROJECT NEED

As noted in the Housing chapter of the Maui Island Plan, Maui residents face a critical housing situation. Due to numerous factors, Maui's housing prices have increased dramatically over the last decade, with many residents struggling to afford housing on the island. While demand for housing has continued to grow, new residential construction declined during the Great Recession and continues to be slow in Maui County, even as the economy has recovered. Continued population growth and housing demand, combined with constrained housing supply, has created an unbalanced housing market and led to decreased affordability for Maui residents.

The State of Hawai'i, Department of Business, Economic Development, and Tourism (DBEDT) assessed the long-range housing demand for Hawai'i between 2015 and 2025 based on projected net household growth and demand for vacant housing. The report Measuring Housing Demand in Hawai'i, 2015 to 2025 estimates that there will be a demand for between 14,000 to 15,000 housing units in Maui County over the next 10 years. This translates to 1,400 to 1,500 housing units per year (State of Hawai'i, Department of Business, Economic Development, and Tourism, 2015).

While the DBEDT's 2015 report does not provide a breakdown of housing demand by affordability level, the Hawai'i Housing Planning Study, 2011 does provide estimates for the number of new housing units needed by affordability level for 2012 to 2016. The number of new housing units needed is presented based on household income groups defined as a percentage of Area Median Income (AMI). The current AMI for a four-person household in Maui County is $75,100. As shown in **Table 1**, an estimated 1,360 for-sale

units and 2,094 rental units are needed between 2012 and 2016. This includes a demand for 1,161 for-sale units for households earning less than 180 percent of AMI.

Table 1. New Housing Units Needed in Maui County, 2012 to 2016

Household Income Category	Ownership Units	Rental Units	Total Units
Less than 30% AMI	130	673	803
30% to 50% AMI	249	441	690
50% to 80% AMI	380	544	924
80% to 120% AMI	131	243	374
120% to 140% AMI	10	91	101
140% to 180% AMI	261	41	302
More than 180% AMI	199	61	260
TOTAL	**1,360**	**2,094**	**3,454**
Source: SMS Research, Hawai'i Housing Planning Study, 2011.			

The applicant proposes to sell 30 percent of the ownership units to "Below Moderate" income residents, 30 percent to "Moderate" income residents, 20 percent to "Above Moderate" income residents and 20 percent to "Gap Income" residents. The County of Maui Housing Division defines those categories as follows:

Category	Percent of Median Income
Below Moderate	81% to 100%
Moderate	101% to 120%
Above Moderate	121% to 140%
Gap Income	141% to 160%

The proposed project will provide 43 housing units, 22 of which will be affordable to households earning between 81 percent to 160 percent of the AMI. The proposed Hoku Nui Project will provide much needed affordable and market rate housing units for Maui residents.

The affordable housing proposed to be located around a large farm lot dedicated to agriculture and a native Hawaiian habitat will encourage a "live-work" lifestyle without traffic commutes.

Provisions for an onsite farm market and commercial kitchen will provide fresh and readily accessible products using the "farm to table" concept of purchasing locally grown food directly from the source. Such practices maximize the use of these agricultural lands to stimulate and insure economic viability of the planned agricultural community. Finally, the provisions for a hula halau classroom facility will serve to perpetuate Hawaiian cultural practices and traditions consistent with principles outlined in State and County plans and policy documents.

E. REGULATORY CONTEXT

1. Section 201H-38, Hawai'i Revised Statutes

The Hoku Nui Maui Community advances the provision of affordable housing, and accordingly, will utilize the provisions of Section 201H-38, Hawai'i Revised Statutes (HRS) to ensure the timely planning, design, and construction of the project. Section 201H-38, HRS promotes the delivery of affordable housing by allowing the exemption of endorsed projects from:

> *...all statutes, ordinances, charter provisions, and rules of any governmental agency relating to planning, zoning, construction standards for subdivisions, development, and improvement of land and the construction of units thereon.*

As such, a Section 201H-38, HRS application will be filed with the Maui County Council to request exemptions from County requirements in order to support the timely implementation of the project, without compromising public health, safety, or welfare considerations.

2. Chapter 343, Hawai'i Revised Statutes

Offsite road improvements along Pi'iholo Road associated with the proposed development constitutes use of public lands and is a trigger for the preparation of an Environmental Assessment (EA) pursuant to Chapter 343, Hawai'i Revised Statutes (HRS) environmental review requirements. As such, this Environmental Assessment (EA) has been prepared in accordance with Chapter 343 HRS and Chapter 200 of Title 11, Hawai'i Administrative Rules (HAR).

F. PROJECT COST AND IMPLEMENTATION SCHEDULE

The cost of the Hoku Nui Maui Community project is approximately $40 million. The project will be initiated upon receipt of the Section 201H-38, HRS approval, subdivision, and applicable construction-related permits. Construction of the market and affordable

housing unit will occur concurrently, with initial vertical construction anticipated to begin in 2017. Full buildout of the housing units is estimated to be completed by 2019.

II. DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

II. DESCRIPTION OF EXISTING CONDITIONS, POTENTIAL IMPACTS, AND PROPOSED MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

a. Existing Conditions

The proposed Hoku Nui Maui Community project site is located about a half mile outside of the heart of Makawao town in Upcountry Maui on the western slope of Haleakalā. The Makawao area is characterized by a combination of urban, rural, and agricultural uses. The approximately 258-acre project site abuts Pi'iholo Road. Refer to **Figure 2**. Properties on the eastern side of Pi'iholo Road are open agricultural lands owned by Maui Land & Pineapple Company, Inc. and Waiahiwi Ranch Land Company LLC. The property is bordered to the northwest by the St. Joseph Catholic Church, school, and cemetery. Along the project site's western border runs an unnamed gulch encumbered by a drainage reserve area adjacent to other similarly zoned agricultural properties. The southern extent of the property is bordered by the State of Hawai'i's University of Hawai'i demonstration farm site. About a ½ mile east of the site is Makawao Town characterized by a Business-Country Town design style. Refer to **Figure 1**.

The project site was formerly pineapple fields and more recently used for pasture land.

b. Potential Impacts and Proposed Mitigation Measures

The proposed action encompasses an affordable agricultural cluster housing community alongside agricultural lands. Other components of the sustainable community include native habitat restoration areas, a farm market, a commercial kitchen to process agricultural products, barn facilities to compliment farming activities, and a hula halau facility. The proposed low density project is in keeping with the agricultural character of the region and, therefore, is not anticipated to adversely affect the surrounding area.

2. Climate

a. Existing Conditions

Makawao's climate is typical of most mountainous areas in Hawai'i, with conditions varying by altitude and wind direction. Low land areas are generally typified by arid to semi-tropical climate, while higher elevations are characterized by more temperate climate conditions (Atlas of Hawai'i, 1998). Average temperatures in the project area range from the mid 50's to the mid and high 70 degrees Fahrenheit. Winds are generally northeasterly trades with southerly Kona storm winds occurring from October to April. Annual Mean Monthly Rainfall is 1999.6 millimeters, or 65.6 inches, based on historical data from a discontinued Pi'iholo Station SKN 433 situated at elevation 1,780 feet (Rainfall Atlas of Hawai'i, 2013).

b. Potential Impacts and Proposed Mitigation Measures

According to the United States Environmental Protection Agency (EPA), the development of cities and suburban areas has a tendency to increase temperatures slightly as compared to surrounding natural land cover. This "heat island" effect, as it is often denoted, refers to urban air and surface temperatures that may be higher than nearby rural or undeveloped areas (U.S. EPA, 2015).

The proposed agricultural community proposes to develop 20 acres for clustered housing. A Farm Market, Commercial Kitchen, and hula halau facility will be part of the remaining 238-acre agricultural lot. From the agricultural lot, 120 acres will remain for pasturelands to include cattle, sheep, goats, pigs, chicken broilers, and egg-layers that will rotate throughout the pastures using a regenerative agricultural approach. The other 118 acres of the agricultural lot will be reserved for native habitat, open space, greenways, and access laneways/roadways. Fruit and nut trees are proposed to line the access laneways/roadways.

With at least 90 percent of the project area being retained for agriculture, native habitat, open space, and roadways lined with trees, potential heat effects of buildings and pavement will be negligible. Therefore, the proposed project is not anticipated to significantly affect climatic conditions in the area.

3. Topography, Soil, and Agricultural Land Characteristics

a. Existing Conditions

The average slope of the project site is approximately 6.6 percent and slopes from southeast to northwest. See **Appendix "A"**. The project is bordered by Pi'iholo Road to the north, the University of Hawai'i Haleakala Research Facility to the east, agricultural lands and Māliko Gulch to the south and St. Joseph Catholic, church school and cemetery along the northwest border. The property is undeveloped, moderately sloped pasture land with some temporary structures used for storage and equipment to support current agricultural activities on the property. The property is currently being used for cattle and sheep grazing along with raising chickens for meat and egg production.

The project site consists of soils belonging to the Hana-Makaalae-Kailua association. See **Figure 7**. This soil association is well-drained, moderately fine textured and fine textured soils on the intermediate uplands of East Maui. These soils are gently sloping to steep. This association is used for pineapple, truck crops, orchards pasture, woodlands, wildlife habitat, homesites, and water supply.

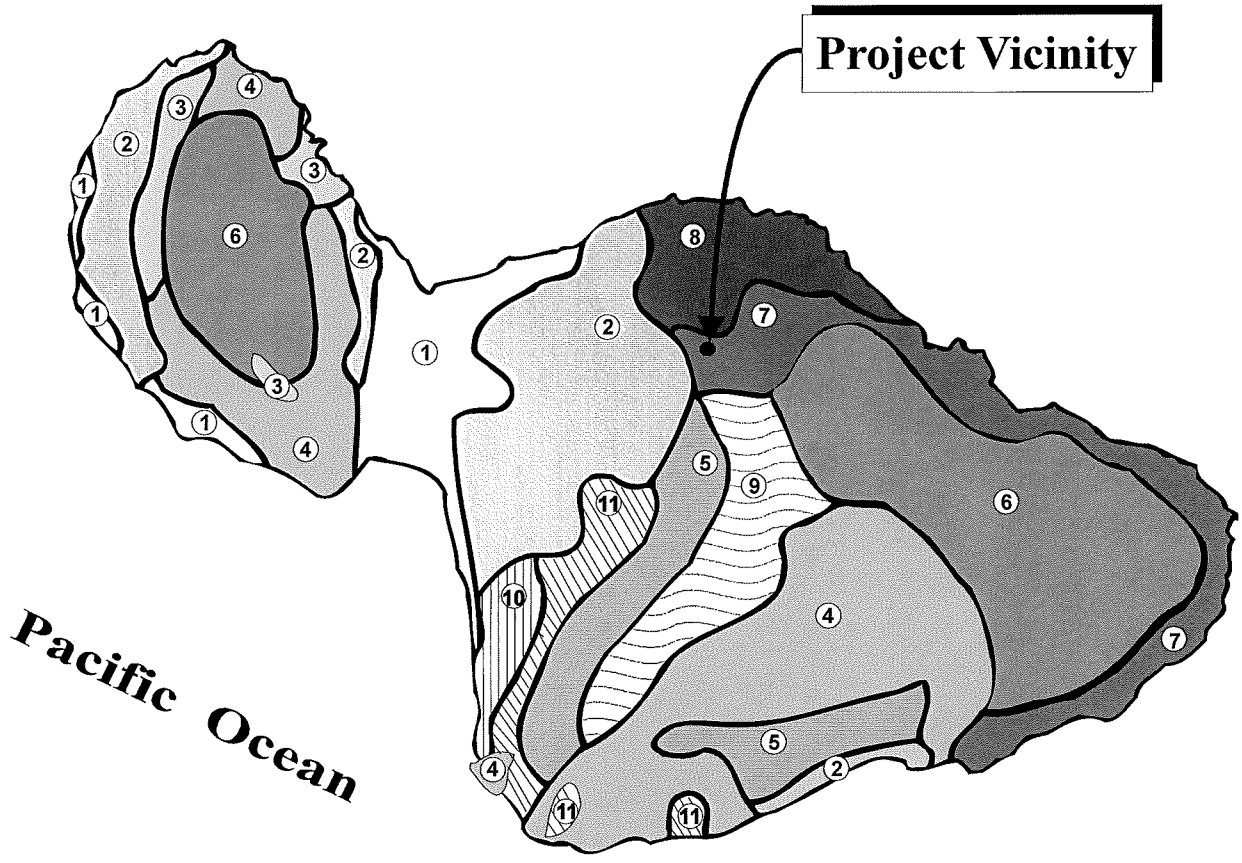
Soils underlying the project site consist of Makawao Silty Clay, 7 to 15 percent slopes (MfC) series, which are well drained on the uplands of Maui developed in volcanic ash and in material weathered from igneous rock. See **Figure 8**. This soil series are moderately sloping to strongly sloping with runoff characteristics of slow to medium and the erosion hazard is slight to moderate (USDA, Soil Conservation Service).

The entire project area of 258 acres is designated as "Agricultural" by the State Land Use Commission. See **Figure 9**. In 1977, the State Department of Agriculture developed a classification system to identify Agricultural Lands of Importance to the State of Hawai'i (ALISH). The classification system is based primarily, though not exclusively, upon the soil characteristics of the lands. The three (3) classes of ALISH lands are: "Prime", "Unique", and "Other Important" agricultural land, with all remaining lands termed "Unclassified".

When utilized with modern farming methods, "Prime" agricultural lands have a soil quality, growing season, and moisture supply necessary to

LEGEND

- (1) Pulehu-Ewa-Jaucas association
- (2) Waiakoa-Keahua-Molokai association
- (3) Honolua-Olelo association
- (4) Rock land-Rough mountainous land association
- (5) Puu Pa-Kula-Pane association
- (6) Hydrandepts-Tropaquods association
- (7) Hana-Makaalae-Kailua association
- (8) Pauwela-Haiku association
- (9) Laumaia-Kaipoipoi-Olinda association
- (10) Keawakapu-Makena association
- (11) Kamaole-Oanapuka association



Source: USDA, Soil Conservation Service

Figure 7

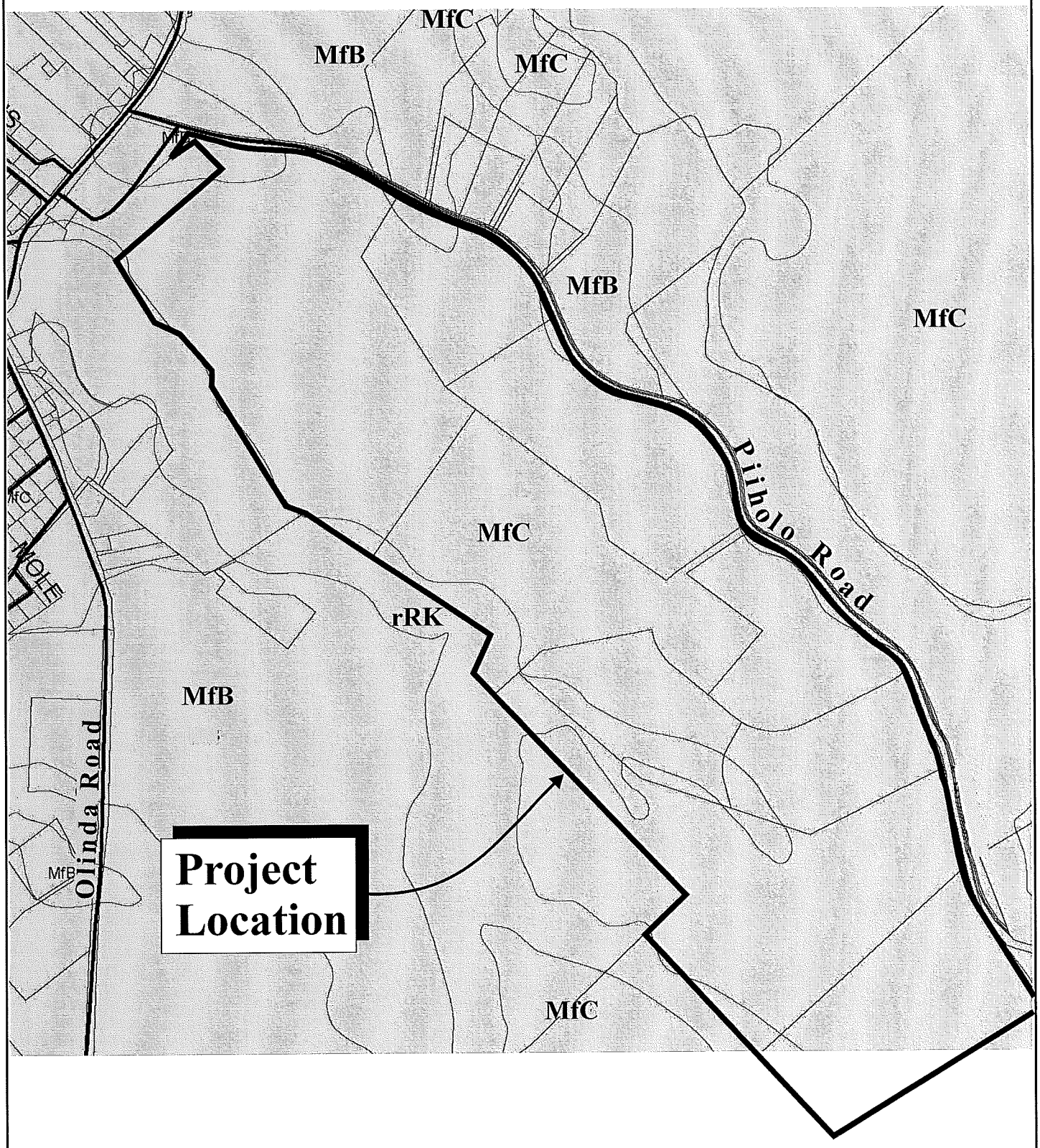
Proposed Hoku Nui Maui Community

Soil Association Map

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC



Source: Arc GIS, USDA Soil Conservation Service

Figure 8 Proposed Hoku Nui Maui Community

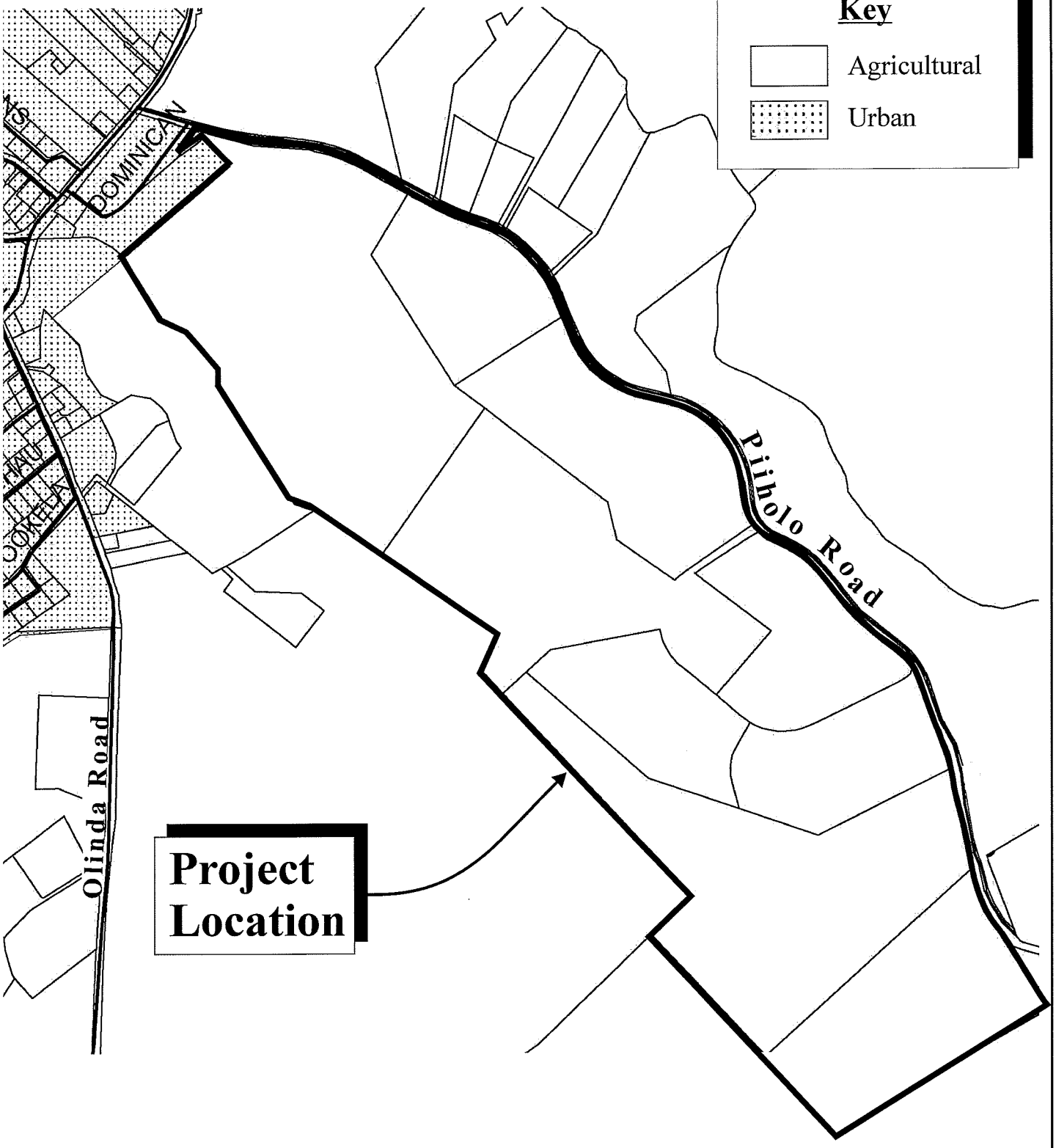
Soil Classification Map

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

HokuNui\Piiholo Sustainable\Soil Classification



Source: Arc GIS, State Land Use Commission

Figure 9 Proposed Hoku Nui Maui Community
State Land Use District

NOT TO SCALE

Prepared for: Hoku Nui Maui LLC

MUNEKIYO HIRAGA

HokuNui\Piiholo Sustainable\SLUD

produce sustained crop yields economically. "Unique" agricultural lands possess a combination of soil quality, growing season, and moisture supply to produce sustained high yields of a specific crop. "Other Important" agricultural lands include those that have not been rated as "Prime" or "Unique", but are of statewide or local importance for agricultural use.

The majority of the project's lands are characterized as "Prime" lands by the ALISH system. See **Figure 10**.

The University of Hawai'i, Land Study Bureau (LSB) developed the Overall Productivity Rating, which classified soils according to five (5) levels, with "A" representing the class of highest productivity soils and "E" representing the lowest. These letters are followed by numbers which further classify the soil types by conveying such information as stoniness, texture, and drainage. The project area is located on lands designated as C49 and C50. See **Figure 11.** The "C49" and "C50" category represents lands which are characterized as Non stony, fine textured, and well drained.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

The project lands were previously in pineapple cultivation from the early 1930s until Maui Pineapple Company ended its operations in 2009. The lands are now being used for cattle and sheep grazing and raising chickens for meat and egg production. Current agricultural operations are exercising regenerative farming practices to build soil health for future crop production. Grazing cattle is actively rotated through different paddocks to promote grass regrowth. Chickens are moved across the pasture every few days to eat insects left by the cattle and fertilize the ground with their wastes.

Once the comprehensively planned sustainable agricultural community is developed, the property will include cattle, sheep, goats, pigs, chicken broilers, and egg-layers that rotate throughout the pastures using a regenerative agricultural approach. See **Appendix "B"**. Row crops will be implemented throughout the property with fruit and nut trees planted along access laneways. Native habitat will be integrated throughout the agricultural areas.

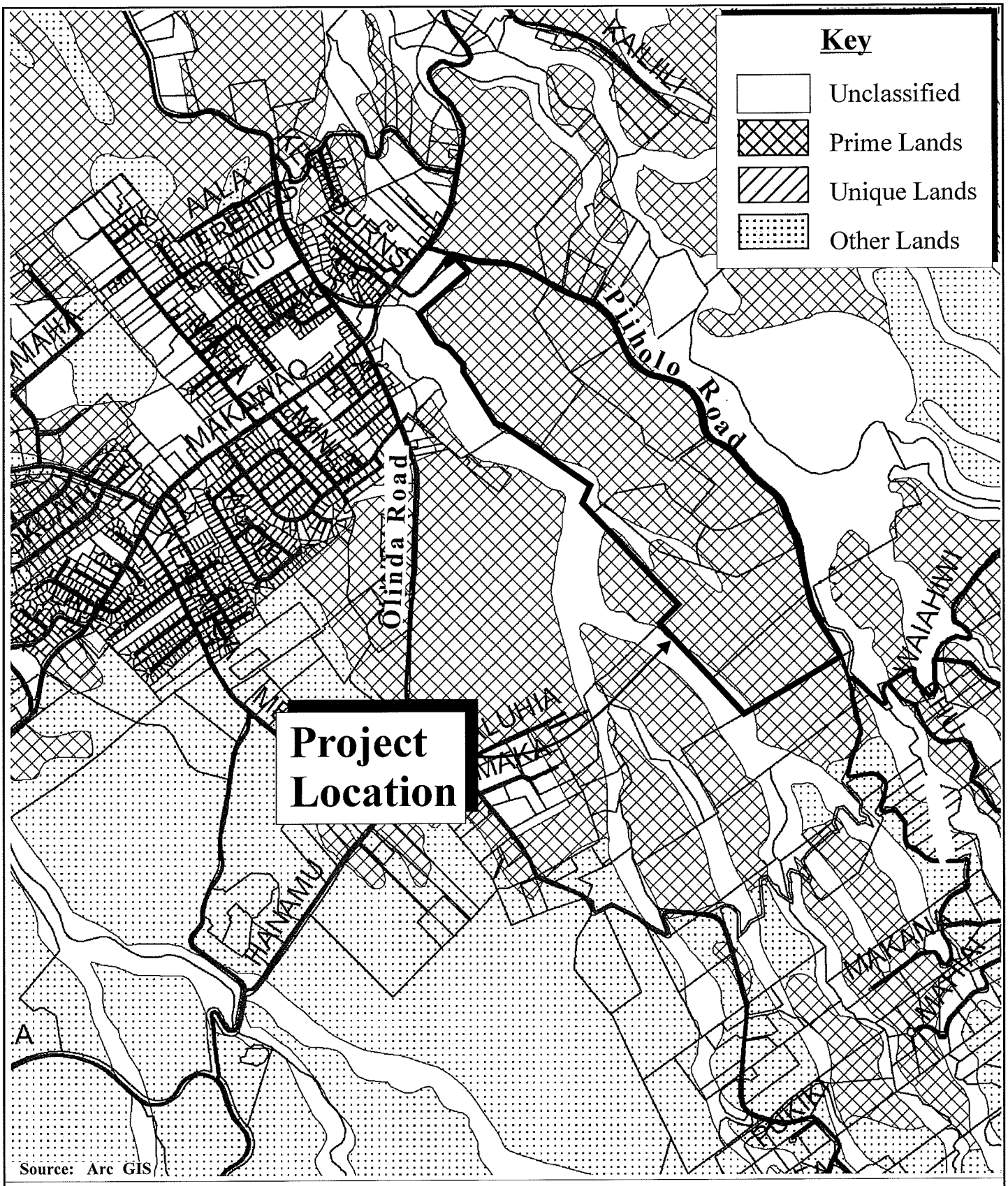


Figure 10 Proposed Hoku Nui Maui Community

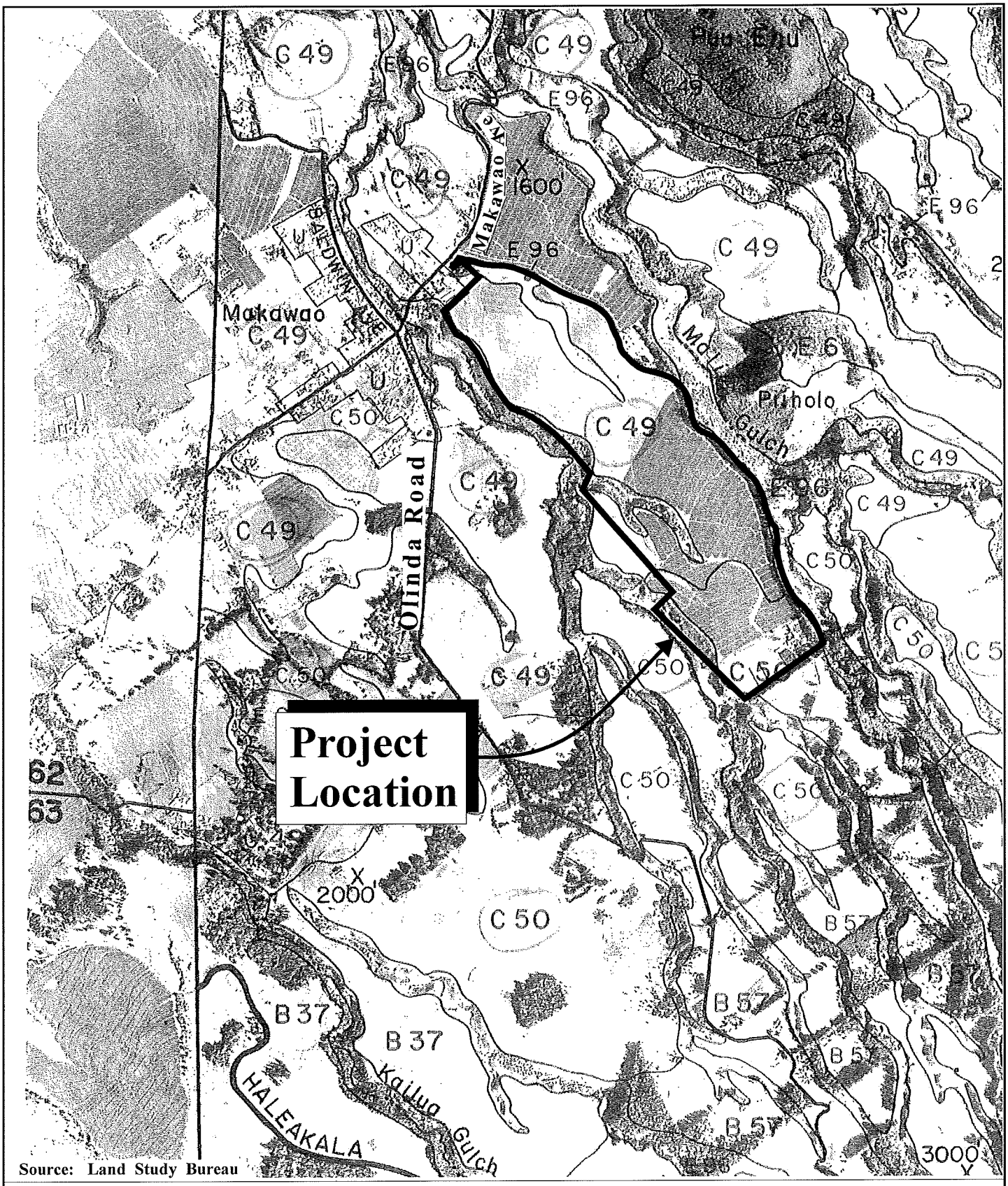
Agricultural Lands of Importance to the State of Hawai'i Map

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

HokuNui\Piiholo Sustainable\ALISH



Source: Land Study Bureau

Figure 11 Proposed Hoku Nui Maui Community

NOT TO SCALE

Land Study Bureau - Land Classification Map

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

HokuNui\Piiholo Sustainable\LSB Map

Of the 258 acres to be developed, 20 acres are proposed for 20 affordable homes and 20 market priced homes. The remaining 238 acres will be for a farm lot that will consist of 120 acres for cattle and chicken grazing pastureland with the remaining 118 acres for native habitats, open space, greenways, access laneways, and sheep to control understory grasses. One (1) market and two (2) affordable units will also be provided on the 238-acre parcel. Within this farm lot, two (2) approximately 2,500 square feet barn structures are proposed along with a Farm Market and Commercial Kitchen on one (1) acre and a hula halau facility on approximately 3 acres to provide a venue for perpetuating Hawaiian culture and traditions.

The proposed internal roadways, access laneways, building pads, infrastructure installation, and drainage improvements will require both excavation and embankment. However, the drainage design criteria are to minimize any alteration to the existing drainage patterns while collecting and storing stormwater runoff into seven (7) onsite detention basins. Natural grass swales will be used together with grated inlets and drainlines as necessary. Refer to **Appendix "A"**. After the development of the proposed project, there will be a net decrease in volume of runoff sheet flowing into the adjacent Māliko Gulch.

Proposed grading for site and infrastructure improvements on roadways, access, drainage, and utilities will implement a design criteria to minimize any alteration to existing drainage patterns. For the majority of acreage on the property being retained for agricultural uses, regenerative farming practices will sustain soil health for the planned agricultural community. Therefore, the proposed project is not anticipated to present any significant adverse impacts on the existing topography and soil characteristics on the property and the surrounding area.

During construction of the project site, grading will be required to create internal roadways and adjoining half roadway frontage improvements. The project proposes to balance the cut and fill on the site to minimize excessive export of excavated material or import of embankment material.

To prevent soil erosion during site work, the applicant will implement Best Management Practices (BMPs) to control dust, erosion, and sedimentation.

While terrain will be modified during construction, the proposed improvements are not anticipated to adversely alter topographic

characteristics in the vicinity. No work is planned within the gulch zones and native habitat restoration areas. Refer to **Figure 2**, Conceptual Site Plan.

4. Flood and Tsunami Hazards

a. Existing Conditions

As noted by the Federal Emergency Management Area (FEMA) Flood Insurance Rate Map (FIRM) for Maui Island, the project site is located in Zone X, an area determined to be outside the 0.2 percent annual chance floodplain. Refer to Flood Hazard Assessment (Exhibits 4A–4I) in **Appendix "A"**, Preliminary Engineering Report.

In addition, the project site is situated well outside of the tsunami zone, designated tsunami evacuation areas, and is not located in any known hazard zone.

b. Potential Impacts and Proposed Mitigation Measures

The proposed sustainable community is located outside of any flood hazard zone, tsunami inundation zone, designated tsunami evacuation zone, and natural hazard zone. There are no threats from flooding, coastal wave action, or natural hazard. No adverse impacts with regards to flood, tsunami, or natural hazards are anticipated with implementation of the proposed sustainable community.

5. Flora and Fauna

a. Existing Conditions

A Botanical and Faunal Survey was conducted by biologists Forest Starr and Kim Starr of Starr Environmental on December 29 and 30, 2014. See **Appendix "C"**.

Original vegetation on the site would have been a diverse mesic native forest, typically of canopy specie including koa *(Acacia koa)*, ohia *(Metrosideros polymorpha)*, halapepe *(Chrysodracon auwahiensis)*, and olopua *(Nestegis sandwicensis)*. With arrival of humans, a series of forces including fire, agriculture, and introduced plants, animals, and diseases transformed the site to predominantly non-native vegetation. Major uses of the land then, included cattle grazing and pineapple cultivation.

Current use of the site is open pasture consisting of non-native grasses that are grazed by cattle, sheep, and goats. Forested gulches are comprised of predominantly non-native kukui nut *(Aleurites moluccana)*, Christmasberry *(Shcinus terebinthifolius)*, black wattle *(Acacia mearnsii)*, and Eucalyptus *(Eucalyptus spp.)*.

Vegetation on the site is predominantly non-native types, mainly open pasture and forested gulch. There are naturally occurring native plants in the gulches identified as the indigenous Palapalai fern *(Microlepia stirgosa)* scattered in the gulches. The other native fern in the gulch is pakahakaha *(Lepisorus thunbergianus)* on tree trunks and koali awa *(Ipomoea indica)*, a common indigenous vine.

The bulk of the site is relatively flat open areas of grassland consisting of numerous non-native pasture grasses. Most common grasses in the pasture includes Guinea grass *(Megathyrsus maximus),* molasses grass *(Melinis minutiflora)*, Natal red top *(Melinis repens)*, broom sedge *(Andropogon virginicus)*, Kikuyu grass *(Cenchrus clandestinus)*, caned grass *(Cenchrus purpureus)*, pangola grass *(Digitaria eriantha)*, sourgrass *(Digitaria ciliaris)*, and vasey grass *(Paspalum urvillei).*

Herbaceous plant varieties include fireweed *(Senecio madagascariensis)*, tick clover *(Desmodium spp.)*, partridge pea *(Chamaecrista nictitans)*, Spanish needle *(Bidens pilosa)*, hairy cat's ear *(Hypocheoeris radicata)*, and balloon plant *(Asclepias physocarpa)*.

The southwest corner of the property includes some savannah where the pastures include young trees of non-native black wattle *(Acacia mearnsii)*. This area also has non-native tree species escaping from the adjacent University of Hawai'i Agricultural Station, predominantly pines *(Pinus spp.)* and Acacia *(Acacia spp.)*. Native plants in the pastures are uhaloa *(Waltheria indica)* and popolo *(Solanum americanum)*, of which both species are considered questionably indigenous and are common in Hawai'i and elsewhere.

A few spots have cultivated edible plants such as bananas *(Musa spp.)*, taro *(Colocasia esculenta)*, and sugar cane *(Saccharum officinarum)*. There are also cultivated native plants including dwarf koa *(Acacia koaia)* and anapanapa *(Colubrina asiatica)*.

Gulches near the western boundary along the mauka portions are generally dominated by eucalyptus *(Eucalyptus spp.)* and black wattle *(Acacia mearnsii)*. Makai portions are mostly dominated by kukui nut *(Aleurites moluccana)* and Christmasberry *(Shinus terebinthifolius)*. Other less common, tree species in the gulches are strawberry guava *(Psidium cattleianum)*, java plum *(Syzygium cumini)*, jacaranda *(Jacaranda mimosifolia)*, camphor *(Cinnamomum camphora)*, and tropical ash *(Fraxinus uhdei)*.The understory or forest undergrowth in many places are of bare soil. Predominant in some areas of the the gulch bottom are ape *(Xanthosoma robustum)*. Other non-native understory plants include Jerusulem cherry *(Solanum pseudocapsicum)*, bamboo grass *(Osplimenus hirtellus)*, panic veldt grass *(Ehrharta erecta)*, and thimbleberry *(Rubus rosifolius)*. Refer to **Appendix "C"** for the complete Plant Species List inventoried during the field studies.

In conjunction with the botanical survey, field observations were done to observe faunal species, its abundance, activities, and locations as well as observations of trails, tracks, scat and signs of feeding. An evening visit was made to observe the presence of the Hawaiian Hoary Bats *(Lasiurus cinereus semotus)*. Bats are relatively common in the Olinda/Pi'iholo area of Maui and regularly observed on and near the Hoku Nui property. During the night survey, only a single lone bat was viewed off the property at a distance. The Hawaiian Hoary Bats roost in tall trees such as on the branch tips of mature Eucalyptus trees and the bats give birth to and raise their young in the summer.

Non-native mammals on the project site were actively grazing cattle *(Bos Taurus)*, goats *(Capra hircus)*, and sheep *(Ovis aries)*. Visible in the gulches were trails and tracks of wild axis *(Axis axis)*. A few mongoose *(Herpestes javanicus)* were observed running across the roads into the grass and dogs *(Canis familiaris)* were heard barking from nearby residential housing. Not observed but likely to utilize the property are wild pigs *(Sus scrofa)*, rats *(Rattus spp.)*, mice *(Mus domesticus)*, and cats *(Felis domesticus)*.

Native bird species observed were two (2) Nene *(Branta sandvicensis)* that flew over the site and a Pacific Golden-Plover or Kolea *(Pluvialis fulva)* foraging in the pasture. Other common non-native species of birds observed were the Scaly-breasted Munia *(Lonchura punctulata)*, Cattle Egrets

(Bubulcis ibis), Common Munas *(Acridotheres tristis)*, Skylarks *(Alauda arvensis)*, and Ring-necked Pheasants *(Phasianus colchicus)*.

The Hawaiian Short-eared Owl or Pueo *(Asio flammeus sandwichensis)* was not observed during the surveys. However, site workers mentioned their occasional presence.

Hawaiian Petrels *(Pterodroma sandwichensis)* and other seabirds raise their young in Haleakalā National Park and other upland sites of East Maui. They feed at sea during the day and fly up to mountain burrows at night navigating with the moon, stars, and land features.

The only native insect observed on the site was the indigenous Green Darner Dragonfly *(Anax junius)*, common in Hawai'i and elsewhere. Conspicuous non-native insects were butterflies, including Passion Butterfly *(Agraulis vanillae)*, Monarch Butterfly *(Danaus plexippus)*, and Bean Butterfly *(Lampikes boeticus)*. Honey bees *(Apis mellifera)* were commonly observed and numerous hives were being maintained on the site.

No tree tobacco *(Nicotiana glauca)* plants or signs of the endangered Blackburn's Sphinx Moth *(Manduca blackburni)*, its eggs, larvae, fras, or damage were observed.

Refer to **Appendix "C"** for the complete Animal Species List inventoried during the field studies.

b. <u>Potential Impacts and Proposed Mitigation Measures</u>

Native plant species found on the project site are all common throughout Hawai'i and elsewhere and presents no special conservation concerns. The native *Palapalai*, *pakahakaha*, and *koali awa* ferns naturally found in the gulches will be able to continue to thrive as the gulches will be left in its natural state with some areas earmarked for native habitat restoration efforts.

Most animals observed on the project site are non-native and poses no special conservation concerns. Nene transit over the site, but apparently does not currently utilize the site. Hawaiian Hoary Bats that transit over the site may continue to roost in the untouched gulch areas. With low density cluster housing and continued agricultural use of the project site, Hawaiian Short-eared Owls will be able to utilize the pastures and farmed land areas.

Likewise, the lone native Green Darner Dragonfly insect species will be able to continue to hunt for insects in the open agricultural areas and gulches.

Although no signs of the Blackburn's Sphinx Moth or Tree Tobacco were observed, another survey will be conducted immediately prior to construction to search for eggs, larvae, and signs of larval feeding and identify host plants of the Blackburn's sphinx moth that should not be cut or disturbed. The project will also implement precautionary measures to avoid cutting of large trees during summer months while bats are pupping. If Nene are thought to be nesting, the Department of Land and Natural Resources (DLNR) will be consulted for appropriate action. Also, any proposed street lighting or other outdoor lighting will use downward facing lens so as not to disorient night flying seabirds.

Hoku Nui Maui LLC and its construction contractors will implement the above described mitigation measures. As such, the proposed project is not expected to have a significant negative impact on biological resources.

6. Wetlands and Streams

a. Existing Conditions

There are no existing wetlands within or in the immediate vicinity of the project site (U.S.F.W.S. 2015). There is a small gulch within the project area that connects with a gulch tributary along the west boundary of the property that converges into Māliko Gulch downstream of Makawao Avenue. These gulch tributaries are unnamed on United State Geological Survey (USGS) maps. However, on old land grant boundary descriptions, the small gulch and unnamed gulch tributary was called Huluhululi'ili'i Gulch and Ku'aihulumoa Gulch, respectively. See **Appendix "D"**. These unnamed tributaries and Māliko Gulch only flow during periods of heavy rainstorms. The project property onsite runoff general sheet flows in a southeast to northwest direction with the majority of the runoff flowing into Māliko Gulch. Refer to **Appendix "A"**. The remainder of the runoff sheet flows to Pi'iholo Road or properties below.

b. Potential Impacts and Proposed Mitigation Measures

The proposed agricultural community's drainage design criteria is to minimize any alteration to the existing drainage patterns while collecting

and storing stormwater runoff into seven (7) onsite detention basins. Natural grass swales will be used together with grated inlets and drainlines as necessary. A maintenance plan will be developed for permanent stormwater Best Management Practices (BMPs) to insure that site features will continue to function properly. Refer to **Appendix "A"**. After the development of the proposed project, there will be a net decrease in volume of runoff sheet flowing into Māliko Gulch, adjacent properties downstream of the site, and Pi'iholo Road. During construction grading operations, BMPs will be implemented for appropriate erosion and sediment control. Given the absence of wetlands and proposed BMPs during construction and permanent BMPs designed into the project site, no adverse impacts to these environmental parameters are anticipated.

7. Archaeological and Historic Resources

a. Existing Conditions

An Archaeological Inventory Survey (AIS) was prepared for the project site by Pacific Legacy Inc. in 2007. The study covered 258 acres of the project site plus a couple adjacent parcels for a total of 325 acres in Haliimaile Ahupuaa, Makawao District, Island of Maui.

Historically, the area was utilized for commercial pineapple cultivation for the past 70 years and is now pastureland.

An inadvertent burial was found in December 2003 by Maui Land & Pineapple Company workers excavating a waterline on the edge of Pi'iholo Road which is on the southeast corner of the project site. The remains were identified by the archaeologist and medical examiner to be an Asian female approximately age 30. The burial was assigned State Site No. 50-50-06-5501 and its displaced remains were reinterred in a pit adjacent to where they were originally found. The pit is covered with concrete inscribed with the site number and an upright boulder was placed over the burial. Subsequently, Archaeological Services Hawai'i performed in September 2005, an archaeological investigation in the area to determine if additional burials existed and none were found.

The AIS also identified a new Site No. 50-50-06-6273 in the floor of an unnamed gulch located about midway along the southwest project site

boundary. The Site consists of a slope retaining wall comprised of stacked basalt cobbles and boulders.

A single adze fragment was recovered from the north central portion of the project site at the center of an eroded pineapple road. No cultural deposits associated with the fragment were found and its origin is unknown. The fragment was collected to be transferred to the property owner. See **Appendix "E", "E-1", "E-2",** and **"E-3"**.

b. Potential Impacts and Proposed Mitigation Measures

To prevent construction equipment from accidentally running over the burial site, temporary orange construction fencing will be placed at a 50 feet radius around the burial site. After site grading is complete, Site No. 50-50-06-5501 is proposed to be left in its present state which is defined by a concrete inscription with the site number, and marked with an upright boulder. There are some ti leaf plantings surrounding the site with boulders placed along Piiholo Road. Subject to approval by the State Historic Preservation Division (SHPD) and Maui/Lanai Islands Burial Council (MLIBC), a small rock barrier with ti leaf vegetation is proposed to permanently demarcate and protect the burial site and its buffer zone.

Site No. 50-50-06-6273 will be passively preserved and no grading disturbance to the gulch site and surrounding gulch areas will be done.

The project's consultant archaeologist is continuing to coordinate with the SHPD office to address early consultation comments provided by letter dated October 27, 2015. (Refer to Chapter IX of the EA.)

8. Cultural Resources

a. Existing Conditions

The project area is located in the Makawao Ahupua'a, Hāmakuā Poko Moku (Traditional District) on the island of Maui. Pre-contact Hawaiian settlement in this ahupua'a took place around A.D. 1620. Prior to this time, the populations were believed to be concentrated along the coastal reaches of Hāmakuā Poko Moku, in Kū'au and Pā'ia, and in the broad sections of Māliko Gulch and Kailua Gulch. References to chiefly presence in areas of Hāli'imaile and Kapalaea indicated cultivation of dryland crops such as *'uala* (sweet potato) and dryland *kalo* (taro). Makawao's rich agricultural

soils, coupled with adequate rainfall and freshwater resources from watersheds and streams, would have provided settlers with enough food and water. Refer to **Appendix "D"**.

Makawao, with its cool climate, majestic views, fertile soils, and forest resources, later became a popular location with early foreign settlers of both whaling men and missionaries. During this period in the early 1800s-1840s, Makawao is described as being dotted by farms of native Hawaiians who grew bananas, *'uala*, dryland taro, *kalo* and sugar cane. The foreign settlers further developed the area's sugar plantations to have approximately 700 acres planted by 1849 with 200 of those acres settled and operated by Hawaiians. There are a number of foreign members of the community that were instrumental in the region's development and land use through history. Much of the land of Makawao was government land that may have never been worked by native Hawaiians as traditional *kuleana* lands. Thus, illustrating a period in Hawaiian history where Hawaiians and foreigners were in the midst of blending cultures, religions, and agricultural practices.

The first government lease of lands, which includes lands of the current project area, was for use as a sugar plantation. Reverend Green was instrumental in Makawao's history who spread Christianity through the establishment of Po'okela Church in nearby Olinda. He also encouraged the Hawaiian population to farm and plant western crops such as wheat and corn. The American Protestant missionaries influence, coupled with the creation of industries based on world economic markets rather than small scale subsistence fishing and farming, led to the Organic Act of 1848 also known as the Māhele' Āina. In 1845, this new land ownership concept was brought to Makawao earlier than any other region in Hawai'i (with the exception of Mānoa, O'ahu) with lands offered in an experimental land sale for which Rev. Green become the land agent for Makawao. Lands were predominantly purchased by Hawaiians.

From the Māhele period forward, properties originally bought by Native Hawaiians were acquired by expanded sugar plantations. The demand for labor grew, bringing in Chinese, Japanese, and Portuguese contract laborers to Makawao along with their respective cultural traditions and religious practices. These immigrants eventually purchased land and established businesses. Sugar companies then diversified with cattle ranching operations and dairy operations.

The project area does contain a historic access trail called the "Bridle Path" shown on an old 1872 Hawaiian Government Survey map of Makawao by C. J. Lyons. It was said to be important for movement of people living in Makawao, travelling to neighboring regions including Hā'iku and Haleakalā.

Majority of these early sugar companies and cattle ranches consolidated with Haleakala Ranch Company and Maui Pineapple Company to dominate the fee ownership of Makawao. Migrant laborers continued agricultural farming, while others became cowboys, merchants, and shop owners of Makawao. These cattle ranching and agricultural industries became the predominant drivers of the economy to establish the rural, pastoral, agricultural, and ranching community typical of contemporary Makawao town. Maui Pineapple Company, a large scale pineapple farming company ceased operations in 2008 and put up their lands for sale. Makawao now caters to a growing visitor industry to accommodate a shift to tourism being the major driver of Hawai'i's economy.

The Archaeological Inventory Survey discussed in the previous chapter describes an Asian female burial located near the edge of Pi'iholo Road at the southeast corner of the project site. The burial site is identified as State Site No. 50-50-06-5501.

In order to obtain an in-depth cultural perspective for the proposed project area, interviews with informants were conducted during the preparation of the Draft Environmental Assessment. Refer to **Appendix "D"**. Informal interviews were conducted with eleven (11) individuals with experiences and knowledge of the project area. Two (2) formal interviews were conducted of which summaries are provided below.

James "Jimmy" DeRego

Mr. Jimmy DeRego was born September 30, 1927 at Pā'ia Hospital and grew up on Haleakala Ranch in Kapalaea (current day Haleakala Ranch Office area) where his father was a ranch foreman managing cowboys and cattle. He is of Portuguese descent. His family attended St. Joseph Church where many of his relatives are buried. He worked as a cowboy for Haleakala Ranch, in maintenance for Haleakalā National Park, and worked for 30 years with the Maui County Roads Department before retiring.

In his childhood, he attended Makawao Elementary School and recalls walking to school and cutting grass on the way home for the family's milk cow. He helped during cattle round–ups and drives when the Haleakala Highway through Pukalani was unpaved. The all-day operation involved about 10 to 15 men driving 200 head of cattle from Kapalaea all the way down to Kahului Harbor for export to the mainland. He also described cattle being driven from Haleakala Ranch through Makawao Town to the slaughterhouse. Also, a dairy existed in Ukulele (Makawao Forest Reserve) when Olinda Road used to be an old wagon road.

He recalls hunting wild pigs near the stream areas, goats, and pheasants which were used for smoked meats and sausages. The ranch provided beef and the family raised chickens and grew vegetable gardens.

As a cowboy, he installed and repaired fences, cleared pastures of weeds, and branded calves. As a part-time maintenance worker at Haleakalā National Park, being experienced with horses and pack mules, he maintained all of the hiking trails in the crater, stocked cabins with firewood and other gear, and hunted goats and pigs that ate *mamane* tree bark causing damage to the forests.

Mr. DeRego described Makawao Town during his childhood years as the same old town as you see it today with all the old buildings like Komoda Bakery that has been there for close to 100 years. Businesses were mostly owned by Japanese and the Club Rodeo was owned by the Molina family who is also well known as the famous Molina Orchestra who provided dance music at various venues.

His father and grandparents lived across the St. Joseph Church graveyard and later bought a place at the northeast corner of Pi'iholo Road and Makawao Avenue that used to be a pineapple field. His father used to own land below 'Alelele Pond and raised cattle there. He recalls swimming in the pond as children and described his family as "mountain men" that did not care for the beach especially without vehicles to travel down from the country.

Doug McClure

Mr. Doug McClure who was originally from California with an agriculture degree from Fresno State College, began his career on Maui with Baldwin

Packers, a pineapple canning company. In 1962 Baldwin Packers merged with Maui Pineapple Company when in 1964 he managed their Honolua Plantation lands in West Maui. Then in 1969 Maui Land & Pineapple Company (ML&P) was created where he transferred to Hāliimaile to become manager of ML&P operations. For a time he lived along Baldwin Avenue where it borders Māliko Gulch.

He describes the lands of the current project area being cultivated in pineapple from 1914 to 2008 when ML&P pineapple operations ended. The gulch along the southern boundary of the property which was referred to as "Makawao Gulch" flowed intermittently. Water diversions from the field were channeled to this gulch since overly wet conditions for pineapple caused it to taste sour. He suggested *ʻōhelo* berries and drinking tea plants as more suitable and profitable for the area climate. A settling pond directly behind St. Joseph Church existed where the Hoku Nui base yard sits. On the mauka end and adjacent to the Hoku Nui property was an experiment station which now houses the Maui Invasive Species Committee offices (MISC). Mr. McClure who is now retired, is very involved with the MISC. When he managed the fields within the Hoku Nui property, he recalls weeds which included sour grass and *kukui pua* (grass) and chemical spraying was used to control weeds. In the gulches of the project area and overall focus area existed *waiawi*, Christmas berry and guava.

Mr. McClure was involved with developing the 10 million-gallon Kaʻiliʻili reservoir now located on Piʻiholo Ranch that was used to irrigate Hāliimaile pineapple fields.

He recalls when in the late 1960s, Axis deer was initially brought in and released in Ōmaʻopio by Mr. Oskie Rice. More were brought in later by the Department of Land and Natural Resources and released at Red Hill. There are now many deer in the area as well as pigs that can be found down to the coast. He described ponds around Puʻu Piʻiholo and remembers red swordtail fish and frogs in them.

Mr. McClure managed a "Corn Camp" located in the current day Makawao Fire Station and Wai Ulu Farm area which was once a 200-acre corn plantation. Onion, white rose potatoes and red rose potatoes were also grown here to supply the west coast during the Gold Rush.

Mr. McClure recalls attending the St. Joseph Church's Feast every year and pointed out that it was a major fund raising community event where sheep, cattle, goats, and pigs were auctioned with games for entertainment and Portuguese soup for sale.

b. Potential Impacts and Proposed Mitigation Measures

The land has been predominantly in agriculture since Hawaiians settled growing dryland crops. With the arrival of foreign settlers, crop production such as sugar and pineapple developed and expanded. Prior to its current uses, the site was used for almost a hundred years of pineapple cultivation up to 2008. Most recently the property has been used for cattle and sheep grazing, egg producing chickens, and bee keeping.

The proposed Hoku Nui project is a sustainable farming community that will serve to perpetuate all viable agricultural uses of the land while providing market and affordable housing, and a commercial kitchen and farm market for processing and marketing various agricultural products. Site design maintains the maximum amount of acreage for farm lands massed within the project area and clusters the housing units in three (3) locations. The site concepts also maintain gulch areas to establish a native Hawaiian habitat restoration with retention ponds and contours to capture and retain surface water to minimize use of underground water sources. A portion of the project area will be set aside for the creation of a *hula hālau* facility to provide a permanent home for perpetuating Hawaiian traditions and culture.

Although dwellings were not known to occupy the property, proposed cluster housing will be designed to be in alignment with the land's traditional forest and agricultural landscape. Impact of viewable housing will be mitigated with strategic planting of indigenous and endemic tree and shrub species.

Consultation is continuing with the Department of Land and Natural Resources, Na Ala Hele office who is responsible for ancient and historic trails. A plan on how the "Bridle Path" can be recognized and memorialized on the project site is being developed.

With regard to the burial site located at the southeast corner of the project site, preparation of a burial treatment plan will be completed and submitted

for review and approval to the State Historic Preservation Division (SHPD) office. Presently, the burial location is being protected from desecration by placement of large rocks and ornamental plantings around the spot. A permanent burial treatment plan will be implemented upon its approval by the SHPD office.

The project team continues to keep an open communication line with the St. Joseph Church Parrish Council. This dialogue is intended to insure that all activities on the Hoku Nui property will not adversely impact their church, cemetery property, and their morning pre-school traffic flow.

Based on the actions taken thus far and actions proposed, the project is not expected to impact any of the historic and cultural sites, and cultural practices.

9. Air and Noise Quality

a. Existing Conditions

There are no point sources of airborne emission in the immediate vicinity of the project site. Air quality in the Upcountry Makawao area is good with existing airborne pollutants attributable to automobile exhaust from the nearby roadways and agricultural activities.

Noise generated in the vicinity and within the project site may be attributable to natural (e.g., wind) conditions and traffic along the adjacent Pi'iholo Road.

b. Potential Impacts and Proposed Mitigation Measures

Airborne particulates, including dust, may be generated during site work grading and construction operations. Temporary dust control measures, such as dust fences and regular watering, will be implemented to control wind-blown emissions during construction. In the long term, all graded and grubbed areas will be stabilized with vegetation to mitigate dust-generated impacts. Best Management Practices (BMP) will be exercised during agricultural operations, to minimize wind-blown emissions.

Ambient noise conditions will be temporarily affected by site grading and construction operations. Construction work will be limited to weekdays and daylight work hours to minimize impacts on nearby residents.

The proposed agricultural uses that are associated with the project are not anticipated to create significant adverse impacts to ambient noise conditions. Proposed uses are similar in nature to the surrounding agricultural zoned properties and nearby residential and public/quasi-public uses.

10. Scenic and Open Space Resources

a. Existing Conditions

Scenic resources in the area include the slopes of Haleakala to the southeast of the project site. Views in the northwest direction include the West Maui Mountains and the island's northern coastline.

The project site is not a part of a designated scenic view corridor.

b. Potential Impacts and Proposed Mitigation Measures

While portions of the project site will be utilized for market and affordable homes, as well as complementary uses such as the commercial kitchen, farm market, hula halau and related agricultural accessory buildings, these structures will be strategically placed to maintain large contiguous agricultural spaces to ensure that the visual character of the region is not compromised. In this regard, the proposed action is not anticipated to have a significant adverse effect on scenic and open space resources.

11. Traditional Mountain Access

a. Existing Conditions

According to an 1872 Hawaiian Government Survey map of Makawao by C. J. Lyons, there were two (2) historic trails that generally ran east-west to connect Ka'ili'ili Road in Hai'kū to Olinda Road above Makawao town. The trail traversed through the project site and was labelled a "Bridal Path" which is a trail passable or designed for horses. Refer to **Appendix "D"**. The trails appear to have provided access between Hai'kū and Makawao via horses and not for traditional mauka-makai access. Its use was probably deemed no longer practical with the invention of the automobiles and improvements of old horse and buggy roads for more efficient motor vehicle travel. Past decades of pineapple cultivation and pasture grazing have since obliterated these paths.

b. Potential Impacts and Proposed Mitigation Measure

The proposed action is not anticipated to have an adverse effect on traditional mauka-makai access. With regard to the "Bridle Path", an initial site meeting was held on October 8, 2015 with the Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife – Nā Ala Hele Trails and Access Program staff. Consultation is continuing with DLNR to eventually develop a plan to recognize and memorialize this historic trail, as appropriate.

The proposed action is not anticipated to have an adverse effect on traditional mauka-makai access. Also, the pre-existence of a historic trail through the project that has been since obliterated will be recognized and memorialized as appropriate.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Regional Setting

a. Existing Conditions

The project site is located along Pi'iholo Road in the Makawao Upcountry region on the northwest slopes of Haleakalā. The area is characterized by a combination of Urban, Public/Quasi-Public, Rural, and Agricultural uses. The project site is currently vacant and located along Pi'iholo Road mauka of the intersection of Makawao Avenue and Pi'iholo Road. St. Joseph Catholic Church, school, and cemetery border the northwest boundary of the project site. Along the eastern and western borders of the project site are similarly zoned agricultural parcels. The University of Hawai'i demonstration farm site borders the property's southern boundary.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is considered compatible with the surrounding agricultural land uses. The regional character of Makawao and more specifically the Pi'iholo-Olinda area is not anticipated to be adversely impacted by the proposed Hoku Nui Maui Community.

2. Population

a. Existing Conditions

The population of the County of Maui has exhibited relatively strong growth over the past decade. Maui County's population has grown from 128,094 in 2000 to 154,834 in 2010, representing a 21 percent growth over ten (10) years (U.S. Census 2010).

In 2010, the population of the island of Maui was 144,444 with approximately 25,500 residents of the island's population living in the Makawao-Pukalani-Kula area (U.S. Census, 2010). Growth in Maui County is expected to continue as baseline population forecasts for the year 2020 reflect a Makawao-Pukalani-Kula population of 27,640, as well as an island-wide and County-wide population of 162,370 and 174,450, respectively (County of Maui Planning Department, June 2006).

b. Potential Impacts and Proposed Mitigation Measures

The proposed project consists of 43 housing units of which 22 units are to fulfill a need in the affordable housing market. The project is expected to accommodate the projected increase in housing demands associated with population growth for the island and the Makawao-Pukalani-Kula area. In this regard, the proposed project is not expected to have a significant adverse impact in the resident population of Maui County.

3. Economy and Labor Force

a. Existing Conditions

The Makawao-Pukalani-Kula Region, with its fertile soil and cool climate conditions, has resulted in successful produce and flower cultivation for export to domestic and international markets. The vast lands of pasture have also enabled cattle ranching and alternative ranching activities, such as goat, sheep and llama herding, all of which contribute to the island's economy.

As of July 2015, Maui County's non-seasonally adjusted unemployment rate dropped to 3.3 percent, a reduction of 1.2 percent from July 2014. Similarly, Maui Island's non-seasonally adjusted unemployment rate for July 2015 stood at 3.1 percent, a reduction of 1.3 percent from July 2014 (DLIR, August, 2015).

b. Potential Impacts and Proposed Mitigation Measures

On a short-term basis, the project will support construction and construction-related employment. Accordingly, the project will have a beneficial impact on the local economy during the period of construction.

From a long-term perspective, the proposed action will provide new housing inventory to residents who desire to work and live within an agriculturally sustainable community in the Makawao-Pukalani-Kula region. Importantly, the proposed action is intended to enhance and diversify agricultural opportunities for Maui's residents.

4. Housing

a. Existing Conditions

As reported by the Realtors Association of Maui, Inc. in June 2015, the median sales prices for a single-family home on Maui was $607,098.00. While for the Makawao/Olinda/Haliimaile area, a single-family home was $410,000.00.

As discussed previously in Chapter I, continued population growth and housing demand, combined with constrained housing supply, has created an unbalanced housing market and led to decreased affordability for Maui residents. The State of Hawai'i, Department of Business, Economic Development, and Tourism (DBEDT) estimates that there will be a demand for between 1,400 to 1,500 housing units per year (State of Hawai'i, Department of Business, Economic Development, and Tourism, 2015).

While the DBEDT's estimates do not provide a breakdown of housing demand by affordability level, the Hawai'i Housing Planning Study, 2011 does provide estimates for the number of new housing units needed by affordability level for 2012 to 2016. The number of new housing units needed is presented based on household income groups defined as a percentage of Area Median Income (AMI). The current AMI for a four-person household in Maui County is $75,100.00. An estimated 1,360 for-sale units and 2,094 rental units are needed between 2012 and 2016. This includes a demand for 1,161 for-sale units for households earning less than 180 percent of AMI. Refer to **Table 1** in Chapter I.

b. Potential Impacts and Proposed Mitigation Measures

The Hoku Nui Maui Community will provide 43 additional housing units to the overall island inventory. Market and affordable units will be provided concurrently in accordance with the Section 201H affordable housing agreement which will be entered into with the County of Maui. The project is being developed in the context of sustaining Maui's agricultural industry and, therefore, seeks to meet objectives of providing housing for local residents while strengthening the island's agricultural economic base. With this in mind, the proposed action is viewed as a positive aspect in addressing the island's overall housing objectives.

C. PUBLIC SERVICES

1. Police

a. Existing Conditions

The County of Maui's Police Department is headquartered in Wailuku, near the intersection of Mahalani Street and Kaahumanu Avenue. The Maui Police Department consists of several patrols, investigative and administrative divisions. The Wailuku or Central station serves the Haiku, Pā'ia, Makawao, Pukalani and Kula regions. There is a Makawao Police Satellite Station in the Eddie Tam Memorial Center and a police substation located in Pukalani, west of the project site in the Kulamalu Town Center.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not expected to extend the existing service area limits for police service or significantly intensify the need for services in the area. Therefore, the proposed project is not anticipated to have an adverse impact on police service in the area.

2. Fire

a. Existing Conditions

Fire prevention, suppression, and protection services are provided by the County Department of Fire and Public Safety. The Makawao Station, which serves the region, is located at 134 Makawao Avenue, about 2.2 miles from the project site. Next nearest community fire stations in Kula and

Pā'ia, are available to provide firefighting support to the Makawao region as well.

b. Potential Impacts and Mitigation Measures

Adequate fire suppression systems will be provided to the project site from an 8-inch internal fire suppression line. Buildings will be designed with appropriate fire mitigation measures and will be code compliant as related to fire resistance requirements. The proposed project is not expected to extend the existing service area limits for the Makawao Station and is not anticipated to have any significant adverse impact on fire service in the area.

3. Medical Services

a. Existing Conditions

Maui Memorial Medical Center, the only major medical facility on the island, is located approximately fourteen (14) miles to the northwest of the project site. Licensed for 231 beds, this facility provides acute, emergency, general, and obstetric care services. Several medical and dental care facilities are located in Makawao and Pukalani to service Upcountry residents.

Further Upcountry is the Kula Hospital and Clinic situated about twelve (12) miles south of the project site. The hospital has 100 certified beds and serves as a critical access hospital that provides long-term care for residents and a 24-hour emergency room.

b. Potential Impacts and Proposed Mitigation Measures

The proposed action is not anticipated to affect the service capabilities of medical service operations and is not expected to extend the existing service area limits for emergency services.

4. Solid Waste

a. Existing Conditions

Solid waste generated in the Upcountry region is transported to the Central Maui Landfill off of Pulehu Road, approximately twelve (12) miles west of the project site. Other than the Hana Landfill, the Central Maui Landfill is the only disposal site on the island of Maui which accepts County-hauled

residential waste, commercially-hauled commercial waste, and self-hauled waste. A County supported green waste recycling facility is also located at the Central Maui Landfill.

Privately owned facilities, such as the Maui Demolition and Construction Landfill and the Pohakulepo Concrete Recycling Facility, accept solid waste and concrete from demolition and construction activities. These facilities are located at Maalaea, near Honoapiilani Highway's junction with North Kihei Road and Kuihelani Highway. A green waste recycling facility is present at the Central Maui Landfill.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is not anticipated to affect the service capabilities of the County's residential solid waste collection system. Solid waste from the individual residences will be collected by the County of Maui, while solid waste from the farm market, commercial kitchen, and hula halau will be handled by a private contractor.

According to the County of Maui Integrated Solid Waste Management (ISWM) Plan, the existing Central Maui Landfill has adequate capacity to accommodate residential and commercial waste needs through the year 2026 (ISWM Plan, 2009). The proposed action is not anticipated to adversely impact the County's solid waste collection and disposal system.

5. Education

a. Existing Conditions

The State of Hawai'i, Department of Education (DOE) operates five (5) public schools in the Upcountry region. For high school students grade 9 to 12, there is King Kekaulike High School. For middle school aged children grades 6 to 8, there is Kalama Intermediate School. Three (3) elementary schools serve the grade school aged children grades K to 5, namely, Makawao Elementary, Pukalani Elementary, and Kula Elementary.

Table 2 shows the last two (2) school year enrollments and the design enrollment capacities of the five (5) public schools in the Upcountry region. Thus far, all of the schools' enrollments are below their design capacities.

University of Hawai'i Maui College (UH-Maui) located in Kahului is a part of the University of Hawai'i system and is the primary higher education institution serving Maui.

Table 2. Enrollments at Department of Education Schools

School	Official Enrollment Count			
Baldwin-Kekaulike-Maui Complex	**2014-15**	**2015-16**	***Design Enrollment Capacity**	**Current Percent Capacity**
Kalama Intermediate	719	747	1,225	61%
King Kekaulike High	934	900	1,575	57%
Kula Elementary	353	390	460	85%
Makawao Elementary	465	476	598	80%
Pukalani Elementary	415	378	552	68%

Source: Department of Education, 2015.
*DOE Analysis of the Central Maui School Impact Fee District, 2010.

There are also three (3) private schools in the region. The largest one is Kamehameha Schools located in Kulamalu west of the project site, which is primarily for elementary, middle, and high school students of native Hawaiian ancestry. The others are Haleakalā Waldorf School (Grades K to 8) and Seabury Hall (Grades 6 to 12).

b. Potential Impacts and Proposed Mitigation Measures

The number of students projected from the proposed residential housing component of the project is not expected to significantly impact the Upcountry public school system. See **Table 3**. Nonetheless, the project applicant will coordinate with the State Department of Education to address applicable school facilities impact fee requirements.

Table 3. Projected Students

School Grade	Student Single Family Ratio	Students – 42 Single-Family Units	Percent of Enrollment Capacity
Elementary	0.23	10	1.7% (Makawao)
Middle	0.11	5	0.4% (Kalama)
High	0.15	7	0.4% (King Kekaulike)
	Total	**22**	
Source: DOE Analysis of the Central Maui School Impact Fee District, 2010.			

6. Recreational Facilities

a. Existing Conditions

The nearest park facilities are located at the Eddie Tam Memorial Center located at 931 Makawao Avenue. This facility consists of a basketball court gymnasium, community center space with kitchen, center stage, and two (2) barbecue pits. Ground facilities consist of two (2) pavilions with picnic tables and barbecue pit for sports fields that can accommodate soccer, softball, Little League, Bronco League, and Junior/Senior Little League, utility fields, bleachers, dugouts, and restrooms.

In addition, the nearby Pukalani area includes the Mayor Hannibal Tavares Community Center and Upcountry Pool at the southwest corner of the Old Haleakalā Road and Pukalani Street. The facilities include a community center and meeting rooms, aquatic center and swimming pool, active sports fields for softball and soccer, tennis and basketball courts, playgrounds, restrooms and parking.

Among the many other recreational facilities in the region are the Polipoli State Park and Haleakalā National Park, offering camping, hunting, hiking, mountain biking, and sight-seeing opportunities.

b. Potential Impacts and Proposed Mitigation Measures

The proposed project is a low density agricultural sustainable community to accommodate market and affordable housing needs, together with other agriculturally compatible land uses. The proposed project is not anticipated to affect recreational facilities or demands for such facilities in the

Makawao region. An exemption will be sought pursuant to Section 201H, HRS for a waiver from Maui County Code 18.16.320.B Park Dedication Requirement.

D. INFRASTRUCTURE

1. Roadways

a. Existing Conditions

The project abuts the southwest edge of Pi'iholo Road, between Makawao Avenue and Waiahiwi Road. Pi'iholo Road is an approximately five mile long, north-south, two –lane, two-way roadway that extends from Makawao Avenue to Olinda Road. Pi'iholo Road is posted with a speed limit of 20 miles per hour (mph) and runs through forest lands with a winding road alignment.

Makawao Avenue is an east-west, two-lane, two-way roadway that extends from Haleakalā Highway in Pukalani through Makawao town and terminates at the intersection of Kokomo Road and Ka'ili'ili Road, where it continues as Kaupakalua Road through Hai'kū. Makawao Avenue provides local access to retail shops, residential neighborhoods, and public facilities and has a posted speed limit of 20 mph within the study area.

Olinda Road is a north-south, two-lane, two-way roadway that extends from Makawao Avenue opposite Baldwin Avenue for approximately five miles before coming to a dead end near the Waihou Spring Forest Reserve. Olinda Road provides local access to residential neighborhoods, agricultural land, and Seabury Hall private school. The posted speed limit is 20 mph within the study area.

Waiahiwi Road is an approximately 0.6 mile long two-way, two-lane roadway that extends eastward from Pi'iholo Road then becomes a private road for Pi'iholo Ranch.

Other roadways within the study area are Baldwin Avenue and Brewer Road. Baldwin Avenue is a north-south, two-lane, two-way roadway that extends from Makawao Avenue and terminating at Hāna Highway in Pā'ia town. Baldwin Avenue provides local access to retail shops, schools, and residential neighborhoods and has a posted speed limit of 20 mph within the study area.

Brewer Road is a short 800 foot long, two-way, two-lane roadway that connects Baldwin Avenue and Makawao Avenue to provide access to residential lots and a private parking area.

A Traffic Impact Analysis Report (TIAR) was prepared in May 2015 utilizing traffic volume data collected on Tuesday, December 16 and Wednesday, December 17, 2014. See **Appendix "F"**. Intersection analyses were performed on the following five unsignalized intersections that are within the project study area:

1. Olinda Road/Baldwin Avenue/Makawao Avenue
2. Baldwin Avenue/Brewer Road
3. Makawao Avenue/Brewer Road
4. Pi'iholo Road/Makawao Avenue
5. Pi'iholo Road/Waiahiwi Road

Olinda Road/Baldwin Avenue/Makawao Avenue is an all-way stop-controlled intersection with shared lanes on all approaches. The existing overall operations of this unsignalized intersection is Level of Service (LOS) F in the AM and LOS E in the PM. Limited intersection right-of-way (ROW) with structures built up to intersection corners and sight distance constraints makes the installation of traffic signals, roundabouts and/or auxiliary lane improvements not viable.

Baldwin Avenue/Brewer Road is an unsignalized T-intersection with stop control on the Brewer Road approach, shared lanes on all approaches, and has northbound right turns restricted due to a sharp skew in intersection geometry. All movements operate at LOS B or better during the AM and PM peak hours.

Makawao Avenue/Brewer Road is an unsignalized T-intersection with stop on the Brewer Road approach, shared lanes on eastbound and westbound approaches, and exclusive channelized turn lanes on the minor southbound approach. All movements operate at LOS C or better in the AM and PM peak hours.

Pi'iholo Road/Makawao Avenue is an unsignalized T-intersection with stop control on the Pi'iholo Road approach and shared lanes on all approaches. All movements currently operate at LOS B or better during the AM and PM peak hours.

Pi'iholo Road/Waiahiwi Road is an unsignalized T-intersection with stop control on the Waiahiwi Road approach and shared lanes on all approaches. All movements currently operate at LOS A during the AM and PM peak hours.

b. Potential Impacts and Proposed Mitigation Measures

The project encompasses 43 residential dwellings, a Farm Market, space for Hula Halau, two barns, farming space and Native Habitat with five (5) proposed driveways off Pi'iholo Road. Full project build out is expected in 2017.

The TIAR determined traffic projections for the expected project build out year of 2017 based on the Maui Regional Traffic Demand Model (MRTDM). Growth rates along Makawao Avenue to the east and west of Baldwin Avenue were determined to be 1.4 and 1.6 percent per year. Baldwin Avenue's growth rate was determined to be 0.8 percent per year. The MRTDM did not have traffic projections for Brewer Road, Pi'iholo Road, and Waiahiwi Road and therefore the average of growth rates along Makawao Avenue east of Baldwin Avenue and Baldwin Avenue were applied to these roadways.

Base Year 2017 traffic conditions without the project are forecasted to operate with LOS similar to existing conditions with all movements operation at LOS D or better during the AM and PM peak hour except at the Olinda Road/Baldwin Avenue/Makawao Avenue all-way stop controlled intersection. Traffic is anticipated to increase by approximately 6% at this intersection. The eastbound approach is forecast to continue operating at LOS F and over-capacity conditions during the AM and PM peak hours. The westbound approach will continue operating at LOS F and overcapacity conditions during the AM peak hour and worsen from LOS D to LOS E in the PM peak hour. The northbound and southbound approaches during the AM peak hour will worsen from LOS D to LOS E and continue at not worse than LOS C for the PM peak hour.

Anticipated traffic for future year 2017 with the project were determined for 42 residential dwelling units, a Farm Market, Hula Halau, two barns, farming space and Native Habitat. Only the 43 residential dwelling units and Farm Market are expected to generate trips during the AM and PM peak hours. Project trips generated are approximately 71 AM peak hour trips and

118 PM peak hour trips which translates to approximately a 3.7 percent traffic increase from the Base Year 2017 conditions.

Analyses for Future Year 2017 with project traffic indicates that all study area intersections will continue to operate with LOS similar to Base Year 2017 conditions. All movement are expected to operate at LOS D or better during the AM and PM peak hours with the exception of the Olinda Road/Baldwin Avenue/Makawao Avenue intersection.

The Olinda Road/Baldwin Avenue/Makawao Avenue intersection movements are forecast to continue operation with similar LOS and capacity conditions during the AM and PM peak hours with the westbound approach dropping from LOS E to F during the PM peak hour. As mentioned before, limited intersection right-of-way (ROW) with structures built up to intersection corners and sight distance constraints makes the installation of traffic signals, roundabouts and/or auxiliary lane improvements difficult.

Five (5) proposed driveway connections along Pi'iholo are spaced at generally 1,000 feet apart. The first driveway servicing the Farm Market and Hula Halau is anticipated to generate the highest turning movements estimated at under 35 vehicles during any peak hour. The remaining four (4) driveways will service the clusters of housing spread across the project parcel. Impacts by all five project driveways are anticipated to be minimal when combined with under 150 vehicles in either direction along Pi'iholo Road.

The TIAR concludes that all the intersections and proposed driveways will operate at LOS C or better for all movements in AM and PM peak hours, except at the Olinda Road/Baldwin Avenue/Makawao Avenue intersection. Traffic at the Olinda Road/Baldwin Avenue/Makawao Avenue is expected to increase by approximately 3.7 percent from the Base Year 2017 conditions during the AM and PM peak hour with LOS F and overcapacity conditions for eastbound and westbound movements. However, due to limited intersection right-of-way (ROW) with structures built up to intersection corners and sight distance constraints, the installation of traffic signals, roundabouts and/or auxiliary lane improvements are not recommended.

2. Water

a. Existing Conditions

A Preliminary Engineering Report (PER) was prepared by Otomo Engineering, Inc. Refer to **Appendix "A".** Water service to the project site, which lies within the Makawao-Pukalani-Kula Community Plan District, is provided by the County Department of Water Supply (DWS) systems. Water storage tanks serving the area are the Pookela tank (elevation 1,830 feet), Maluhia tank (elevation 2,050 feet), and the Lower Kula tank (elevation 2,778 feet).

There are no County waterlines along Pi'iholo Road that fronts the project site but there is one that terminates approximately 2,000 feet east of the project site on Pi'iholo Road. Makawao Avenue to the northwest of the project site contains 4, 8, and 12-inch waterlines.

The Pi'iholo South Well (State Well No. 5116-04) completed in 2009 is located on the project site. It has an approved pump capacity of 1,200 gallons per minute (gpm) with a head of 1,800 feet.

Maui County Codes Chapter 14.12 – *Water Availability* and Chapter 14.13 – *Water Meter Issuance Provisions for the Upcountry Water System* applies. Subdivision approval will be subject to verification of a long-term reliable source of water and the DWS will not accept new meter applications to be placed on the priority list.

b. Potential Impacts and Proposed Mitigation Measures

A private onsite water system is proposed for domestic purposes and fire protection. There is an onsite well with a Certificate of Well Construction Completion issued on April 2, 2009, with an approved pump capacity of 1,200 gpm.

The primary source of water for all agricultural irrigation will be from stormwater collected and stored within the seven (7) onsite detention basins. The onsite private water system will be for available for backup irrigation.

The original Pi'iholo South development plan proposed by the previous property owners demanded a 1,200 gpm pump system. The current property

owners anticipate a reduced water demand and has replaced the 1,200 gpm pump with a smaller 205 gpm pump.

Projected average daily water demand for the project is 33,240 gallons per day (gpd). In accordance with the DWS, maximum daily water demand is calculated as 1.5 times the average daily demand, or 49,860 gpd. Evaluation of the system will be made during the building permit process to possibly reduce the fire flow requirements, by installing a fire sprinkler system.

Water conservation measures, such as low-flow toilets and shower heads, will be considered to decrease water demand. Greywater reuse is proposed for outdoor water such as for agriculture and landscaping.

The calculated storage volume requirements for the project is 292,800 gallons for which a 300,000 gallon reservoir is recommended to accommodate domestic water and fire flow requirements for the project. All water system improvements and fire flow systems will be designed in accordance with applicable regulatory design standards.

3. Wastewater

a. Existing Conditions

The existing property is undeveloped and presently used for pasture land grazine. There are no existing sanitary sewer systems on the property.

b. Potential Impacts and Proposed Mitigation Measures

The primary goal of the proposed sustainable community is to manage its energy, water and nutrients onsite to minimize its ecological, energy, and water footprints. Proposed are several onsite wastewater treatment systems designed to meet secondary treatment standards for the residential units, commercial facilities, and agricultural activities. Refer to **Appendix "B"**. Sustainable practices will include organic food and energy production, composting, and best management practices to collect, treat, and reuse nonpotable water and nutrient supplies.

For commercial and residential zones, the proposed onsite wastewater treatment system will include primary and secondary treatment stages with effluent designed to meet Department of Health recycled water quality R-3. Primary treatment tanks will be located at each of the buildings within the

various zones. Gravity flow or a Septic Tank Effluent Pump system is proposed to take wastewater from the primary treatment tank through a septic tank effluent filter to the secondary treatment systems. Secondary treatment is proposed with engineered wetlands that mimic the natural composting abilities of marshes to transform pollution into food for wetland organisms. Refer to **Appendix "A"**.

Onsite natural wastewater treatment systems will be installed in accordance with Hawai'i Administrative Rules, Chapter 11-62 2002.

4. Drainage

a. Existing Conditions

The project site ranges from approximately 2,115 feet above mean sea level (MSL) at its southeasterly corner to approximately 1,639 feet above MSL at its northwesterly corner with an average slope of approximately 6.6 percent. Refer to **Appendix "A"**. Onsite runoff generally sheet flows in a southeast to northwest direction across the project site with the majority of the runoff flowing into Māliko Gulch. The remainder of the runoff sheet flows to Pi'iholo Road or properties below.

Based on the Natural Resources Conservation Service (NRCS) Method applicable to project areas greater than 100 acres, the pre-development 100-year, 24-hour storm runoff from the 258-acre project site is 1,839 cubic feet per second (cfs). Of this runoff, 1,055 cfs from approximately 148 acres of the project area sheet flows across the project site into Māliko Gulch. The 784 cfs from the remaining 110 acres sheet flows onto Pi'iholo Road or onto adjacent downstream properties.

b. Potential Impacts and Proposed Mitigation Measures

The project will require both excavation and embankment to construct roadways, building pads, infrastructure, and drainage improvements. However, the drainage design criteria are to minimize any alteration to the existing drainage patterns and volumes. For the design of onsite drainage systems and detention basins with drainage areas less than 100 acres, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, applies the Rational Method using a 50-year, 1-hour storm frequency.

The proposed drainage plan includes grassed swales along roadways with runoff directed into seven (7) onsite detention basins. Natural grass swales will be used together with grated inlets and drainlines as necessary. Storage volume of the seven (7) detention basins will be approximately 2,039,426 cubic feet. Only 264,343 cubic feet of storage volume will be needed for runoff from proposed developed areas. Therefore, the available storage volume will far exceed the flow from the development for a 50-year, 1-hour storm, leaving excess storage volume capacity for irrigation. Post-development conditions will result in a net decrease in the volume of runoff sheet from the project site into Māliko Gulch and onto adjacent Makai properties and Pi'iholo Road.

During construction grading operations, BMPs will be implemented for appropriate erosion and sediment control. A maintenance plan will be developed for permanent stormwater Best Management Practices (BMPs) to insure that site features will continue to function properly.

5. Electrical, Telephone Services, and Cable Television

a. Existing Conditions

Electrical, telephone, and cable television (CATV) overhead lines are available along Pi'iholo Road and Makawao Avenue. These private utility services are provided by Maui Electric Company, Ltd., Hawaiian Telcom, and Oceanic Time Warner Cable. Refer to **Appendix "A"**.

b. Potential Impacts and Proposed Mitigation Measures

The project will connect to existing overhead electrical, telephone, and CATV services and coordination with the respective companies will be undertaken with regard to their specific requirements. However, as a proposed sustainable agricultural community, Hoku Nui Maui Community is committed to being a fossil fuel free community by implementing an energy system that is 100 percent renewable. Refer to **Appendix "B"**. Therefore, as the project progresses through the development process, energy saving measures and strategies to use a mix of renewable energy alternatives will be employed. To minimize energy use, examples of strategies implemented will include designing energy efficient "green" buildings, capturing and retaining surface stormwater for agricultural

irrigation to reduce water well electrical pump usage, and installing energy efficient street and common area lighting.

The project is anticipated to reduce electrical demands on Maui Electric Company and the island's dependency on fossil fuels, with the use of renewable energy alternatives. With regard to telephone and CATV, no significant impact to these services are expected as nearby overhead services are available along the abutting Pi'iholo Road and nearby Makawao Avenue.

E. CUMULATIVE AND SECONDARY IMPACTS

1. Cumulative Impacts

Pursuant to the Hawai'i Administrative Rules, Chapter 200, Section 11-200-2, entitled Environmental Impact Statement Rules, a cumulative impact means:

> *The impact on the environment which results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

The project's agricultural parcels, which were previously used for pineapple cultivation, are now used for cattle and sheep grazing, and raising chickens for meat and egg production. Regenerative farming practices are being used to build soil health for future crop production.

With respect to foreseeable future actions, the County of Maui adopted the Maui Island Plan (MIP) which includes future urban growth boundaries (UGB), rural growth boundaries (RGB), and small town growth boundaries (STB) which direct growth in the Upcountry area. The project site is proposed as a comprehensively planned sustainable agricultural community within parcels that are designated agriculture in the Community Plan and by Maui County zoning. Although the project falls within an area not identified for future growth, its use as a sustainable agricultural community is deemed consistent with the character of the surrounding agriculturally zoned properties. Other elements of the project, such as the cluster housing element, is of a low density nature. The farm market, commercial kitchen, native habitat restoration, and hula halau, will facilitate onsite farming and livestock operation, promote sustainable practices, and integrate a cultural element into the

overall project. All the elements proposed for the project are compatible with small town communities which the site abuts. Improvements and mitigation measures proposed to address various potential impacts from the project is not anticipated to have cumulative impacts on the environment or infrastructure.

2. Indirect or Secondary Impacts

Indirect effects are also referred to as secondary impacts. According to the Hawai'i Administrative Rules, Chapter 200, Section 11-200-2, entitled Environmental Impact Statement Rules, a secondary impact or indirect effect means:

> *Effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.*

There may be a minor positive impact to the island's overall housing shortage with the introduction of the project's affordable housing component. The project's commitment to develop a 100 percent renewable energy community will slightly reduce the island's dependency on fossil fuels. Aside from the direct development impacts discussed in the previous sections of this chapter, the project is not anticipated to have significant adverse impact on the physical environment. Consequently, the proposed action is not anticipated to result in significant adverse secondary impacts.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

This section discusses the relationship of the proposed Hoku Nui Maui Community project to applicable State and County land use plans, policies, and controls.

A. STATE LAND USE DISTRICTS

Pursuant to Chapter 205, Hawai'i Revised Statues (HRS), all lands in the State have been placed into one (1) of four (4) major land use districts by the State Land Use Commission. These land use districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is former pineapple land classified "Agricultural". Refer to **Figure 9**.

The proposed Hoku Nui Maui Community advances agriculture through an integrated housing and farming concept which includes market and affordable housing together with opportunities for agricultural production and marketing. The implementation of the project involves variances from zoning lot size standards to enable the use of a more efficient cluster housing format. An exception to the lot size standard as well as other Maui County code provision will be sought through the Section 201H process, as described in Section "G" of this chapter.

B. HAWAI'I STATE PLAN

Chapter 226, HRS, also known as the Hawai'i State Plan, is a long-range comprehensive plan which serves as a guide for the future long-term development of the State by identifying goals, objectives, policies, and priorities, as well as implementation mechanisms. Examples of State objectives and policies relevant to the proposed project are as follows:

1. Objectives and Policies

The proposed action is consistent with the following objectives and policies of the Hawai'i State Plan:

a. Section 226-05. Objective and policies for population.

(1) It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement

of physical, economic, and social objectives contained in this chapter.

(2) To achieve the population objective, it shall be the policy of this State to:

- *Manage population growth statewide in a manner that provides increased opportunities for Hawai'i's people to pursue their physical, social, and economic aspirations while recognizing the unique needs of each county.*

- *Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.*

Response: The project's proposed cluster housing format adjacent to a large farm lot presents a scenario that can support a diversity of viable agricultural activities while accommodating common support facilities, and further complimented by large open spaces. This concept offers a lifestyle conducive to allowing people to pursue their physical, social, and economic aspirations as applicable to this agricultural community. Also, agricultural economic activities and employment within the farm lot are consistent with the rural character of the surrounding community.

b. Section 226-7 Objectives and policies for the economy-- agriculture.

(1) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:

- *Growth and development of diversified agriculture throughout the State.*

- *An agriculture industry that continues to constitute a dynamic and essential component of Hawai'i's strategic, economic, and social well-being.*

(2) To achieve the agriculture objectives, it shall be the policy of this State to:

- *Encourage agriculture by making best use of natural resources.*

- *Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.*

- *Expand Hawai'i's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.*

- *Facilitate the transition of agricultural lands in economically nonfeasible agricultural production to economically viable agricultural uses.*

Response: The proposed comprehensively planned sustainable agricultural community concentrates all the agricultural activities on one large farm lot to provide economically viable opportunities for a diverse range of agriculture. Sustainability practices will conserve water resources by capturing and retaining stormwater runoff for reuse in irrigation applications. Agricultural amenities, such as the Farm Market and Commercial Kitchen, will facilitate sales of products onsite. The land use concepts will offer maximum agricultural potential on prime portions of the project while retaining non-feasible areas such as laneways for fruit and nut trees and gulch zones for native plant restoration. All of these strategies make best use of natural resource, assures availability of agriculturally suitable lands, and facilitates the transition of these agricultural lands to economically viable agricultural uses.

c. **Section 226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.**

(1) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawai'i's scenic assets, natural beauty, and multi-cultural/historical resources.

(2) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

- *Promote the preservation and restoration of significant natural and historic resources.*

- *(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of*

mountains, ocean, scenic landscapes, and other natural features.

- *(5) Encourage the design of developments and activities that complement the natural beauty of the islands.*

Response: The proposed agricultural community's drainage design criteria is intended to minimize any alteration to the existing drainage patterns. This site design approach will preserve views and vistas toward the mountain, ocean, and other natural landscape features. The natural rolling beauty of the project lands typical of this rural area will be retained. There are two (2) significant archaeological sites that have and will continue to be permanently preserved in place.

d. Section 226-13 Objectives and policies for the physical environment--land, air, and water quality.

(1) Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:

- *Promote effective measures to achieve desired quality in Hawai'i's surface, ground, and coastal waters.*

- *Encourage design and construction practices that enhance the physical qualities of Hawai'i's communities.*

Response: The proposed water quality design features will include grassed swales and underground drainage pipes to capture storm runoff in retention basins for irrigation and other non-potable uses to minimize potable water demand from the onsite water well. The system of capturing stormwater into retention basins will serve as a permanent BMP feature that will allow revitalization of the natural hydrology and offer natural water treatment through grassed swale surfaces.

e. Section 226-19. Objectives and policies for socio-cultural advancement--housing.

(1) Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:

- *Greater opportunities for Hawai'i's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawai'i's population.*

- *The orderly development of residential areas sensitive to community needs and other land uses.*

(2) To achieve the housing objectives, it shall be the policy of this State to:

- *Effectively accommodate the housing needs of Hawai'i's people.*

- *Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.*

- *Foster a variety of lifestyles traditional to Hawai'i through the design and maintenance of neighborhoods that reflect the culture and values of the community.*

Response: The project's proposed 20 cluster housing one-acre lots will each have a market priced unit and an affordable dwelling unit. The cluster housing format will help to address housing needs to support agriculture, as well as to meet the needs of Maui's working families. The comprehensively planned sustainable agricultural community has all elements that are compatible with the project area's rural surroundings.

f. Section 226-23 Objective and policies for socio-cultural advancement--leisure.

(1) Planning for the State's socio- cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

(2) To achieve the leisure objective, it shall be the policy of this State to:

- *Foster and preserve Hawai'i's multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities.*

- *Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.*

Response: The project has an innovative Sustainability Plan (refer to **Appendix "B"**) with one of its goals to meet community health needs by creating trails, parks, and greenways. These amenities will encourage an active lifestyle. The proposed Farm Market and Commercial Kitchen will further facilitate this goal by having onsite produce, as well as raw products grown and raised on the large farm lot accessible to the adjacent clustered housing lots. The project also proposes to include a hula halau site to sustain a key Hawaiian cultural practice. The on-property hula halau facility will increase opportunities for appreciation and participation in the cultural arts.

g. **Section 226-25 Objective and policies for socio-cultural advancement--culture.**

(1) Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawai'i's people.

(2) To achieve the culture objective, it shall be the policy of this State to:

- *Foster increased knowledge and understanding of Hawai'i's ethnic and cultural heritages and the history of Hawai'i.*

Response: The project's proposed hula halau facility will sustain a key Hawaiian cultural practice. Creating this venue will achieve the culture objective by fostering increased knowledge in Hawai'i's ethnic and cultural heritage.

2. Priority Guidelines

a. Section 226-103 Economic priority guidelines.

(1) Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawai'i's people and achieve a stable and diversified economy:

- *Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawai'i's small-scale producers, manufacturers, and distributors*

(2) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:

- *Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.*

- *Assist in providing adequate, reasonably priced water for agricultural activities.*

- *Assist in the formation and operation of production and marketing associations and cooperatives to reduce production and marketing costs.*

Response: The project's sustainable agricultural community model of a large farm lot adjacent to clustered housing lots with affordable units will meet the demand for housing while creating opportunities for agricultural-related employment within the planned community. The large farm lot containing shared amenities to support agricultural activities can encourage formation of cooperatives and other favorable marketing and/or distribution arrangements. Also, sustainable practices to reuse storm runoff water for irrigation applications will provide a reasonably priced source of water for agricultural activities.

b. **Section 226-106 Affordable housing. Priority guidelines for the provision of affordable housing:**

(1) Encourage the use of alternative construction and development methods as a means of reducing production costs.

Response: Recognizing that there is an affordable housing component to the project that requires meeting price range requirements established by the County's Department of Housing and Human Concerns, the project architect is continuing to explore the use of innovative low cost building materials and methods that can satisfy building code requirements.

c. **Section 226-108. Sustainability.**

(1) Priority guidelines and principles to promote sustainability include:

- *Encouraging balanced economic, social, community, and environmental priorities;*
- *Encouraging planning that respects and promotes living within the natural resources and limits of the State;*
- *Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;*

Response: The project's Sustainability Plan (refer to **Appendix "B"**) includes sustainable goals and strategies that place emphasis on environmental priorities. Regenerative agriculture is a primary component of the project which uses integrative farm practices to build soil health. There are goals outlined in the plan to achieve clean energy systems, energy efficient building designs, clean sustainable water, clean transportation, native habitat restoration and open space, and sustainability education. All of these factors promote living within the limits of available natural resources with consideration for future generations.

d. **Section 226-109. Climate change adaptation priority guidelines.**

(1) Priority guidelines to prepare the State to address the impacts of climate change, including impacts to the areas of agriculture; conservation lands; coastal and nearshore marine areas; natural and cultural resources; education; energy; higher education; health; historic preservation; water resources; the

built environment, such as housing, recreation, transportation; and the economy shall:

- *Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments;*

- *Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change.*

Response: The goals and objectives contained in the Sustainability Plan (refer to **Appendix "B"**) that involve preserving and maintaining a native habitat and open space zones will encourage preservation of natural landscape features, forests, and streambeds. The proposed site designs to minimize alteration to existing drainage patterns while incorporating retention ponds to store and retain storm runoff for irrigation water will minimize adverse impacts to shoreline resources. All of these measures will have the inherent capacity to avoid, minimize, or mitigate impacts of climate change.

C. GENERAL PLAN OF MAUI COUNTY

As indicated by the Maui County Charter, the purpose of the general plan shall be to:

> *... indicate desired population and physical development patterns for each island and region within the county; shall address the unique problems and needs of each island and region; shall explain opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies, and implementing actions to be pursued with respect to population density; land use maps, land use regulations, transportation systems, public and community facility locations, water and sewage systems, visitor destinations, urban design, and other matters related to development.*

Chapter 2.80B of the Maui County Code, relating to the General Plan and Community Plans, implements the foregoing Charter provision through enabling legislation which calls for a Countywide Policy Plan and a Maui Island Plan. The Countywide Policy Plan was adopted as Ordinance No. 3732 on March 24, 2010, while the Maui Island Plan, which

delineates areas for future urban and rural growth as part of a Directed Growth Strategy, was adopted as Ordinance No. 4004 on December 28, 2012.

The following sections identify pertinent objectives, policies, implementing actions and related provisions set forth in the Countywide Policy Plan and the Maui Island Plan. It is recognized that both documents are comprehensive in nature and address a number of functional planning areas which apply to all programs, plans, and projects. However, for purposes of addressing General Plan compliance requirements, policy considerations which are deemed most relevant in terms of compatibility and consistency are addressed in this report section.

1. Countywide Policy Plan

With regard to the Countywide Policy Plan, Section 2.80B.030 of the Maui County Code states the following.

Code states the following.

> *The countywide policy plan shall provide broad policies and objectives which portray the desired direction of the County's future. The countywide policy plan shall include:*
>
> *1. A vision for the County;*
>
> *2. A statement of core themes or principles for the County; and*
>
> *3. A list of countywide objectives and policies for population, land use, the environment, the economy, and housing.*

Core principles set forth in the Countywide Policy Plan are listed as follows:

> *1. Excellence in the stewardship of the natural environment and cultural resources;*
>
> *2. Compassion for and understanding of others;*
>
> *3. Respect for diversity;*
>
> *4. Engagement and empowerment of Maui County residents;*
>
> *5. Honor for all cultural traditions and histories;*
>
> *6. Consideration of the contributions of past generations as well as the needs of future generations;*
>
> *7. Commitment to self-sufficiency;*

8. *Wisdom and balance in decision making;*

9. *Thoughtful, island appropriate innovation; and*

10. *Nurturance of the health and well-being of our families and our communities.*

Congruent with these core principles, the Countywide Policy Plan identifies goals objectives, policies and implementing actions for pertinent functional planning categories, which are identified as follows:

1. *Natural environment*

2. *Local cultures and traditions*

3. *Education*

4. *Social and healthcare services*

5. *Housing opportunities for residents*

6. *Local economy*

7. *Parks and public facilities*

8. *Transportation options*

9. *Physical infrastructure*

10. *Sustainable land use and growth management*

11. *Good governance*

With respect to the Hoku Nui Maui Community project, the following goals, objectives, policies and implementing actions are illustrative of the project's compliance with the Countywide Policy Plan.

PROTECT THE NATURAL ENVIRONMENT

Goal:

Maui County's natural environment and distinctive open spaces will be preserved, managed, and cared for in perpetuity.

Objective:

Improve the opportunity to experience the natural beauty and native biodiversity of the islands for present and future generations.

Policy:

Perpetuate native Hawaiian biodiversity by preventing the introduction of invasive species, containing or eliminating existing noxious pests, and protecting critical habitat areas.

PRESERVE LOCAL CULTURES AND TRADITIONS

Goal:

Maui County will foster a spirit of pono and protect, perpetuate, and reinvigorate its residents' multi-cultural values and traditions to ensure that current and future generations will enjoy the benefits of their rich island heritage.

Objectives:

Perpetuate the Hawaiian culture as a vital force in the lives of residents.

Emphasize respect for our island lifestyle and our unique local cultures, family, and natural environment.

Policy:

Encourage the perpetuation of each culture's unique cuisine, attire, dance, music, and folklore, and other unique island traditions and recreational activities.

Objective:

Preserve for present and future generations the opportunity to know and experience the arts, culture, and history of Maui County.

Policies:

Foster teaching opportunities for cultural practitioners to share their knowledge and skills.

Support the perpetuation of Hawaiian arts and culture.

Objective:

Preserve and restore significant historic architecture, structures, cultural sites, cultural districts, and cultural landscapes.

Policy:

Protect and preserve lands that are culturally or historically significant.

EXPAND HOUSING OPPORTUNITIES FOR RESIDENTS

Goal:

Quality, island appropriate housing will be available to all residents

Objective:

Reduce the affordable housing deficit for residents

Policy:

Ensure that an adequate and permanent supply of affordable housing, both new and existing units, is made available for purchase or rental to our resident and/or workforce population, with special emphasis on providing housing for low- to moderate-income families, and ensure that all affordable housing remains affordable in perpetuity.

Objective:

Increase the mix of housing types in towns and neighborhoods to promote sustainable land use planning, expand consumer choice, and protect the County's rural and small-town character.

Policies:

Seek innovative ways to develop 'ohana cottages and accessory-dwelling units as affordable housing.

Design neighborhoods to foster interaction among neighbors.

Encourage a mix of social, economic, and age groups within neighborhoods.

Objective:

Increase and maintain the affordable housing inventory

Policies:

Prioritize available infrastructure capacity for affordable housing

Develop public-private and nonprofit partnerships that facilitate the construction of quality affordable housing.

Streamline the review process for high-quality, affordable housing developments that implement the goals, objectives and policies of the General Plan.

STRENGTHEN THE LOCAL ECONOMY

Goal:

Maui County's economy will be diverse, sustainable, and supportive of community values.

Objective:

Promote an economic climate that will encourage diversification of the County's economic base and a sustainable rate of economic growth.

Policies:

Support and promote locally produced products and locally owned operations and businesses that benefit local communities and meet local demand.

Support home-based businesses that are appropriate for and in character with the community.

Encourage businesses that promote the health and well-being of the residents, produce value-added products, and support community values.

Support efforts to improve conditions that foster economic vitality in our historic small towns.

Support and encourage traditional host-culture businesses and indigenous agricultural practices.

Objective:

Diversify and expand sustainable forms of agriculture and aquaculture.

Policies:

Prioritize the use of agricultural land to feed the local population, and promote the use of agricultural lands for sustainable and diversified agricultural activities.

Assist farmers to help make Maui County more self-sufficient in food production.

Support ordinances, programs, and policies that keep agricultural land and water available and affordable to farmers.

Support cooperatives and other types of nontraditional and communal farming efforts.

IMPROVE PHYSICAL INFRASTRUCTURE

Goal:

Maui County's physical infrastructure will be maintained in optimum condition and will provide for and effectively serve the needs of the County through clean and sustainable technologies.

Objective:

Improve water systems to assure access to sustainable, clean, reliable, and affordable sources of water.

Policies:

Develop and fund improved water-delivery systems.

Improve the management of water systems so that surface-water and groundwater resources are not degraded by overuse or pollution.

PROMOTE SUSTAINABLE LAND USE AND GROWTH MANAGEMENT

Goal:

Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.

Objective:

Improve land use management and implement a directed-growth strategy.

Policies:

Direct new development in and around communities with existing infrastructure and service capacity, and protect natural, scenic, shoreline, and cultural resources.

Enable existing and future communities to be self-sufficient through sustainable land use planning and management practices.

Objective:

Improve planning for and management of agricultural lands and rural areas.

Policies:

Protect prime, productive, and potentially productive agricultural lands to maintain the islands' agricultural and rural identities and economies.

Provide opportunities and incentives for self-sufficient and subsistence homesteads and farms.

Conduct agricultural-development planning to facilitate robust and sustainable agricultural activities.

Objective:

Design all developments to be in harmony with the environment and to protect each community's sense of place.

Policies:

Protect and enhance the unique architectural and landscape characteristics of each Community Plan Area, small town, and neighborhood.

Protect rural communities and traditional small towns by regulating the footprint, locations, site planning, and design of structures.

Objective:

Improve and increase efficiency in land use planning and management.

Policies:

Encourage public and private partnerships to preserve lands of importance, develop housing, and meet the needs of residents.
Promote creative subdivision designs that implement best practices in land development, sustainable management of natural and physical resources, increased pedestrian and bicycle functionality and safety, and the principles of livable communities.

In summary, the proposed Hoku Nui Maui Community project is consistent with the themes and principles of the Countywide Policy Plan.

2. **Maui Island Plan**

The Maui Island Plan (MIP) is applicable to the island of Maui only, providing more specific policy-based strategies for population, land use, transportation, public and community facilities, water and sewage systems, visitor destinations, urban design, and other matters related to future growth.

As provided by Chapter 2.80B, the MIP shall include the following components:

1. *An island-wide land use strategy, including a managed and directed growth plan*

2. *A water element assessing supply, demand and quality parameters*

3. *A nearshore ecosystem element assessing nearshore waters and requirements for preservation and restoration*

4. *An implementation program which addresses the County's 20-year capital improvement requirements, financial program for implementation, and action implementation schedule*

5. *Milestone indicators designed to measure implementation progress of the MIP*

It is noted that Ordinance No. 4004 does not address the component relating to the implementation program. Chapter 2.80B of the Maui County Code, relating to the General Plan, was amended via Ordinance No. 3979 on October 5, 2012, to provide that the implementation program component be adopted no later than one (1) year following the effective date of Ordinance No. 4004. The implementation program component of the MIP was adopted by Ordinance No. 4126 on May 29, 2014.

The MIP addresses a number of planning categories with detailed policy analysis and recommendations which are framed in terms of goals, objectives, policies and implementing actions. These planning categories address the following areas:

1. *Population*
2. *Heritage Resources*
3. *Natural Hazards*
4. *Economic Development*
5. *Housing*
6. *Infrastructure and Public Facilities*
7. *Land Use*

An essential element of the MIP is its directed growth plan which provides a management framework for future growth in a manner that is fiscally, environmentally, and culturally prudent. Among the directed growth management tools developed through the MIP process are maps delineating urban growth boundaries (UGB), small town boundaries (STB), and rural growth boundaries (RGB). The respective boundaries identify areas appropriate for future growth and their corresponding intent with respect to development character. Hoku Nui Maui LLC (Applicant) proposes the development of a comprehensively planned sustainable agricultural community within parcels that are designated agriculture in the Community Plan and by Maui County zoning. The project site is part of a larger area utilized for agricultural purposes. The northwest end of the proposed development parcel abuts the MIP Directed Growth Boundary of the Makawao 'Small town'growth boundary. See **Figure 12**.

The cluster housing element of the project maintains low density. Other elements of the project such as the farm market, agricultural commercial kitchen, native habitat restoration, and hula halau, will facilitate onsite farming and livestock operations, promote sustainable practices and integrate a cultural element into the site. All the elements proposed for the project are compatible with small town communities and Maui's agricultural lifestyle.

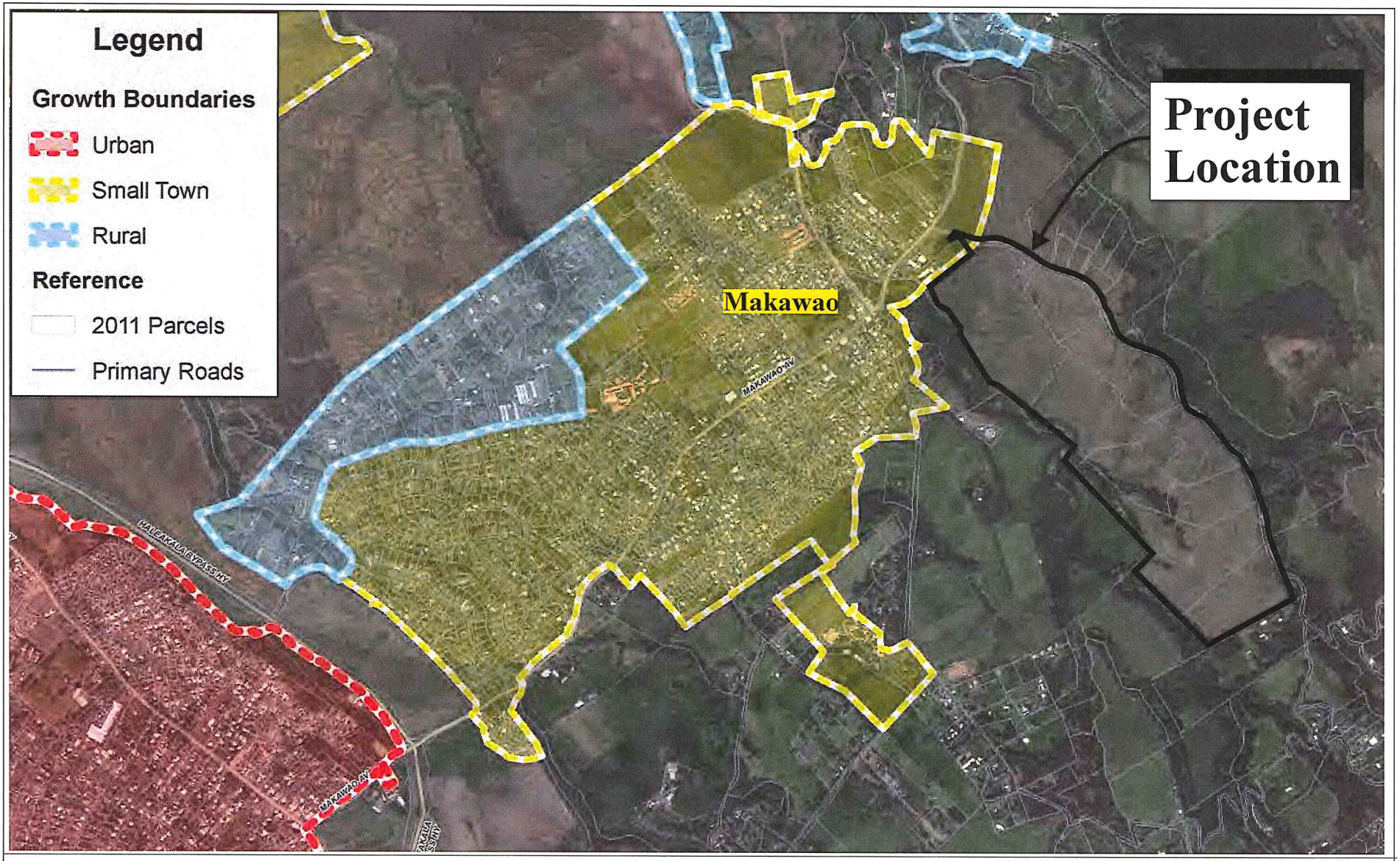


Figure 12

Proposed Hoku Nui Maui Community

Maui Island Plan - Directed Growth Map

NOT TO SCALE

Prepared for: Hoku Nui Maui LLC

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HokuNui/Piiholo Sustainable/MIP Directed Growth

The proposed Hoku Nui Maui Community project falls within an area not identified for future growth, as recognized by the UGB, SRB, and RGB. However, its use as a sustainable agricultural community is deemed consistent with the agricultural character of the surrounding environs.

The proposed Hoku Nui Maui Community has been reviewed with respect to pertinent goals, objectives, policies and implementing actions of the MIP. A summary of these policy statements are provided below:

POPULATION

According to population projections developed by the State of Hawai'i Department of Business, Economic Development & Tourism (DBEDT), Maui's population from 2010 to 2030 is projected to increase 34.7 percent. (Maui Island Plan). United States Census statistics show that from 1980 to 2000, the percentage of Mauians born in Hawai'i compared to elsewhere have dropped. Out-migration of residents may be attributable to Maui's high cost of housing and limited employment opportunities. Policies and actions of the MIP help to provide choices for island residents to remain on Maui. The MIP notes the importance of providing resident housing near employment.

Goal:

Maui's people, values, and lifestyles thrive through strong, healthy, and vibrant island communities.

Objective:

Greater retention and return of island residents by providing viable work, education, and lifestyle options.

Policy:

Expand programs that enable the community to meet the education, employment, housing, and social goals of youth and young adults.

HERITAGE RESOURCES

Maui's Native Hawaiian History and more recent multi-ethnic history make the island rich in archaeological resources and historic sites. Preservation of cultural landscapes, archaeological resources, and perpetuation of traditional practices plays an important role in Maui's economy in continuing to provide visitors with the island's unique sense of identity.

Protection of natural resources such as watersheds, forested land and streambeds are critical for the prevention of degrading water quality in streams and near shore waters.

Goal:

Our community respects and protects archaeological and cultural resources while perpetuating diverse cultural identities and traditions.

Objective:

An island culture and lifestyle that is healthy and vibrant as measured by the ability of residents to live on Maui, access and enjoy the natural environment, and practice Hawaiian customs and traditions in accordance with Article XII, Section 7, Hawai`i State Constitution, and Section 7-1, Hawai`i Revised Statutes (HRS).

Policy:

Perpetuate the spirit of aloha and celebrate the host Hawaiian culture and other ethnic cultures.

Objective:

Enhance the island's historic, archaeological, and cultural resources.

Policy:

Support the use of easements, dedications, and other mechanisms to acquire, maintain, and protect lands with cultural, archaeological, and historic significance.

Goal:

Healthy watersheds, streams, and riparian environments.

Objective:

Greater protection and enhancement of watersheds, streams, and riparian environments.

Policy:

Maui will protect all watersheds and streams in a manner that guarantees a healthy, sustainable riparian environment.

Objective:

Decreased NPS and point source pollution.

Policies:

Enforce water pollution related standards and codes.

Support the use of Low Impact Development (LID) Techniques such as those described in the State of Hawai`i LID Practitioner's Guide (June 2006), as amended.

Encourage farmers and ranchers to use agricultural BMPs.

Objective:

Greater preservation of native flora and fauna biodiversity to protect native species.

Policies:

Work with appropriate agencies to eliminate feral ungulate populations and invasive species.

Support the work of conservation groups and organizations that protect, reestablish, manage, and nurture sensitive ecological areas and threatened indigenous ecosystems.

Goal:

Maui's natural areas and indigenous flora and fauna will be protected.

Objective:

A comprehensive management strategy that includes further identification, protection, and restoration of indigenous wildlife habitats.

Policies:

Identify and inventory the following:

(1) Natural, recreational, and open space resources;

(2) Flora and fauna with medium, high, and very high concentrations of threatened or endangered species; and

(3) Location and extent of invasive species.

Require flora and fauna assessment and protection plans for development in areas with concentrations of indigenous flora and fauna; development shall comply with the assessment and protection plan and shall use the avoidance, minimization, and mitigation approach respectively, with an emphasis on avoidance.

ECONOMIC DEVELOPMENT

Although Maui's economy thrives on tourism, an economy needs to diversify to flourish with the times and market change. According to the MIP, Maui can secure economic wellbeing while protecting the islands natural environment and cultural heritage.

Substituting locally produced foods and products for imports will make Maui more self-sufficient. Supporting establishment of farmers markets or other community supported agricultural programs will provide alternative market channels to sell locally grown and manufactured agricultural products.

Small businesses are the backbone of Maui County. Supporting efforts to increase the local production and consumption of the same can significantly strengthen the economy to recycle money within the community.

Objective:

Increase activities that support principles of sustainability.

Policies:

Support industries that are sustainable, and culturally and environmentally sensitive.

Encourage and support local businesses.

Objective:

Improve the island's business climate.

Policies:

Ensure an adequate supply of affordable workforce housing.

Develop neighborhoods and communities that are attractive to the workforce of a diversified economy.

Goal:

Maui will have a diversified agricultural industry contributing to greater economic, food, and energy security and prosperity.

Objective:

Strive for at least 85 percent of locally-consumed fruits and vegetables and 30 percent of all other locally-consumed foods to be grown in-State.

Policies:

Strive to substitute food/agricultural product imports with a reliable supply of locally produced food and agricultural products.
Facilitate and support the direct marketing/sale of the island's agricultural products to local consumers, through farmers markets and similar venues.

Goal:

Small businesses will play a key role in Maui's economy.

Objective:

Increase the number of and revenue generated by small businesses and decrease the percentage of small business failures.

Policies:

Provide incentives and support for small businesses and entrepreneurs that incorporate sustainable technologies and practices into their operations, utilize local materials, or produce and sell locally-made goods or services.

Support community markets and venues that sell locally-made produce, goods, and services.

HOUSING

Maui's housing costs have escalated dramatically in the past ten years making it difficult for many Maui residents to afford housing. There is a need to work with government agencies, community groups, landowners and others to find ways to provide affordable housing for all residents.

Goal:

Maui will have safe, decent, appropriate, and affordable housing for all residents developed in a way that contributes to strong neighborhoods and a thriving island community.

Objective:

Provide affordable housing, rental or in fee, to the broad spectrum of our island community.

Policies:

Seek to have ownership of affordable for-sale and rental housing vested in a non-profit community land trust, or other qualified housing provider, committed to keeping such housing affordable in perpetuity.

LAND USE

The MIP states that the best strategy to protect agricultural lands is to preserve agricultural subdivisions and create an environment where agriculture can be profitable. Also, preserving agricultural lands is a key factor for long-term sustainability of Maui.

The Hoku Nui Maui Community project is a comprehensively planned sustainable agricultural community. Utilizing best practices for sustainability, the project incorporates housing and related components in harmony with the project site's surrounding environs. It focuses growth to an existing agricultural area to creatively utilize underdeveloped property while preserving existing archaeological sites and other sensitive lands. See **Figure 13**.

Goal:

Maui will have a rural landscape and lifestyle where natural systems, cultural resources and farm lands are protected and development enhances and compliments the viability and character of rural communities.

Objective:

Reduce the proliferation and impact of residential development outside of urban, small town, and rural growth boundaries.

Policies:

Encourage cluster development with a mandatory buffer requirement/clear edge at the interface of country towns, agricultural uses, and surrounding rural landscapes.

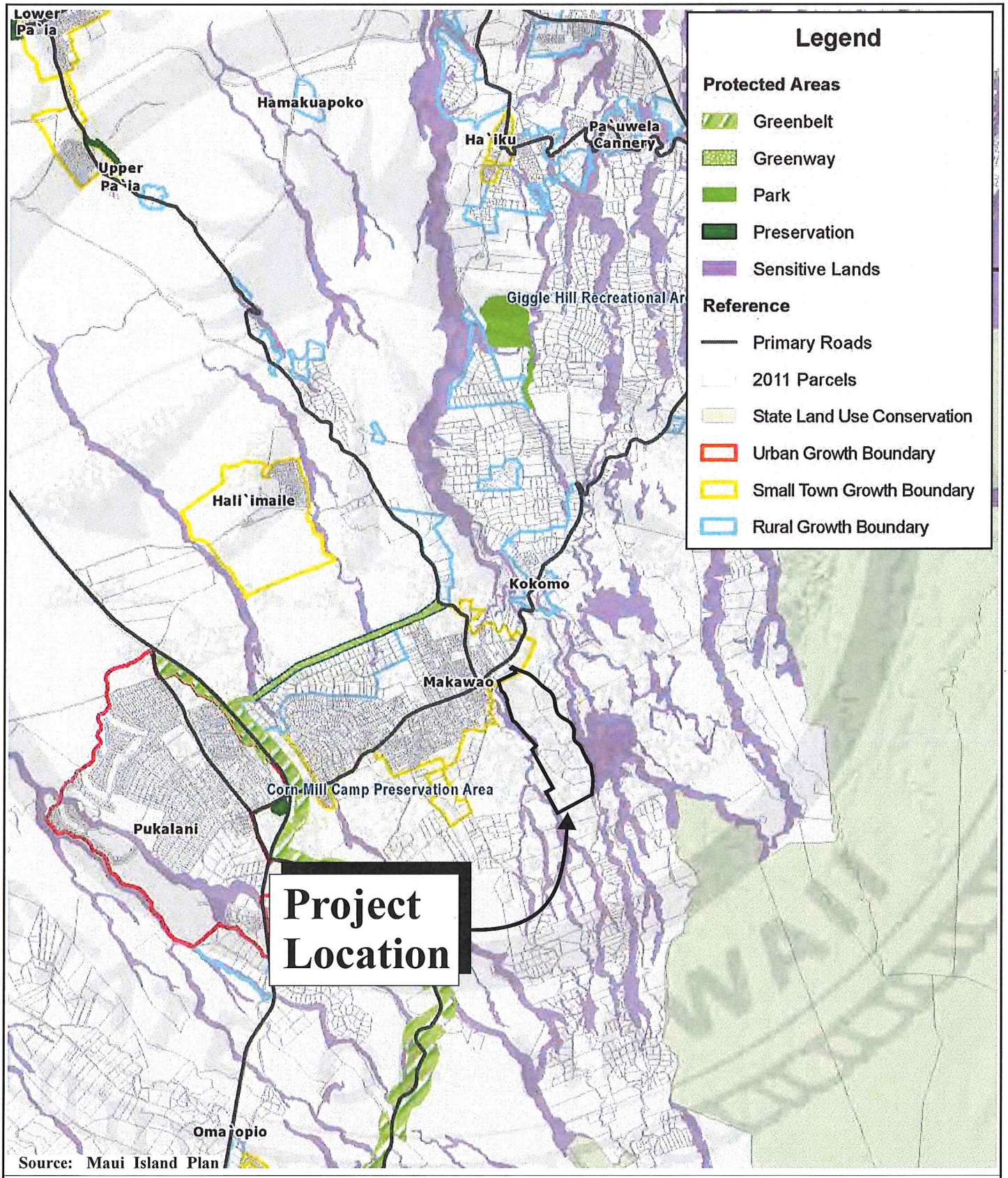


Figure 13 Proposed Hoku Nui Maui Community

Maui Island Plan - Protected Areas Diagram

NOT TO SCALE

MUNEKIYO HIRAGA

Prepared for: Hoku Nui Maui LLC

HokuNui\Piiholo Sustainable\MIP Protected Areas

Encourage or require, where appropriate, CSDs and the use of green spaces/natural separations to protect the character of rural landscapes.

Encourage the use of alternative stormwater management techniques that minimize land disturbance and preserve natural drainage features.

D. MAKAWAO-PUKALANI-KULA COMMUNITY PLAN

Within Maui County, there are nine (9) community plan regions. From a General Plan implementation standpoint, each region is governed by a Community Plan which sets forth desired land use patterns, as well as goals, objectives, policies, and implementing actions for a number of functional areas, including infrastructure-related parameters.

Land use guidelines are set forth by the Makawao-Pukalani-Kula Community Plan. As shown in **Figure 14**, the Hoku Nui Maui Community Project is consistent with the following goals, policies, and objectives of the Community Plan:

ECONOMIC ACTIVITY

Goal

A stable and diverse economic environment which supports a level of community prosperity in order to provide social services and environmental amenities and which respects the region's rural and agricultural lifestyle, open space and natural resources.

Objectives and Policies

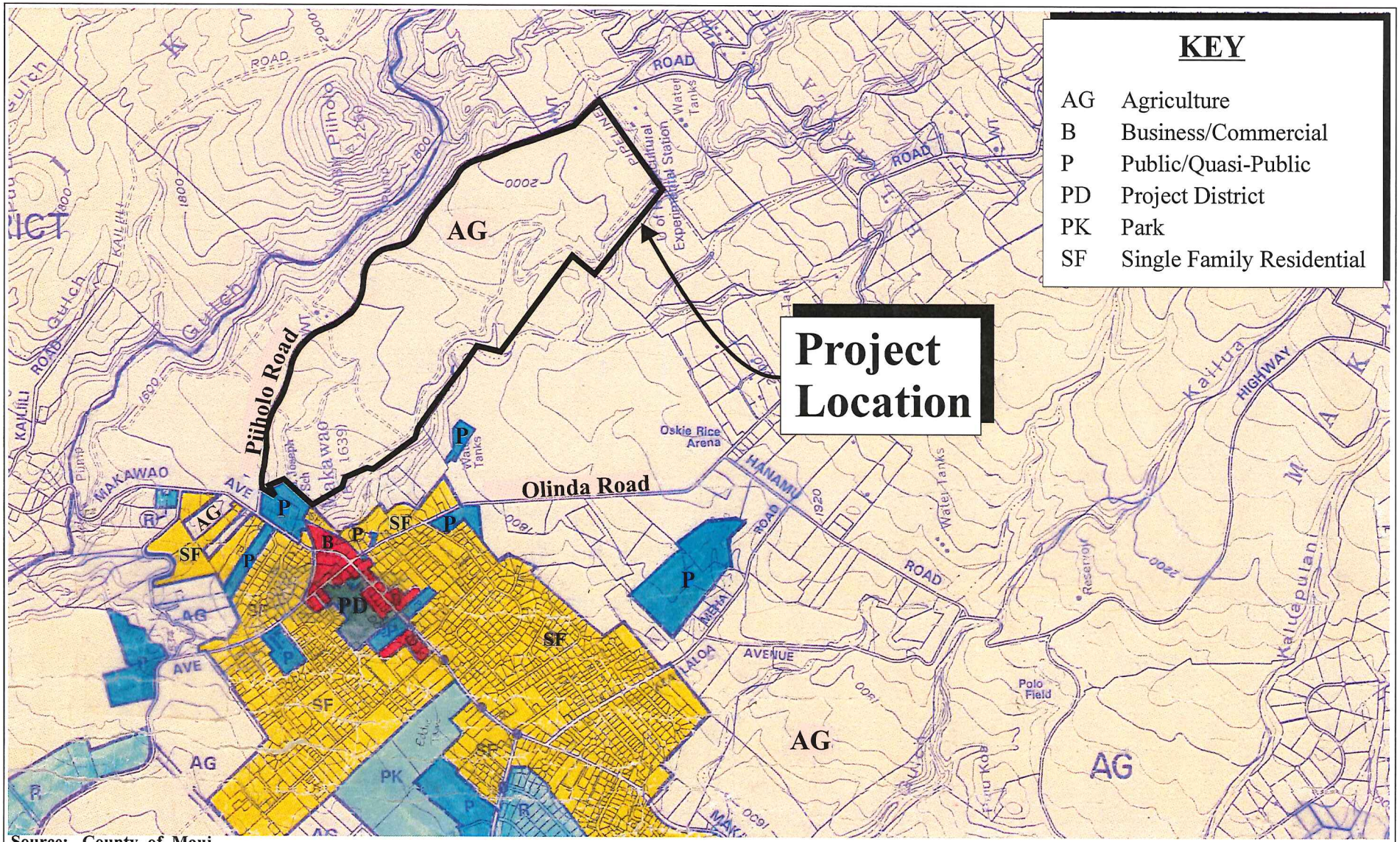
Provide for the preservation and enhancement of agricultural lands and operations, emphasizing the importance of promoting diversified agriculture to the region's economic base and lifestyle.

Support programs and plans to develop adequate water systems for agricultural use.

Recognize the rural, open space character of the Upcountry region as an economic asset of the island.

Preserve agriculture by actively promoting locally grown agricultural products.

Encourage the continuation of sugar, pineapple, cattle ranching, and diversified agriculture as major agricultural activities in the region and at the same time encourage the pursuit of alternative agricultural industries.



Source: County of Maui

Figure 14 Proposed Hoku Nui Maui Community

Makawao-Pukalani-Kula Community Plan Land Use Map

NOT TO SCALE

Prepared for: Hoku Nui Maui LLC

MUNEKIYO HIRAGA

HokuNui/Piiholo Sustainable/CPLUD

Implementing Actions

Analyze the zoning and subdivision ordinances and revise wherever needed to facilitate and support the maintenance and development of diversified agricultural activities.

LAND USE

Goal

The maintenance and enhancement of Upcountry's unique and diverse rural land use character with sensitivity to existing land use patterns, natural resource values, and economic and social needs of the region's residents.

Objectives and Policies

Recognize the value of open space, including agricultural lands and view planes to preserve the region's rural character.

Establish land use patterns which recognize the "Right to Farm," in order to minimize conflicts between existing agricultural operations and urban-related activities.

Discourage speculation in agricultural lands.

Encourage land use patterns which will:

Support the long-term viability of agriculture.

Encourage and support the development of land use performance and subdivision standards such as cluster development which will encourage viable farm operations and discourage estate subdivisions on agricultural lands such as Kula 200 or Kula Glen. Preserve and enhance the "country" atmosphere in all communities by maintaining the small-scale, unique and independent character of each of the three sub-regions. "Country" atmosphere is defined by building style, a low density mix of residences, ranches, open spaces, greenways, plantings and cultivated lands.

Make available agricultural lands for those who wish to farm.

Encourage the development of land use performance and subdivision standards which are compatible with the agricultural Upcountry character.

Ensure an adequate supply of land designated for residential use to provide opportunity for residents to participate in housing market "trade-ups".

Implementing Actions

Adopt zoning standards which use varying minimum lot sizes or other means to differentiate rural residential and agricultural land uses; and implement a program to rezone existing pseudo-agricultural subdivisions to the two-acre rural district.

Adopt alternative subdivision standards, in regards to roadway widths, street lights, etc., that reflect the rural and agricultural character of the region. Such standards shall at a minimum, provide for sidewalks on one side of the street for County roads within a 3/4-mile radius of developed or proposed school sites.

ENVIRONMENT

Goal:

Protection of Upcountry's natural resources and environment as a means of preserving and enhancing the region's unique beauty, serenity, ecology, and productivity, in order that future generations may enjoy and appreciate an environment of equal or higher quality.

Objectives and Policies:

Preserve environmental resources by maintaining important agricultural lands as an integral part of the open space setting in each community.

Recognize agricultural lands as an essential ingredient to the Upcountry atmosphere.

Recognize and protect rare, endangered and unique biological resources in the region.

Support efforts for a comprehensive watershed management program which shall incorporate, as key components, soil conservation, forest management and reforestation/replanting which:

- *Utilizes endemic and indigenous plant species;*
- *Protects the environment from exotic plants and animals; and*
- *Prevents the introduction and establishment of non-native species within this native forest region that may ultimately threaten water supply and native ecosystems.*

Implementing Actions:

Assist State and Federal government efforts to prevent establishment and spread of invasive alien species.

CULTURAL RESOURCES

Goal:

The identification, preservation and where appropriate, restoration and promotion of cultural resources and practices which reflect the rich and diverse heritage found in the Upcountry region.

Objectives and Policies:

Recognize the importance of historically and archaeologically sensitive sites, both known and undiscovered, and encourage their preservation and protection.

Support public and private efforts to inventory, evaluate, classify, register, and protect, as appropriate, cultural resources to increase public knowledge of the region's rich and diverse cultural character.

URBAN DESIGN

Goal:

Recognition and preservation of the unique design characteristics of the Makawao, Pukalani and Kula communities in order to enhance Upcountry's man-made environment.

Objectives and Policies:

Support the development of pedestrian, equestrian and bikeway connections which provide safe and convenient linkages within and between Upcountry communities.

Encourage the use of appropriate landscaping, with greenways where possible, along major roadways, parking areas and land use transition areas to establish and maintain landscape themes which are consistent with the character of the each Upcountry community.

Implementing Actions:

Develop and implement alternate rural standards for public facilities and privately sponsored building improvements, roadways and subdivisions.

Develop appropriate street lighting standards for agricultural and rural areas.

PHYSICAL INFRASTRUCTURE

Goal:

The timely and environmentally sensitive development and maintenance of infrastructure systems which protect and enhance the safety and health of Upcountry's residents and visitors, including the provision of domestic water,

utility and waste disposal services, and effective transportation systems which meet the needs of residents and visitors while maintaining the region's rural character.

Water

Objectives and Policies:

Restrict the use of any water developed within or imported to the Upcountry region to consumption within the Upcountry region, with exception provided for agricultural use.

Drainage

Objectives and Policies:

Respect and preserve natural drainageways as part of good land development practices and recognize their value as open-space corridors.

HOUSING

Goal:

Housing opportunities for the residents of Makawao-Pukalani-Kula, to include all income and age groups, which are affordable, safe, and environmentally and culturally compatible.

Objectives and Policies:

Encourage the use of tools such as low-rise planned unit development or rural cluster housing approaches which will allow housing projects to be more compatible with the natural setting and preserve open space.

In keeping with public health and safety principles, and consistent with the Upcountry character, develop zoning, subdivision and design standards which will facilitate the development of affordable housing

Implementing Actions:

Develop and adopt guidelines for rural cluster developments.

E. COUNTY ZONING

The project site parcels identified as Tax Map Key (2) 2-4-012:005, 039 through 046, are zoned "Agricultural" by the County of Maui.

The Hoku Nui Maui Community is master planned as an agricultural sustainable community. Its market and affordable housing components will be provided via a cluster

housing concept. Inasmuch as the lot sizes for the house lots will be less than the two-acre minimum required by Chapter 19.30A (Agricultural Districts) of the Maui County Code, an exemption to this provision of the code will be requested through the Section 201H process. Further discussion of the proposed Section 201H request is provided in Section "G" of this chapter.

F. COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES

The Hawai'i Coastal Zone Management Program (HCZMP), as formalized in Chapter 205A, HRS, establishes objectives and policies for the preservation, protection, and restoration of natural resources of Hawai'i's coastal zone. Section 205A-1 defines "coastal zone" as all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the United States territorial sea. The Hoku Nui Maui Community project is not located within the County of Maui's Special Management Area (SMA). However, the project has been reviewed in the context of HRS 205A.

1. Recreational Resources

Objective:

Provide coastal recreational opportunities accessible to the public.

Policies:

a. *Improve coordination and funding of coastal recreational planning and management; and*

b. *Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*

   i. *Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;*

   ii. *Requiring replacement of coastal resources having significant recreational value, including but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;*

   iii. *Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;*

iv. *Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;*

v. *Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;*

vi. *Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;*

vii. *Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and*

viii. *Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of Section 46-6.*

Response: The project site is located inland on the slopes of Haleakala and away from shoreline resources. The proposed action will, therefore, not affect coastal recreational opportunities.

2. **Historic Resources**

Objective:

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:

a. *Identify and analyze significant archeological resources;*

b. *Maximize information retention through preservation of remains and artifacts or salvage operations; and*

c. *Support state goals for protection, restoration, interpretation, and display of historic resources.*

Response: As stated in Chapter II, an archaeological inventory survey of the project area was carried out in 2007. Refer to **Appendix "E"**. The inadvertent

burial identified as State Site No. 50-50-06-5501 was reinterred where found and will remain preserved in place. The slope retaining wall feature identified as Site No. 50-50-06-6273 in the floor of the unnamed gulch will be passively preserved by not grading or disturbing the site and surrounding gulch areas. Adverse impacts to historic resources are not anticipated.

3. **Scenic and Open Space Resources**

Objective:

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:

a. *Identify valued scenic resources in the coastal zone management area;*

b. *Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;*

c. *Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and*

d. *Encourage those developments which are not coastal dependent to locate in inland areas.*

Response: The project site is located approximately six (6) miles to the nearest coastline along the northern side of the island. Views across the site down to the coastline in certain directions are obscured by natural tree lines in the distance. The proposed project site itself is not part of any scenic corridors and the proposed improvements are not anticipated to have a significant adverse impact upon scenic or open space resources.

4. **Coastal Ecosystems**

Objective:

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

a. *Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;*

b. *Improve the technical basis for natural resource management;*

c. *Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;*

d. *Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and*

e. *Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.*

Response: The proposed project is not anticipated to result in any adverse impacts to coastal ecosystems as the project area is located approximately six (6) miles from the nearest coastline along the northern side of the island. Applicable Best Management Practices (BMPs) and erosion-control measures will be implemented to mitigate runoff during construction-related activities and long-term agricultural operations. Adverse effects upon coastal ecosystems are not anticipated.

5. Economic Uses

Objective:

Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

a. *Concentrate coastal dependent development in appropriate areas;*

b. *Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and*

c. *Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:*

   i. *Use of presently designated locations is not feasible;*

ii. Adverse environmental effects are minimized; and

iii. The development is important to the State's economy.

Response: The proposed project is a comprehensively planned sustainable agricultural community designed to be in harmony with the project area's surrounding environs. Promotion of diversified agriculture within this community through the provision of housing, land, support facilities and operations are intended to have a positive economic impact.

6. Coastal Hazards

Objective:

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

Policies:

a. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

b. Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;

c. Ensure that developments comply with requirements of the Federal Flood Insurance Program; and

d. Prevent coastal flooding from inland projects.

Response: The project site is located in an area with no constraining flood hazard considerations. Appropriate BMPs will be implemented during construction and post-construction to ensure downstream and adjacent properties will not be adversely impacted.

7. Managing Development

Objective:

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

Policies:

a. *Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;*

b. *Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and*

c. *Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.*

Response: In compliance with the requirements of Chapter 343, Hawai'i Revised Statutes (HRS), this Environmental Assessment (EA) has been prepared to facilitate public understanding and involvement in project development. All aspects of the development will be conducted in accordance with applicable Federal, State and County standards. Compliance with applicable regulatory requirements, including Section 201H-38, HRS, advances the objective and policies for managing development without adverse impact to coastal resources.

8. Public Participation

Objective:

Stimulate public awareness, education, and participation in coastal management.

Policies:

a. *Promote public involvement in coastal zone management processes;*

b. *Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and*

c. *Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.*

Response: Opportunities for public awareness and participation for the project are facilitated through the notification, review and comment processes of the EA requirements of Chapter 343, HRS and the Section 201H-38, HRS application. The proposed project is not contrary to the objectives of public awareness, education, and participation in coastal management.

The Applicant has additionally met with community stakeholders, including the Makawao Community Association board members and general membership, St. Joseph Catholic Church Parish Council, and community members.

The Makawao Community Association invited the project team to their general membership meeting open to the public, held on September 15, 2015, to update board members and present the project to meeting attendees and answer questions. Approximately seventy (70) people attended. Attendees posed a number of questions specific to farming and other agricultural type activities planned. There was a question relating to possibly connecting a safe path to Makawao Avenue in which the project owner explained some of the challenges with Pi'iholo Road's limited width. Management of the commercial farm was questioned to which the project owner intends to a have a farm cooperative model implemented. The number of affordable units proposed and how many acres would be allocated for the various components to the project were asked. Otherwise, there were no objections to the project raised.

The project team meeting with the St. Joseph Church Parrish Council took place on September 23, 2015. Understanding that the project will be like a Low Impact Development (LID), the Parrish chair felt the design to retain runoff in ponds will prevent the church property located downhill of the project from being adversely impacted. Various questions were asked to clarify what is planned on the project for housing, farming, and other agricultural activities. The Parrish members were concerned with the potential for the project to impact the traffic problems that already occurs with the morning drop-offs for the preschool operated on the church site. Everyone acknowledged that options to address traffic problems are limited due to the lack of space for widening at the intersection of Makawao Avenue and Pi'iholo Road. The project owner expects drivers to avoid travelling during peak hours and added that the proposed Farm Market operations will avoid the morning peak hours. The project owner and his representative agreed to keep communication lines open in case future issues with the project arise.

University of Hawai'i's Haleakala Research Facility, which is a neighboring property along the southeast project boundary, was consulted through the early consultation process. (Refer to Chapter IX of the EA.)

As the project advances further, the Applicant intends to hold subsequent meetings with stakeholders to keep them updated and assure continued dialogue regarding project-related concerns.

9. Beach Protection

Objective:

Protect beaches for public use and recreation.

Policies:

a. *Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;*

b. *Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and*

c. *Minimize the construction of public erosion-protection structures seaward of the shoreline.*

Response: The proposed project is not located in proximity to shoreline areas, nor is it anticipated to impact shoreline activities or beach processes.

10. Marine Resources

Objective:

Promote the protection, use, and development of marine and coastal resources to assure their sustainability.

Policies:

a. *Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;*

b. *Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;*

c. *Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;*

d. *Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and*

e. *Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.*

Response: The proposed project is not anticipated to impact marine or coastal resources as the project site is located over six (6) miles away from the ocean.

G. SECTION 201H APPLICATION

The Applicant proposes the filing and processing of a Section 201H application to facilitate the implementation of the affordable housing component of the project. Specifically, Section 201H-38 of the Hawai'i Revised Statutes allows for the granting of exemptions from "statutes, ordinances, charter provisions, and rules of any government agency relating to planning, zoning, construction standards for subdivisions, development and improvement of land, and the construction of dwelling units thereon..."

As noted previously, the project will provide 21 market housing units and 22 affordable units on twenty approximately one-acre clustered lots and on an approximately 238-acre farm lot. Applicable exemptions from Maui County zoning code will be requested to enable the implementation of this design concept. Additionally, exemptions from other code provisions will be identified to enable the cost effective delivery of the affordable units. These exemptions will be identified in the Section 201H application submitted to the Maui County Council. The Council is the approving authority for the application and may approve the project with modifications.

The exemptions proposed are as follows:

1. EXEMPTIONS FROM TITLE 3, MCC, REVENUE AND FINANCE

a. An exemption from Section 3.48.325, MCC, Deferred or roll back tax – Change in classification, shall be granted to exempt the project from payment of deferred taxes imposed by this section on lots of five acres or less.

2. EXEMPTIONS FROM TITLE 14, MCC, PUBLIC SERVICES

a. An exemption from Chapter 14.74, MCC, Impact Fees for Traffic and Roadway Improvements in Makawao-Pukalani-Kula, Maui, Hawaii, shall be granted to exempt the project from the payment of impact fees, which may be adopted prior to issuance of building permits for the project.

3. EXEMPTIONS FROM TITLE 16, MCC, BUILDING AND CONSTRUCTION

a. An exemption from Chapters 16.04B, MCC, Fire Code, 16.18B, MCC, Electrical Code, 16.20B, MCC, Plumbing Code, and 16.26B, MCC Building Code, shall be granted to exempt the affordable housing units proposed by the project from fire, electrical, plumbing, and building permit fees, as well as plan review and inspection fees.

b. The project shall conform with the MCC Chapters 16.04B, Fire Code; 16.16A, Energy Code; 16.18B, Electrical Code; 16.20B, Plumbing Code; and 16.26B, Building Code, as stated at the time of filing of the 201H-38 application and despite any subsequent amendments to the Chapters 16.04b, 16.16A, 16.18B, 16.20B, and 16.26B, or any updates to the Fire Code, Energy Code, Electrical Code, Plumbing Code, or Building Code adopted prior to the issuance of the last building permits for the project. Exceptions to this exemption shall be in the case where amendments result in improvements to health and safety conditions and is also cost effective.

c. An exemption from Section 16.26B.3600, MCC, Improvements to Public Streets, shall be granted from pavement widening and substantial shoulder and roadside grading improvements along Pi'iholo Road.

4. EXEMPTIONS FROM TITLE 18, MCC, SUBDIVISIONS

a. An exemption from Section 18.20.040, MCC, Improvements to Existing Street, shall be granted to exempt the project from pavement widening and substantial shoulder and roadside grading improvements along Pi'iholo Road.

b. An exemption from Section 18.20.140 – Utility lines and facilities, B. Utility lines, to allow overhead utility lines along Pi'iholo Road and within the subdivision.

c. An exemption from Section 18.24.010, MCC, Fees Designated, shall be granted to exempt the project from payment of the plan review fees for the affordable units.

d. An exemption from Section 18.16.320B, MCC, Parks Dedication Requirements, shall be granted to allow the project to satisfy required parks dedication and assessment fees with privately owned and maintained open recreational spaces.

5. EXEMPTIONS FROM TITLE 19, MCC, ZONING

a. An exemption from Section 19.30A.030 District standards, shall be granted to allow 1) Minimum lot areas of one acre; 2) Maximum wall heights greater

than four feet within yard setbacks; and 3) Exceeding the maximum number of lots that may be created in the agricultural district.

b. An exemption from Section 19.30A.040 Limitations on resubdivision regarding the number of lots prescribed in the Agreement for Allocation of Future Subdivision Potential agreement recorded with the bureau of conveyances.

c. An exemption from Section 19.30A.050 Permitted Uses, shall be granted to 1) allow more than two commercial agricultural structures per lot, and 2) allow a farm market, commercial kitchen, administration office, pump and maintenance shed, greenhouse, and hula halau facility.

d. An exemption from Section 19.30A.050, MCC, Permitted Uses, B. Accessory Uses, to waive the need for a farm plan for each of the proposed individual one acre lots.

e. An exemption from Section 19.30A.050, MCC, Permitted Uses, B.1 Accessory Uses, shall be granted to allow three farm dwelling units for the 238-acre farm lot.

f. An exemption from 19.30A.072, MCC, Commercial Agricultural Structures, shall be granted to allow the permitted uses without obtaining a Special Use Permit for floor areas that exceed three thousand square feet for a farmer's market, and one thousand square feet for an agricultural retail structure and agricultural food establishment.

g. An exemption from Section 19.35.020, MCC, Accessory Dwellings, Maximum gross floor area, shall be granted to allow a total gross floor area up to 1,000 square feet for lots with areas between 43,560 to 87,119 square feet.

6. EXEMPTIONS FROM TITLE 20, MCC, ENVIRONMENTAL PROTECTION

a. An exemption from Sections 20.08.130, 20.08.140, and 20.08.150, MCC, Permit Bond, shall be granted to exempt the project from filing a bond with the County of Maui for grading, construction of drainage improvements and implementation of erosion control measures

IV. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

IV. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed project involves the development of a 258-acre sustainable agricultural community consisting of 21 market priced homes and 21 affordable homes, a farm market, community kitchen, and hula halau, integrated with lands designated for agricultural pursuit. Gulch areas and terrain not suitable for farming and grazing will be maintained as native forest habitat areas.

Assessment of construction-related impacts, noise and air quality impacts, and potential impacts on physical and socio-economic environment were carried out as part of the Environmental Assessment (EA).

The development of this sustainable community will result in certain unavoidable construction-related environmental impacts and commitments of resources, including land, infrastructure, and public services as outlined in Chapter II. Commitments of these resources are considered irreversible and irretrievable. However, when measured against the need for affordable housing, positive effects on the local job market and economy, perpetuation of cultural traditions and practices, preserving archaeological resources, and maintaining a native forest habitat, the commitments are considered appropriate.

Short-term construction related impacts associated with grading of the site and construction of facilities are expected. Temporary impacts on air quality from dust generating site work grading, discharge of heavy equipment exhaust, and noise generation will be unavoidable. Appropriate BMP measures using dust fences and water wagon sprinklers will be incorporated into daily construction operations for dust control. Use of properly maintained construction equipment will mitigate noise and exhaust impacts. Compliance with State Department of Health construction noise limits will further mitigate noise impacts.

Long-term adverse air impacts or noise impacts are not anticipated from the proposed land uses. The proposed project will include a drainage system designed with mitigation control measures to protect downstream and coastal waters from stormwater runoff.

V. ALTERNATIVES TO THE PROPOSED ACTION

V. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The proposed sustainable agricultural community, as outlined in Chapter I, Project Overview, is the preferred alternative. The project represents an efficient and environmentally responsible use of agricultural lands within the rural-agricultural community of Makawao. The Hoku Nui Maui Community will also satisfy a need for affordable housing, fulfill a local job market, include facilities for marketing and processing agricultural products, provide a venue for perpetuating cultural traditions and practices, preserve archaeological resources, and maintain a native forest habitat.

B. NO ACTION ALTERNATIVE

The no action alternative limits the use of the 258 acres to only livestock grazing and does not utilize the property to its full potential. Without proposed agricultural amenities for production, processing, and marketing, there are few incentives for expanded farming activities that can promote employment and other business and economic opportunities. The affordable housing, cultural, archaeological, self-sufficiency concepts, and positive environmental aspects of the project will not be realized.

The Agreement for Allocation of Future Subdivision (see **Appendix "G"**) for the existing approved Piiholo South Subdivision, allows a maximum of 21 lots that can potentially be created with the proposed project. (**Exhibit "A",** Allocation of Lots table attached to the Agreement specifies the subdivision potential for each lot and associated minimum lot sizes). The proposed project area is comprised of nine (9) lots (number 3 to 11) from the Piiholo South Subdivision. Current lot sizes range from about fifteen (15) acres up to about 59 acres. Six (6) of the nine (9) lots have a potential to be further subdivided into three (3) lots to make up the maximum potential of 21 lots. See **Appendix "H"** illustrating the lot size and layouts of the final approved plat map.

C. SITE DEVELOPMENT ALTERNATIVES

The Section 201H application seeks exemptions from Chapter 19.30A to enable the creation of house lots measuring less than two (2) acres in size. The applicant does have the option of creating a traditional agricultural subdivision in keeping with the agricultural lot allocation requirements set forth by Chapter 19.30A.030 (District Standards). This alternative, however, would result in the creation of larger lot sizes which would make the

provision of an integrated housing and agricultural community less viable. See **Appendix "I"**, Conceptual Subdivision Plan. The proposed clustering of market and affordable homes under the proposed action is viewed as preferred in terms of agricultural production opportunities, and housing cost efficiencies.

The development model of clustering the market and affordable homes and allocating the remaining acreage to mass the agricultural activities into one large 238-acre farm offers the best opportunities to expand and diversify farm activities. The large farm lot can accommodate centralized agricultural amenities to facilitate production, processing, and marketing. Regenerative farming practices and centralized systems to collect and store stormwater as well as establishing onsite water and wastewater treatment systems are also more viable within a large farm lot. The proposed sustainable agricultural community concepts encourage the formation of cooperatives and other favorable marketing and distribution arrangements which are consistent with economic priority guidelines established in the Hawai'i State Plan.

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

VI. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed sustainable agricultural community is anticipated to result in the irreversible and irretrievable commitment of land and fiscal resource. Other resource commitments include energy, labor, and material resources. Impacts relating to the use of these resources are not considered significant when weighed against the expected positive socio-economic and community benefits derived from the project.

The project is located near existing infrastructure and public services and is not anticipated to require a substantial commitment of government services or facilities. Significant additional requirements on police, fire, medical, and social services are not anticipated. Self-sufficiency elements of the project include use of an onsite water well and a private wastewater system.

VII. SIGNIFICANCE CRITERIA ASSESSMENT

VII. SIGNIFICANCE CRITERIA ASSESSMENT

The "Significance Criteria", Section 12 of the Administrative Rules, Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following criteria and analysis are provided:

1. **Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.**

   The proposed action will result in short-term construction related air quality and noise impacts. However, these effects will be limited in scope due to the short-term duration of construction. There are no known rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats located within the project site. Although no signs of Blackburn's Sphinx Moth or Tree Tobacco were observed, the project will implement precautionary measures such as a site inspection by a trained biologist for any evidence of the moth prior to construction. Precautionary measures to protect the Hawaiian hoary bat will involve the avoidance of cutting of large trees during summer months while bats are pupping. As such, the proposed project is not anticipated to adversely impact threatened or endangered species or their habitats. Refer to **Appendix "C"**.

   Archaeological resources found within the project site include an inadvertent burial identified as Site No. 50-50-06-5501; a slope retaining wall and associated terrace identified as Site No. 50-50-06-6273; and single adze fragment recovered in an eroded pineapple road under the same site number. Refer to **Appendix "E"**. The inadvertent burial site and retaining wall and terraces will be preserved in place. An Archaeological Monitoring Plan will be implemented during construction.

   The Cultural Impact Assessment (CIA) recommends that Best Management Practices (BMP) are used throughout all phases of the project to preserve streams, gulches, fresh water resources, and downstream coastal ocean resources from sediments and pollutants. Refer to **Appendix "D"**. The project will exercise BMP techniques through its construction and post-construction phases. Other environmental features recommended for protection are view corridors and re-establishment of desired plant species from a cultural practitioner's perspective. The agricultural community proposes to cluster housing lots and retain 120 acres pasturelands and another 118 acres for open spaces, native habitat, and access laneways/roadways. The proposed site layouts and land use allocations will serve to preserve view corridors and restore native plant species. The CIA also recommends that project activities do not adversely impact the neighboring St. Joseph Church. An open dialog has been established with the church's Parrish Council to insure

that the project as proposed and future activities of the agricultural community do not adversely impact the church's grounds and activities. Finally, the CIA recommends the historic Bridle Path access trail be given consideration for re-establishment. The Applicant is consulting with the Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife – Nā Ala Hele Trails and Access Program staff to develop an appropriate plan to recognize the Bridle Path.

Based on the foregoing, the proposed action does not involve an irrevocable commitment to loss or destruction of any natural or cultural resources.

2. **Curtails the range of beneficial uses of the environment.**

The proposed action and the commitment of land resources will not curtail the range of beneficial uses of the environment. The project site and its surrounding lands fall within the State "Agricultural" district, and is designated as "Agriculture" by the Makawao-Pukalani-Kula Community Plan. County zoning for the project site is "Agricultural". The proposed sustainable agricultural uses of the property with supporting facilities for marketing and processing agricultural products are compatible with the current designations of the subject property and its surroundings. The housing component is proposed through the HRS §201H-38 application process. The cluster approach to housing development is deemed to be an effective and efficient land use design principle.

3. **Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders**.

The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawai'i Revised Statutes (HRS). The proposed action, which consists of an agriculturally sustainable community, is intended to preserve the island's natural and cultural resources while creating affordable housing and economic opportunities. The project's components are compatible with the rural and agricultural character of the region and advances balance between the physical and social environment. The proposed action is consistent with the policies and guidelines of Chapter 344, HRS.

4. **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.**

The proposed action will have a beneficial effect on the local economy during construction. In the long term, the proposed project will provide much needed affordable housing and employment opportunities associated with agriculture. The farm market and community kitchen are intended to enhance the viability of agricultural endeavors. Inclusion of a hula halau facility will provide a venue for the perpetuating cultural traditions and practices.

5. **Substantially affects public health.**

No adverse impact to public health or welfare is anticipated as a result of the proposed action. The proposed action strives to incorporate Smart Growth and Livability strategies that encourage an active lifestyle with convenient access to fresh food choices produced within the community. The mix of affordable and market priced housing next to agricultural lands and support facilities will foster a live-work community. Site design of roadways and pathways will encourage walking, bicycling, and horseback riding whether for work commutes or recreational enjoyment. Refer to **Appendix "B"**.

6. **Involves substantial secondary impacts, such as population changes or effects on public facilities.**

The proposed action is not anticipated to increase the general population in the area beyond expected growth projections. It is anticipated that the housing units will increase the inventory of affordable and market priced homes for Upcountry residents. Due to the limited number of proposed units (43units), significant adverse secondary impacts are not anticipated.

From a land use perspective, all the elements of the proposed project are compatible with the surrounding rural and agricultural character of the area. The proposed actions are consistent with objectives, policies, and implementing actions of the Countywide Policy Plan, Maui Island Plan, and the Makawao-Pukalani-Kula Community Plan. No adverse impacts are anticipated to affect public facilities.

7. **Involves a substantial degradation of environmental quality.**

During the construction phases of the project, appropriate BMPs will be utilized to ensure that potential adverse environmental effects are mitigated. About 24 acres of the project site will be for residential homes, a farm market and community kitchen, and hula halau facility. The site design retains the majority of the property for livestock grazing, farming, open space, greenways, and native forest habitat areas. No substantial degradation of environmental quality is anticipated as a result of the proposed actions.

8. **Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.**

The proposed action is not part of a larger action and is not expected to result in cumulative impacts that would adversely affect the environment.

9. **Substantially affects a rare, threatened, or endangered species, or its habitat.**

The project property is situated on land previously cultivated in pineapple and is currently used for livestock grazing. As mentioned before, there are no known rare, threatened, or endangered species of flora, fauna, avifauna, or important habitats located within the project site. Refer to **Appendix "C"**.

10. **Detrimentally affects air or water quality of ambient noise levels.**

Temporary short-term construction related air quality and noise impacts may occur. However, air quality impacts during construction will be mitigated through compliance with the provisions of the State Department of Health Administrative Rules, Title 11, Chapter 60.1-33, "Fugitive dust". Other mitigative measures will include implementing dust screens, daily watering of loose or exposed soil, and re-vegetating/stabilizing exposed areas as soon as practical. Agricultural operations associated with the proposed project land uses, such as tilling of land and application of fertilizers, will also be conducted in a manner to reasonably minimize fugitive dust.

Temporary noise impacts may also be generated from construction equipment. Mitigation to minimize equipment noise impacts will be through compliance with the provisions of the State of Hawai'i, Department of Health Administrative Rules, Title 11, Chapter 46, "Community Noise Control".

To protect water quality, BMPs will be implemented during construction in compliance with the National Pollutant Discharge Elimination System (NPDES) permit, as applicable. Site designs will incorporate native trees and plants throughout the property with open pasture spaces, native forest habitat, and vegetated contours that will provide natural filtration and retention for stormwater runoff.

With proposed mitigation measures which will comply with applicable Hawai'i Administrative Rules and permits, the proposed project actions are not anticipated to have adverse significant impacts on air quality, water quality, or noise levels.

11. **Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.**

The project site is not located within or near environmentally sensitive areas such as those listed above. The Flood Insurance Rate Map (FIRM) for this region indicates that the project site is located in Zone X, an area of minimal flooding. The project is not a shoreline property and is located well above the tsunami evacuation areas. There are no geologically hazardous lands, estuaries, or coastal waters within or adjacent to the project site.

12. **Substantially affects scenic vistas and viewplanes identified in county or state plans or studies.**

The project site is not identified as a scenic vista or view plane in County or State plans. It is not anticipated, therefore, that the proposed action will affect scenic corridors and coastal scenic and open space resources.

13. **Requires substantial energy consumption.**

The proposed project will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources. In the long term, the proposed lands uses will slightly increase demand for energy resources which will be mitigated by implementing the sustainability goal of developing a 100 percent off-grid energy community using a combination of renewable energy, energy efficient design and operations, and micro grid technology. See **Appendix "B"**.

In summary, the proposed action will provide much needed affordable housing within an innovative sustainable agricultural community that can support the local job market. Supporting facilities for marketing and processing agricultural products will promote other business and economic opportunities. Other elements of this community will also feature a venue to perpetuate cultural traditions and practices, and a site design that will preserve archaeological resources and maintain a native forest habitat. Impacts related to the use of resources are not considered significant when weighed against the expected positive socio-economic and community benefits derived from the project. Based on the foregoing findings, the proposed action is not anticipated to result in significant adverse impacts.

VIII. LIST OF PERMITS AND APPROVALS

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State of Hawai'i

1. Hawai'i Revised Statutes (HRS) Chapter 343 Environmental Assessment

2. Department of Health, Indoor and Radiological Branch - Community Noise Permit, as applicable

3. Department of Health, Clean Water Branch – National Pollutant Discharge Elimination System (NPDES) permit, as applicable

4. Department of Health, Waste Water Branch permit

5. Department of Health – Water System approval

6. Department of Land and Natural Resources, Commission on Water Resources Management – Well Construction Permit

7. Department of Land and Natural Resources, Commission on Water Resources Management – Pump Installation Permit

County of Maui

1. Section 201H-38, HRS Affordable Housing Approval

2. Subdivision Approval

3. Construction Permits (Work on County Highway, Grading/Grubbing, Building, Electrical, and Plumbing), as applicable

IX. PARTIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE COMMENTS

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The following agencies, organizations, community groups, and individuals were consulted during the preparation of the Draft Environmental Assessment (EA). Agency comments and responses to substantive comments are included herein.

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33. Tivoli Faaumu, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

34. David Goode, Director
County of Maui
Department of Public Works
200 South High Street
Wailuku, Hawaii 96793

35. Jo Anne Johnson Winer, Director
County of Maui
Department of Transportation
200 South High Street
Wailuku, Hawaii 96793

36. David Taylor, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

37. Honorable Michael White, Council Chair
Maui County Council
200 South High Street
Wailuku, Hawaii 96793

OTHER

38. Michael Grider
Maui Electric Company, Ltd.
P.O. Box 398
Kahului, Hawaii 96733

39. Hawaiian Telcom
60 South Church Street
Wailuku, Hawaii 96793

40. Duane Hamamura, President
Makawao Community Association
P.O. Box 733
Makawao, Hawaii 96768

41. Cindy Reeves
Maui County Administrator
University of Hawaii at Manoa
College of Tropical Agriculture
Cooperative Extension Offices and Research Station
310 Kaahumanu Avenue, Bldg 214
Kahului, Hawaii 96732

42. Edwin Ferreira, Chairman of Parrish Council
St. Joseph Church
1295 Makawao Avenue
Makawao, Hawaii 96868

43. Torrie Nohara
Na Ala Hele, Trails and Access Specialist
1955 Main Street, Room 301
Wailuku, Hawaii 96793

NOV 0 2 2015

DEPARTMENT OF THE ARMY
HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

October 28, 2015

SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community located in Makawao, Maui; DA File No. POH-2015-00200

Charlene Shibuya
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawai'i 96793

Dear Ms. Shibuya:

The Honolulu District, U.S. Army Corps of Engineers (Corps), has received your letter dated October 12, 2015 for the proposed Hoku Nui Maui Community located in Makawao, Maui. Your project has been assigned Department of the Army (DA) file number POH-2015-00200. Please reference this number in all future correspondence.

Please be advised, if the proposed project involves work in waters of the U.S., a DA authorization may be required. Under Section 10 of the Rivers and Harbors Act, structures and/or work in or affecting the course, location, condition, or capacity of navigable waters of the U.S. require DA authorization. Navigable waters of the U.S. are waters subject to the ebb and flow of the tide.

Under Section 404 of the Clean Water Act, DA authorization is required for discharges of dredged or fill material into waters of the U.S., including wetlands. Generally, discharges of fill material include materials that change the bottom elevation of a water of the U.S. and includes rock, sand, soil, debris, overburden, etc. Waters of the U.S. include navigable waters of the U.S. and other waters including wetlands, rivers, streams, lakes, and ponds.

Thank you for your cooperation with the Honolulu District Regulatory Program. Please contact this office if you have any questions. You may contact the me at 808-835-4306 or via email at kate.m.bliss@usace.army.mil

Sincerely,

Kate Bliss

Kate Bliss
Project Manager
Regulatory Office

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Kate Bliss
Project Manager – Regulatory Office
Department of the Army
Honolulu District
U.S. Army Corps of Engineers
Fort Shafter, Hawaii 96858-5440

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Ms. Bliss:

Thank you for your letter dated October 28, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community.

Project owner Hoku Nui Maui LLC (HNM) understands that if the proposed project involves work in waters of the U.S., a Department of the Army (DA) authorization may be required. Upon further development of the project when preliminary site construction plans are available, a jurisdictional determination will be requested from your office, as applicable.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comments.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Buddy Almeida, Department of Housing and Human Concerns
K:\DATA\Hoku Nui\Pilholo Sustainable\ECL Responses\Army response.doc

NOV 0 6 2015

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

NOV 0 3 2015

In Reply Refer To:
01EPIF00-2016-TA-0019

Ms. Charlene Shibuya, Senior Associate
Munekiyo & Hiraga, Inc.
205 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Technical Assistance for the Proposed Hoku Nui Maui Community, Makawao, Maui

Dear Ms. Shibuya:

The U.S. Fish and Wildlife Service (Service) received your correspondence on October 16, 2015, requesting preliminary comments on a Proposed Hoku Nui Maui Community located on Piiholo Road, in Makawao, Maui (TMK: (2)2-4-012:005). The proposed action is on a 258-acre plot and will include 20, one-acre house lots, a one-acre farm market and commercial kitchen, and three-acre hula halau. The remaining land will be split between a farm lot and green space. Each housing lot and the farm lot will include a main dwelling (and accessory dwelling comprising a total of 42 housing units, half of which will be sold at market cost and the remainder as affordable housing. The farm market and commercial kitchen will include a 6,000 square foot building and parking lot. The hula halau will include a 3,600 square foot building and parking lot. The farm lot will support 120 acres of grazing and two barn structures approximately 2,500 square feet each. Farm labor housing may be included at a future date. 118 acres will be reserved for native habitat, open space, greenways, and access laneways. Other improvements include storm water detention basins, lined/natural drainage swales, roadway and access improvements, and water and wastewater systems development. Currently, the majority of the plot (250 acres) is used for grazing. The current status of the remaining 8 acres is not noted in your letter.

Based on information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity Program (ECP), there are 8 listed species possibly in the vicinity of the project area that are of concern: the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Blackburn's sphinx moth (*Manduca blackburni*), Hawaiian Stilt (*Himantopus mexicanus knudseni*), Hawaiian coot (*Fulica alai*), Hawaiian goose (*Branta sandvicensis*), and Hawaiian petrel (*Pterodroma sandwichensis*), the federally threatened Newell's shearwater (*Puffinus newelli*), and the federally proposed band-rumped storm petrel (*Oceanodroma castro*).

Hawaiian hoary bat

The Hawaiian hoary bat is known to occur across a broad range of habitats throughout the State of Hawaii. This bat roosts in both exotic and native woody vegetation and, while foraging, leaves young unattended in "nursery" trees and shrubs. If trees or shrubs suitable for bat roosting are cleared during the Hawaiian hoary bat breeding season (June 1 to September 15), there is a risk that young bats that cannot yet fly on their own could inadvertently be harmed or killed. As a result, the Service recommends that woody plants greater than 15 feet tall should not be removed or trimmed during the Hawaiian hoary bat breeding season. Additionally, Hawaiian hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When barbed wire is used in fencing, Hawaiian hoary bats can become entangled. The Service, therefore, recommends that barbed wire not be used for fencing as part of this proposed action.

Blackburn's sphinx moth

The Blackburn's sphinx moth could potentially be in the vicinity of the proposed project area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), iliee (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*); larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothocestrum latifolium*). To pupate, the larvae burrow into the soil and can remain in a state of torpor for up to a year (or more) before emerging from the soil. Soil disturbance can result in death of the pupae. The Service recommends that a qualified biologist survey areas of proposed construction activities for Blackburn's sphinx moth and its host plants prior to work initiation. We recommend these surveys be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and immediately prior to construction. Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage). Any host plants of Blackburn's sphinx moth identified should not be cut or disturbed.

Hawaiian waterbirds and Hawaiian goose

The Hawaiian stilt, Hawaiian coot (collectively referred to as waterbirds) and Hawaiian goose are known to occur in the vicinity of your project area. Based on the project details provided, our information suggests that your project may result in standing water or creation of open water, thus attracting Hawaiian waterbirds and Hawaiian geese to the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations if water is present (e.g., any ponding water). Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. To avoid potential adverse impacts to listed Hawaiian waterbirds and Hawaiian geese, we recommend the construction occur outside of the Hawaiian stilt breeding season (February through August). If the Hawaiian stilt breeding season cannot be avoided, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

Hawaiian Seabirds

Seabirds, including the Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel, fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. To reduce potential impacts to seabirds, we recommend the following minimization measures be incorporated into your project description:

- Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.

- If lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

Threatened and Endangered Plants

Though our database does not show any threatened or endangered plant species on your property, there are threatened and endangered plant species around the project area. To assess the possible impact to threatened and endangered plants, a qualified botanist should conduct botanical surveys prior to project implementation to document the distribution and status of listed plant species in the proposed disturbance area. Unavoidable impacts to listed plants can be offset by propagating the listed plants and common native plants and outplanting them to areas that are protected from ungulate browsing, wildfire, competition from invasive species, and other disturbances.

Landscape Suggestions – Native Species

Hawaii's native ecosystems are heavily impacted by exotic invasive plants. Whenever possible we recommend using native plants for landscaping purposes. If native plants do not meet the landscaping objectives, we recommend choosing species that are thought to have a low risk of becoming invasive. The following websites are good resources to use when choosing landscaping plants: Pacific Island Ecosystems at Risk (www.hear.org/Pier/), Hawaii-Pacific Weed Risk Assessment (www.botany.hawaii.edu/faculty/daehler/wra/full_table.asp.html) and Global Compendium of Weeds (www.hear.org/gcw).

Recommendations for Recreational Land Use

(i.e. Green Space, Parks, Picnic Area, Resorts, etc.)

To minimize potential adverse impacts to listed wildlife, we suggest that free movements of pets (*i.e.,* dogs off leash) be prohibited on the property. Furthermore, educational signs should be used to inform path users of leash laws and the presence of sensitive species. We also recommend the use of sturdy animal-proof garbage containers to reduce the attraction of the area to non-native and feral species, such as house mice, rats, and feral cats.

Implementation of these measures will minimize but does not ensure that take of listed species associated with this proposed action will be fully avoided. Thank you for your efforts to conserve listed species and native habitats. Please contact Fish and Wildlife Biologist Jon Sprague (808-792-9573) if you have any questions or for further guidance.

Sincerely,

For Michelle Bogardus
Island Team Leader
Maui Nui and Hawaii Island

MUNEKIYO HIRAGA
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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Michelle Bogardus
Island Team Leader
Maui Nui and Hawaii Island
United States Department of the Interior
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

SUBJECT: Technical Assistance and Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui; DA File No. POH-2015-00200

Dear Ms. Bogardus:

Thank you for your letter dated November 3, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community.

Project owner Hoku Nui Maui LLC (HNM) appreciates the extensive information you provided from data compiled by the Hawaii Biodiversity Program. In response to your comment that the current status of the remaining eight (8) acres is not noted in our consultation letter, please note that there are remaining areas out of the total 258-acre property that are not suitable for grazing. Examples are dirt roads, gulches, and agricultural maintenance yards and storage facilities to house equipment and supplies.

In response to your concerns and recommendations associated with specific species, HNM provides the following discussion under the headings listed in the order of your letter.

Hawaiian Hoary Bat

HNM will avoid removal or trimming of woody plants taller than 15 feet, during the Hawaiian hoary bat breeding season from June 1 to September 15. However, from an agricultural management standpoint, HNM believes that barbed wire fencing will be necessary for cattle/sheep fencing. Its use will be avoided in other applications within the project.

Blackburn's Sphinx Moth

A botanical and faunal survey of the property was conducted by Starr Environmental in January 2014 to document species on the site or likely to occur at the property. A copy of the report will be included in the Draft Environmental Assessment (EA). As recommended, this survey was conducted during the wettest portion of the year between November-April. Another survey will be conducted immediately prior to construction to search for eggs, larvae, and signs of larval feeding and identify host plants of the Blackburn's sphinx moth that should not be cut or disturbed.

Hawaiian Waterbirds and Hawaiian Goose

To the extent practicable, HNM will schedule construction to occur outside of the Hawaiian stilt breeding season for February through August. If construction cannot completely avoid the breeding season, HNM will work with your office during the project planning for assistance in developing mitigation measures such as fencing, vegetation control, and predator management. HNM will also coordinate with your office on training construction/agricultural operations staff on recognizing bird species for notifications to DLNR, as appropriate.

Hawaiian Seabirds

To reduce potential impact to night flying seabirds including the Newell's shearwater, Hawaiian petrel, and band-rumped storm-petrel, your recommended minimization measures will be incorporated into the project's mitigation strategies. Construction activities will only occur during daylight hours and, therefore, use of nighttime construction lighting is not anticipated. If there is an unavoidable instance that lighting is necessary, low to the ground, motion-triggered, and shielded and /or full cut off lighting will be used.

Threatened and Endangered Plants

As mentioned previously, HNM had qualified biologists Forest and Kim Starr of Starr Environmental conduct a botanical and faunal survey in January 2014. The report documents all species observed on the project site and noted that no endangered species or habitats were present on the project site. Recommendations are included in the report to take the opportunity to propagate the hardy native Palapalai ferns (*Microlepia strigosa*). With respect to faunal species, the report recommends mitigation measures by 1) contacting the Department of Land and Natural Resources to verify whether Nene may be nesting in the area, 2) not cutting large trees during summer months when bats are pupping, and use of downward facing lights to not disorient night flying native seabirds.

Landscape Suggestions – Native Species

The Draft EA will include a Sustainability Plan that lists planned sustainability strategies for the project. These include a landscaping strategy to plant native and climate-appropriate plants to reduce water needs and regenerate watershed resource. For the native habitat restoration component of the project, use of native species for landscaping areas by buildings, roadway, parks/open spaces, trails, and common areas are proposed. As appropriate, the websites you list will be reviewed for other strategies on choosing landscaping plants. We note that the project owner is already working with local native species experts on developing a native planting plan.

Recommendations for Recreational Land Use

HNM will incorporate into the design and planning of the sustainable agricultural community, strategies to minimize potential adverse impacts to listed wildlife.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comments.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Forest Starr, Starr Environmental
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OCT 2 8 2015

DAVID Y. IGE
GOVERNOR

DOUGLAS MURDOCK
Comptroller

AUDREY HIDANO
Deputy Comptroller

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810-0119

(P)1276.5

OCT 2 3 2015

Ms. Charlene Shibuya, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Hoku Nui Maui Community
Makawao, Maui, Hawaii
TMK: (2) 2-4-012: por 005, 039 through 046

Thank you for the opportunity to comment on the subject project. We have no comments to offer at this time as the proposed project does not impact any of the Department of Accounting and General Services' projects or existing facilities.

If you have any questions, your staff may call Ms. Dora Choy of the Planning Branch at 586-0488.

Sincerely,

JAMES K. KURATA
Public Works Administrator

DC:mo
c: Mr. Wade Shimabukuro, District Engineer, MDO

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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

James K. Kurata
Public Works Administrator
State of Hawaii
Department of Accounting and General Services
P.O. Box 119
Honolulu, Hawaii 96810-0119

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Kurata:

Thank you for your letter dated October 23, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC, acknowledges that your department has no comments to offer at this time since the project does not impact any of your projects or facilities.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment. Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
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OCT 2 6 2015

DAVID Y. IGE
GOVERNOR

KATHRYN S. MATAYOSHI
SUPERINTENDENT

STATE OF HAWAI`I
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAI`I 96804

OFFICE OF SCHOOL FACILITIES AND SUPPORT SERVICES

October 22, 2015

Ms. Charlene Shibuya, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Re: Chapter 343, Hawaii Revised Statues Early Consultation Request for the Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, 039 through 046; Makawao, Maui, Hawaii

Dear Ms. Shibuya:

The Department of Education (DOE) has reviewed the early consultation request for the proposed Hoku Nui Maui community.

This project is outside of the current Maui School Impact Fee Districts.

The DOE has no comment to offer regarding this project.

We appreciate the opportunity to provide comments. If you have any questions, please call Heidi Meeker of the Facilities Development Branch at (808) 377-8301.

Respectfully,

Kenneth G. Masden II
Public Works Manager
Planning Section

KGM:jmb

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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 18, 2016

Kenneth G. Masden II, Public Works Manager
Planning Section
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, Hawaii 96804

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Masden II:

Thank you for your letter dated October 22, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner, Hoku Nui Maui LLC, acknowledges your Department's confirmation that the project is outside of the current Maui School Impact Fee Districts.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment. Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
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NOV 18 2015

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

LUD – 2 2 4 012 005
Early Cons Hoku Nui
Maui Comm—ID2485

November 13, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request
for the Proposoed Hoku Nui Maui Community
Piiholo Road, Makawao, Maui 96768
TMK (2) 2-4-012: 005, 039 through 46

Thank you for allowing us the opportunity to provide comments on the above subject project.

We have the following information to offer.

The subject project is located in the critical wastewater disposal area as determined by the Maui County Wastewater Advisory Committee.

We are unable to offer additional comments at this time as domestic wastewater treatment and disposal have not been thoroughly addressed in the subject document. Information about the project will be required to be submitted to our office before we will be able to determine what type of wastewater treatment system will be allowed if a sewer connection to a private or County sewer system is not available for the project. We encourage the developer to work with the County and utilize recycled water for irrigation and other non-potable water purposes such as dust control, open spaces or landscaping areas.

Please be informed that the proposed wastewater systems for the subdivision/development may have to include design considerations to address any effects associated with the construction of and/or discharges from the wastewater systems to any public trust, Native Hawaiian resources or the exercise of traditional cultural practices. In addition, all wastewater plans must conform to applicable provisions of the Hawaii Administrative Rules, Chapter 11-62, "Wastewater Systems."

Should you have any questions, please call Mark Tomomitsu of our office at (808) 586-4294.

Sincerely,

SINA PRUDER, P.E., CHIEF
Wastewater Branch

LM/MST:lmj

c: Ms. Laura McIntyre, DOH-Environmental Planning Office (15-263), via email
Mr. Roland Tejano, DOH-WWB's Maui Staff, via email
Mr. Kurt Wollenhaupt, County of Maui, Department of Planning, via email

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Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Sina Pruder, P.E., Chief
Wastewater Branch
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801-3378

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui
(LUD – 2 2 4 012 005, Early Cons Hoku Nui, Maui Comm-ID2485)

Dear Ms. Pruder:

Thank you for your letter dated November 13, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) acknowledges your comment that the project is located in the critical wastewater disposal area as determined by the Maui County Wastewater Advisory Committee.

The Draft Environmental Assessment (EA) document will contain a Preliminary Engineering Report to outline the proposed onsite private wastewater treatment facility design. HNM proposes the project as a comprehensively planned sustainable agricultural community.

As applicable, the wastewater system design will consider the effects upon any public trust, Native Hawaiian resources or the exercise of traditional cultural practices. Also, the wastewater plans will comply with applicable provisions of the Hawaii Administrative Rules, Chapter 11-62, "Wastewater Systems".

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be sent to your office for review and comments.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
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DAVID Y. IGE
GOVERNOR OF HAWAII

NOV 20 2015

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

LORRIN W. PANG, M.D., M.P.H.
DISTRICT HEALTH OFFICER

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, HAWAII 96793-3378

November 20, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation for Hoku Nui Maui Community, Makawao, Maui
TMK: (2) 2-4-012:005, 039 through 046

Thank you for the opportunity to review this project. We have the following comments to offer:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage may be required for this project. The Clean Water Branch should be contacted at 808 586-4309.

2. The project is located in the critical wastewater disposal area as determined by the Maui County Wastewater Advisory Committee. We are unable to offer any further comments on the proposed project at this time as domestic wastewater collection, treatment and disposal have not been addressed. Information pertaining to the wastewater collection, treatment and disposal system should be provided in order that we may be able to evaluate any impact and make any determination related to the wastewater project. Please be informed that the proposed wastewater system for the subdivision/development may have to include predesign consideration to address any effects associated with the construction of and/or discharges from the wastewater system to any public trust, Native Hawaiian resources or the exercise of traditional cultural practices. In addition, all wastewater plans must conform to applicable provisions of the Hawaii Administrative Rules, Chapter 11-62, "Wastewater Systems". If you have any questions, please call Roland Tejano, Environmental Engineer, at 808 984-8232.

3. The commercial kitchen must comply with Hawaii Administrative Rules, Chapter 11-50, "Food Safety Code" for manufacturing or processing of agricultural products. Please contact the Sanitation Program at 808 984-8230.

Should you have any questions, please contact me at 808 984-8230 or email me at patricia.kitkowski@doh.hawaii.gov.

Sincerely,

Patti Kitkowski

Patti Kitkowski
District Environmental Health Program Chief

c EPO

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Patti Kitkowski
District Environmental Health Program Chief
State of Hawaii
Department of Health
Maui District Health Office
54 High Street
Wailuku, Hawaii 96793-3378

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Ms. Kitkowski:

Thank you for your letter dated November 20, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) offers the following responses to the comments detailed in your letter.

1. A National Pollutant Discharge Elimination System (NPDES) Permit will be secured, as applicable.

2. We understand the project is located in the critical wastewater disposal area as determined by the Maui County Wastewater Advisory Committee. The Draft Environmental Assessment (EA) document will contain a Preliminary Engineering Report to outline the proposed onsite private wastewater treatment facility design. HNM recognizes that the wastewater system design may need to consider system effects upon any public trust, Native Hawaiian Resources or the exercise of traditional cultural values. HNM will comply with requirements of Hawaii Administrative Rules, Chapter 11-62, "Wastewater Systems" and coordinate with Mr. Roland Tejano, Environmental Engineer, as applicable.

3. The proposed commercial kitchen will comply with Hawaii Administrative Rules, Chapter 11-50, "Food Safety Code" for manufacturing or processing of agricultural products and coordinate with the Sanitation Program, as applicable.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comments.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Lauren Roth Venu, Roth Ecological
Jason Selley, Workshop-HI
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\DOH Maui.doc

OCT 28 2015

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

EPO 15-263

October 22, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: Early Consultation (EC) for Hoku Nui Maui Community, Makawao, Maui
TMK: (2) 2-4-012:005, 039 through 046

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your EC to our office on October 16, 2015.

EPO strongly recommends that you review the standard comments and available strategies to support sustainable and healthy design provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

We suggest you review the requirements for the National Pollutant Discharge Elimination System (NPDES) permit. We recommend contacting the Clean Water Branch at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov after relevant information is reviewed at:

1. http://health.hawaii.gov/cwb
2. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/standard-npdes-permit-conditions
3. http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/forms

Please note that all wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems". We do reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please review online guidance at: http://health.hawaii.gov/wastewater and contact the Planning and Design Section of the Wastewater Branch at 586-4294.

EPO encourages you to examine and utilize the Hawaii Environmental Health Portal. The portal provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings. The Portal is continually updated. Please visit it regularly at: https://eha-cloud.doh.hawaii.gov

You may also wish to review the draft OEQC viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer
This viewer geographically shows where previous Chapter 343 documents have been prepared.

In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www2.epa.gov/ejscreen

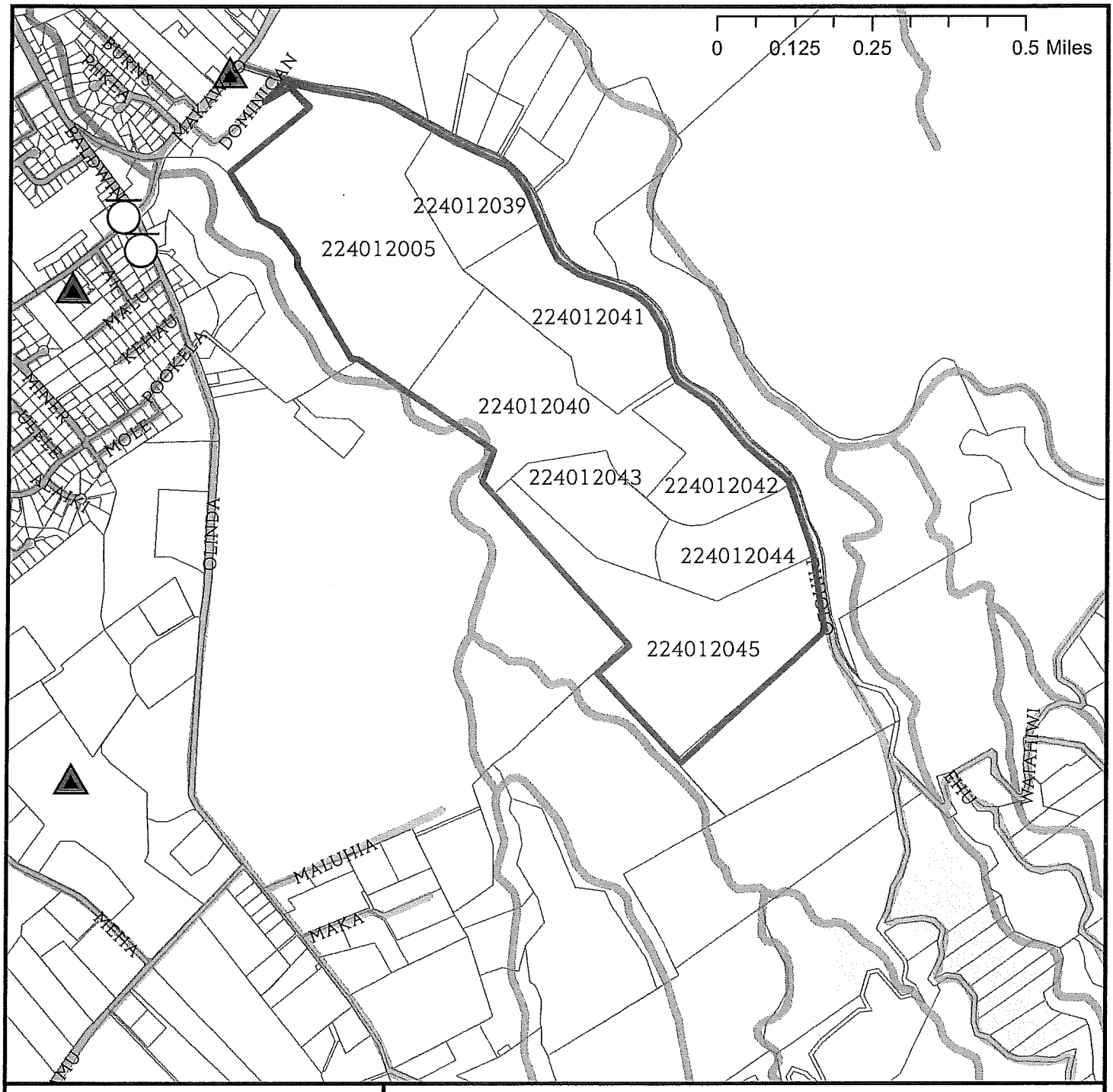
We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design.

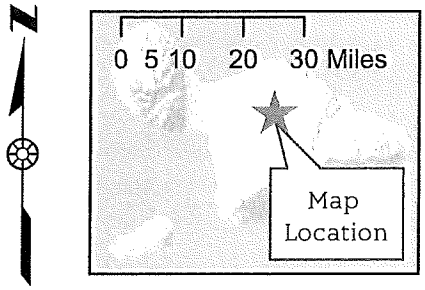
Mahalo nui loa,

Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

Attachment 1: EPO Environmental Information Map
Attachment 2: OEQC Viewer Map
Attachment 3: U.S. EPA EJSCREEN 3 page report

c: DOH: DHO Maui, CWB, WWB, & SAN {via email only)





HAWAII STATE DEPARTMENT OF HEALTH

Hoku Nui Community and Environmental Information

MAKAWAO

- Underground Storage Tanks
- Multiple Permits
- Tax Parcels
- Roads
- Streams
- High erodible land
- Potentially highly erodible land

Environmental Interests data obtained from the Environmental Health Warehouse (http://eha-web.doh.hawaii.gov/ehw)

DOH-EPO NO.: 15-263

Prepared by: Department of Health (DOH) Environmental Planning Office (EPO)

This map is intended for illustrative purposes only.

Date Prepared: 10/23/2015


hawaii.gov
Stay Connected
OEQC Viewer
makawao
4 sites found
Results
Filter
Show sites with no location
West Olinda Tank Replacement (FEA-FONSI)
Environmental Assessment (Agency)
POOKELA WELL DEVELOPMENT (FEA-FONSI)
Environmental Assessment (Agency)
POOKELA WELL (FEA-FONSI)
Environmental Assessment (Agency)
West Olinda Tank (DEA-AFNSI)
Environmental Assessment (Agency)
Hybrid
St Joseph's Church
Hot Island Glass
Komoda Store and Bakery
365
Piiholo Ranch Zipline
Seabury Hall
Map data ©2015 Google Imagery ©2015 DigitalGlobe
Map data ©2015 Google Imagery ©
Report a map error

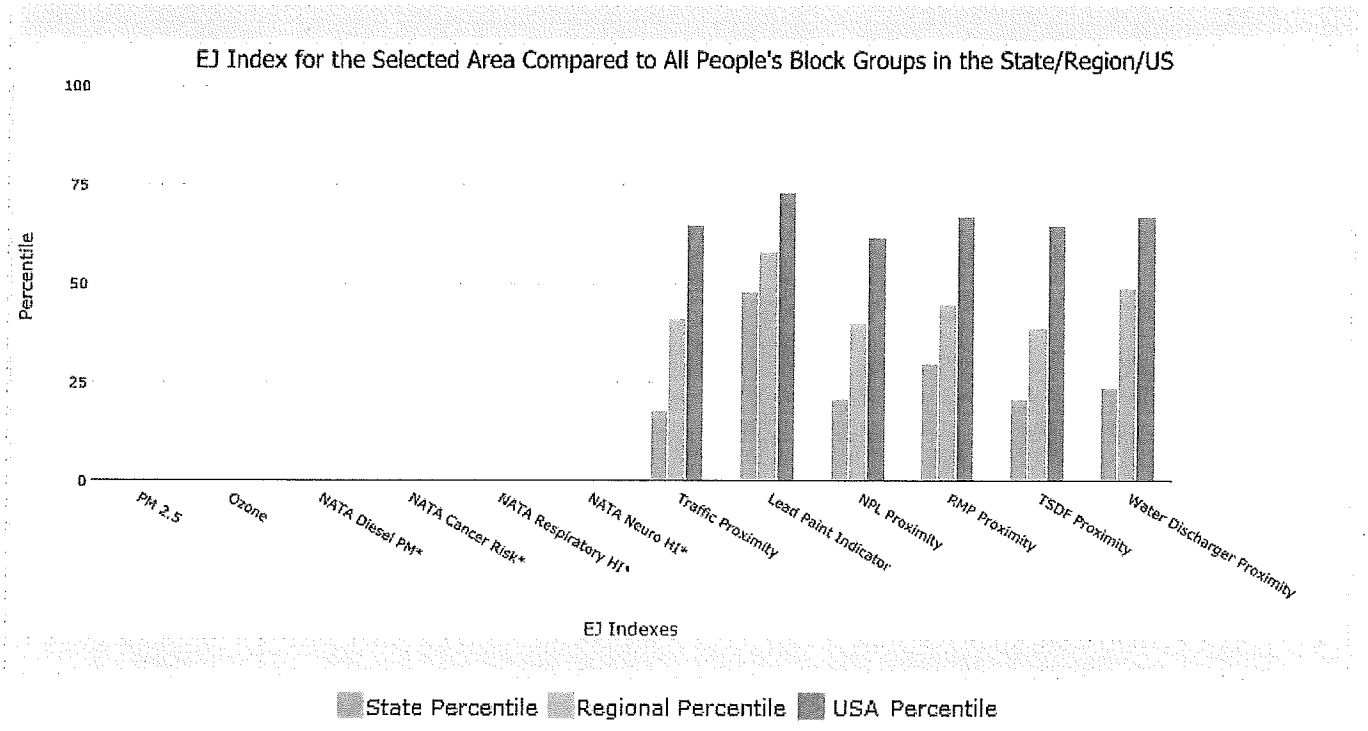
EJSCREEN Report

for 2 mile Ring Centered at 20.853606,-156.303746, HAWAII, EPA Region 9

Approximate Population: 8672

Hoku Nui Community

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA Diesel PM*	N/A	N/A	N/A
EJ Index for NATA Air Toxics Cancer Risk*	N/A	N/A	N/A
EJ Index for NATA Respiratory Hazard Index*	N/A	N/A	N/A
EJ Index for NATA Neurological Hazard Index*	N/A	N/A	N/A
EJ Index for Traffic Proximity and Volume	18	41	65
EJ Index for Lead Paint Indicator	48	58	73
EJ Index for Proximity to NPL sites	21	40	62
EJ Index for Proximity to RMP sites	30	45	67
EJ Index for Proximity to TSDFs	21	39	65
EJ Index for Proximity to Major Direct Dischargers	24	49	67



This report shows environmental, demographic, and EJ indicator values. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

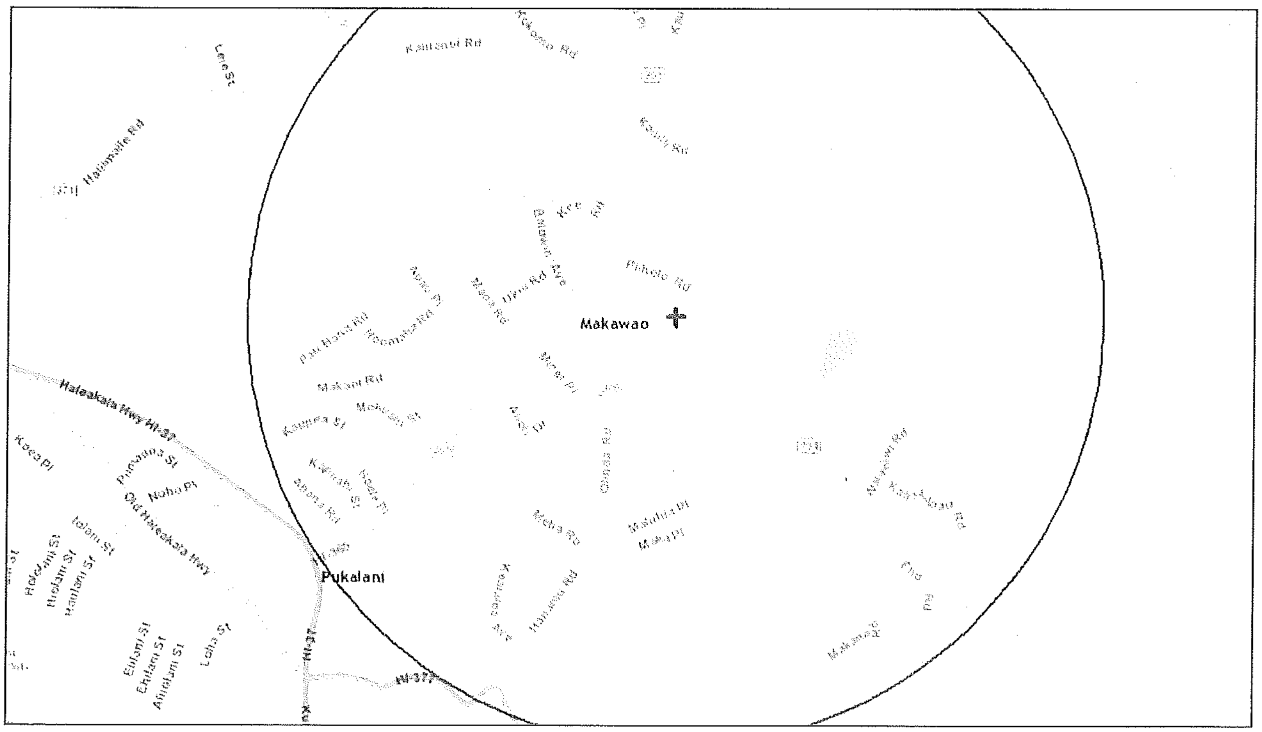
EJSCREEN Report

United States Environmental Protection Agency

for 2 mile Ring Centered at 20.853606,-156.303746, HAWAII, EPA Region 9

Approximate Population: 8672

Hoku Nui Community



October 21, 2015

Digitized Point

Buffer Area

1:36,112

0 0.3 0.6 1.2 mi

0 0.5 1 2 km

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

EJSCREEN Report

for 2 mile Ring Centered at 20.853606,-156.303746, HAWAII, EPA Region 9

Approximate Population: 8672

Hoku Nui Community

Selected Variables	Raw Data	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.95	N/A	9.78	N/A
Ozone (ppb)	N/A	N/A	N/A	49.7	N/A	46.1	N/A
NATA Diesel PM (µg/m³)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Cancer Risk (lifetime risk per million)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Respiratory Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NATA Neurological Hazard Index*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Traffic Proximity and Volume (daily traffic count/distance to road)	6.6	280	8	190	8	110	15
Lead Paint Indicator (% Pre-1960 Housing)	0.12	0.17	52	0.25	47	0.3	38
NPL Proximity (site count/km distance)	0.0051	0.092	14	0.11	5	0.096	1
RMP Proximity (facility count/km distance)	0.059	0.18	21	0.41	10	0.31	17
TSDF Proximity (facility count/km distance)	0.0054	0.092	15	0.12	1	0.054	11
Water Discharger Proximity (facility count/km distance)	0.059	0.33	14	0.19	18	0.25	16
Demographic Indicators							
Demographic Index	44%	51%	25	46%	49	35%	69
Minority Population	60%	77%	18	57%	52	36%	75
Low Income Population	28%	25%	64	35%	45	34%	46
Linguistically Isolated Population	2%	6%	38	9%	28	5%	56
Population With Less Than High School Education	6%	10%	41	18%	29	14%	31
Population Under 5 years of age	7%	6%	61	7%	53	7%	58
Population over 64 years of age	10%	14%	32	12%	53	13%	42

* The National-scale Air Toxics Assessment (NATA) environmental indicators and EJ indexes, which include cancer risk, respiratory hazard, neurodevelopment hazard, and diesel particulate matter will be added into EJSCREEN during the first full public update after the soon-to-be-released 2011 dataset is made available. The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: http://www.epa.gov/ttn/atw/natamain/index.html.

For additional information, see: www.epa.gov/environmentaljustice

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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Laura Leialoha Phillips McIntyre, AICP
Manager, Environmental Planning Office
State of Hawaii
Department of Health
919 Ala Moana Boulevard, Suite 312
Honolulu, Hawaii 96814

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui; EPO 15-263

Dear Ms. McIntyre:

Thank you for your letter dated October 22, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) offers the following responses to the comments noted in your letter.

1. HNM will review Department of Health (DOH), Environmental Planning Office's standard comments detailed in the website noted in your letter, and adhere to comments specifically applicable to the proposed project.

2. HNM will comply with the National Pollutant Discharge Elimination System (NPDES) permit requirements, as applicable, and review relevant information on the websites listed in your letter.

3. The proposed onsite private wastewater treatment facility for the project will conform to applicable provisions of the DOH Administrative Rules, Chapter 11-62, "Wastewater Systems". Detailed wastewater plans will be submitted to your office for review. As recommended, relevant guidance information will be reviewed at the wastewater branch website.

4. The project design team has been informed of your recommendation to examine and utilize the Hawaii Environmental Health portal (https://eha-cloud.doh.hawaii.gov).

Please note that the project proposed is a comprehensively planned sustainable agricultural community. The Draft Environmental Assessment (EA) will include a sustainability plan which will detail strategies to adopt regenerative farming practices, energy efficient buildings, renewable energy and related sustainability measures.

As recommended, the various tools available on the U.S. Environmental Protection Agency (EPA) website will be explored for applicable strategies that could be implemented on the project.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comments.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Lauren Roth Venu, Roth Ecological
Buddy Almeida, Department of Housing and Human Concerns
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DAVID Y. IGE
GOVERNOR OF HAWAII

OCT 2 6 2015

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

10046PCTM.15

October 22, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: Comments on the Early Consultation Request for the Proposed Hoku Nui Maui Community TMK (2) 2-4-012:005, 039 through 046 Makawao, Island of Maui, Hawaii

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated October 12, 2015, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

5. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like

community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at:http://health.hawaii.gov/cwb/, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

CTM:ay

c: EPO [via e-mail Noella.Narimatsu@doh.hawaii.gov only]

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Alec Wong, P.E., Chief
Clean Water Branch
State of Hawai'i
Department of Health
P.O. Box 3378
Honolulu, Hawai'i 96801-3378

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Wong:

Thank you for your letter dated October 22, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) offers the following information in response to the comments detailed in your letter.

HNM will fully comply with Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55 and any additional requirements related to Department of Health – Clean Water Branch programs. More specifically, the following actions will be taken to address comments offered in your letter, as follows:

1. As applicable, HNM will address criteria related to the anti-degradation policy (HAR, Section 11-54-1.1), designated uses (HAR, Section 11-54-3), and water quality (HAR, Sections 11-54-4 through 11-54-8).

2. Pursuant to HAR, Chapter 11-55, a National Pollutant Discharge Elimination System (NPDES) permit is required and will be obtained.

3. The U.S. Army Corps of Engineers (Corps), Regulatory Branch is being consulted regarding the proposed project. A request for early consultation was submitted to the Corps and they will be provided with a copy of the Draft Environmental Assessment (EA) for further review and comment.

4. As applicable, the project will comply with the State's Water Quality Standards.

5a. HNM proposes the project as a comprehensively planned sustainable agricultural community. The Draft EA will include a Sustainability Plan which will detail sustainability goals and strategies. Practices will involve developing a detailed self sufficient water master plan. Site designs will capture surface, rooftop, and roadway stormwater runoff using grassed swales with underground drainage pipes to direct runoff into a series of retention basins for irrigation and other non-potable water uses. This practice will reduce the demand from an onsite water well to be used for potable water.

5b. As described in the previous paragraph, the project proposes to conserve natural water resources. In addition to capturing storm runoff for irrigation and non-potable uses, conservation measures are intended. These include gray water re-use options and other energy conservation methods through smart designs on the site and using architectural building elements which will be consistent with Leadership In Energy and Environmental Design (LEED) , Living Building Challenge, and Hawaii BuiltGreen Program. HMN also proposes to manage their water resources by proposing the installation of several onsite wastewater treatment systems designed to meet secondary treatment standards to serve the proposed new residential units, commercial facilities and agricultural activities. A critical component of the proposed agricultural community is to achieve sustainable water management practices towards *Net-Zero Water.*

5c. The proposed site designs to have grassed swales and underground drainage pipes to capture storm runoff in retention basins for irrigation and other non-potable uses will minimize potable water demand from the onsite water well. The system of capturing stormwater into retention basins will serve as a permanent BMP feature that will allow revitalization of the natural hydrology and offer natural water treatment through grassed swale surfaces.

5d. As stated in paragraph '5.b.', green building practices are proposed. Out of the project's 258 acres, 238 acres will be a farm lot dedicated to agriculture and native Hawaiian habitat. Within this farm lot is proposed the site design of capturing stormwater runoff in a series retention basins. Therefore, site designs will reduce excessive runoff and the need for excessive fertilization. Also,

regenerative farming practices will be implemented to build soil health and regenerate unhealthy soil to further minimize use of fertilizers.

5e. The proposed project is being developed on an existing agriculturally zoned property with no existing stormwater infrastructure to retrofit or bio-engineer.

It is also noted that the information available on the Department's website will be reviewed and comments applicable to the project will be adhered to.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment. A copy will be sent to you for review and comments. Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:lh
Cc: Joshua Chavez, Hoku Nui Maui
Erik Frost, Hoku Nui Maui
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\DOH CWB Response.doc

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 2, 2015

Munekiyo & Hiraga, Inc.
Attention: Ms. Charlene Shibuya, Senior Associate via email: planning@mhplanning.com
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from the Engineering Division on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 20, 2015

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
_X_Commission on Water Resource Management
___ Office of Conservation & Coastal Lands
_X_Land Division – Maui District
_X_Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community
LOCATION: Makawao, Island of Maui; TMK: (2) 2-4-012:005, 039 through 046
APPLICANT: Hoku Nui Maui

Transmitted for your review and comment is information on the above referenced project. Please submit any comments by **October 30, 2015**.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(✓) Comments are attached.

Signed: _____

Print Name: Carty S. Chang, Chief Engineer
Date: 10/29/15

cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/ Russell Y. Tsuji
Ref.: Early Consultation Request for the Proposed Hoku Nui Maui Community, Makawao Maui.030

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone X. The National Flood Insurance Program (NFIP) does not regulate developments within Zone X.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

( ) Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Carter Romero (Acting) at (808) 961-8943 of the County of Hawaii, Department of Public Works.

( ) Mr. Carolyn Cortez at (808) 270-7253 of the County of Maui, Department of Planning.

( ) Mr. Stanford Iwamoto at (808) 241-4896 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments: _____

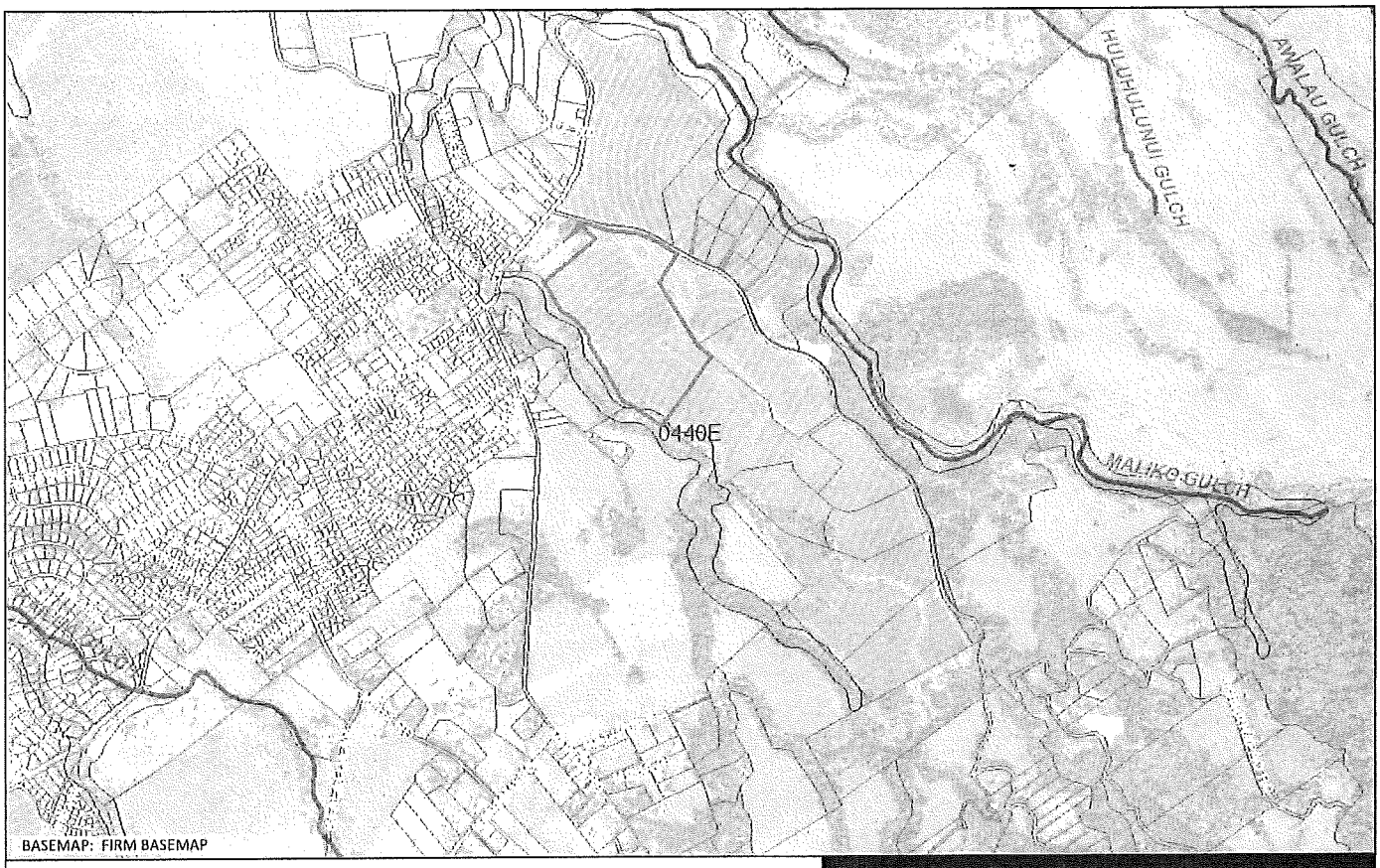
_____

( ) Other: _____

Should you have any questions, please call Mr. Dennis Imada of the Planning Branch at 587-0257.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 10/29/15



BASEMAP: FIRM BASEMAP

Flood Hazard Assessment Report

www.hawaiinfip.org

Property Information

COUNTY:	MAUI
TMK NO:	(2) 2-4-012:005
WATERSHED:	MALIKO
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768

Notes:

Flood Hazard Information

FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: NO
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 0.30 0.60 mi

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.

If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND
(Note: legend does not correspond with NFHL)

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

	Zone A: No BFE determined.
	Zone AE: BFE determined.
	Zone AH: Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
	Zone AO: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
	Zone V: Coastal flood zone with velocity hazard (wave action); no BFE determined.
	Zone VE: Coastal flood zone with velocity hazard (wave action); BFE determined.
	Zone AEF: Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

	Zone XS (X shaded): Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
	Zone X: Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

	Zone D: Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

November 5, 2015

Munekiyo & Hiraga, Inc.
Attention: Ms. Charlene Shibuya, Senior Associate via email: planning@mhplanning.com
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments previously sent you on November 2, 2015, enclosed are comments from the Commission on Water Resources Management on the subject matter. Should you have any questions, please feel free to call Lydia Morikawa at 587-0410. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

October 20, 2015

MEMORANDUM

TO:

DLNR Agencies:
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
___Div. of Forestry & Wildlife
___Div. of State Parks
X Commission on Water Resource Management
___ Office of Conservation & Coastal Lands
X Land Division – Maui District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community
LOCATION: Makawao, Island of Maui; TMK: (2) 2-4-012:005, 039 through 046
APPLICANT: Hoku Nui Maui

Transmitted for your review and comment is information on the above referenced project. Please submit any comments by **October 30, 2015**.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Lydia Morikawa at 587-0410. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(x) Comments are attached.

Signed: /s/ Jeffrey T. Pearson
Print Name: Deputy Director
Date: October 28, 2015

cc: Central Files

FILE ID: RPD. 4267.6
DOC ID: 13471 ✓

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

October 28, 2015

REF: RFD.4267.6

TO: Russell Tsuji, Land Administrator
Land Division

FROM: Jeffrey T. Pearson, P.E., Deputy Director
Commission on Water Resource Management

SUBJECT: Early Consultation Request for the Proposed Hoku Nui Maui Community

FILE NO.: RFD.4267.6
TMK NO.: (2) 2-4-012:005, 039 through 046

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://dlnr.hawaii.gov/cwrm.

Our comments related to water resources are checked off below.

[X] 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

[ ] 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

[X] 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.

[X] 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://hawaii.gov/dbedt/czm/initiative/lid.php.

[X] 6. We recommend the use of alternative water sources, wherever practicable.

[ ] 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

[X] 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

[X] 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

[X] 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.

[X] 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

[ ] 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

[ ] 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.

[ ] 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

[ ] 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

[X] 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

[X] OTHER: The DEA should include a discussion of the potential impacts on water resources, as well as cultural practices dependent on water resources, that may arise if this project is pursued. The DEA should also discuss whether there are any existing wells or other water sources located within the project area; projected water requirements for the project, both potable and non-potable, and the calculations used to derive the projected water needs; water conservation and efficiency measures that will be implemented; the proposed water sources, including any alternative sources of water that may be available to meet nonpotable needs; and BMPs for stormwater management.

If you have any questions, please contact Lenore Ohye of the Planning Branch at 587-0216 or W. Roy Hardy of the Regulation Branch at 587-0225.

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Russell Y. Tsuji, Land Administrator
Land Division
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui; Ref. No. P-14937

Dear Mr. Tsuji:

Thank you for your letters dated October 20, 2015 and November 2, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), offers the following responses to the comments received from your Engineering Division and Commission on Water Resources Management (CWRM).

Engineering Division Comment:

Comment No. 1

The project site lies within Zone X of the Flood Insurance Rate Map (FIRM) and, therefore, is not regulated by the National Flood Insurance Program.

Response:

HNM acknowledges your division's determination that the project site lies within Zone X of the Flood Insurance Rate Map (FIRM). The Draft Environmental Assessment (EA) will include a discussion and exhibit to document that fact.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Commission on Water Resource Management (CWRM) Comments:

Comment No. 1

CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management.

Response:

HNM proposes a progressive agricultural development that will utilize best practices for sustainability. The project will be guided by a Sustainability Plan containing strategies to use non-potable water for irrigation through capturing rainwater held in retention ponds and use of filtered or treated greywater. Other water conservation strategies outlined in the plan include low flow toilets and fixtures, use of drought tolerant plants where feasible, and maximizing green space and open space to encourage percolation and aquifer recharge. A private onsite water system is proposed for domestic purposes and fire protection. Details on the project's potential impacts and proposed mitigation measures on water resources will be detailed in the Draft EA.

Comment No. 2

CWRM recommends coordination with the county to incorporate this project into the county's Water Use and Development Plan.

Response:

As the project's private water system design details are further developed, HNM's design consultants will coordinate with the Department of Water Supply for appropriate direction in this regard.

Comment No. 3

CWRM recommends that water efficient fixtures be installed and water efficient practices be implemented throughout the development to reduce the increased demand on the area's freshwater resources. The reduction in water usage may earn credit towards Leadership in Energy and Environmental Design (LEED) certification.

Response:

As mentioned above, the Sustainability Plan's conservation strategies do include the use of water efficient fixtures. Also, the Sustainability Plan states that sustainable development and building designs adopted by HNM's planned construction will be consistent with the standards of LEED, the Living Building Challenge, and the Hawaii Built Green Program.

Comment No. 4

CWRM recommends the use of best management practices (BMP) for storm water management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Storm water management BMPs may earn credit toward LEED certification.

Response:

The proposed agricultural community's drainage design criteria is intended to minimize any alteration to the existing drainage patterns while collecting and storing stormwater runoff into onsite detention basins. Natural grass swales will be used together with grated inlets as necessary. During construction, necessary BMP practices will be utilized to prevent polluted runoff from storm events.

Comment No. 5

CWRM recommends the use of alternative water sources, wherever practicable.

Response:

As mentioned earlier, the Sustainability Plan will include strategies to use non-potable water for irrigation through capturing rainwater held in retention ponds and use of filtered or treated greywater.

Comment No. 6

CWRM recommends adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online.

Response:

HNM and its consultants will examine additional practices available on the website noted that can supplement strategies previously described, as applicable to the project.

Comment No. 7

There may be the potential for ground or surface water degradation/contamination and recommend the approvals of this project be conditioned upon review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

Response:

As applicable, permits and approvals will be obtained from the Department of Health (DOH), Clean Water Branch for a National Pollutant Discharge Elimination System (NPDES) permit; DOH, Waste Water Branch permit; DOH – Water System approval; and a CWRM Well Construction Permit. HNM will comply with all requirements and conditions of each issued permit and approval.

Comment No. 8

A Well Construction Permit is required before ground water is developed as a source of supply for the project.

Response:

HNM acknowledges that a Well Construction Permit will be required and the necessary approvals applicable to the project will be secured. There is an onsite well (State Well No. 5118-04) with a Certificate of Well Construction Completion issued on April 2, 2009 with an approved pump capacity of 1,200 gallons per minute (gpm). The pump has been replaced with a smaller 205 gpm pump based on a reduced water demand than what was anticipated by the previous property owner. Applicable permit approvals will be noted in the Draft EA.

Comment No. 9

A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

Response:

HNM acknowledges that a Pump Installation Permit will be required and the necessary approvals applicable to the project will be secured. As mentioned in the response to Comment No. 8, the approved pump capacity for the well located onsite is 1,200 gpm. The pump has been replaced with a smaller 205 gpm pump based on a reduced water demand than what was anticipated by the previous property owner. Details on this onsite well source will be included in the Draft EA.

Comment No. 10

The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

Response:

The planned sources of water, as described above, will be described in the Draft EA. The Draft EA will assess potential impact to water resources and identify the anticipated permits applicable to the project.

Comment No. 11

The DEA should include a discussion of the potential impacts on water resources, as well as cultural practices dependent on water resources, that may arise if this project is pursued. The DEA should also discuss whether there are any existing wells or other water sources located within the project area; projected water requirement for the project, both potable and non-potable, and the calculations used to derive the projected water needs; water conservation and efficiency measures that will be implemented; the proposed water sources, including any alternative sources of water that may be available to meet non-potable needs; and BMPs for storm water management.

Response:

As mentioned in the above responses, rainwater, storm runoff, and greywater are proposed for irrigation water use. Domestic water and fire protection are proposed to be supplied by the onsite well. The Draft EA will identify the projects water demand, identify proposed water sources, assess potential impacts to resources, and propose appropriate mitigation measures. As noted previously,

BMPs for stormwater management will be employed during construction and incorporated into the permanent site design.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, Workshop-HI
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\DLNR Land response.doc

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

JEFFREY T. PEARSON
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

October 27, 2015

Charlene Shibuya, Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793
planning@munekiyohiraga.com

Log No: 2015.3782
Doc No: 1510MD05
Archaeology

Aloha Ms. Shibuya:

SUBJECT: **Chapter 6E-42 Historic Preservation Review - Consultation**
Early Consultation for the Hoku Nui Maui LLC Development
Hāli'imaile and Makawao Ahupua'a, Makawao District, Island of Maui
TMK (2) 2-4-012:005, 039-046 [formerly TMK (2) 2-4-012:005 and 009]

Thank you for the opportunity to comment on the subject project, which we received on October 16, 2015. This proposed project entails a sustainable community development project in the upcountry region of East Maui. The applicant is proposing to utilize the provisions of Section 201H, Hawaii Revised Statutes to support the provision of affordable housing for the project and will be engaging in a Chapter 343, HRS environmental assessment (EA) process. Your firm is facilitating this process and has requested comment by SHPD.

A search of our records indicates that an archaeological inventory survey (AIS) has been conducted for this project. Fieldwork was conducted following the inadvertent discovery of a human burial below the till zone during trenching for a water line in 2003; the burial was assigned State Inventory of Historic Places (SIHP) number 50-50-06-5501.

The AIS identified one new historic property, SIHP 50-50-06-6274 which was under passive preservation in 2007. The report documenting the site and the location of the burial was accepted by SHPD in 2008 (McIntosh and Cleghorn 2007; *Log No. 2008.1759, Doc No. 0805PC34*).

We have no records of a preservation plan for SIHP 6274 (located in a gulch), and await a burial plan for SIHP 5501. This project is covered under an approved archaeological monitoring plan submitted in 2008 (Kirkendall, *et al.* 2008; *Log No. 2008.1261, Doc No. 0805PC35*).

Once finalized, the burial location and preservation buffer need to appear on any plan maps for this project in order for us to determine if protections are adequately proposed. **Historic preservation mitigation measures are missing for this project.** Please contact me at (808) 243-4641 or Morgan.E.Davis@hawaii.gov if you have any questions or concerns regarding this letter.

Mahalo,

Morgan E. Davis
Lead Archaeologist, Maui Section

cc: County of Maui
Department of Planning
(Planning@co.maui.hi.us)

County of Maui
Department of Public Works – DSA
(Renee.Segundo@co.maui.hi.us)

County of Maui
Cultural Resources Commission
(Annalise.Kehler@co.maui.hi.us)

Hinano Rodrigues, SHPD History & Culture Branch Chief

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Morgan E. Davis
Lead Archaeologist, Maui Section
State Historic Preservation Division
State of Hawaii
Department of Land and Natural Resources
601 Kamokila Blvd, Suite 555
Honolulu, Hawaii 96707

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui
(Log No.: 2015.3782, Doc No. 1510MD05 Archaeology)

Dear Ms. Davis:

Thank you for your letter dated October 27, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) has retained Archaeological Services Hawaii to prepare a preservation plan for SIHP 6274 and a burial plan for SIHP 5501 as requested in your comment letter. Once this information is submitted to your office for review and approval, the site locations and preservation buffers will be appropriately depicted on project plan maps and construction documents.

This additional archaeological information to be submitted to your office will provide the historic preservation mitigation measures that were not included in the previously submitted Archaeological Inventory Survey reports for the project.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be sent to your office for review and comment.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Lisa Rotunno-Hazuka, Archaeological Services Hawaii
Buddy Almeida, Department of Housing and Human Concerns
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\SHPD response.doc

NOV 0 9 2015

DAVID Y. IGE
GOVERNOR

FORD N. FUCHIGAMI
DIRECTOR

Deputy Directors
JADE T. BUTAY
ROSS M. HIGASHI
EDWIN H. SNIFFEN
DARRELL T. YOUNG

IN REPLY REFER TO:
STP 8.1885

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

October 30, 2015

Ms. Charlene S. Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Hoku Nui Maui Community
Early Consultation for an Environmental Assessment
Makawao, Maui, Hawaii
TMK: (2) 2-4-012:005, 039 through 046

The Draft Environmental Assessment (DEA) should discuss and evaluate the project's contribution to the cumulative traffic impacts on State highways facilities in the area.

If there are any questions, please contact Mr. Norren Kato of the DOT Statewide Transportation Planning Office at telephone number (808) 831-7976.

Sincerely,

FOR FORD N. FUCHIGAMI
Director of Transportation

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Ford N. Fuchigami, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Fuchigami:

Thank you for your letter dated October 30, 2015 providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), acknowledges your comment to include in the Draft Environmental Assessment (EA), a discussion and evaluation of the project's contribution to the cumulative traffic impacts on State highways facilities in the area.

A Traffic Impact Assessment Report (TIAR) will be included in the Draft EA to evaluate impacts on County roadway facilities immediately surrounding the project and nearby Makawao town. The project's primary access onto main roadways will be down Piiholo Road at its intersection with Makawao Avenue. The nearest State facility from the project is Haleakala Highway, located approximately two (2) miles from the project site. The next nearest State facility is Hana Highway located over six (6) miles away from Makawao town along Baldwin Avenue.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comment.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Tyler Fujiwara, Austin Tsutsumi & Associates
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NOV 13 2015

DAVID Y. IGE
GOVERNOR

ARTHUR J. LOGAN
MAJOR GENERAL
ADJUTANT GENERAL

KENNETH S. HARA
BRIGADIER GENERAL
DEPUTY ADJUTANT GENERAL

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

November 10, 2015

Ms. Charlene Shibuya
Munekiya & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2)2-4-012, 039 through 046, Makawao, Maui

Thank you for the opportunity to comment on the subject project.

We strongly recommend one (1) omni-directional 121 db(c) siren be installed for coverage of the proposed development. Hawaii Emergency Management Agency (HIEMA) staff will work with the developer on placement of this additional siren.

We defer to the appropriate State and federal agencies as to the protection of any cultural, historical, and archeological elements of the property.

If you have any questions or concerns, please have your staff contact Mr. Lloyd Maki, Assistant Chief Engineering Officer at (808) 733-8441.

Sincerely,

ARTHUR J. LOGAN
Major General
Hawaii National Guard
Adjutant General

MUNEKIYO HIRAGA
Planning, Project Management, Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Arthur J. Logan, Major General
Hawaii National Guard
State of Hawaii
Department of Defense
Office of the Adjutant
869 Punchbowl Street
Honolulu, Hawai'i 96813-5097

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Logan:

Thank you for your letter dated November 10, 2015 providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), acknowledges your recommendation to install an omni-directional 121 db(c) siren for the proposed development. HNM's engineering consultant will coordinate with your Hawaii Emergency Management Agency (HIEMA) staff on the appropriate placement of this siren.

The Department of Land and Natural Resources - State Historic Preservation Division was consulted on the cultural, historical, and archeological elements of the property and has provided initial comments. The project archaeologist is continuing coordination with the State's archaeologist to address all of the concerns.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comment.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
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NOV 0 6 2015

DAVID Y. IGE
GOVERNOR OF HAWAII

SCOTT GLENN
INTERIM DIRECTOR

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
Department of Health
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813
Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqchawaii@doh.hawaii.gov

November 4, 2015

Munekiyo Hiraga
Attn: Charlene Shibuya, Senior Associate
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Shibuya,

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community, Makawao, Maui

The Office of Environmental Quality Control has reviewed the information contained in your October 12, 2015 letter about the subject project, and offers the following comments for your consideration.

We understand the proposed project is an Applicant Action. The letter stated the trigger under Chapter 343, Hawaii Revised Statutes, is the use of state land. In the draft document, please be sure to identify the Approving Agency. That agency will implement the environmental review process for this project by either 1) anticipating a Finding of No Significant Impact and then preparing a Draft Environmental Assessment (EA) for public review and comment, or 2) based on their judgment and experience, deciding to by-pass the EA step and proceeding directly to the Environmental Impact Statement (EIS) Preparation Notice step if significant effects may or will occur from the project.

In the event that the agency makes a determination to prepare an EIS, either initially or if significant impacts are identified in the Final EA, then the Approving Agency would also determine the acceptability of the subsequent Final EIS.

Based on the information provided, we suggest the consideration of low impact development and green initiatives such as grass pavers for the parking lot to reduce off-site storm water drainage and to increase fresh water infiltration into the ground water resource. The Office of Planning, Land Use Development website: http://planning.hawaii.gov/lud/ has resources for low impact development and green buildings. We also recommend native vegetation for landscaping, as per Act 233 (2015).

The letter provided excellent information on the general layout of the subject property. Given its proposed use for animal husbandry, we recommend the following regarding the management of livestock on the property. Because the total acreage for grazing would

decrease, the density of the animals would likely increase. Please consider environmentally friendly methods for dealing with animal nitrogenous waste. We recommend consideration of best management practices such as not locating the barn or other animal shelters upslope to or near the riparian corridor, in order to limit the impact of waste in the water. The University of Hawaii College of Tropical Agriculture and Human Resources has published guidance appropriate to Hawaii for managing animal waste, such as from pigs (http://www.ctahr.hawaii.edu/oc/freepubs/pdf/lm-23.pdf). Also, we recommend considering the use of different species for grazing the understory, as they eat consume different foods (e.g., sheep, grasses; goats, underbrush). Integrating such an activity with residential use may require management techniques such as tethering the leader to a different area each day to systematically address understory plants and prevent potential damage to residential areas. Lastly, we recommend considering the separation of animal shelters from grazing areas to help decrease parasite issues. For animal nutrition, we recommend that a food animal veterinarian and other local farms be consulted to ensure proper grazing rotation and management.

Thank you for your role in Hawaii's environmental review process and for the opportunity to comment at this early stage of this project. As you prepare to submit documents for publication and public review in The Environmental Notice, we appreciate your diligence in using current and correct publication forms available online. If you have any questions as you navigate this process, please consult our website at http://health.hawaii.gov/oeqc (see in particular the link to the Environmental Assessment Preparation Toolkit on the right panel) or contact our office at (808) 586-4185.

Sincerely,

Scott Glenn, Interim Director

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Scott Glenn, Interim Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Glenn:

Thank you for your letter dated November 4, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner and Applicant, Hoku Nui Maui LLC (HNM), offers the following responses to the comments noted in your letter.

1. The Applicant proposes to utilize the provisions of Section 201H, Hawaii Revised Statutes (HRS), to support the provision of affordable housing for the project. Thus, the County of Maui, Department of Human Concerns will be the Approving Agency. A 'Finding of No Significant Impact' is anticipated and a Draft Environmental Assessment (EA) is being prepared to support this determination.

2. HNM proposes a progressive agricultural development that will utilize best practices for sustainability. A Sustainability Plan will be included in the Draft EA to outline various strategies to be implemented that will support low impact development principles and green initiatives. Also, the recommendation to use native vegetation for landscaping per Act 233 will be facilitated with the 118 acres of the property reserved for native habitat restoration.

3. Guidance and recommendations provided for management of livestock on the property will be considered. The University of Hawaii College of Tropical Agriculture – Haleakala Research Facility is a neighboring property and HNM will look towards their publications as a valuable resource in managing the farm lot's co-existence with riparian corridors and residential lots.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comments.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, Workshop-HI
Jennifer Chirico, Susty Pacific
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OFFICE OF PLANNING
STATE OF HAWAII

DAVID Y. IGE
GOVERNOR

LEO R. ASUNCION
ACTING DIRECTOR
OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

Ref. No. P-14937

November 2, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Ms. Shibuya:

Subject: Early Consultation Request for the Proposed Hoku Nui Maui Community, Makawao, Maui; TMK: (2)2-4-012:005, 039 through 046

Thank you for the opportunity to provide comments on the early consultation request for the Hoku Nui Maui housing and sustainable agricultural community project. The pre-consultation review material was transmitted to our office by letter dated October 12, 2015.

It is our understanding that Hoku Nui Maui proposes the development of a planned sustainable agricultural community near Makawao, Maui. The 258-acre project will incorporate an affordable housing component and Native Hawaiian cultural practice complex. Furthermore, the review material states that all of the facilities will be in harmony with the surrounding environment. The project components include:

- Housing – the homes will be a clustered housing development geared for both affordable and market priced units.
- Farmers Market and a Commercial Kitchen – one acre of the project will reserved for a farm market and commercial kitchen. The market will display and sell agricultural products grown and processed within the Hoku Nui community as well as other farms on Maui.
- Hula Halau facility – to sustain this important Native Hawaiian cultural practice. The halau facility will encompass approximately 3,600 square feet for practice space, storage, and office facilities.
- Farm Operations – livestock will be raised on 120 acres of land. The livestock will include cattle, sheep, goats, pigs, chickens, and egg layers using a regenerative agricultural approach. Two barns of approximately 2,500 square feet each are proposed to accommodate both crops and animals.

- Native Habitat Restoration – 118 acres will be reserved for native habitat, open space, greenways, and access laneways. Other areas will utilize gulch zones, detention basins for stormwater mitigation, and naturally lined drainage swales.
- Infrastructure Improvements – roadway improvements, site grading, water, and wastewater systems development are also planned for this project.

The Office of Planning (OP) has reviewed the transmitted material and has the following comments to offer:

1. Pursuant to the Hawaii Administrative Rules (HAR) Chapter 11-200-10(4) – technical, economic, social, and environmental characteristics – this project must demonstrate that it is consistent with a number of state environmental, social, and economic goals and policies for land-use and housing development. OP provides technical assistance to state and county agencies in administering the statewide planning system in Hawaii Revised Statutes (HRS) Chapter 226, the Hawaii State Plan. The Hawaii State Plan provides goals, objectives, policies, and priority guidelines for growth, development, and the allocation of resources throughout the State. The Hawaii State Plan includes diverse objectives and policies of state interest including but not limited to the economy, agriculture, the visitor industry, federal expenditure, the physical environment, facility systems, socio-cultural advancement, climate change adaptation, and sustainability.

   The Draft Environmental Assessment (Draft EA) should include an analysis that addresses whether the proposed project conforms or is in conflict with the goals, objectives, policies, and priority guidelines listed in the Hawaii State Plan.

2. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State's police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

   HRS Chapter 205A requires all State and county agencies to enforce the coastal zone management (CZM) objectives and policies. The Draft EA should include an assessment as to how the proposed project conforms to the CZM objectives and its supporting policies set forth in HRS § 205A-2. The assessment on compliance with HRS Chapter 205A is an important component for satisfying the requirements of HRS Chapter 343. These objectives and policies include recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection,

and marine resources.

3. Also pursuant to HAR § 11-200-10(4) and HAR § 11-200-10(6) – summary of impacts and alternatives considered; in order to ensure that the natural resources of Upcountry Maui remain protected, the negative effects of stormwater runoff stemming from human activities should be evaluated. The Draft EA should summarize the potential impact to nearshore marine resources and actions proposed to ensure the coastal ecosystem is protected and potential hazards mitigated. Issues that should be examined in the Draft EA include, but are not limited to, site characteristics in relation to erosion controls, protection or enhancement of wetlands, and flood prone areas. These items, as well as the marine water quality classification, should be considered when developing mitigation measures to protect the coastal ecosystem.

   The review material indicated that this project is located well inland of the coastline, it is located in an area classified as agricultural, there are vast undeveloped open spaces, and travel corridors used to access the area. The Draft EA should examine the proposed community development's cumulative impact on coastal resources from polluted runoff and sediment loss, and account for the greater risk of sediment loss from agricultural lands versus urban lands. It should examine the natural process of the land such as water resources, topographic contours, undeveloped open spaces, vegetated versus hardened land surfaces, soil absorption rates, the connecting non-permeable roadways, and any existing drainage infrastructure that may directly connect the parcel to the coastline and vulnerable marine resources.

   OP has a number of resources available to assist in the development of projects which ensure sediment and stormwater control on land, thus protecting the nearshore environment. OP recommends consulting these guidance documents and stormwater evaluative tools when developing strategies to address polluted runoff. They offer useful techniques to keep soil and sediment in place and prevent contaminating nearshore waters, while considering the practices best suited for each project. These three evaluative tools that should be used during the design process include:

   - Hawaii Watershed Guidance provides direction on site-appropriate methods to safeguard Hawaii's watersheds and implement watershed plans http://files.hawaii.gov/dbedt/op/czm/initiative/nonpoint/HI Watershed Guidance Final.pdf

- Stormwater Impact Assessments can be used to identify and evaluate information on hydrology, stressors, sensitivity of aquatic and riparian resources, and management measures to control runoff, as well as consider secondary and cumulative impacts to the area http://files.hawaii.gov/dbedt/op/czm/initiative/stomwater_imapct/final_stormwater_impact_assessments_guidance.pdf

- Low Impact Development (LID), A Practitioners Guide covers a range of structural best management practices (BMP's) for stormwater control management, roadway development, and design layouts that minimizes negative environmental impacts http://files.hawaii.gov/dbedt/op/czm/initiative/lid/lid_guide_2006.pdf

4. The regulatory permits expected to be pursued are unclear. For the planned residential uses within the State Agricultural District, will be applicant be pursuing a Special Permit or district boundary amendment? What are the specific exemptions to be pursued under Section 201H? The Draft EA should provide a thorough discussion with supporting graphics of the soil classifications, productivity and compliance of the proposed uses with Chapter 205, HRS, particularly with respect to permitted uses within the State Agricultural District.

If you have any questions regarding this comment letter, please contact Josh Hekekia of our office at (808) 587-2845.

Sincerely,

Leo R. Asuncion
Acting Director

MUNEKIYO HIRAGA
Planning, Project Management, Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Leo R. Asuncion, Acting Director
Office of Planning
State of Hawaii
P.O. Box 2359
Honolulu, Hawaii 96804

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui; Ref. No. P-14937

Dear Mr. Asuncion:

Thank you for your letter dated November 2, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner Hoku Nui Maui LLC (HNM) offers the following responses to the comments noted in your letter.

1. Pursuant to the Hawaii Administrative Rules (HAR) Chapter 11-200-10(4), the Draft Environmental Assessment (EA) will include a section discussing the proposed project relationship with applicable State and County land use plans, policies, and controls. The Hawaii State Plan's goals, objectives, and policies will be identified that are relevant to the proposed project to demonstrate consistency with regard to State environmental, social, and economic goals and policies for land-use and housing developments.

2. The proposed Hoku Nui Maui Community is not located within the County of Maui's Special Management Area (SMA). However, the project has been reviewed in the context of Hawaii Revised Statutes (HRS) Chapter 205A, which requires all State and County agencies to enforce the Coastal Zone Management (CZM) objectives and policies.

3. Pursuant to HAR 11-200-10(4) and HAR 11-200-10(6), the Draft EA will assess and identify potential impacts on all natural resources, infrastructure, and public services; describe proposed mitigation measures; summarize cumulative and impacts; and evaluate alternatives. The website references listing evaluative tools will be explored for strategies that can be applied to the project.

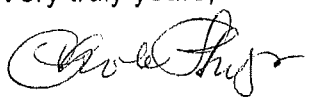
Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

4. The Draft EA will include a list of regulatory permits and approvals applicable to the project. HNM is planning to seek approval for a County of Maui Section 201H, HRS approval to implement this Draft EA. Specific exemptions to be pursued will be included in the Draft EA. Furthermore, the Draft EA will provide a thorough discussion with supporting graphics of the soil classifications, productivity, and compliance of the proposed uses with Chapter 205, HRS with respect to permitted uses within the State Agricultural District.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comments.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,



Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, Workshop-HI
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ALAN M. ARAKAWA
Mayor

KYLE K. GINOZA, P.E.
Director

MICHAEL M. MIYAMOTO
Deputy Director

OCT 2 6 2015

MICHAEL RATTE
Solid Waste Division

ERIC NAKAGAWA, P.E.
Wastewater Reclamation Division

COUNTY OF MAUI
DEPARTMENT OF
ENVIRONMENTAL MANAGEMENT
2050 MAIN STREET, SUITE 1C
WAILUKU, MAUI, HAWAII 96793

October 23, 2015

Munekiyo & Hiraga
Attention: Charlene Shibuya, Senior Associate
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: HOKU NUI MAUI COMMUNITY
EARLY CONSULTATION REQUEST
TMK (2) 2-4-012:005, 039 THRU 046, MAKAWAO

We reviewed the subject application and have the following comments:

1. Solid Waste Division comments:

   a. None.

2. Wastewater Reclamation Division (WWRD) comments:

   a. The County does not have a wastewater system in the area of the subject project.

If you have any questions regarding this memorandum, please contact Michael Miyamoto at 270-8230.

Sincerely,

KYLE K. GINOZA, P.E.
Director of Environmental Management

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 18, 2016

Stewart Stant, Director
County of Maui
Department of Environmental Management
2050 Main Street, Suite 1C
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Stant:

Thank you for your letter dated October 23, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community.

Project owner, Hoku Nui Maui LLC, acknowledges that your Solid Waste Division has no comments to offer and your Wastewater Reclamation Division confirmed that the County does not have a wastewater system in the area of the project.

Thank you for your participation in the Chapter 343, HRS review process. A copy of your comment letter will be included in the Draft Environmental Assessment (EA). Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
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MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 18, 2016

Don Medeiros, Director
Department of Transportation
County of Maui
200 South High Street
Wailuku, Hawaii 96793-2155

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Medeiros:

Thank you for your letter dated October 20, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner Hoku Nui Maui LLC acknowledges that your Department has no comments to offer at this time.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Tyler Fujiwara, Austin Tsutsumi & Associates, Inc.
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OCT 2 3 2015

ALAN M. ARAKAWA
MAYOR

JEFFREY A. MURRAY
CHIEF

ROBERT M. SHIMADA
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE AND PUBLIC SAFETY
FIRE PREVENTION BUREAU

313 MANEA PLACE + WAILUKU, HAWAII 96793
(808) 244-9161 + FAX (808) 244-1363

Date : **October 20, 2015**

To : **Munekiyo & Hiraga , Inc.**
Attn: Charlene Shibuya
305 High Street, Suite 104
Wailuku, HI 96793

Subject : **Early Consultation Request for the Proposed Hoku Nui Maui Community**
Makawao, Maui , Hawaii
TMK : (2) 2-4-012:005,039 through 046

Dear Charlene,

Thank you for allowing the Fire Prevention Bureau the opportunity to comment on the above said project. At this time, we have the following comments:

1. The largest concern may be of the zoning and fire protection requirements. Be advised that Agriculture zoned fire protection is only 500 GPM's for 2 hour duration, which may pose a problem when coming in for the building permits for the Halau and Commercial Kitchen, which may require a minimum of 1500 GPM's for 2 hours. I suggest a meeting with myself, to discuss this further, prior to moving forward.
2. Fire will still be looking for access and fire protection requirements for the different structures that will be part of this project.

Residential and commercial requirements will be implemented. Note that there are differences between the two, and like mentioned above, may pose some problems.

3. We are now in the 2012 NFPA 1 Fire Code and County Amendments, which has some new fire department access requirements in Chapter 18. Please familiarize yourselves with these new requirements and if need clarification, please don't hesitate to contact us here at the Fire Prevention Bureau.

All in all, I believe that this project is good idea for our community. Let's make sure we can also protect the people that will be utilizing it.

If there are any questions, please feel free to contact me by e-mail , peter.davis@mauicounty.gov or at 808-876-4689

Sincerely,

Kono Davis

Kono Davis
Lieutenant, Fire Prevention Bureau
313 Manea Place
Wailuku, HI 96793

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

November 19, 2015

Kono Davis, Lieutenant
County of Maui
Department of Fire and Public Safety
Fire Prevention Bureau
313 Manea Place
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Lieutenant Davis:

Thank you for your letter dated October 20, 2015 regarding the subject project. Our responses to your comments are provided below.

Comment #1: The largest concern may be of the zoning and fire protection requirements. Be advised that Agriculture zoned fire protection is only 500 GPM for 2 hour durations, which may pose a problem when coming in for the building permits for the Halau and Commercial Kitchen, which may require a minimum of 1500 GPM for 2 hours. I suggest a meeting with myself to discuss this further, prior to moving forward.

The project's civil designer anticipates a fire flow of 2,000 gpm for the commercial component of the project. The pipeline sizing, tank sizing, and fire hydrant spacing will be based on this condition. The Draft Environmental Assessment (EA) will contain a Preliminary Engineering Report outlining said design criteria.

Comment #2: Fire will still be looking for access and fire protection requirements for the different structures that will be part of this project. Residential and commercial requirements will be implemented. Note that there are differences between the two, and like mentioned above, may pose some problems.

The project's designers are aware of current fire access requirements and will account for the necessary parameters applicable to each residential and commercial structure.

Comment #3: We are now in the 2012 NFPA 1 Fire Code and County Amendments, which has some new fire department access requirements in Chapter 18. Please familiarize yourselves with these new requirements and if you need clarification, please don't hesitate to contact us here at the Fire Prevention Bureau.

The civil designer is particularly aware of the new requirements for thirty-two (32) feet of paved roadway for dead end streets and will coordinate with your Department to further discuss details as it relates to the project's proposed design layouts.

A copy of your comment letter and our response will be included in the Draft EA. A copy of the Draft EA will be provided to the Department upon its publication in the Office of Environmental Quality Control's Environmental Notice.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui
Erik Frost, Hoku Nui Maui
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
K:\DATA\Hoku Nui\Pilholo Sustainable\ECL Responses\Fire Maui Response.doc

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
HOUSING DIVISION
COUNTY OF MAUI

ALAN M. ARAKAWA
Mayor
CAROL K. REIMANN
Director
JAN SHISHIDO
Deputy Director

35 LUNALILO STREET, SUITE 102 • WAILUKU, HAWAII 96793 • PHONE (808) 270-7351 • FAX (808) 270-6284

NOV 16 2015

November 9, 2015

Ms. Charlene Shibuya, Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Shibuya:

Subject: **Chapter 343, Hawaii Revised Statutes Early Consultation Request for the Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, 039 through 046; Makawao, Maui**

Thank you for the opportunity to review the Chapter 343, Hawaii Revised Statutes Early Consultation Request for the subject property. Based on our review, we have determined that the subject project is subject to Chapter 2.96, Maui County Code that a Residential Workforce Housing agreement is required with the Department of Housing and Human Concerns. At the present time, the Department has no additional comments to offer.

Please call Mr. Veranio Tongson Jr. of our Housing Division at 270-1741 if you have any questions.

Sincerely,

BUDDY A. ALMEIDa
Housing Administrator

cc: Director of Housing and Human Concerns

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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 15, 2016

Buddy A. Almeida, Housing Administrator
Housing Division
County of Maui
Department of Housing and Human Concerns
35 Lunalilo Street, Suite 102
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui;

Dear Mr. Almeida:

Thank you for your letter dated November 9, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner Hoku Nui Maui LLC (HNM) acknowledges the project is subject to Chapter 2.96, Maui County Code that requires a Residential Workforce Housing agreement.

Also, as represented in the early consultation letter, there is an affordable housing component to the proposed project and HNM will further coordinate with your division on the Section 201H-38 application process.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA together with the Section 201H-38 Affordable Housing application will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\DHHC response.doc

ALAN M. ARAKAWA
Mayor

WILLIAM R. SPENCE
Director

MICHELE CHOUTEAU McLEAN
Deputy Director

NOV 16 2015

COUNTY OF MAUI

DEPARTMENT OF PLANNING

November 16, 2015

Ms. Charlene Shibuya, Senior Associate
Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES (HRS), EARLY CONSULTATION COMMENTS FOR THE PROPOSED HOKU NUI MAUI COMMUNITY, LOCATED AT TMK NO.: (2) 2-4-012:005, 039 THROUGH 046, MAKAWAO, ISLAND OF MAUI, HAWAII; (RFC 2015/0161)

Dear Ms. Shibuya:

Thank you for the opportunity to provide comments on the proposed 201H, HRS, affordable housing project located on 258 acres in the Olinda area of Upcountry Maui. The property owner is proposing a cluster or conservation subdivision design with a total of twenty-one (21) lots and forty-two (42) housing units. Twenty (20) of the lots will be one (1) acre clustered lots shown in three (3) clustered areas (Residential Kauhale I, II, and III) on the site plan provided. The proposed one (1) acre house lots will include a main dwelling and an affordable accessory dwelling. The developer is proposing to develop the lots under a condominium property regime to allow for separate ownership of the market and affordable units. The remaining 238 acre farm lot will remain dedicated in perpetuity to agriculture and native Hawaiian habitat. A farm market, commercial kitchen, and hula halau facility are also included in the project proposal. Listed below are the Department of Planning's (Department) initial comments:

1. Clustered site plan. The Department recognizes the value of the clustered site plan which leaves a 238 acre farm lot.. It would be useful to state in the Environmental Assessment (EA) what the current zoning restrictions provided in Maui County Code (MCC) Title 19, Section 19.30A.030 District Standards, would allow for the development of the properties in comparison to what the Applicant is proposing. A sliding scale site plan showing the comparison would also be useful.

   Please include the subdivision cluster site plans in the EA, as well as a description of the process used for siting the home lots, hula halau facility, and farm lot.

2. Condominium property regime. The Department does not support the use of condominium property regimes to separate the ownership of the market and affordable lots. The Department does not recognize a condominium property regime, thus the two (2) lots would be treated as one (1) lot. Please address in the EA the treatment of lots in regards to condominium property regimes by each of the County of Maui Departments and the implications for the individual property owners.

   It would also be useful to explain the reasoning behind the use of a condominium property regime under the 201H HRS process and if the 201H process would allow for the lots to be further subdivided instead of condominiumized.

   It is unclear in the project description if the affordable units will be sold. Please clarify and also discuss if and how the affordable units will remain affordable in perpetuity.

3. Farm lot. Please include a more detailed site plan for the 238 acre farm lot parcel which shows greenways, access roads, the native habitat areas, areas that could be used for farming, open space areas, proposed agricultural structures, etc.

   Please discuss the ownership and management of the farm lot, commercial kitchen, and market. Is the Applicant proposing to keep the farm lot and manage the agricultural activities, lease to a farming entity, or sell it? Would different entities manage different activities on the farm lot?

   On the site plan, show the location of the proposed dwelling or dwellings on the 238 acre farm lot. What are the plans for the farm dwelling(s)?

   The project description states that farm labor housing may be warranted and would need to meet the requirements of MCC 19.30A.050. Please provide a brief description of the number and type of housing that could be constructed, *i.e.,* number of units, square footage, number of bedrooms, etc. Also, discuss how the Applicant would meet the requirements set forth in MCC 19.30A.050.

   The EA should include a description of the different methods of agricultural dedication and the method the Applicant intends to use to permanently dedicate the property to agriculture.

4. Hula halau facility. The Applicant seeks to integrate cultural elements into the project with the inclusion of a hula halau facility. Under MCC, Section 19.30A Agricultural District, hula halau activities in the Agricultural District are subject to certain requirements. Please consult with the Department's Zoning Administration and Enforcement Division for the requirements. Specific

exemptions from the code, or a State Land Use Special Use Permit, and/or a Conditional Permit may be required.

5. Community input. Please include information about community and neighbor meetings about the project, and how the Applicant has addressed concerns.

Thank you for the opportunity to comment. If additional clarification is needed, please contact Staff Planner Gina Flammer at gina.flammer@mauicounty.gov or at (808) 270-5780.

Sincerely,

CLAYTON I. YOSHIDA, AICP
Planning Program Administrator

for WILLIAM SPENCE
Planning Director

xc: Gina M. Flammer, Staff Planner (PDF)
RFC Project File
General File
WRS:CIY:GMF:sn
K:\WP_DOCS\PLANNING\RFC\2015\0161_HokuNuiMaui\Early consultation comments.doc

MUNEKIYO HIRAGA
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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 24, 2016

William Spence, Director
Department of Planning
County of Maui
2200 Main Street, Suite 315
Wailuku, Hawai'i 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Spence:

Thank you for your letter dated November 16, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner, Hoku Nui Maui LLC (HNM), provides the following responses in the order of the comments listed in your letter.

1. Clustered Site Plan

In the Draft Environmental Assessment (EA), HNM will include a proposed subdivision cluster site plan along with the current approved subdivision final plat map and the agricultural allocation agreement. A comparison of what is permitted under the Maui County Code (MCC) Title 19.30A.030 District Standards will be provided in the Draft EA.

2. Condominium Property Regime

An explanation of the reasoning behind the use of a condominium property regime (CPR) under the 201H HRS process will be included in the Draft EA. The strategy for using the CPR process is to separate the market and affordable units in a creative approach to providing affordable units while complying with the agricultural allocation agreement. There are limitations imposed by the agricultural allocation agreement that would prevent the same intent to be achieved with separate subdivided lots in lieu of a CPR arrangement that would provide a viable number of affordable units under the 201H process. Affordable units are intended to be sold under the Affordable Sales Price Guidelines

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

established annually by the County of Maui Department of Housing and Human Concerns. Architectural designs of the affordable units will use these price ranges as their cost criteria.

3. Farm Lot

A conceptual site plan and Preliminary Engineering Report will be included in the Draft EA to show the proposed drainage scheme. The drainage design criteria is intended to minimize any alteration to the existing drainage patterns while collecting and storing stormwater runoff into onsite detention basins. Natural grass swales will be used together with grated inlets as necessary. The swales and detention basins are proposed within the farm lot together with the variety of permitted agricultural land uses prescribed under MCC Title 19.30A.050 Permitted Uses.

4. Hula Halau Facility

HNM and its consultants will further coordinate with the Planning Department's Zoning Administration and Enforcement Division to verify exemptions from the code necessary to permit the Hula Halau Facility without obtaining a State Land Use Special Use Permit and/or a Conditional Permit. Any requirements identified as applicable to the project will be included in the Draft EA.

5. Community Input

HNM has been engaged in a continuing dialog with the Makawao Community Association (MCA) Board and General Membership. HNM has also met with the neighboring St. Joseph Church's Parrish Council. HNM is continuing to update the community on the proposed project's development through periodic meetings with the MCA and church Parrish. Outcomes of these meetings will be summarized in the Draft EA.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA together with the 201H-38 Affordable Housing application will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
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NOV 0 6 2015

POLICE DEPARTMENT
COUNTY OF MAUI

ALAN M. ARAKAWA
MAYOR

OUR REFERENCE

YOUR REFERENCE

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

TIVOLI S. FAAUMU
CHIEF OF POLICE

DEAN M. RICKARD
DEPUTY CHIEF OF POLICE

November 3, 2015

Ms. Charlene Shibuya
Senior Associate
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, HI 96793

Dear Ms. Shibuya:

SUBJECT: Chapter 343, HRS, Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, 039 through 046; Makawao

We have reviewed the information submitted for this project and have submitted our comments and/or recommendations. Thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Victor K. Ramos
for: Tivoli S. Faaumu
Chief of Police

c: William Spence, Dept. of Planning

TO : **TIVOLI S. FAAUMU, CHIEF OF POLICE, COUNTY OF MAUI**

VIA : **CHANNELS**

Victor K. Ramos
Assistant Chief
11/02/16.

FROM : **JAN PONTANILLA, POIII, COMMUNITY POLICE OFFICER**

SUBJECT : **CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR THE PROPOSED HOKU NUI MAUI COMMUNITY AT TMK (2)2-4-012:005, 039 THROUGH 046; MAKAWAO MAUI**

This communication is being submitted as a response to early comments on the proposed project for the Environmental Assessment (EA) process, for Hoku Nui Maui Community at TMK (2)2-4-012:005, 039 through 046; Makawao, Maui. This request is being made by Charlene Shibuya, Senior Associate, Munekiyo & Hiraga, at 305 S. High Street #104 Wailuku, HI 96793.

PROJECT	:	Proposed Hoku Nui Maui Community
TMK(s) #	:	(2) 2-4-012:005, 039 through 046
APPLICANT	:	Charlene SHIBUYA, Senior Associate Munekiyo & Hiraga, Inc.

The proposed project is located on the south side of Piiholo Road at TMK (2) 2-4-012:005, 039 through 046; Makawao, Maui, between St. Joseph Church and UH Haleakala Research Facility. County zoning for the parcel is designated Agricultural land. The proposed 258-acre Hoku Nui project incorporates market and affordable housing. There will be a total of 41 units within a 21 acre cluster housing format. The remaining acres will include an area reserved for native habitat, farm operations, a farm market, commercial kitchen and hula halau.

COMMENTS:

In review of the submitted documents, concerns from the Police perspective are upon the safety of pedestrian and vehicular movement. Currently the traffic flow in the area of the project are minimal as it is not fully developed however, upon developing, this will increase the amount of vehicles and pedestrian traffic as well as increasing calls for service in this area.

RECOMMENDATIONS:

Recommendations from a police standpoint would be to increase lighting in this area for motorists and pedestrians entering and exiting the development. There are no other concerns for the proposed project.

Respectfully Submitted,

Officer J. PONTANILLA E15061
Community Oriented Police
10/30/15 @ 0900 hours

Concur with Officer PONTANILLA's recomendation for lighting at the entrance and exit of property. 20 housing lots proposed do not pose any immediate concerns for traffic on the less traveled Piiholo Road.

Heather M. GILROY E-# 12687

Concur w/ comments -
Capt
11/3/15

MUNEKIYO HIRAGA
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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Tivoli S. Faaumu, Chief of Police
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Chief Faaumui:

Thank you for your letter dated November 3, 2015 providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), offers the following responses to the comments received from your Community Police Officer for the Makawao area.

HNM and its consultants acknowledge your department's recommendations to increase lighting in the area for motorists and pedestrians entering and exiting the development. Additional street lighting for the proposed access connections onto Piiholo Road will be incorporated as appropriate for this rural area.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comment.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Tyler Fujiwara, Austin Tsutsumi & Associates
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NOV 0 6 2015

ALAN M. ARAKAWA
Mayor

DAVID C. GOODE
Director

ROWENA M. DAGDAG-ANDAYA
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
200 SOUTH HIGH STREET, ROOM NO. 434
WAILUKU, MAUI, HAWAII 96793

GLEN A. UENO, P.E., P.L.S.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

November 3, 2015

Ms. Charlene Shibuya, Senior Associate
MUNEKIYO HIRAGA
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Ms. Shibuya:

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION FOR THE HOKU NUI MAUI COMMUNITY; TMK (2) 2-4-012:005, 039 THROUGH 046; MAKAWAO, MAUI

We reviewed your early consultation request and have the following comments:

Comments from the Development Services Administration, Subdivision and Civil Construction Section:

1. A listing of code exemptions proposed under the Section 201H process was not provided. We may have additional comments if code exemptions under the Department of Public Works (DPW) jurisdiction will be requested.

2. The properties included with the project are large and sloping. The project also includes extensive proposed development. It is recommended that Low Impact Development (LID) design is used for the project.

Comments from the Highways Division:

3. If internal roads are to be dedicated to the County, they shall be constructed to County standards as determined by DPW's Engineering Division.

4. Any landscaping along the Piiholo Road frontage and along any roads proposed to be dedicated to the County shall be provided with root barriers to mitigate damage to public infrastructure.

5. Ensure adequate sight distance at the proposed public access locations along Piiholo Road.

6. The proposed engineered wetland, demonstration loi area and catchment/retention pond area shall be located far enough away from Piiholo Road to prevent saturation of the soils under the Piiholo Road right of way. Saturation of soils could cause structural damage to the road infrastructure and appurtenant shoulder improvements.

Please call Rowena M. Dagdag-Andaya at 270-7845 if you have any questions regarding this letter.

Sincerely,

DAVID C. GOODE
Director of Public Works

DCG:RMDA:da
xc: Highways Division
Engineering Division
S:\DSA\Engr\CZM\Draft Comments\24012005_039-046_hoku_nui_maui_comm.wpd

MUNEKIYO HIRAGA
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Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

David C. Goode, Director
Department of Public Works
County of Maui
200 South High Street, Room No. 434
Wailuku, Hawaii 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Goode:

Thank you for your letter dated November 3, 2015 providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), offers the following responses to the comments received from your Development Services Administration (DSA) and Highways Division.

Comments from the Development Services Administration, Subdivision and Civil Construction Section

Comment No. 1

A listing of code exemptions proposed under the Section 201H process was not provided. We may have additional comments if code exemptions under the Department of Public Works (DPW) jurisdiction will be requested.

Response:

A list of proposed code exemptions will be included in the Draft Environmental Assessment (EA). HNM and its consultants will coordinate preliminary discussions with your DSA office of these proposed exemptions.

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

Comment No. 2

The properties included with the project are large and sloping. The project also includes extensive proposed development. It is recommended that Low Impact Development (LID) design is used for the project.

Response:

HNM is aware of LID goals to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. The proposed project is situated on 258 acres of agricultural zoned property in a rural setting. Twenty (20) acres are proposed for clustered housing lots. The remaining 238 acres will be a large farm lot to support agricultural activities with approximately 3 acres for a hula halau facility. The proposed agricultural community's drainage design criteria is intended to minimize any alteration to the existing drainage patterns while collecting and storing stormwater runoff into onsite detention basins for irrigation water. Natural grass swales will be used together with grated inlets as necessary. Other LID strategies will be explored as applicable to the project's various components.

Comments from the Highways Division

Comment No. 3

If internal roads are to be dedicated to the County, they shall be constructed to County standards as determined by DPW's Engineering Division.

Response:

Internal roads are intended to be dedicated to the County and will be constructed to comply with DPW's requirements.

Comment No. 4

Any landscaping along the Pi'iholo Road frontage and along any roads proposed to be dedicated to the County shall be provided with root barriers to mitigate damage to public infrastructure.

Response:

HNM acknowledges the need for root barriers around trees along Pi'iholo Road and internal dedicated roads and will include them in the project's site construction plans.

Comment No. 5

Ensure adequate sight distance at the proposed public access locations along Pi'iholo Road.

Response:

HNM's civil consultant will analyze all proposed access connections onto Piiholo Road and design the intersections to meet acceptable engineering standards relative to sight distance and other geometric requirements.

Comment No. 6

The proposed engineered wetland, demonstration loi area and catchment/retention pond area shall be located far enough away from Pi'iholo Road to prevent saturation of soils could cause structural damage to the road right-of-way infrastructure.

Response:

The proposed site design will make provisions for the retention ponds and loi areas to be situated at a sufficient distance from Pi'iholo Road and internal roads to be dedicated to the County, to prevent road structure damage.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering Inc.
Tyler Fujiwara, Austin Tsutsumi & Associates
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ALAN M. ARAKAWA
Mayor

JO ANNE JOHNSON-WINER
Director
MARC I. TAKAMORI
Deputy Director
Telephone (808) 270-7511

OCT 29 2015

DEPARTMENT OF TRANSPORTATION

COUNTY OF MAUI
200 South High Street
Wailuku, Hawaii, USA 96793-2155

October 20, 2015

Ms. Charlene Shibuya
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Subject: Early Consultation Request for the Proposed Hoku Nui Maui Community

Dear Ms. Shibuya,

Thank you for the opportunity to comment on this project. We have no comments to make at this time.

Please feel free to contact me if you have any questions.

Sincerely,

Jo Anne Johnson Winer
Director

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

January 18, 2016

Don Medeiros, Director
Department of Transportation
County of Maui
200 South High Street
Wailuku, Hawaii 96793-2155

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Medeiros:

Thank you for your letter dated October 20, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner Hoku Nui Maui LLC acknowledges that your Department has no comments to offer at this time.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Tyler Fujiwara, Austin Tsutsumi & Associates, Inc.
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Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

NOV 13 2015

ALAN M. ARAKAWA
Mayor

DAVID TAYLOR, P.E.
Director

PAUL J. MEYER
Deputy Director

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793-2155
www.mauiwater.org

November 6, 2015

Munekiyo & Hiraga, Inc.
Attn.: Charlene Shibuya, Senior Associate
305 High Street, Ste 104
Wailuku, HI 96793

Dear Ms. Shibuya:

RE: Early Consultation for a Draft Environmental Assessment (DEA)
Proposed Hoku Nui Maui Community (Makawao, Maui, Hawaii)
TMK: (2) 2-4-012:005, 039-046

Thank you for the opportunity to offer the following comments on the above referenced project. We understand that the applicant, Hoku Nui Maui, proposes to develop a sustainable agricultural community, utilizing Section 201H, Hawaii Revised Statutes, to support the provision of affordable housing for the project.

Source Availability, Consumption and System Infrastructure
The potable water source for the project site is the Makawao aquifer, with a sustainable yield of 7 million gallons per day according to the Commission on Water Resource Management (CWRM).

The site is not metered by the Department of Water Supply (DWS). We note that the Piiholo South Well No. 5118-04, with a capacity of 1.68 million gallons per day is located on TMK (2) 2-4-012:005. The DEA should identify potable and non-potable water needs.

Please be aware that DWS may request an easement crossing the site located at approximately 1,800' elevation to accommodate a new transmission line and tank. Please contact Jase Miyabuchi, at 270-7835 or jase.miyabuchi@mauicounty.gov regarding this issue.

Pollution Prevention
In order to protect ground and surface waters, Best Management Practices (BMPs) designed to minimize infiltration and runoff should be noted in the DEA and implemented during construction. Attached you will find a draft of the Wellhead Protection (WHP) Ordinance, which includes construction BMPs and WHP Overlay District Map No. 6.

Conservation
We are pleased that native plants for the native habitat, open spaces and greenways, which conserve water and protect the watershed from degradation will be extensively used. DWS recommends that the following conservation measures be included in the DEA and implemented in the project.

Outdoor Conservation Measures

- Use Smart Approved WaterMark irrigation products. Examples include ET irrigation controllers, drip irrigation, and water saving spray heads;
- Avoid plant fertilizing and pruning that would stimulate excessive growth. Time watering should occur in the early morning or evening to limit evaporation; and
- Dust control: Reclaimed water for dust control should be considered as an alternative source of non-potable water for dust control during construction.

Indoor Conservation Measures:

- Use EPA WaterSense labeled plumbing fixtures;
- Install flow reducers and faucet aerators in all plumbing fixtures wherever possible; and
- Install dual flush toilets with high efficiency models that use 1.28 gallons per flush or less.

Should you have any questions, please contact staff planner Marti Buckner at (808) 463-3104 or marti.buckner@co.maui.hi.us.

Sincerely,

Dave Taylor, P.E., Director
mlb
attachments: Draft Chapter 19.94 WHP Overlay District; WHP Overlay District Map No. 6.
cc: DWS Engineering Division
DWS Water Resources & Planning Division

3/19/14 DRAFT

ORDINANCE NO. _____

BILL NO. _____ (2015)

A BILL FOR AN ORDINANCE AMENDING TITLE 19, MAUI COUNTY CODE, TO ESTABLISH A WELLHEAD PROTECTION OVERLAY DISTRICT

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

SECTION 1. Title 19, Maui County Code, is amended by adding a new chapter to be appropriately designated and to read as follows:

"**CHAPTER 19.94**

WELLHEAD PROTECTION OVERLAY DISTRICT

Sections:

19.94.010 Purpose and intent.
19.94.020 Definitions.
19.94.030 Applicability.
19.94.040 Wellhead protection overlay district zones and maps.
19.94.050 Regulations for Zone A.
19.94.060 Regulations for Zone B.
19.94.070 Regulations for Zone C.
19.94.080 Wellhead protection permits.
19.94.090 Best Management Practices.
19.94.100 Design guidelines.
19.94.110 Liability.
19.94.120 Interpretation of District Boundaries.
19.94.130 Enforcement.
19.94.140 Administrative Rules.
19.94.150 Severability.

19.94.010 Purpose and intent. Maui County recognizes that many residents rely on groundwater for their safe drinking water supply, and that certain land uses may contaminate groundwater sources. To ensure the protection of these drinking water sources, this ordinance establishes a zoning overlay district to be known as the Wellhead

Protection Overlay District ("WPOD"). The purpose and intent of the WPOD is to:

A. Protect the public's health, welfare, and safety by minimizing the risks of contamination of aquifers;

B. Preserve and protect existing and potential drinking water sources;

C. Implement land use policies consistent with the Maui County General Plan and Community Plans; and

D. Restrict and prohibit land uses that are incompatible with groundwater protection.

19.94.020 Definitions. The following definitions shall apply to this chapter. Terms not defined below shall have the meanings set forth in section 19.04.040 of this code, unless the context clearly indicates a different meaning:

"Confined animal feeding operation" means a lot or facility (other than an aquatic animal production facility) where animals will be stabled or confined and fed or maintained for a total of 45 days or more in any 12 month period, and where crops, vegetation forage growth, or post harvest residues are not sustained in the normal growing season over any portion of the lot or facility. Pasture operations are not confined animal feeding operations.

"Contamination" means an impairment of water quality by one or more of the regulated substances listed in Appendix A attached hereto.

"Dump" means a lawfully operated and privately owned refuse disposal site.

"Hazardous material" means substances that are identified as hazardous waste by the U.S. Environmental Protection Agency set forth in 40 CFR Part 261 Subpart D or identified as a hazardous substance designated by the U.S. Environmental Protection Agency pursuant to 40 CFR part 302.

"Integrated Pest Management" means a decision-making process that considers cultural, mechanical, biological and chemical controls of pests such as insects or rodents. Control mechanisms are selected as each situation warrants. Where chemical control is indicated, specific pest populations are targeted for treatment when they are most vulnerable rather than a general pesticide application.

"Landfill" means any sanitary landfill maintained and operated by the County.

"Primary Containment Facility" means a tank, pit, container, pipe or vessel containing a liquid or chemical that is not a secondary containment facility.

"Public Water System" as per the administrative rules of the State of Hawaii Department of Health (HAR 11-20-2), means a water system which provides water for human consumption, through pipes or other constructed conveyances if the system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least sixty days out of any 12-month period. Such term includes: (1) any collection treatment, storage and distribution facility under control of the operator of such system, and (2) any collection or pretreatment storage facility not under such control which are used primarily in connection with such system.

"Regulated substances" means substances regulated under the National Drinking Water Regulations implementing the Safe Drinking Water Act or under the Rules Relating to Public Water Systems pursuant to Hawaii Administrative Rules Title 11 Chapter 20 and listed in Appendix A, attached hereto and incorporated herein by reference and may be amended in the same manner as any part of this chapter.

"Release" means any unplanned or unpermitted discharge, leak, or spill of a potential contaminant including a hazardous material.

"Secondary Containment Facility" means a second tank, catchment pit, pipe, or vessel that limits and contains liquid or chemical leaking or leaching from a primary containment area.

"Sewage sludge" means any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, industrial process, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.

"Time-of-travel" ("TOT") distance means the distance that groundwater will travel in a specified time. This distance is generally a function of the permeability and slope of the aquifer.

"Wellhead protection area" means the surface and subsurface area surrounding a water well or well field that supplies a public water system, through which contaminants are reasonably likely to move toward and reach the water well or well field.

"Wellhead protection overlay district" (WPOD) means the zoning district consisting of the wellhead protection areas as identified on the maps entitled "Wellhead Protection Overlay District Zones", dated June 4, 2013, on file in the Office of the County Clerk with certified copies being placed on file in the Department of Planning and the Department of Water Supply.

19.94.030 Applicability. This ordinance shall apply to wellhead protection overlay district zones as defined herein for Department of Water Supply wells. Nonconforming uses as defined in

section 19.04.040 are subject to the provisions of section 19.500.110 of this code.

19.94.040 Wellhead protection overlay district zones and maps. WPOD zones are delineated by the University of Hawaii Department of Geology and Geophysics utilizing a fixed distance for Zone A nearest to the well, and TOT distance criteria for Zones B and C using the United States Geological Survey three-dimensional numerical groundwater model MODFLOW followed by a particle tracking program MODPATH. Zone B is intended to designate a conservative estimate of the area that may contribute bacteria and viruses to the wellhead. A two-year TOT criterion is based on survival times for bacteria and viruses in soil and groundwater. Zone C is based on a ten-year TOT to allow sufficient time to implement management and remedial measures to mitigate contamination from accidental contaminant spills and other causes.

A. The WPOD zones are superimposed on all current zoning districts and identified on the maps entitled "Wellhead Protection Overlay District Zones", dated June 4, 2013, on file in the Office of the County Clerk with certified copies being placed on file in the Department of Planning and the Department of Water Supply. Said Wellhead Protection Overlay District zone maps shall be deemed to be incorporated herein by reference, and may be amended in the same manner as any part of this chapter.

B. The WPOD zones are designated as follows:

1. ZONE A - 50 feet direct chemical contamination zone. Zone A is defined as the fixed 50-foot radius around each well. The purpose of this zone is to provide protection from vandalism, tampering, or other threats at a well site.

2. ZONE B - Indirect microbial contamination zone. Zone B consists of the surface area overlying the portion of an aquifer that contributes water to the well within two years..

3. ZONE C - Indirect chemical contamination zone. Zone C consists of the surface area overlying the portion of an aquifer that contributes water to the well within ten years.

19.94.050 Regulations for Zone A. Permitted uses: Necessary public utilities/facilities including the construction, maintenance, repair, and enlargement of drinking water supply-related facilities including but not limited to wells, pipelines, aqueducts, and tunnels.

19.94.060 Regulations for Zone B.

A. Permitted uses: All uses permitted in the underlying zoning districts, unless required to obtain a wellhead protection permit pursuant to subsection B below, or prohibited in subsection C below.

B. Permit required. The following uses in Zone B shall require a wellhead protection permit issued by the director of Water Supply pursuant to section 19.94.080.

1. Commercial automobile body/repair shops.

2. Car washes.
3. Cement/concrete plants.
4. Gas stations.
5. Fleet/trucking/bus terminals.
6. Dry cleaners.
7. Irrigated crops using soil fumigants (>50 acres) or pesticides rated by the U.S. Environmental Protection Agency as having high leachability potential.
8. Commercial machine shops.
9. Commercial wood preserving/treating facilities.
10. Confined animal feeding operations.
11. Commercial equipment maintenance/fueling areas.
12. Hospitals.
13. Parking lots/malls (>50 spaces).
14. Waste transfer/recycling stations.
15. All non-residential facilities involving collection, handling, manufacture, use, storage, transfer or disposal of more than 55 gallons of petroleum products or more than 10 gallons for any other regulated substance as defined herein.
16. Subdivisions that create three (3) or more residential or residential mixed use developable lots.

C. Prohibited uses. The following uses are prohibited within Zone B.

1. New cesspools.
2. Commercial electrical/electronic manufacturing facilities that utilize regulated substances as defined herein.
3. Mortuaries/graveyards.
4. Golf courses.
5. Commercial metal plating/finishing/fabricating facilities that utilize regulated substances as defined herein.
6. Commercial chemical processing/storage facilities.
7. Plastics/synthetic production facilities that utilize regulated substances as defined herein.
8. Commercial junk/scrap/salvage yards.
9. Mines.
10. Landfills/dumps.
11. Injection wells/dry wells/sumps on non-residential properties.
12. Irrigation with reclaimed wastewater classes R2 and R3.
13. Sewage sludge land applications.
14. Commercial slaughterhouses.
15. Wastewater percolation ponds.

19.94.070 Regulations for Zone C.

A. Permitted uses: All uses permitted in the underlying zoning districts, unless required to obtain a wellhead protection permit pursuant to subsection B below, or prohibited in subsection C below.

B. Permit required. The following uses in Zone C shall require a wellhead protection permit issued by the director of Water Supply pursuant to section 19.94.080.

1. Commercial automobile body/repair shops.
2. Gas stations.
3. Fleet/trucking/bus terminals.
4. Dry cleaners.
5. Golf courses.
6. Commercial machine shops.
7. Commercial wood preserving/treating facilities.
8. Confined animal feeding operations.
9. Commercial equipment maintenance/fueling areas.
10. All nonresidential facilities involving collection, handling, manufacture, use, storage, transfer or disposal of more than 55 gallons of petroleum products or more than 10 gallons of any other regulated substance as defined herein.
11. Subdivisions that create three (3) or more developable residential lots, including residential mixed use lots.

C. Prohibited uses. The following uses are prohibited within Zone C:

1. New cesspools.
2. Commercial electrical/electronic manufacturing facilities that utilize regulated substances as defined herein.
3. Commercial chemical processing/storage facilities.
4. Commercial plastics/synthetic production facilities that utilize regulated substances as defined herein
5. Commercial junk/scrap/salvage yards.
6. Commercial metal plating/finishing/fabricating facilities that utilize regulated substances as defined herein.
7. Mines.
8. Landfills/dumps.
9. Injection wells/dry wells/sumps on non-residential properties.
10. Wastewater percolation ponds.

19.94.080 Wellhead protection permits.

A. Wellhead protection permit applications shall be submitted to the director of Water Supply, and shall include:

1. The name, address, and phone number of the applicant who will be responsible for implementation of best management practices;
2. Verification of property ownership; authorization by all property owners if the applicant is not the sole owner of the subject property.
3. The tax map key of the project site;
4. A plot plan showing the project location on the tax map key parcel;

5. A description of the proposed use, including names and quantities of any regulated substances collected, handled, manufactured, used, stored, transferred or disposed of at the project site;

6. A Best Management Plan addressing all activities subject to the Wellhead Protection Permit;

7. Additional information as may be requested by the director of Water Supply.

B. Permit processing.

1. Upon receipt of a complete application, the director of Water Supply shall approve or deny the application pursuant to the requirements of this chapter, and may impose conditions upon the proposed use to ensure that the purpose and intent of this chapter are met. If a complete application does not meet the requirements of this chapter, it shall be denied.

2. Initial permits shall be valid for a period of up to five (5) years. Subsequent permit renewals and permit amendments may be granted by the director of Water Supply for longer duration. In reviewing applications for renewals, the director of Water Supply shall require evidence of compliance with applicable best management practices and any other permit conditions.

3. All permits and renewals shall contain a provision for inspection at reasonable times and upon presentation of appropriate credentials.

C. Revocation and Appeal. Any wellhead protection permit may be revoked at any time and/or may not be renewed by the director of Water Supply if the permit terms and conditions have been violated or if the requirements of this chapter have not been met. Appeals of permit denials, revocations, non-renewals or alleging errors shall be heard and determined by the board of variances and appeals pursuant to chapter 19.520 of this code.

19.94.090 Best Management Practices. The following standards shall apply to uses in Zones B and C of any WPOD.

A. Any non-residential facility involving the collection, handling, manufacture, use, storage, transfer or disposal of more than 55 gallons of petroleum products or more than 10 gallons of any regulated substance as defined herein, must have a secondary containment system which shall be easily inspected and whose purpose is to intercept any leak or release from the primary containment vessel or structure.

B. Confined animal facilities shall meet the minimum requirements for operating a confined animal facility set forth in Department of Health "Guidelines for Livestock Waste Management dated January 19, 2010" as may be amended.

C. The irrigation of crops shall follow Integrated Pest Management in accordance with U.S. Department of Agriculture Natural Resources Conservation Service Technical Guide dated 1989, as may be amended.

D. Subdivisions that create three (3) or more residential or residential mixed use developable lots in unsewered areas resulting in septic systems that serve more than one residential unit per acre shall install aerobic treatment units or alternative treatment units achieving equal or higher level of wastewater treatment.

E. Parking lots shall be maintained on a yearly basis, including cleaning catch basins, and sweeping and sealing cracks. Runoff from parking lots should be diverted to storm water drains.

F. Waste transfer/recycling stations shall have an operating manual to insure that only clean, marketable recyclables are collected. Storage of residuals shall be accomplished to prevent spillage and leaking.

G. Golf course development shall meet best management practices for use of nutrients and pesticides as set forth in "Golf Course Management Measure", Hawaii's Coastal Nonpoint Pollution Control Program Management Plan, dated June 1996, as may be amended.

H. Construction activities shall be in accordance with chapter 20.08 of this code and these standards:

1. There shall be a designated person on site during operating hours who shall be responsible for supervising the use, storage, and handling of hazardous material and who shall take appropriate mitigating actions necessary in the event of fire or spill.

2. Hazardous materials left on site when the site is unsupervised must be inaccessible to the public. Locked storage sheds, locked fencing, locked fuel tanks on construction vehicles, or other techniques may be used if they will preclude access.

3. Construction vehicles and stationary equipment that are found to be leaking fuel, hydraulic fluid, and/or other hazardous materials shall be removed from the site and from any wellhead protection zone. The vehicle or equipment may be repaired in place, provided the leakage is completely contained.

4. Hazardous materials shall not be allowed to enter stormwater systems.

19.94.100 Design guidelines. A. The following design guidelines shall apply to subdivisions that create three (3) or more residential or mixed use developable lots.

1. Proposed development and uses should be located as far from the wellhead as feasible.

2. Storm-water infiltration basins should be located outside the WPOD where feasible.

3. Active parks and schools should implement Integrated Pest Management.

4. If development or use is proposed on property which is partially within a WPOD, the proposed development or use should be located to the maximum extent feasible on the portion of the property that is outside the WPOD

19.94.110 Liability. Nothing in this ordinance shall be construed to imply that the County of Maui has accepted any of an

owner/developer's liability if a permitted facility or use contaminates groundwater in any aquifer.

19.94.120 Interpretation of District Boundaries.

A. If parts of a parcel lie within one or more of the delineated zones of the WPOD, the parts shall be governed by the restrictions applicable to the zone in which the part of the property is located.

B. Where the boundary between two WPOD zones passes through a facility, the entire facility shall be considered to be in the more restrictive zone.

C. Where the facility, or portion thereof, is overlapped by delineated zones of the WPODs of different wells or wellfields, the stricter zone(s) shall apply.

19.94.130 Enforcement. Any violation of this chapter shall be enforced pursuant to chapter 19.530 of this code, and through revocation or non-renewal as prescribed herein.

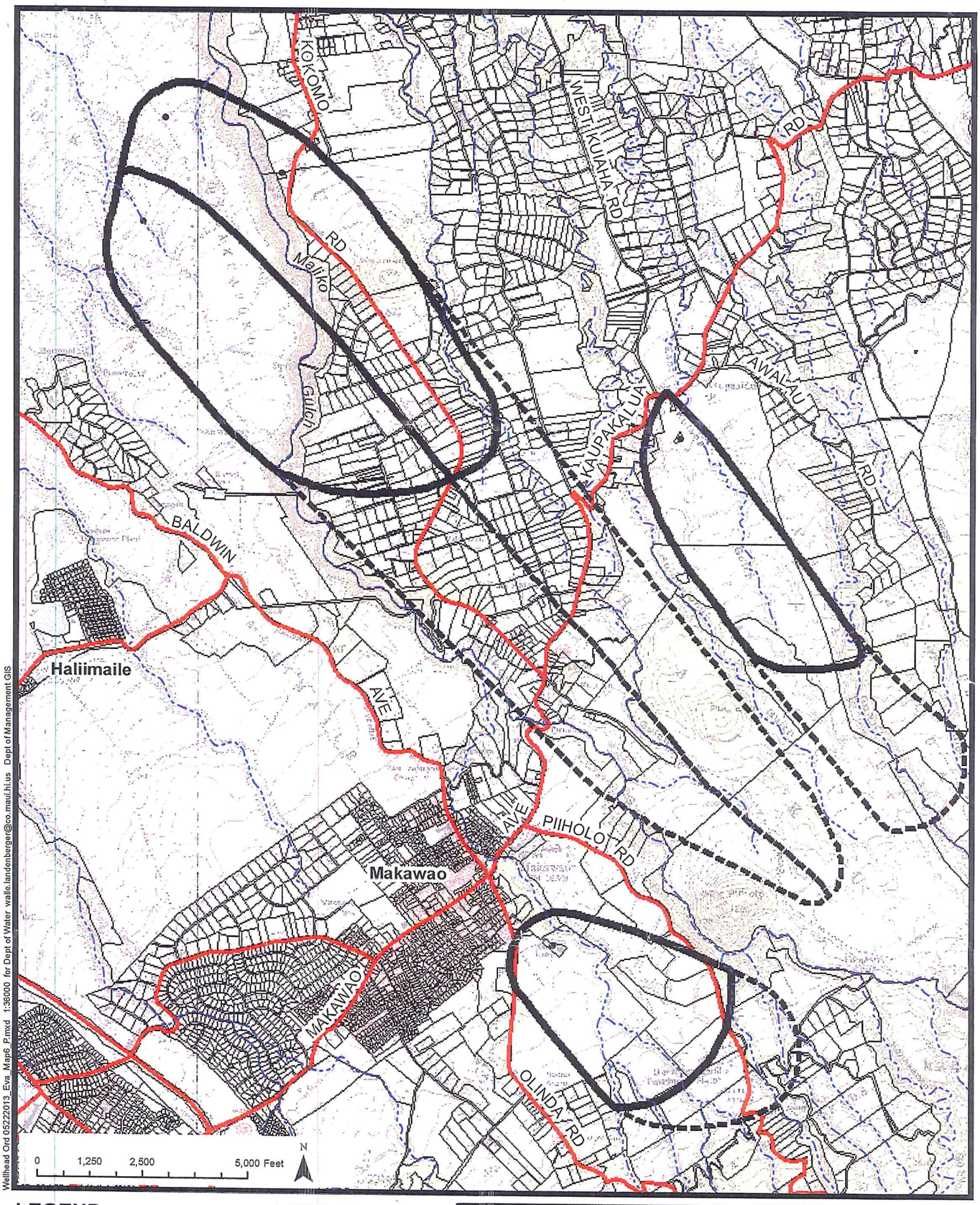
19.94.140 Administrative Rules. The Planning director and the director of Water Supply may adopt administrative rules regarding the administration of this chapter, pursuant to Chapter 91, Hawaii Revised Statutes.

19.94.150 Severability. Should any section or provision of this ordinance be declared invalid, such decision shall not affect the validity of the ordinance as a whole or any other part thereof. A determination that any portion or provision of this overlay protection district is invalid shall not invalidate any permit previously issued thereunder.

SECTION 2. This ordinance shall take effect upon its approval.

APPROVED AS TO FORM
AND LEGALITY:

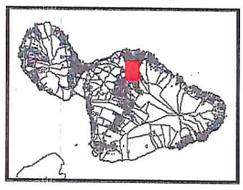
_____
EDWARD S. KUSHI, JR.
First Deputy Corporation Counsel
S:\ALL\ESK\Ords\Title 19, Chapter 19.24 Wellhead Protection Overlay District.wpd



Wellhead Ord 05222013_Eva_Map6_P.mxd 1:36000 for Dept of Water walle.landenberger@co.maui.hi.us Dept of Management GIS

LEGEND

- WPOD ZONE A
- WPOD ZONE B - 2 year
- WPOD ZONE C - 10 year
- 2013 PARCEL



NOTE:

WPOD zones were delineated by the University of Hawaii Department of Geology & Geophysicsutilizing fixed distance for the ZONE A nearest the well and Time of Travel (TOT) criteria for Zones B and C using the USGS 3-demensional numerical groundwater model, MODFLOW, followed by the particle tracking program, MODPATH.

ZONE B is intended to designate a conservatiive estimate of the area that may contribute bacteria and viruses to the wellhead.
A 2-year TOT criterion is based on survival times for bacteria and viruses in soil and groundwater.

ZONE C is based on a 10-year TOT to allow sufficient time to implament management and remedial measures to mitigate contamination from accidential contaminant spills and other causes.

OFFICE OF THE COUNTY CLERK
200 SO. HIGH ST., WAILUKU, MAUI, HAWAII 96793

WELLHEAD PROTECTION OVERLAY DISTRICT MAP No. 6

KOKOMO - PIIHOLO - AWALAU, MAUI

APPROVED:	PUBLIC HEARING:
COUNTY CLERK DATE	ADOPTED BY COUNCIL:
APPROVED:	ADOPTED BY MAYOR:
PLANNING DIRECTOR DATE	BILL No./YEAR ORDINANCE No.

DRAFT 03 WPOD Map 6

MUNEKIYO HIRAGA
Planning. Project Management. Sustainable Solutions.

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 24, 2016

Dave Taylor, Director
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Taylor:

Thank you for your letter dated November 6, 2015, providing early consultation comments on the proposed Hoku Nui Maui Community. The project owner Hoku Nui Maui LLC (HNM), provides the following responses in the order of the comments listed in your letter.

1. Source Availability, Consumption, and System Infrastructure

In the Draft Environmental Assessment (EA), HNM will identify the potable and non-potable water needs and sources. The existing Piiholo South Well No. 5118-04 will provide water for domestic purposes and fire protection. Stormwater collected and stored within the seven (7) onsite detention basins will be the primary source of water for all agricultural irrigation.

HNM acknowledges that Department of Water Supply (DWS) may request an easement crossing the site located at approximately 1,800 feet elevation. Initial contact has been made with Jase Miyabuchi of your office and coordination is continuing to obtain more details on this easement crossing.

2. Pollution Prevention

The proposed project will implement Best Management Practices (BMPs) during the construction phase and include permanent BMPs in the project's site designs. Applicable Federal, State, and County permitting and regulations as it relates to BMPs will be complied with. Post construction BMPs include the use of grassed swales to collect and retain stormwater in detention basins. This

practice will promote natural filtration and also contribute to groundwater recharge.

3. Conservation

The Draft EA will include a Sustainability Plan to guide the project in using various strategies to maximize use of non-potable water for irrigation. Other strategies include reducing potable domestic water use by installing low flow toilets and water fixtures and use of non-potable water for toilet flushing where possible.

The Sustainability Plan also contains strategies to use native and climate appropriate landscaping plants to reduce water needs and regenerate watershed resources. The proposal to maintain a native habitat restoration area of approximately 118 acres will compliment this landscaping strategy to conserve water and protect the watershed.

Outdoor and Indoor Conservation Measures recommended in your letter that are not explicitly described in the Sustainability Plan will be considered as applicable to the project.

We appreciate your input and will include a copy of your department's response letter in the Draft EA. A copy of the Draft EA together with the 201H-38 Affordable Housing application will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Stacy Otomo, Otomo Engineering
Jennifer Chirico, Susty Pacific
K:\DATA\Hoku Nui\Piiholo Sustainable\ECL Responses\DWS Response.doc

Hawaiian Telcom

November 1, 2015

Munekiyo Hiraga
305 High Street, Suite 104
Wailuku, HI 96793

ATTN: Charlene Shibuya, Senior Associate

SUBJECT: CHAPTER 343, HAWAII REVISED STATUTES EARLY CONSULTATION REQUEST FOR PROPOSED HOKU NUI MAUI COMMUNITY, MAKAWAO DISTRICT, MAUI, HAWAII
TMK: (2) 2-4-012:005, 039 through 046

Dear Ms. Shibuya:

Thank you for providing Hawaiian Telcom Incorporated, the opportunity to comment on the Consultation for the proposed Hoku Nui Maui Community Draft EA in the district of Makawao on the Island of Maui.

Hawaiian Telcom has no comments on this project at this time.

If there are any questions, please call Sheri Tihada at (808) 242-5258.

Sincerely,

Gerry Saguci
Neighbor Island Section Manager
Network Engineering & Planning

C: File (3050 1510-073)
S. Tihada

MUNEKIYO HIRAGA
Planning Project Management Sustainable Solutions

Michael T. Munekiyo
PRESIDENT
Karlynn K. Fukuda
EXECUTIVE VICE PRESIDENT
Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

February 25, 2016

Gerry Sagucio
Neighbor Island Section Manager
Network Engineering & Planning
P.O. Box 2200
Honolulu, Hawai'i 96841

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Mr. Sagucio:

Thank you for your letter dated November 1, 2015 providing early consultation comments on the proposed Hoku Nui Maui Community. Project owner, Hoku Nui Maui LLC (HNM), acknowledges that your company has no comments on the project at this time. As the project is further developed, any communication services needed from your company will be coordinated by HNM, with your Maui office.

We appreciate your input and will include a copy of your department's response letter in the Draft Environmental Assessment (EA). A copy of the Draft EA will be provided to your office for review and comment.

Should you have any questions or require further information, please contact me at (808) 244-2015.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
cc: Joshua Chavez, Hoku Nui Maui LLC
Erik Frost, Hoku Nui Maui LLC
Jason Selley, Workshop-HI
Stacy Otomo, Otomo Engineering Inc.
Neil Nishida, Electrical Engineering Consultant

Maui: 305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Tel: 808.244.2015 • Fax: 808.244.8729
Oahu: 735 Bishop Street, Suite 321 • Honolulu, Hawaii 96813 • Tel: 808.983.1233
www.munekiyohiraga.com

College of Tropical Agriculture and Human Resources
Cooperative Extension Service

UNIVERSITY of HAWAI'I®
MĀNOA

October 20, 2015

Munekiyo & Hiraga, Inc.
Attention: Charlene Shibuya, Senior Associate
305 High Street, Suite 104
Wailuku, HI 96793

Dear Charlene,

Thank you for the opportunity to provide preliminary input on the proposed Makawao development. The administration of the College of Tropical Agriculture and Human Resources have reviewed your draft plans, and do not see immediate impact to or from activities performed at our adjacent Research Station. We noted that you have included a riparian border between the properties, and this seems to be an important element to preserve, since otherwise residents of new development may be adversely affected at times by equipment noise from the station (the station is currently a helicopter staging area for the important activity of invasive weed management in Maui County), and noise from human activities associated with youth training activities in agricultural and resources management. Although we are not currently conducting livestock research at this research station, that is certainly possible in the future, and livestock odors might also be of concern to residents if there is an insufficient border between the properties.

Should sewer hookup be part of your plans, the college and the University of Hawaii at Manoa would be interested in discussing this with you.

Please understand that these are preliminary impressions based on the draft plans, and that further developments and refinements in your plans may lead to greater potential impacts or concerns than are apparent from this early review. I would appreciate your keeping me apprised of future developments.

Sincerely,

Cindy Reeves

Cindy Reeves, PhD, MPH
Maui County Administrator

Maui Extension Office, 310 Kaahumanu Ave, Building 214
Kahului, Hawai'i 96732
Telephone: (808) 244-3242 Fax: (808) 244-7089
Email: kahului@ctahr.hawaii.edu Website: www.ctahr.hawaii.edu

MUNEKIYO HIRAGA
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Michael T. Munekiyo
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Mark Alexander Roy
VICE PRESIDENT
Tessa Munekiyo Ng
VICE PRESIDENT

November 19, 2015

Cindy Reeves, PhD, MPH
Maui County Administrator
University of Hawaii
Maui Extension Office
310 Kaahumanu Avenue, Building 214
Kahului, Hawaii 96732

SUBJECT: Early Consultation Request for Proposed Hoku Nui Maui Community at TMK (2) 2-4-012:005, and 039 through 046; Makawao, Maui

Dear Dr. Reeves:

Thank you for your letter dated October 20, 2015 regarding the subject project.

We appreciate your comments with regard to the proposed riparian border between the project and the University of Hawaii (UH) Haleakala Research Facility. We also acknowledge that the research station does generate adverse noise impacts from its helicopter staging area used for invasive weed management in Maui County, and human activities associated with youth training in agricultural and resources management.

As for possible future livestock research conducted by UH, Hoku Nui Maui does not anticipate any issues associated with livestock odors. The comprehensively planned agricultural community will also have livestock grazing and chickens on the open pasture areas and farm lots surrounding the proposed cluster housing.

There is no County sewer system in the Upcountry area. Wastewater generated by the project will be treated by an onsite private wastewater treatment system.

A copy of your comment letter and our response will be included in the Draft EA. A copy of the Draft EA will be provided to your office upon its publication in the Office of Environmental Quality Control's Environmental Notice.

Very truly yours,

Charlene S. Shibuya
Senior Associate

CSS:tn
Cc: Joshua Chavez, Hoku Nui Maui
Erik Frost, Hoku Nui Maui
Stacy Otomo, Otomo Engineering Inc.
Jason Selley, JS Architecture + Design LLC
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APPENDIX A.

Preliminary Engineering Reports

PRELIMINARY ENGINEERING REPORT

FOR

HOKU NUI SUSTAINABLE COMMUNITY

Makawao, Maui, Hawaii

T.M.K.: (2) 2-4-012: 005 & 039 to 046

Prepared for:

Hoku Nui Maui LLC
P.O. Box 1347
Makawao, Maui, Hawaii 96768

Prepared by:

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July 2015

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PRELIMINARY ENGINEERING REPORT
FOR
HOKU NUI SUSTAINABLE COMMUNITY
T.M.K.: (2) 2-4-012: 005 & 039 to 046

1.0 INTRODUCTION

The purpose of this report is to provide information on the existing infrastructure, which will be servicing the proposed project and to also evaluate the adequacy of the existing infrastructure and anticipated improvements, which may be required for the development of the proposed project.

The subject parcels are identified as T.M.K.: (2) 2-4-012: 005 and 039 to 046, which encompasses a total area of approximately 258.1 acres. The Hoku Nui Sustainable Community (HNSC) is bordered by Piiholo Road to the north, the University of Hawaii Demonstration Farm to the east, agricultural lands and Maliko Gulch to the south and St. Joseph Church and School to the west (See Exhibit 2). A key element of the proposed project is to create 20 residential lots each with a market priced and affordable residential unit, and a large farm lot with a market priced and two (2) affordable residential units, for a total of 43 residential units. The residential lots are proposed as one acre house lots in a cluster housing format. The main dwelling will be sold as a market unit and the accessory dwelling will serve to meet the needs of those qualifying for affordable units. The remaining land area will be dedicated to farming and native habitat.

Hoku Nui Maui LLC proposes the development of a comprehensively planned sustainable agricultural community utilizing best practices for sustainability. The proposed Hoku Nui project incorporates housing with the project area's surrounding features. The project components are described below.

Housing

A key element of the project is the market and affordable housing. Of the 21 lots currently entitled, 20 lots are proposed for a clustered housing development of 20, one-acre house lots. The remaining 238 acres will have a market priced and two

(2) affordable housing units and the remainder of the lot will be a farm lot which will remain dedicated to agriculture and native Hawaiian habitat in perpetuity. The cluster housing format helps to address housing needs to support agriculture, as well as to meet the needs of Maui's working families. The proposed one-acre house lots will include a main dwelling and an accessory dwelling. The main dwelling will be sold as a market unit, while the accessory dwelling will serve to meet the needs of those qualifying for affordable units. Each of the 20 one-acre lots will be developed under a condominium property regime (CPR) to allow for separate ownership of the market and affordable units. A total of 43 units are proposed with each of the 20 lots having the capacity to provide one (1) market and one (1) affordable unit and the large farm lot will provide one (1) market and two (2) affordable units. Inasmuch as minimum lot size requirements for lands zoned County "Agricultural" is two acres, the applicant proposes to utilize the Section 201H provisions of the Hawaii Revised Statutes to seek appropriate exemptions which will enable the implementation of the project as proposed.

Farm Market and Commercial Kitchen

Encompassing an area of approximately one acre, the location of the proposed Farm Market and Commercial Kitchen is shown on Exhibit 5. The Farm Market will conform to Maui County Code 19.30A.050-B.4. Hours of operation will be restricted to daylight hours, between 9:00 a.m. and 6:00 p.m., Monday through Friday. The market will display and sell agricultural products grown and processed within the Hoku Nui project area or grown by other farmers in the County. The market and kitchen building structure will be approximately 6,000 square feet which includes interior and exterior lanai space. A parking lot consisting of 16 paved stalls will be developed. The commercial kitchen is proposed to primarily process agricultural products grown onsite for marketing on and off-site. The kitchen will be utilized by agricultural product producers within the HNSC and is anticipated to be an "on-demand" operation.

Hula Halau

The applicant seeks to integrate cultural elements as part of its master planning

efforts. Towards this end, a hula halau facility is proposed to sustain this important cultural practice. The area encompassed by the hula halau is approximately 3 acres, as shown in Exhibit 5. The halau facility is anticipated to include a classroom facility with an ancillary building.

The principal halau facility will encompass an approximately 3,600 square feet main building and an ancillary building to accommodate space for practice, storage and office facilities. Parking for approximately 19 vehicles are anticipated for this facility. Preliminarily, hours of operation for the halau are anticipated to be between 6:00 p.m. and 9:00 p.m. four days a week. The facility is intended to accommodate up to 30 students and their supporters.

Farm Operations

Livestock grazing is currently on 250 acres and will be reduced to 120 acres when development begins. The property will include cattle, sheep, goats, pigs, chicken broilers, and egg-layers that rotate throughout the pastures using a regenerative agricultural approach. This approach uses integrative, regenerative farm practices that help to build soil health and regenerate unhealthy soil. Two (2) barn structures of approximately 2,500 square feet each are proposed to accommodate food crop and farm animal (chickens, sheep, goats and cattle) operations.

Native Habitat Restoration

Approximately 118 acres will be reserved for native habitat, open space, greenways, and access laneways (fruit and nut trees are proposed to line the access laneways, and sheep will be utilized to maintain and control understory grasses). Other passively developed areas will be gulch zones, potential storm water detention basins and lined/natural drainage swales.

Other Improvements

To support the project proposal, site and infrastructure improvements will be implemented to include roadway and access improvements, site grading, and

water and wastewater systems development. The envisioned infrastructure systems include improvements to Piiholo Road and development of a production well from an existing well located onsite.

2.0 EXISTING INFRASTRUCTURE

2.1 ROADWAYS

The primary regional access to the Makawao area is provided by Haleakala Highway, which is located approximately 1.9 miles to the southwest of the project site. It is a four-lane undivided State-owned highway which runs in the north-south direction from Kahului to the Upcountry area. The speed limit is 45 miles per hour (mph) in the vicinity of the intersection with Makawao Avenue. The intersection of Haleakala Highway and Makawao Avenue is signalized with existing left turn pockets.

Baldwin Avenue is a County-owned north-south two lane, two-way roadway from Hana Highway in Paia to its terminus at Makawao Avenue. It provides access to retail shops, schools and residential areas. The speed limit is 20 mph in the vicinity of the project site.

Makawao Avenue is located immediately west of the project site. It is a two-way, two-lane County roadway which runs in an east-west direction. It provides access to retail shops, residential neighborhoods and public facilities. The southern terminus of Makawao Avenue is its intersection with Old Haleakala Highway and the northern terminus is Kokomo Road, where it turns into Kaupakalua Road. The posted speed limit on most of Makawao Avenue is 30 mph.

Piiholo Road is a County-owned north-south two lane, two way roadway that extends from Makawao Avenue for approximately five miles with a terminus at Olinda Road. It provides access to residential neighborhoods,

agricultural lands, Piiholo Ranch and the Makawao Forest Reserve. Access to the project site will be from driveways off of Piiholo Road.

2.2 DRAINAGE

The elevation on the mauka development site ranges from approximately 2,115 feet above mean sea level at its southeasterly corner to approximately 1,639 feet above mean sea level at its northwesterly corner, with a slope averaging approximately 6.6%.

According to Panel Number 150003 0440E, dated September 19, 2012, of the Flood Insurance Rate Map, prepared by the United States Federal Emergency Management Agency, the subject parcels are situated in Flood Zone X (See Exhibits 4A to 4I). Flood Zone X represents areas that are outside of the 0.2% annual chance flood plain.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii" (August 1972), prepared by the United States Department of Agriculture Soil Conservation Service, the soils within the project site are classified as Makawao silty clay, 3 to 7 percent slopes (MfB), Makawao silty clay, 7 to 15 percent slopes (MfC), Jaucas sand, 0 to 15 percent slopes (JaC), and Rock land (rRK) (See Exhibit 3). Makawao silty clay, 3 to 7 percent slopes is present in small pockets off of Piiholo Road near the northwestern corner of the project site. It is characterized as having moderately rapid permeability, slow runoff, and a slight erosion hazard. Makawao silty clay, 7 to 15 percent slopes is present on the majority of the developable land area. It is characterized as having moderately slow permeability, slow to medium runoff and a slight to moderate erosion hazard. Rock land is present within and along the existing drainageway. It is made up of areas where exposed rock covers 25 to 90 percent of the surface.

Onsite runoff generally sheet flows in a southeast to northwest direction. The majority of the existing runoff sheet flow across the project site and into Maliko Gulch. The remainder of the runoff sheet flows to the makai properties or onto Piiholo Road.

Since the project area is greater than 100 acres, the NRCS Method (100-year, 24-hour storm) will be used to compute the existing runoff from the project site. It is estimated that the pre-development 100-year, 24-hour storm runoff from the 258 acre project site is 1,839 cfs. Onsite runoff of 1,055 cfs from approximately 148 acres of the project area presently sheet flows across the project site and into Maliko Gulch. Runoff of 784 cfs from the remaining 110 acres presently sheet flows onto Piiholo Road or onto the adjacent downstream properties.

2.3 SEWER

There is no County sewer system in the Upcountry area. Wastewater generated from developments is collected and treated onsite by individual wastewater systems.

2.4 WATER

Water service in the vicinity of the project site is provided by the County's water system. The Pookela tank (elevation 1,830 feet), Maluhia tank (elevation 2,050 feet) and the Lower Kula tank (elevation 2,778 feet) provide storage in the area.

There are no County waterlines along Piiholo Road fronting the project site. There is a 2-inch waterline that terminates approximately 2,000 feet to the east of the project site on Piiholo Road. There are existing 4, 8 and 12-inch waterlines along Makawao Avenue.

The project is subject to Chapter 14.12-Water Availability, of the Maui County Code. In general, Chapter 14.12 requires verification of a long-term, reliable source of water before applicable subdivisions are

approved. In addition, Chapter 14.13-Water Meter Issuance Provisions for the Upcountry Water System of the Maui County Code states that "*Effective as of January 1, 2013, the department will not accept any new applications to be placed on the priority list*".

The Piiholo South Well (State Well No. 5118-04), which is located on the project site, was completed in 2009. The approved pump capacity was 1,200 gallons per minute (gpm) with a head of 1,800 feet.

2.5 ELECTRIC, TELEPHONE, AND CABLE TV

There are existing overhead electric, telephone and cable TV lines along Piiholo Road and Makawao Avenue.

3.0 ANTICIPATED INFRASTRUCTURE IMPROVEMENTS

3.1 ROADWAYS

Access to the proposed project will be from five driveway connections on Piiholo Road. The driveways will be adequately spaced at locations that provide the required sight distances.

The following conclusion and recommendations were proposed by Austin, Tsutsumi & Associates, Inc. in the *Traffic Impact Analysis Report for Hoku Nui Maui Subdivision*, dated June 15, 2015:

"The Project is proposed to subdivide the 258 acres into 42 residential dwelling units, and provide a Farm Market and space for a Hula Halau, two barns, farming space and Native Habitat. It was determined that the 42 residential dwelling units and Farm Market will be the only land uses that generate trips during the AM and PM peak hours of traffic. The Project is anticipated to generate approximately 61 AM peak hour trips and 118 PM peak hour trips. Trips generated by the Project is anticipated to increase traffic by approximately 3.4% from Base Year 2017 conditions, at the

Olinda Road/Baldwin Avenue/Makawao Avenue intersection during the AM/PM peak hours of traffic. Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended.

Impacts to the five (5) project driveways are anticipated to be minimal, with the highest turning movement generating under 35 vehicles during any peak hour. In combination with relatively low mainline throughput traffic under 150 vehicles in either direction along Piiholo Road, turn lanes are likely not needed."

The report recommended the following:

"Existing Conditions

- *Olinda Road/Baldwin Avenue/Makawao Avenue – Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended. All-way stop control should be maintained.*

Future Year 2017

- *No significant Project impact. Therefore, no additional improvements recommended."*

3.2 DRAINAGE

The proposed project will require both excavation and embankment for the construction of the roadways, building pads, infrastructure installation and drainage improvements. In general, the drainage design criteria are to minimize any alteration to the existing drainage patterns and volumes.

In accordance with Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, the Rational Method will be used to design the onsite drainage systems and detention basins with drainage areas less than 100 acres. For these onsite drainage systems, the 50-year, 1-hour storm frequency will be used.

In accordance with said rules, the design of the drainage systems with retention basins shall be based on the following design conditions:

> *"In areas where the existing drainage systems are inadequate, the existing system shall be upgraded to handle runoff from the new project area or a new system shall be provided to connect to an adequate outlet. When there is no existing drainage system or adequate outlet to connect to, the additional runoff generated by the development may be retained on-site in a temporary retention basin with the following design conditions:*
>
> A. *Storage volume of an infiltration basin, infiltration trench piping, or retention basin shall equal at least the total additional runoff volume for the appropriate storm intensity.*
> B. *Soil percolation shall not be used in satisfying required storage volumes.*
> C. *Fifty percent (50%) of voids within the rock envelope for subsurface drains may be used in satisfying required storage volume provided that filter fabric is installed around the pipe and at the interface of the rock envelope and soil.*
> D. *Sumps, detention and retention facilities will remain private.*
> E. *Detention or retention ponds with embankment heights equal to or in excess of 50 acre-feet shall conform to all state and federal requirements relative to dams".*

Based on the above drainage design criteria, the proposed drainage plan for the project include grassed swales along the roadways which will transport the runoff into seven (7) onsite detention basins. If needed,

grated inlet catch basins will be installed within the grass swales with drainlines diverting the runoff into the detention basins.

The seven onsite detention basins have a total storage volume of approximately 2,039,426 cubic feet (46.8 acre-feet). Runoff from the developed areas within the seven drainage basins will require approximately 265,343 cubic feet of storage volume. The available storage volume provided far exceeds the storage volume required to accommodate the flow from the development for a 50-year, 1-hour storm.

The detention basins will be designed to collect and store the runoff, which will be used as the primary source of water for irrigation. Overflow spillways from each detention basin will allow the release of the excess stored runoff into Maliko Gulch. The spillways will be designed in accordance with the criteria set forth by the Natural Resources Conservation Service (NRCS).

The proposed project contains a mix of residential, farming, agricultural, educational and open space. Runoff will be collected by grassed swales within the landscaped shoulder areas and drainage systems within the roadways, as needed, and routed to one of seven detention basins. A description of the detention basins are as follows (See Exhibit 8):

Detention Basin No. 1: Collects runoff from the area mauka of Residential Kauhale III.

Detention Basin No. 2: Collects runoff from a portion of Residential Kauhale III and to the north toward Piiholo Road.

Detention Basin No. 3: Collects runoff from the area to the west of Residential Kauhale III.

Detention Basin No. 4: Collects runoff from Residential Kauhale II and areas to the south and west of this residential area.

Detention Basin No. 5: Collects runoff from the upper half of Residential Kauhale I and to the south of this residential area.
Detention Basin No. 6: Collects runoff from the lower half of Residential Kauhale I and to the south of this residential area.

Detention Basin No. 7: Collects runoff from the area to the north of the Hula Halau.

The proposed drainage system will be designed to accommodate the increase in surface runoff volume from a 50-year, 1-hour storm generated by the project. In addition to the detention basins, large grassed swales will be constructed along the roadway shoulders to convey runoff into the detention basins. If needed, drainage improvements such as catch basins and drainlines will be installed to convey runoff to the detention basins.

After the development of the proposed project, there will be a net decrease in the volume of runoff sheet flowing from the project site into Maliko Gulch and onto the adjacent makai properties and Piiholo Road.

In accordance with the County's *"Rules for the Design of Storm Water Treatment Best Management Practices"*, the design of the stormwater system will include water quality treatment to reduce the discharge of pollutants to the maximum extent practicable. Some examples of stormwater best management practices (BMP) are:

Grassed Swales will be implemented within the landscaped areas where practical. Grass and groundcover provides natural filtration and allows for percolation into the underlying soils.

Open Space and Parks will be maintained with grass or other landscape materials, thereby reducing the amount of impervious surfaces and promotes infiltration.

Stormwater Detention serves to collect and store stormwater allowing some of the suspended solids to settle out. The stored runoff will be used as the primary source of irrigation for the project.

A maintenance plan will be developed for the permanent stormwater BMPs. The plan will include the requirements for removal of the accumulated debris and sediment, maintaining vegetation, and performing inspections to insure that the BMPs are functioning properly.

Temporary erosion control measures will be incorporated during the construction period to minimize dust and soil erosion. Additional controls will be implemented to protect Maliko Gulch. Temporary BMPs include the construction of diversion berms and swales, dust fences, silt fences, stabilized construction entrances, truck wash down areas, inlet protection, temporary grassing of graded areas, and slope protection. Water trucks and temporary sprinkler systems will be used to minimize dust generated from the graded areas. A National Pollution Discharge Elimination System (NPDES) permit will be required by the Department of Health prior to approval of the grading permit.

The drainage design criteria will be to minimize any alterations to the drainage pattern of the existing onsite surface runoff. No additional runoff will be allowed to sheet flow from the project site into Maliko Gulch, the adjacent makai properties or onto Piiholo Road.

3.3 SEWER

See Appendix C - Onsite Wastewater Treatment, prepared by Roth Ecological Design Int. LLC.

3.4 WATER

Water for domestic purposes and fire protection for the project will be provided from a private onsite water system. A well has been drilled on the site and the Certificate of Well Construction Completion was issued on April 2, 2009. The approved pump capacity was 1,200 gpm.

Storm water collected and stored within the seven onsite detention basins will be the primary source of water for all agricultural irrigation. Water from the onsite private water system will be used as a backup for irrigation.

Due to the anticipated reduction in demand from the original Piiholo South development plan, the current owners replaced the 1,200 gpm pump with a 205 gpm pump.

The estimated water demand for the project was determined from the Department of Water Supply's Water System Standards (DWSWSS), dated 2002, as follows:

- Single-Family Ohana: 300 gallons per day (gpd) per unit
- Rural Residential: 1,000 gpd/unit
- Commercial/Employment: 140 gallons/1,000 s.f.
- School: 1,700 gallons/acre

Based on the water usage, the projected average daily water demand for the project is 33,240 gallons per day (gpd). In accordance with the DWSWSS, the maximum daily water demand is calculated as being 1.5 times the average daily demand, or 49,860 gpd. Based on the commercial use, the maximum fire demand is 2,000 gpm (See Appendix B for Water Demand Calculations). The developer can consider installing a fire sprinkler system to possibly reduce the fire flow requirements. Evaluation of the system will be made during the building permit process.

Water conservation measures such as low-flow toilets and shower heads will be considered for use in the project, which will decrease the water demand. The primary irrigation source for the agricultural areas will be from the storm water collected and stored in the detention basins, which will also decrease the water demand.

The reservoir capacity is based on the DWSWSS Criterion 2 for Reservoir Capacity, which is to meet the maximum daily consumption plus fire flow for the duration of the fire with the reservoir three-quarters full at the start of the fire. Credit is given for incoming flow from pumps as a source input into the reservoir. Based on this criterion, the required storage volume for the proposed project is 292,800 gallons. It is recommended that a 300,000 gallon reservoir be constructed to accommodate the domestic water and fire flow requirements of the project.

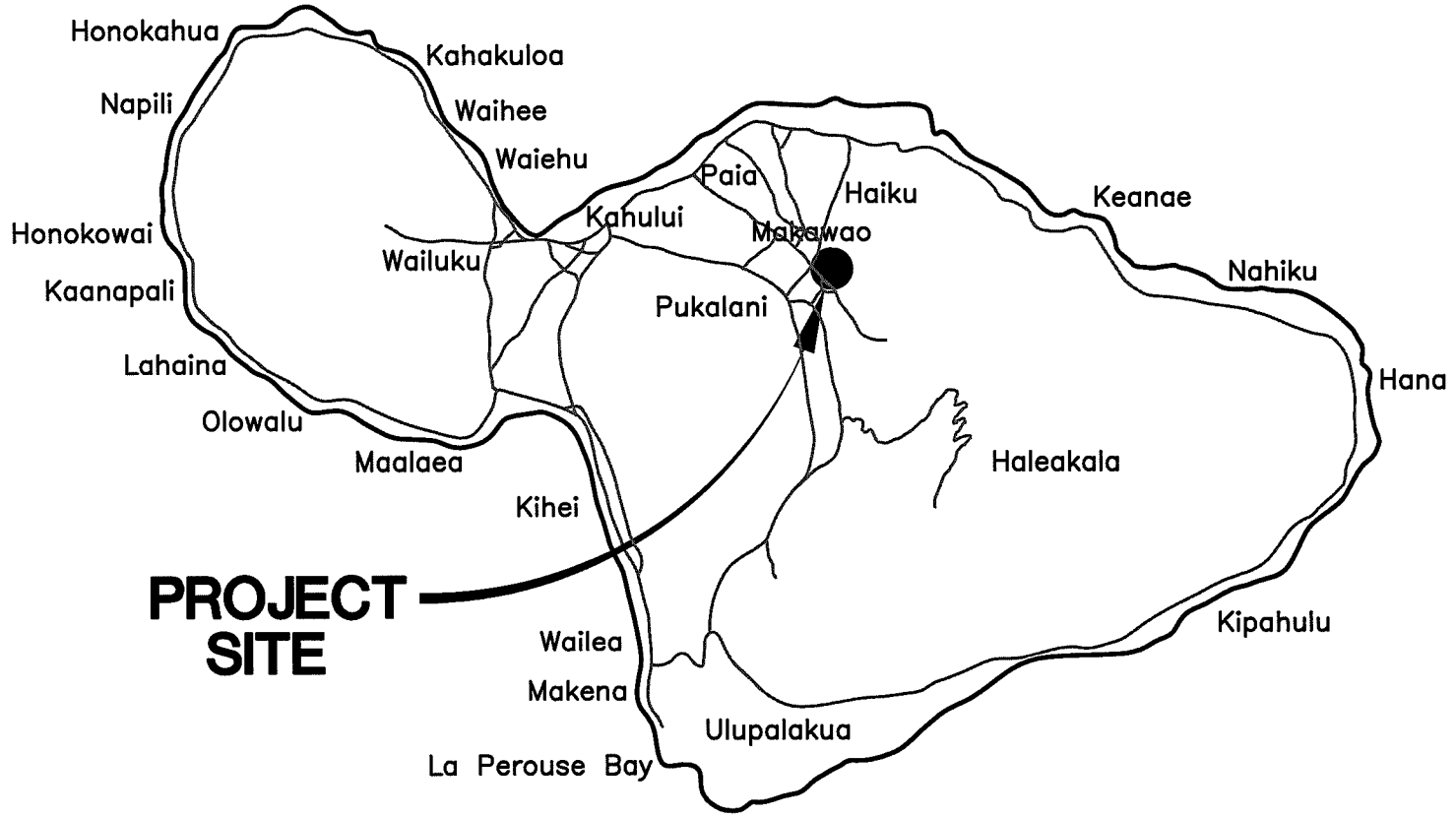
The 300,000 gallon reservoir will be constructed near the uppermost section of the project site (see Exhibit 9). The upper section of the development where the static pressure is less than 50 pounds per square inch (psi) will be serviced by a pressurized booster pump system. In the service area of the development where the static pressure is greater than 50 psi, gravity lines from the storage tank will be utilized. The pressure criteria is to have a minimum of 40 psi for domestic purposes at all structures and have a minimum residual pressure of 20 psi at each hydrant while delivering the required fire flow.

3.5 ELECTRIC, TELEPHONE, AND CABLE TV

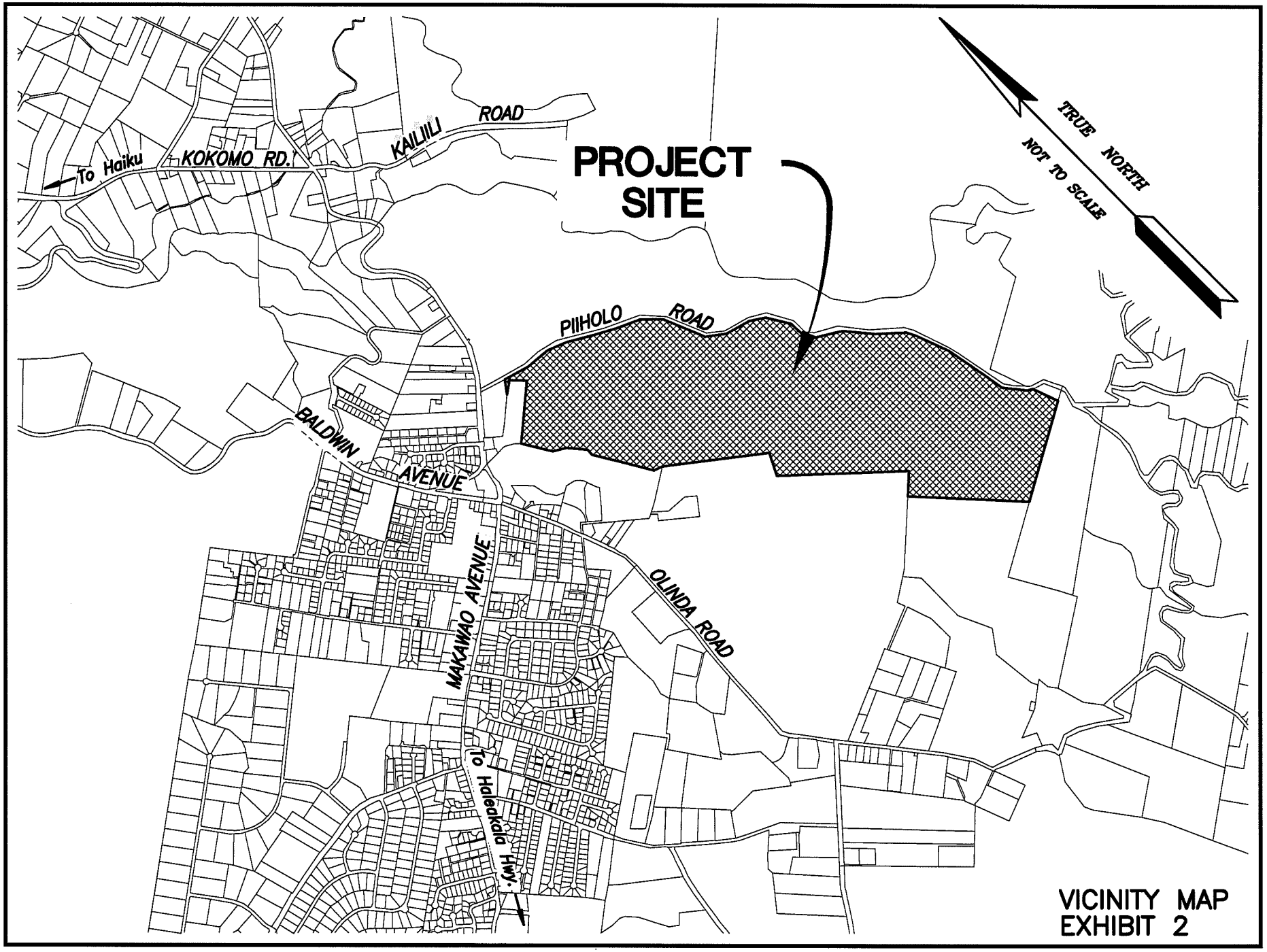
Electric, telephone and cable TV service will be provided by the existing overhead facilities in the area. The project's electrical engineering consultant will coordinate the required improvements with the utility companies to determine the required onsite and offsite improvements to support the project.

EXHIBITS

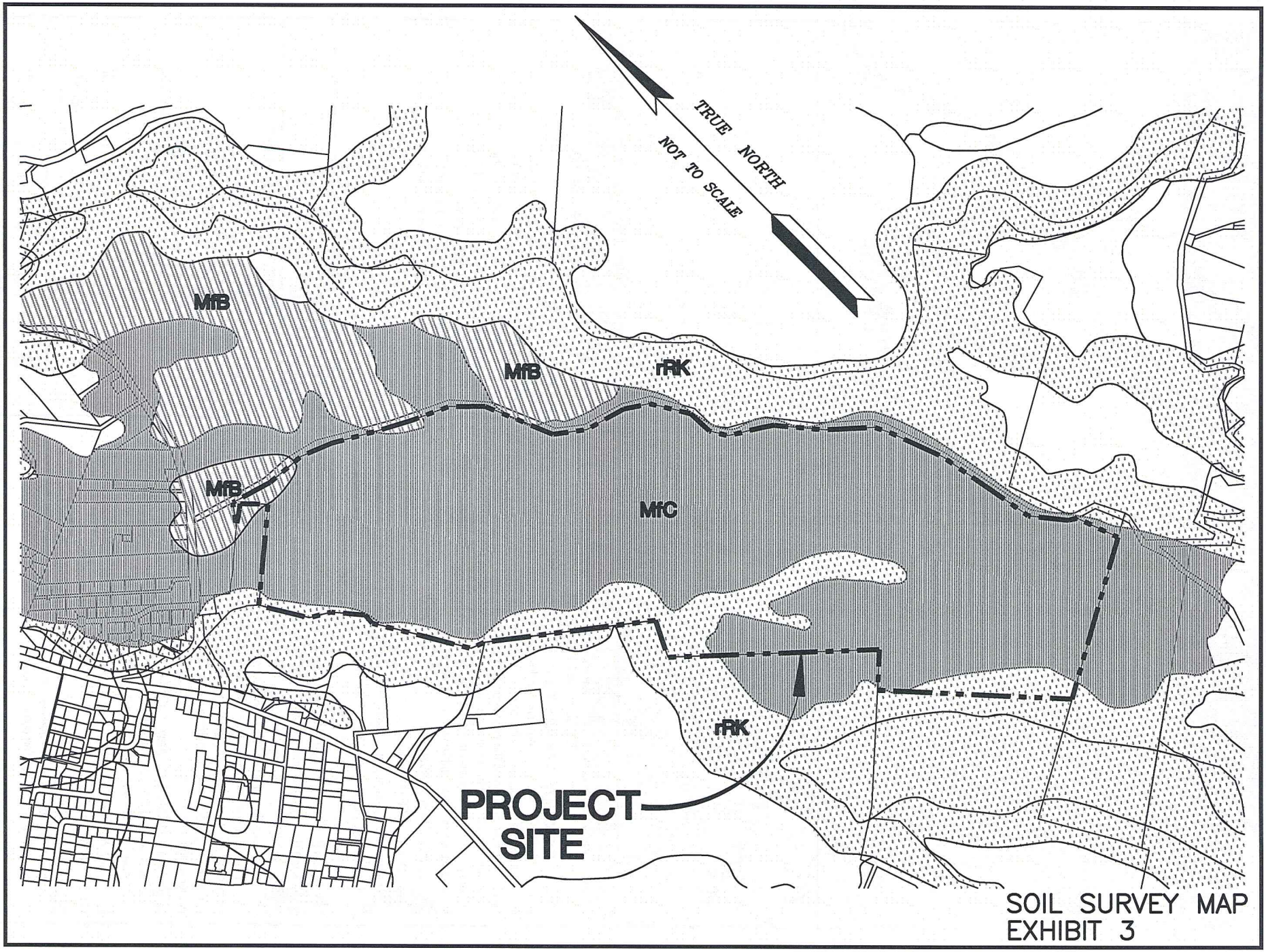
1	LOCATION MAP
2	VICINITY MAP
3	SOIL SURVEY MAP
4A-4I	FLOOD INDURANCE RATE MAPS
5	PROPOSED SITE PLAN
6	PROPOSED ROADWAY SECTIONS
7	EXISTING DRAINAGE PATTERN
8	PROPOSED DRAINAGE SYSTEM
9	PROPOSED WATER SYSTEM



LOCATION MAP
EXHIBIT 1



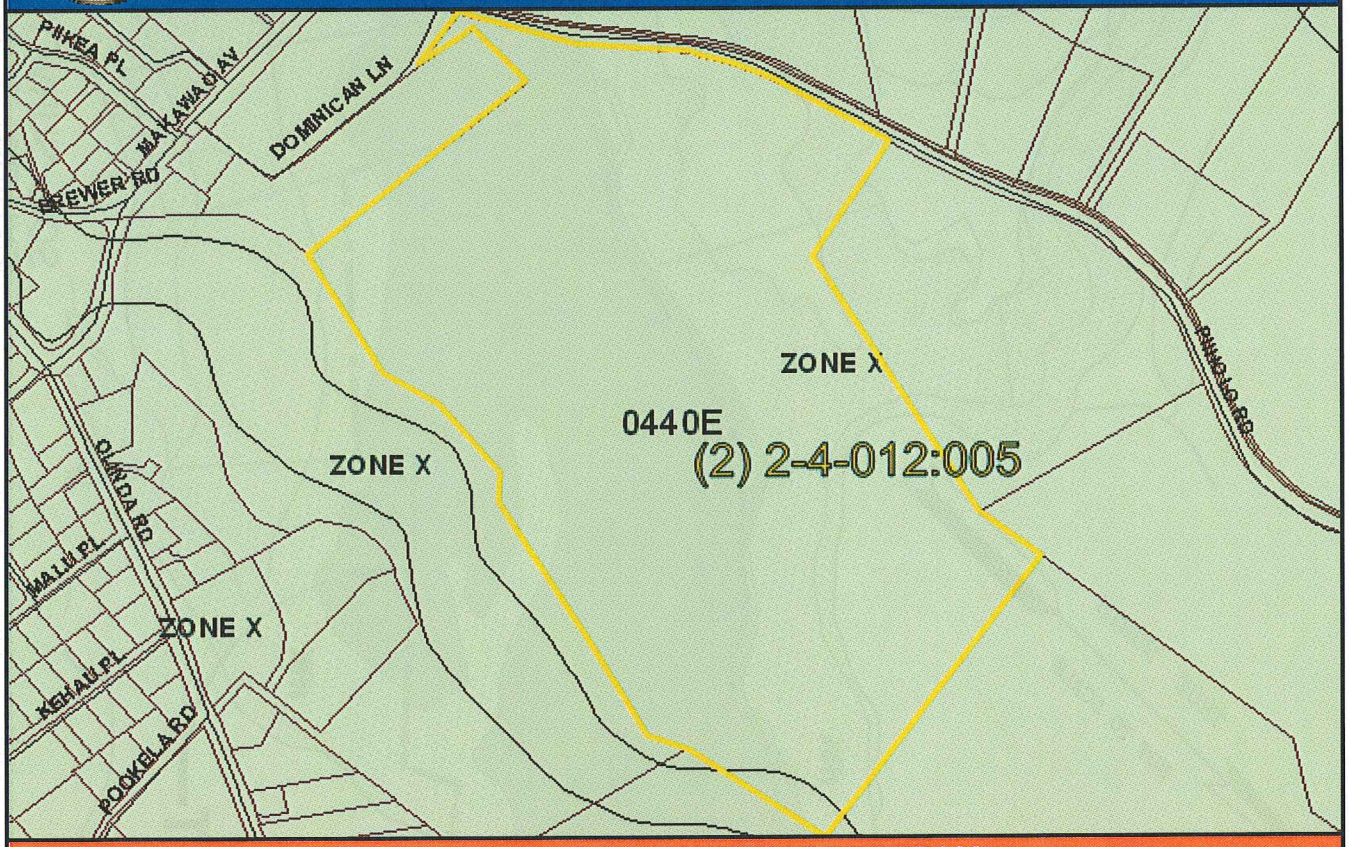
VICINITY MAP
EXHIBIT 2



SOIL SURVEY MAP
EXHIBIT 3

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-005
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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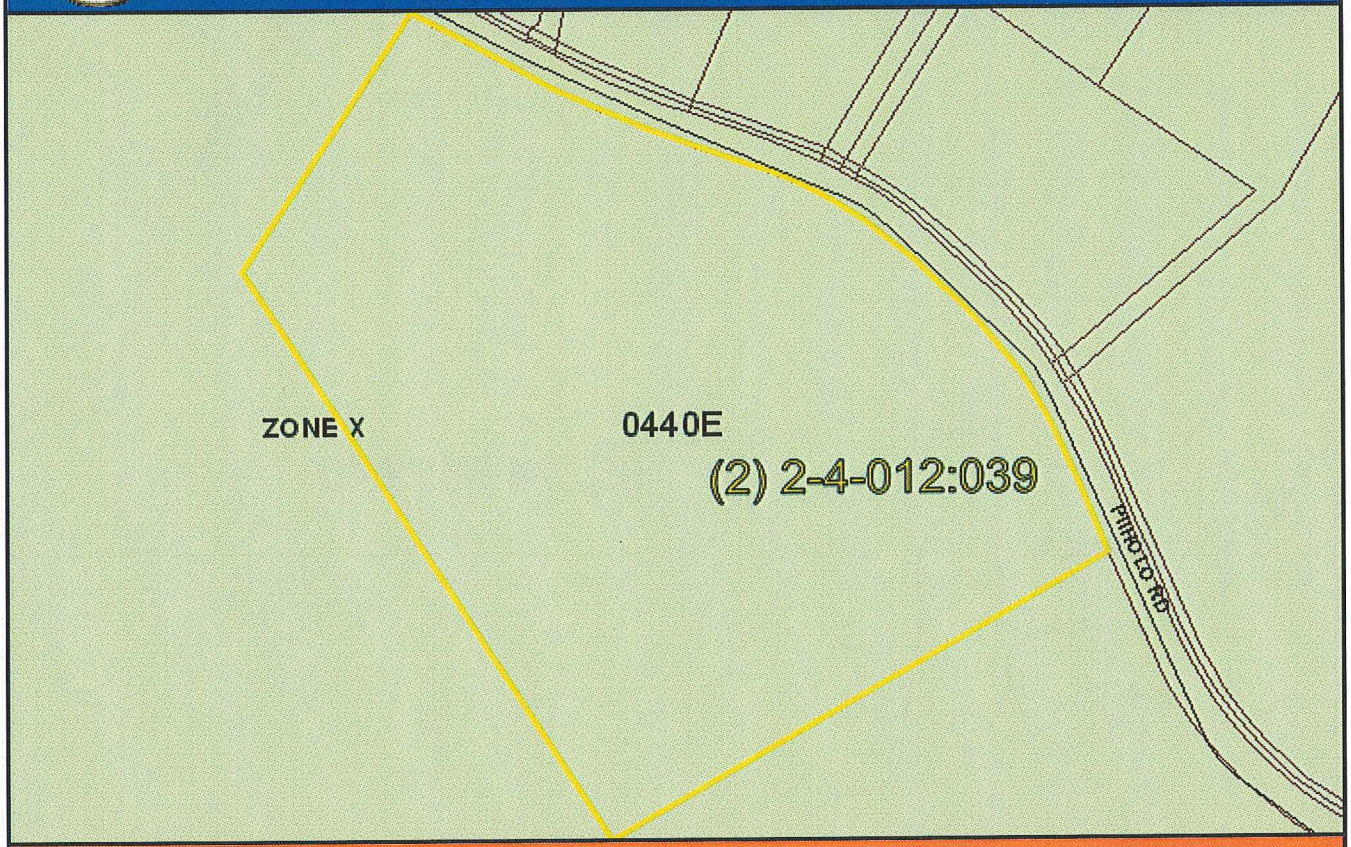
If this map has been identified as 'PRELIMINARY' or 'UNOFFICIAL', please note that it is being provided for informational purposes and is not to be used for official/legal decisions, regulatory compliance, or flood insurance rating. Contact your county NFIP coordinator for flood zone determinations to be used for compliance with local floodplain management regulations.

EXHIBIT 4A
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-039
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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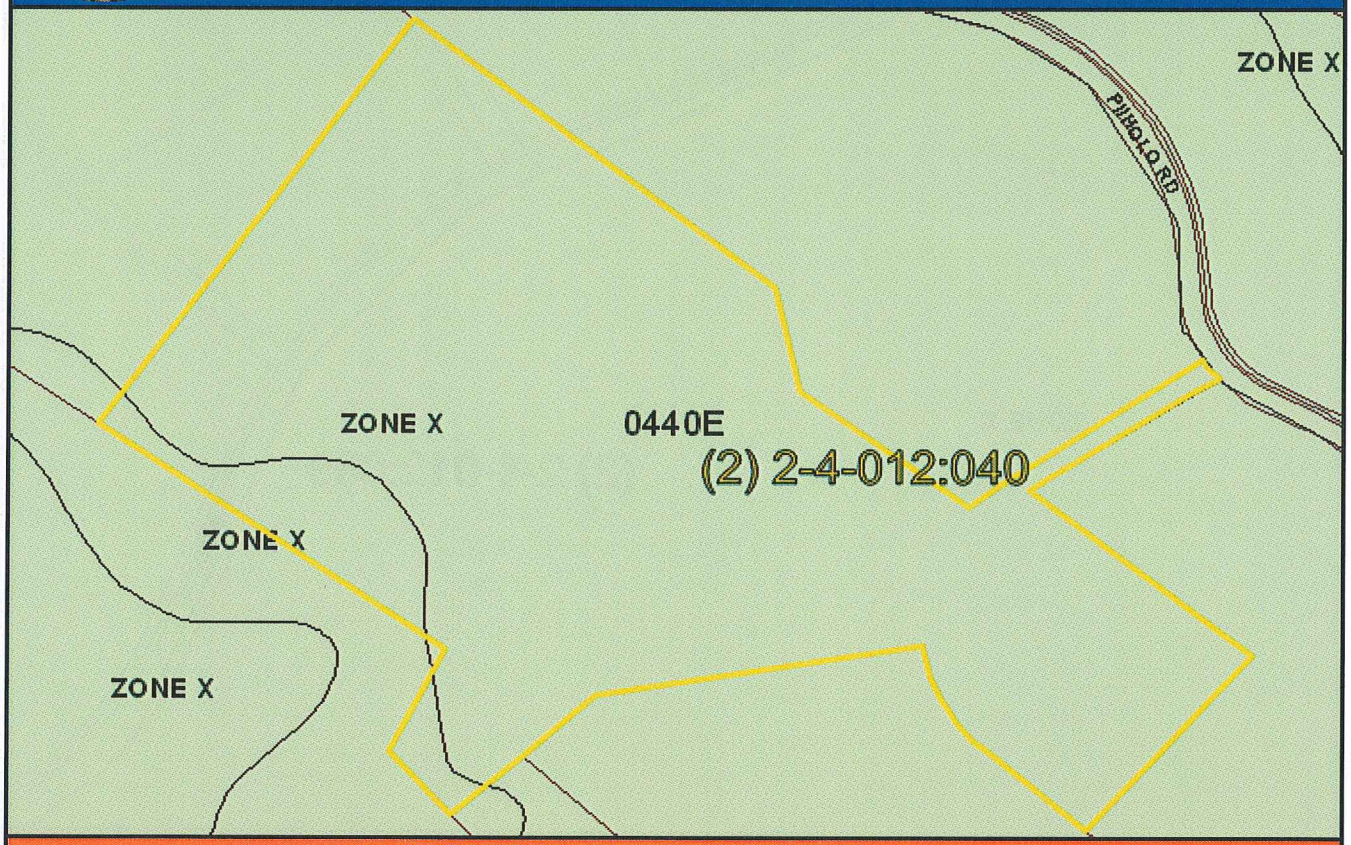
EXHIBIT 4B
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-040
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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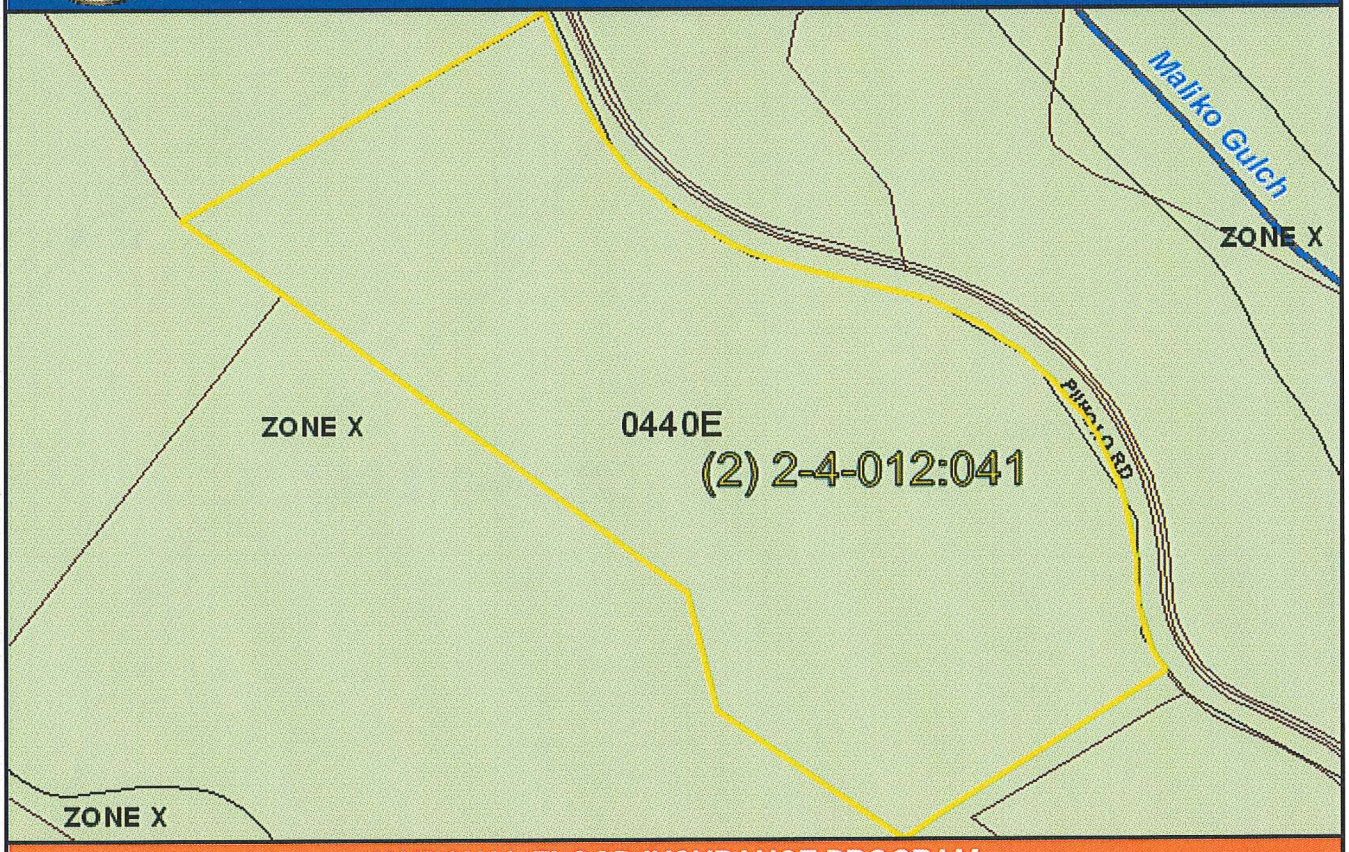
EXHIBIT 4C
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-041
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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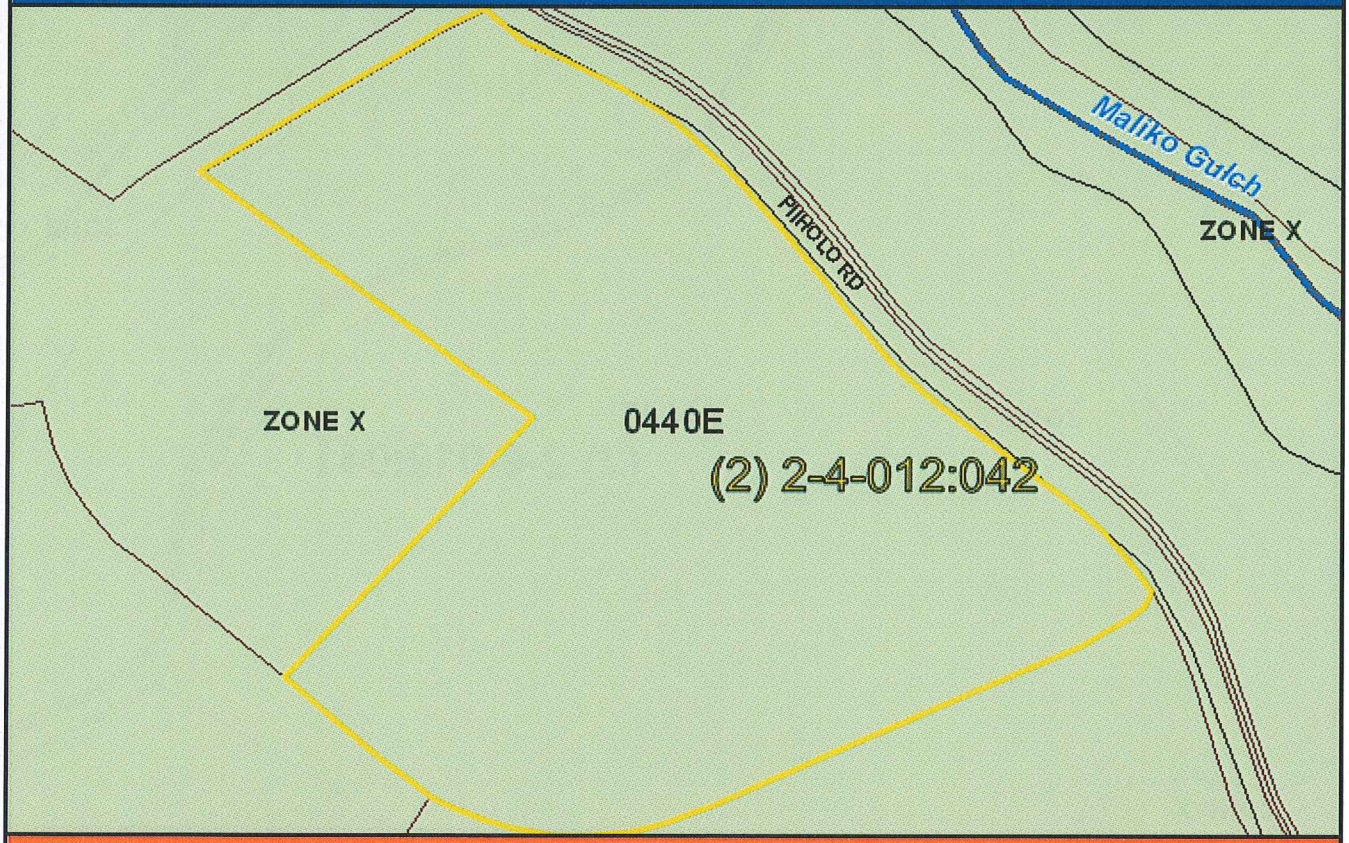
EXHIBIT 4D
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-042
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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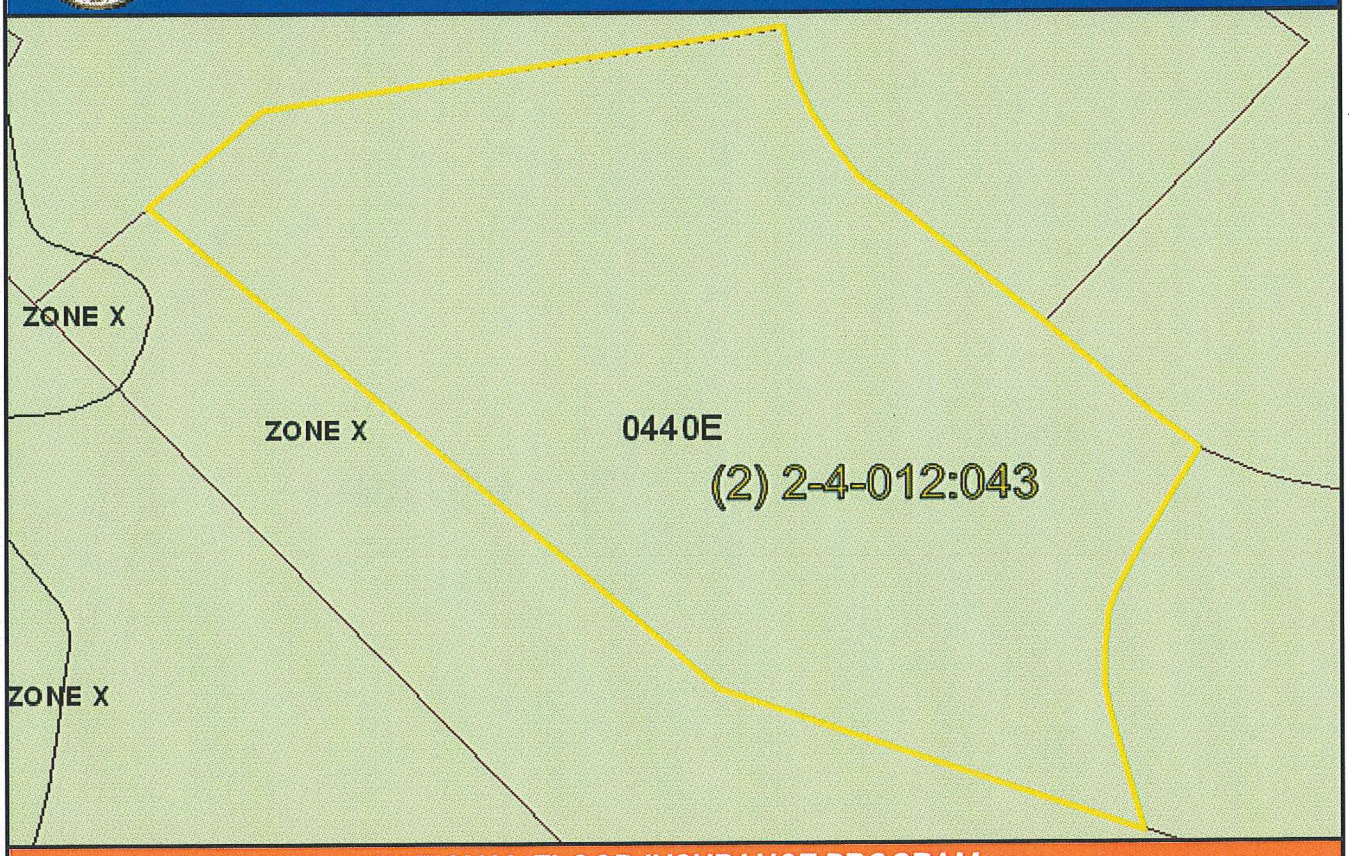
EXHIBIT 4E
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-043
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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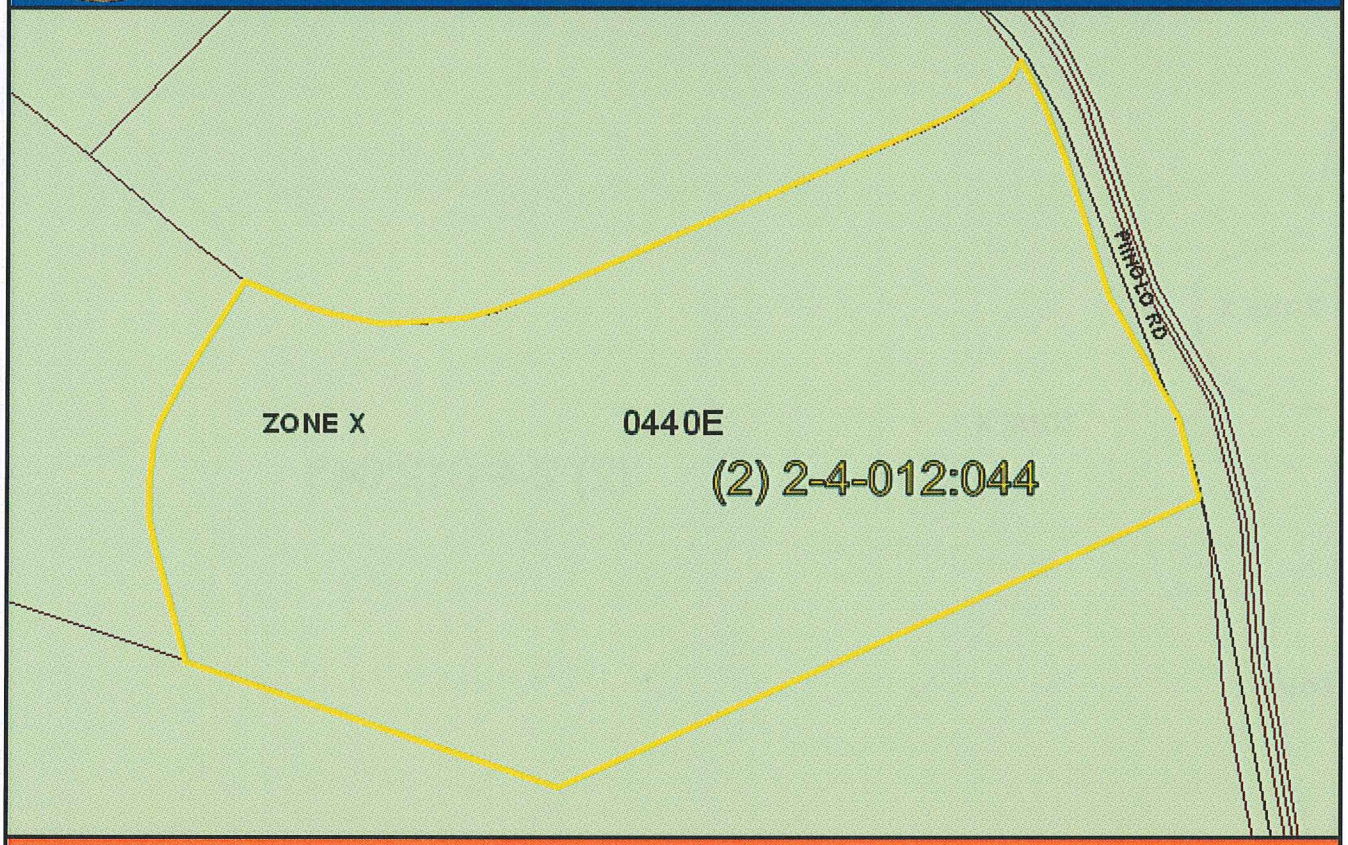
EXHIBIT 4F
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-044
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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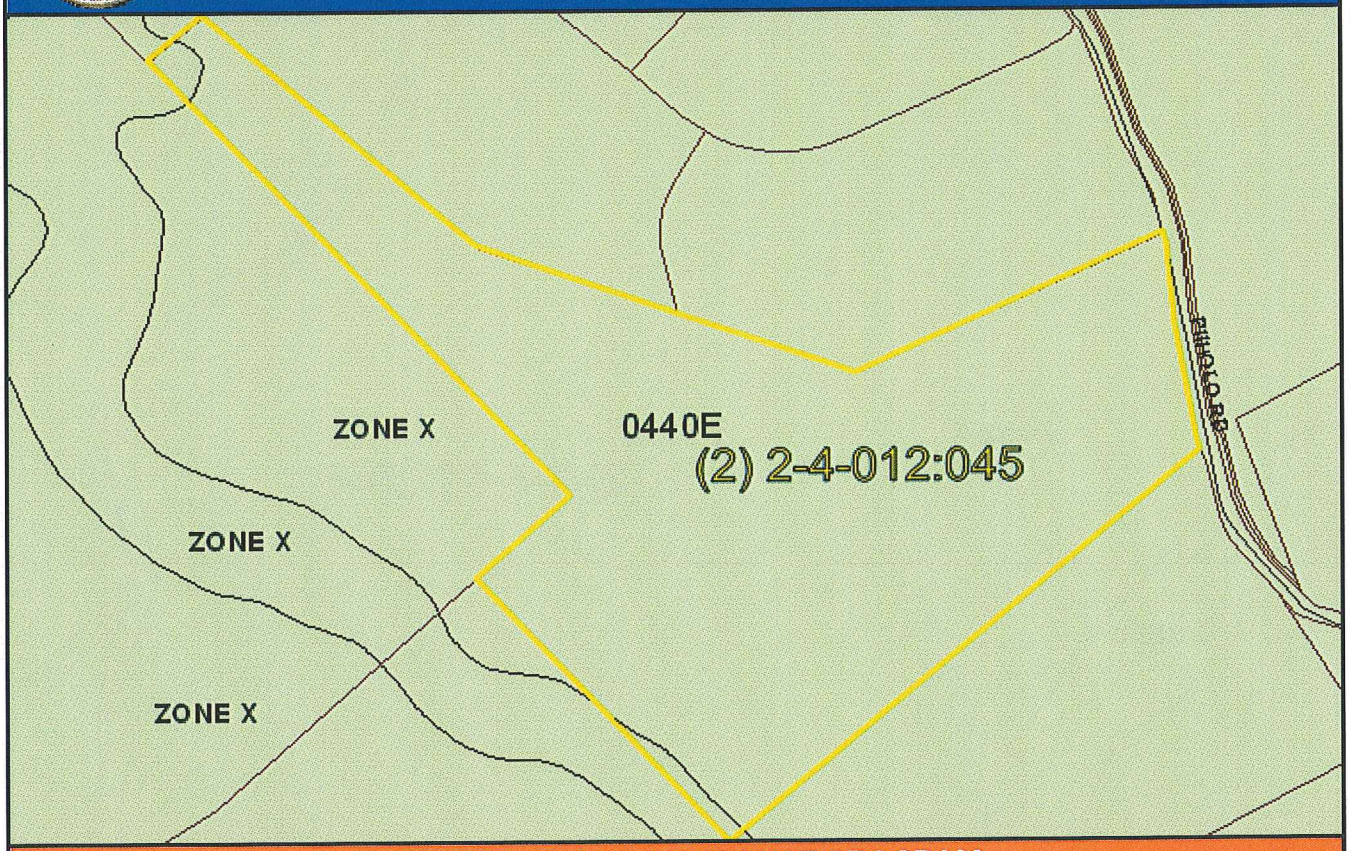
EXHIBIT 4G
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-045
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

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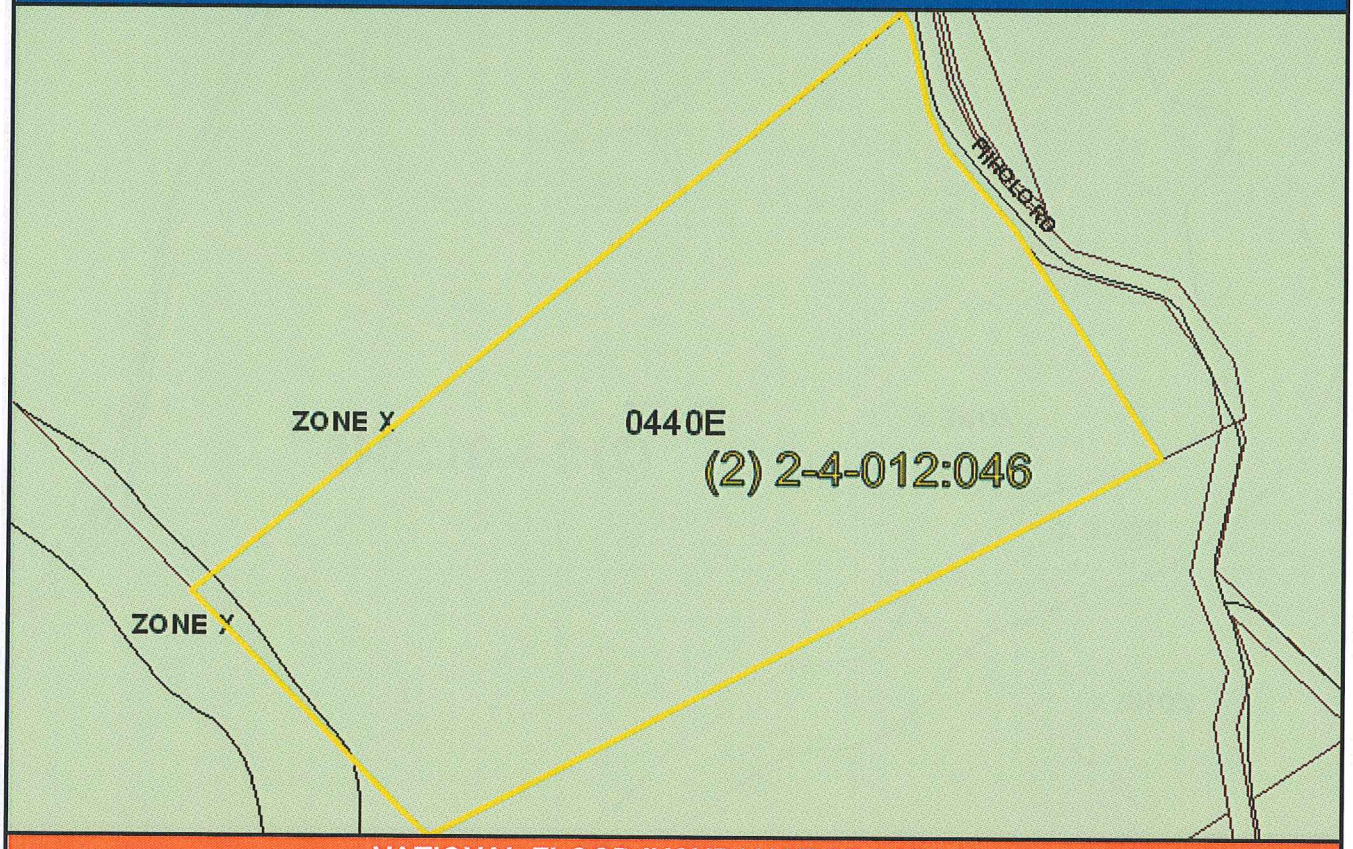
EXHIBIT 4H
FLOOD INSURANCE RATE MAP

State of Hawaii

FLOOD HAZARD ASSESSMENT REPORT



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD ZONE DEFINITIONS

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD – The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA – An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

PROPERTY INFORMATION

COUNTY:	MAUI
TMK NO:	(2) 2-4-012-046
PARCEL ADDRESS:	PIIHOLO RD MAKAWAO, HI 96768
FIRM INDEX DATE:	SEPTEMBER 19, 2012
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL(S):	1500030440E
PANEL EFFECTIVE DATE:	SEPTEMBER 25, 2009

PARCEL DATA FROM:	JULY 2013
IMAGERY DATA FROM:	MAY 2005

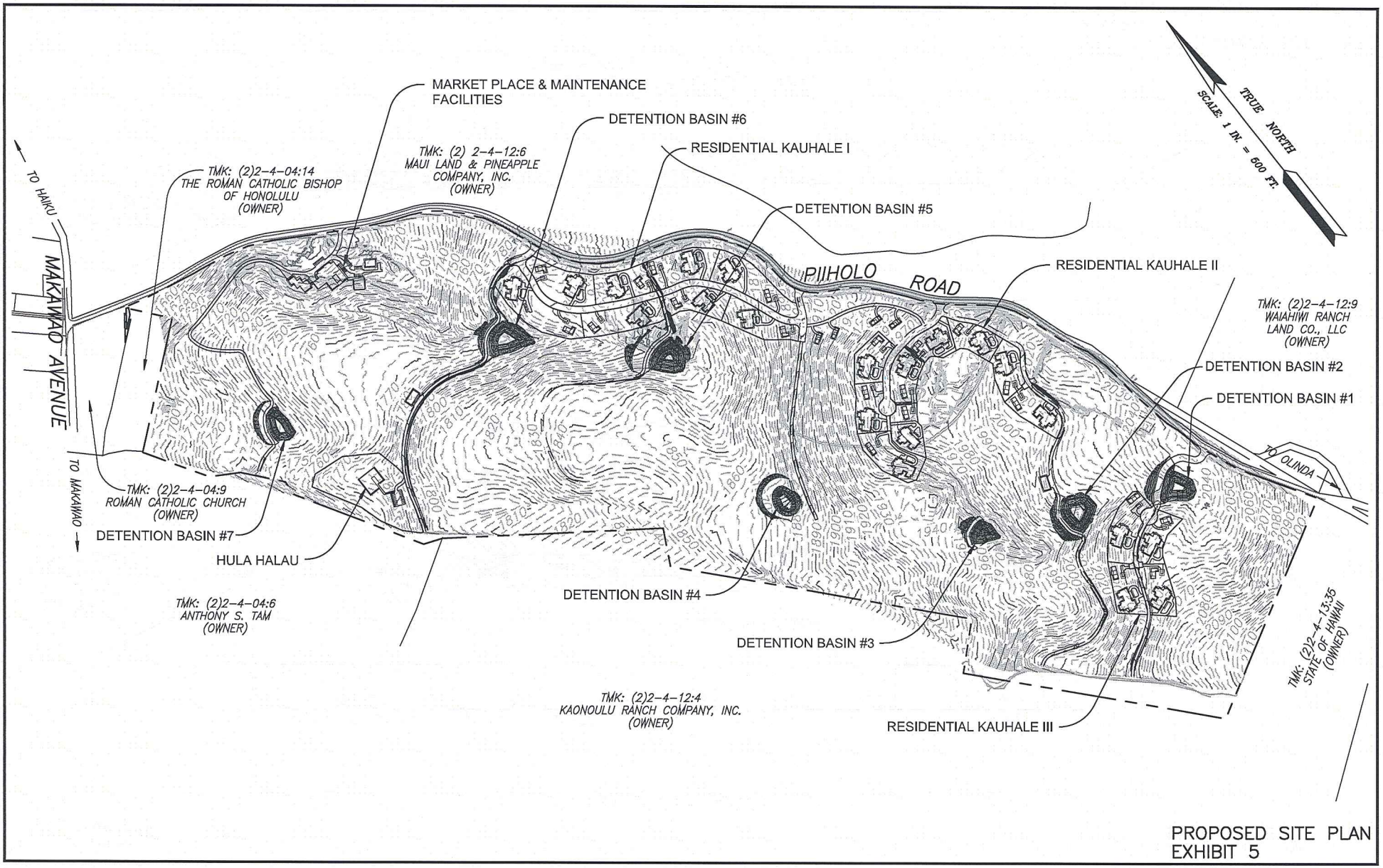
IMPORTANT PHONE NUMBERS

County NFIP Coordinator	
County of Maui	
Carolyn Cortez	(808) 270-7253
State NFIP Coordinator	
Carol Tyau-Beam, P.E., CFM	(808) 587-0267

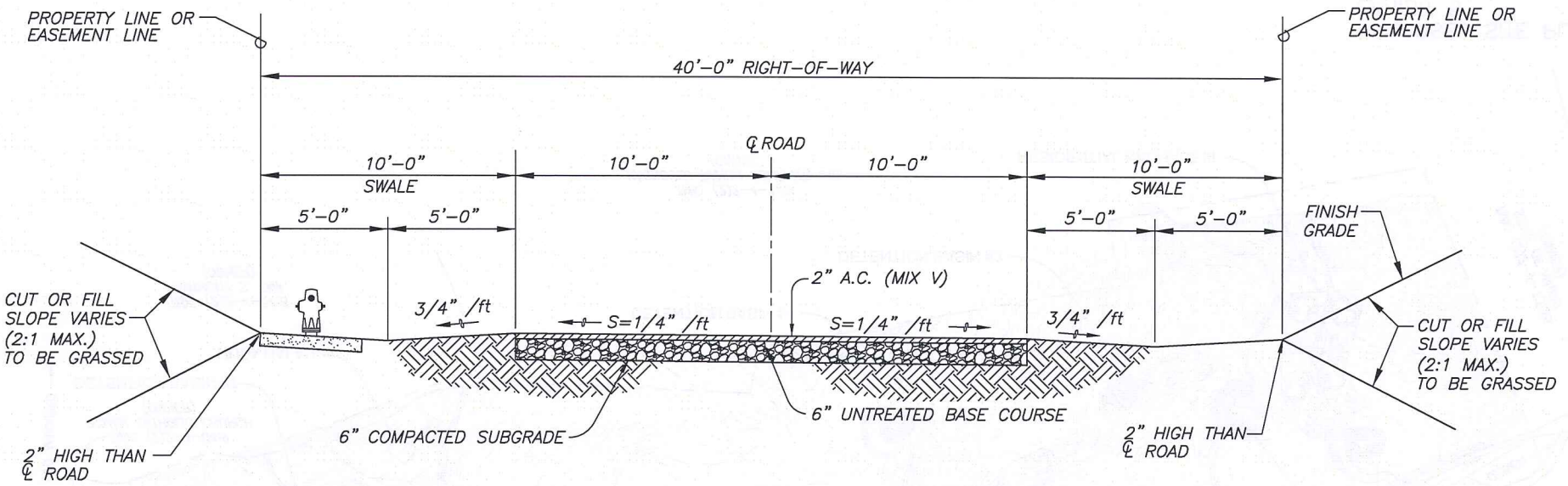
Disclaimer: The Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use of the information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR from any liability, which may arise from its use.

If this map has been identified as 'PRELIMINARY' or 'UNOFFICIAL', please note that it is being provided for informational purposes and is not to be used for official/legal decisions, regulatory compliance, or flood insurance rating. Contact your county NFIP coordinator for flood zone determinations to be used for compliance with local floodplain management regulations.

EXHIBIT 4I
FLOOD INSURANCE RATE MAP

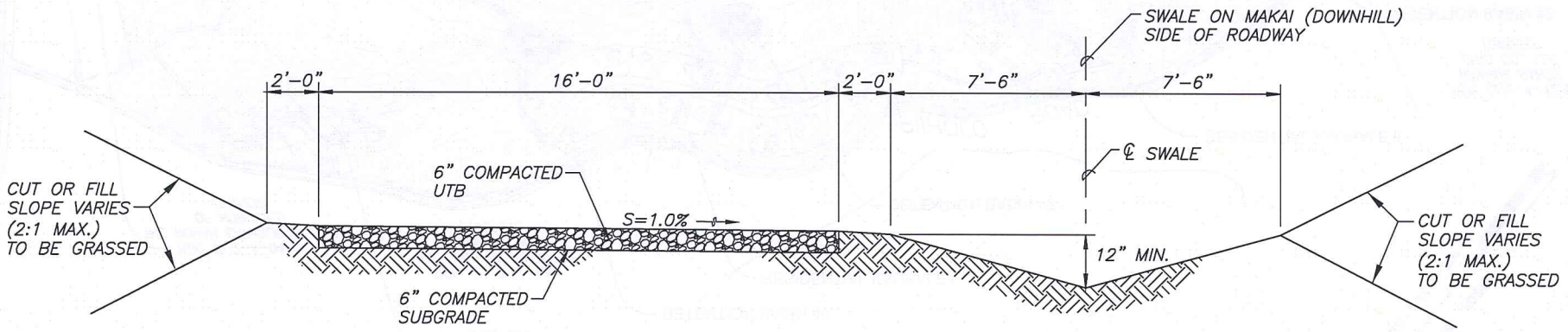


PROPOSED SITE PLAN
EXHIBIT 5



TYPICAL SECTION – SUBDIVISION ROADWAY

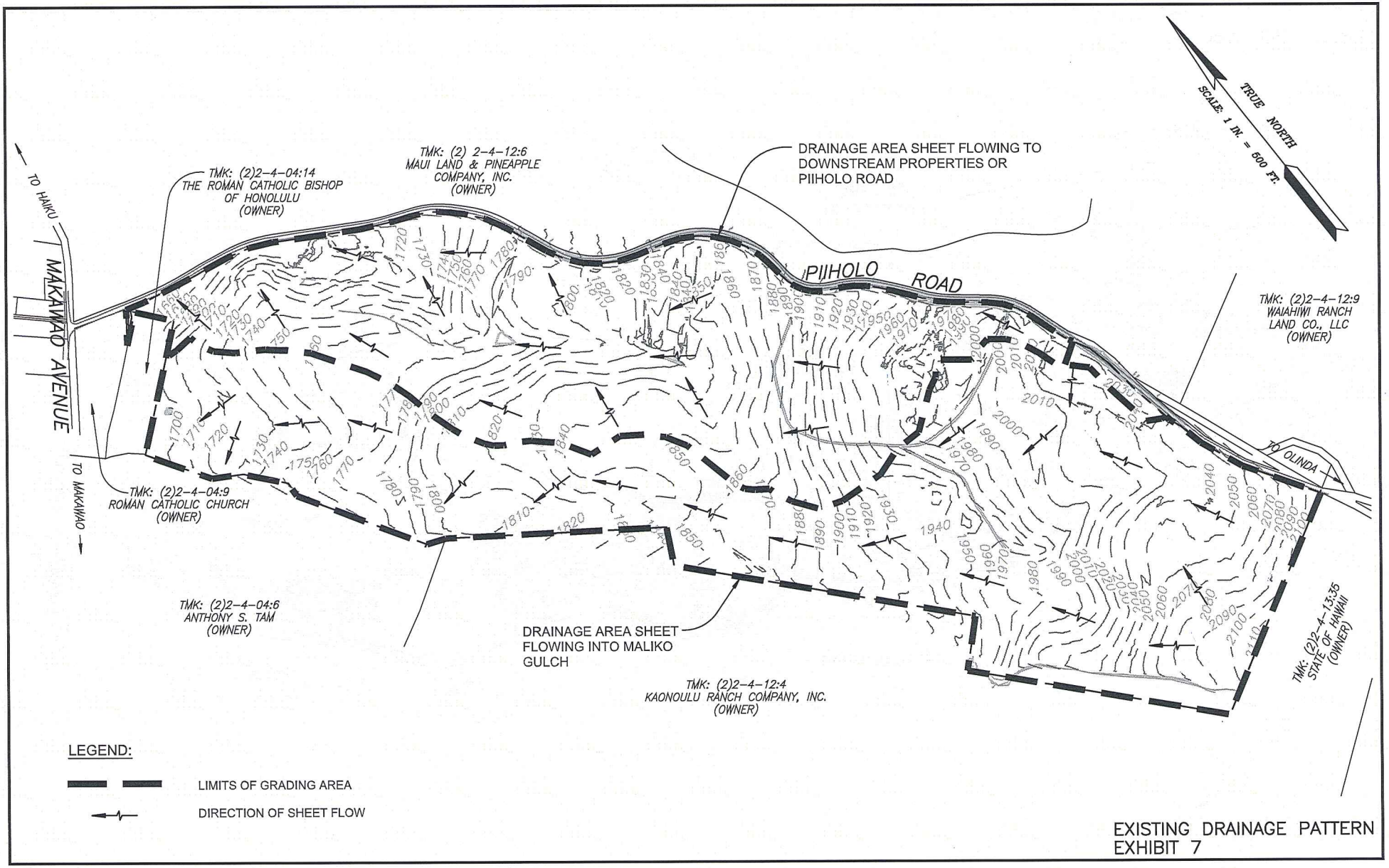
SCALE: 1/4 INCH = 1 FOOT



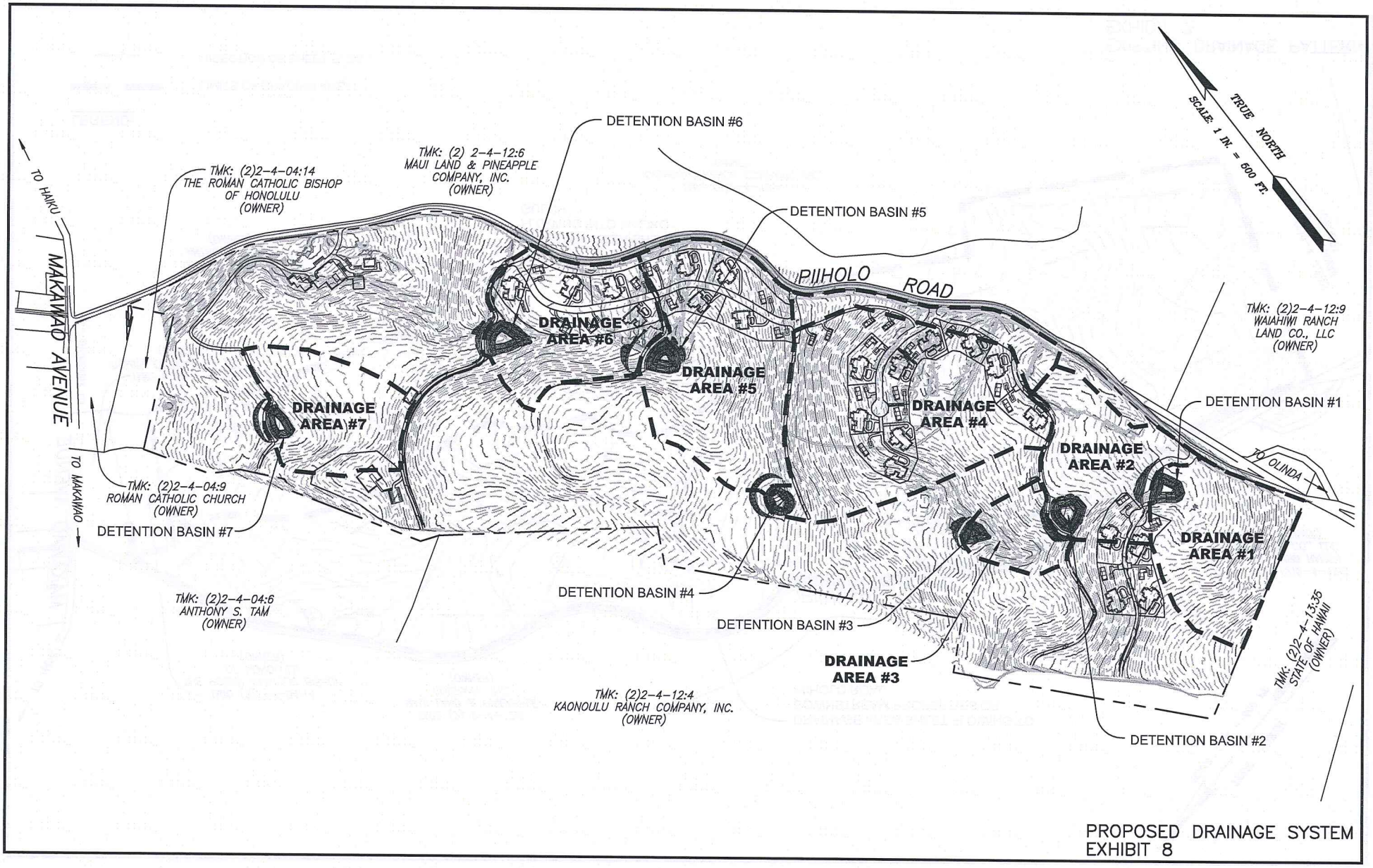
DETAIL – AG/FARM ROADS

SCALE: 1/4 INCH = 1 FOOT

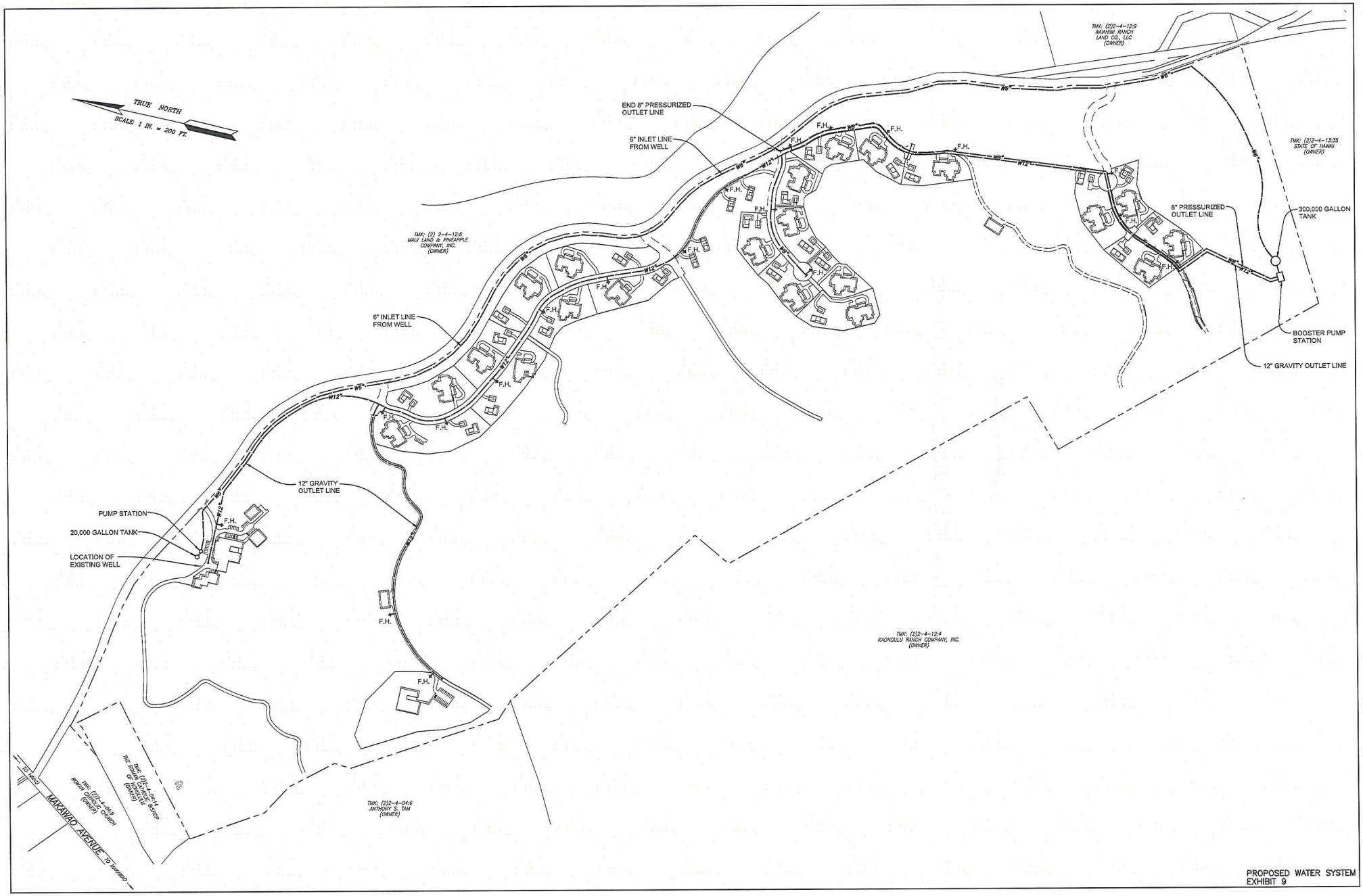
PROPOSED ROADWAY SECTIONS
EXHIBIT 6



EXISTING DRAINAGE PATTERN
EXHIBIT 7



PROPOSED DRAINAGE SYSTEM
EXHIBIT 8



PROPOSED WATER SYSTEM
EXHIBIT 9

APPENDIX A

HYDROLOGIC CALCULATIONS

Hydrologic Calculations – Detention Basins

Purpose: Determine the runoff and storage volume required for the seven (7) onsite detention basins for a 50-year, 1-hour storm.

A. Determine the Runoff Coefficient (C):

DRAINAGE AREA CHARACTERISTICS:

LANDSCAPE AREAS:

Infiltration (Medium)	=	0.07
Relief (Flat)	=	0.03
Vegetal Cover (Good)	=	0.03
Development Type (Landscape)	=	0.15
C	=	0.28

Note-The drainage areas for detention basins 2, 3, 4 and 6 will be partially developed with homes or other structures. The runoff coefficient for these drainage areas is computed to be 0.30.

B. Determine the 50-year 1-hour rainfall:

i_{50} = 3.0 inches

Adjust for time of concentration to compute Rainfall Intensity (I):

Detention Basin	1	2	3	4	5	6	7
Tc (min)	19	26	20	36	14	35	21
I [in]	5.25	4.59	5.14	3.94	5.88	3.99	5.04

C. Drainage Area (A):

Detention Basin	1	2	3	4	5	6	7
Area (acres)	12.32	16.04	24.43	38.15	5.04	13.36	15.27

D. Compute the 50-year storm runoff (Q) for each detention basin:

$$Q = CIA$$

$Q1 = (0.28)(5.25)(12.32)$

$= 18.11$ cfs

$Q2 = (0.30)(4.59)(16.04)$

$= 22.11$ cfs

$Q3 = (0.30)(5.14)(24.43)$

$= 37.68$ cfs

$Q4 = (0.30)(3.94)(38.15)$

$= 45.04$ cfs

$Q5 = (0.28)(5.88)(5.04)$

$= 8.30$ cfs

$Q6 = (0.30)(3.99)(13.36)$

$= 15.99$ cfs

$Q7 = (0.28)(5.04)(15.27)$

$= 21.54$ cfs

E. 50-year, 1-hour storm Volume (V):

Basin	Drainage Area (ac)	Q 50-Yr (cfs)	Storage Volume Required (cf)
1	12.32	18.1	20,643
2	16.04	22.1	34,487
3	24.43	37.7	45,218
4	38.15	45.0	97,293
5	5.04	8.3	6,472
6	13.36	16.0	33,587
7	15.27	21.5	27,143
TOTAL STORAGE REQUIED			**265,343**

F. Calculate the available storage for the proposed detention basins:

Basin	Top Area (sf)	Bottom Area (sf)	Average Area (sf)	Average Height (ft)	Volume (cf)
1	22,585	2,548	12,567	16	201,072
2	32,999	4,841	18,920	18	340,560
3	34,793	1,225	18,009	26	468,234
4	21,079	3,161	12,120	16	193,920
5	16,019	1	8,010	20	160,200
6	33,526	4,916	19,221	20	384,420
7	27,140	1,962	14,551	20	291,020
TOTAL AVAILABLE STORAGE					**2,039,426**

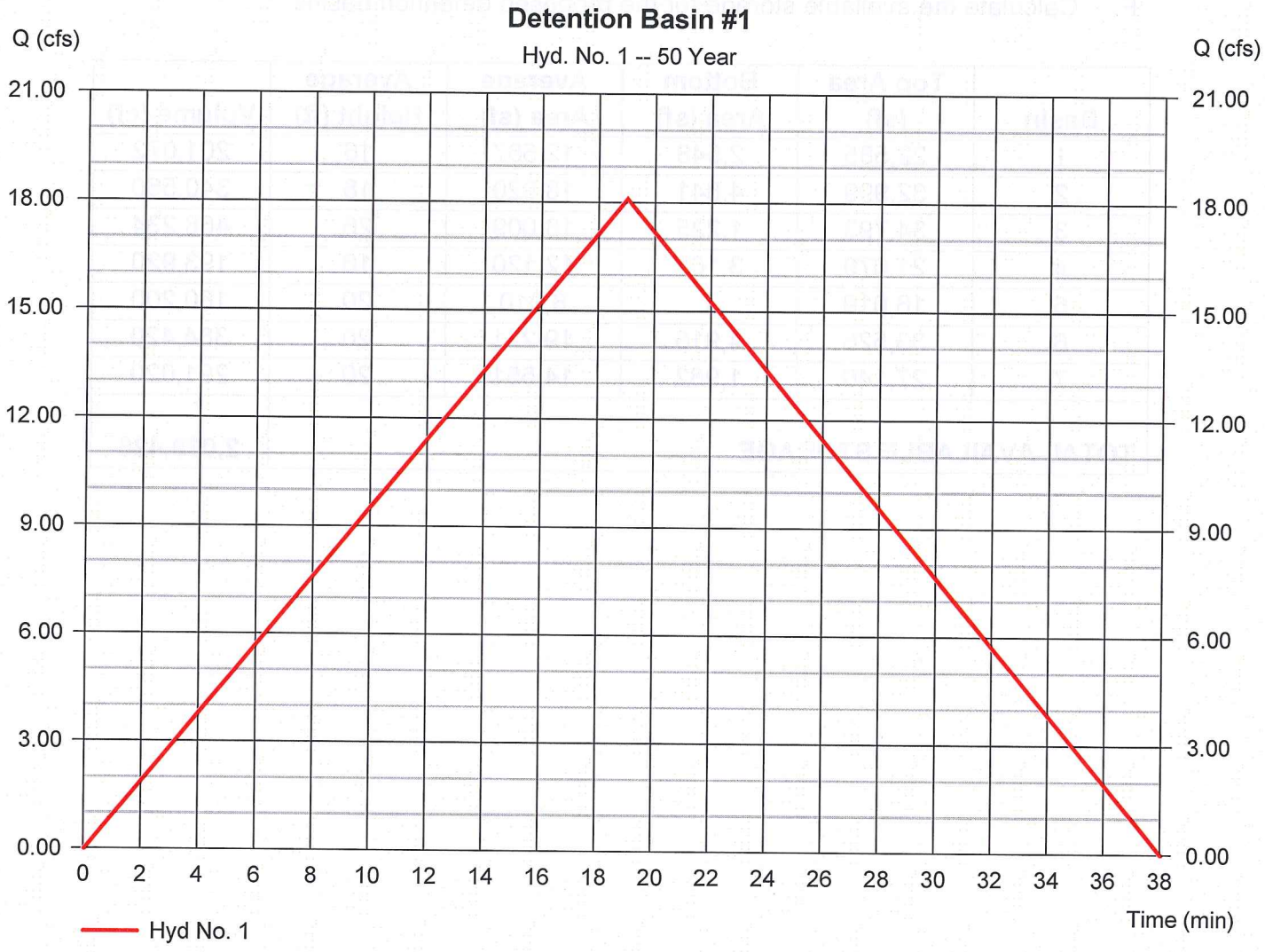
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 1

Detention Basin #1

Hydrograph type	= Rational	Peak discharge	= 18.11 cfs
Storm frequency	= 50 yrs	Time to peak	= 19 min
Time interval	= 1 min	Hyd. volume	= 20,643 cuft
Drainage area	= 12.321 ac	Runoff coeff.	= 0.28
Intensity	= 5.249 in/hr	Tc by FAA	= 19.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



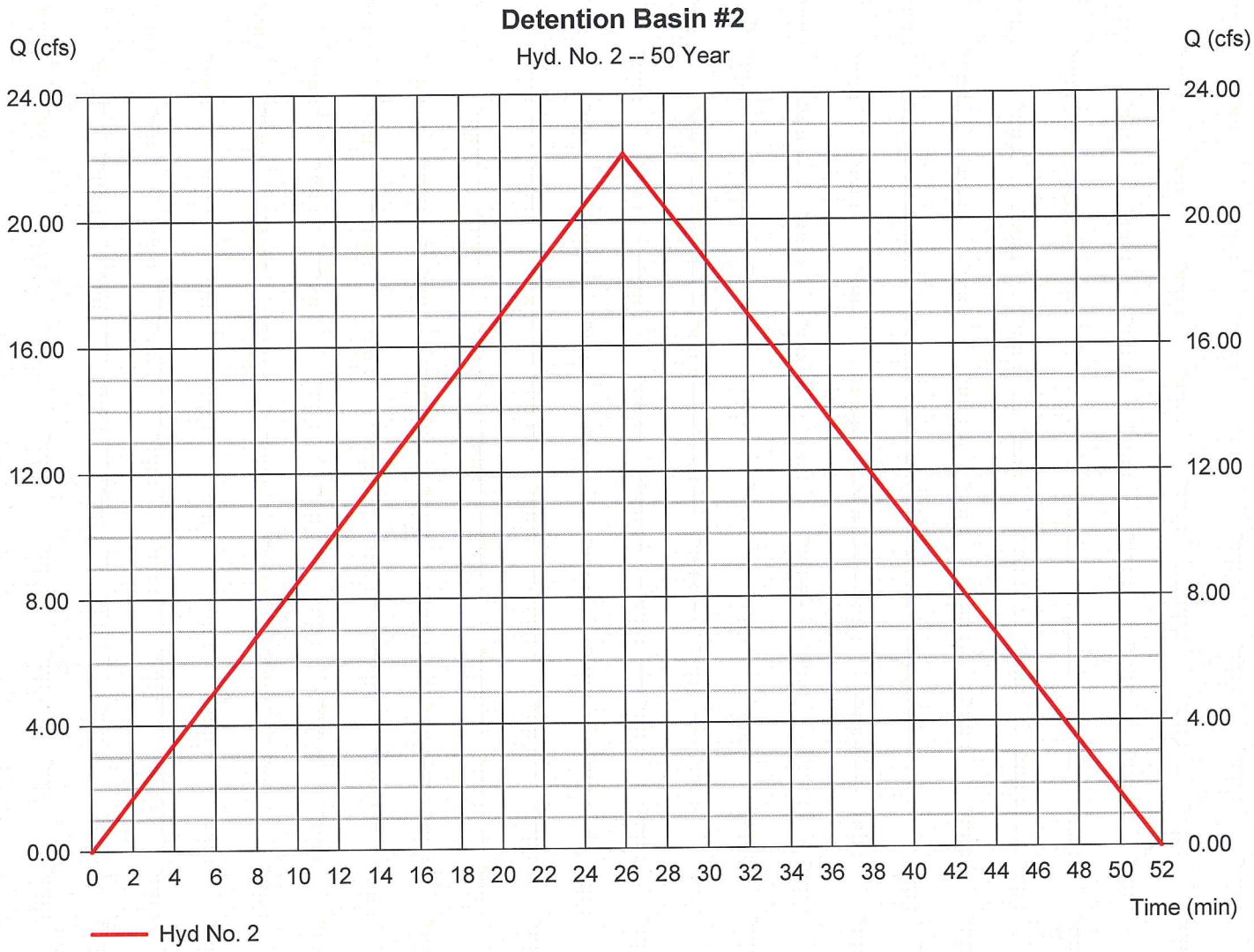
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 2

Detention Basin #2

Hydrograph type	= Rational	Peak discharge	= 22.11 cfs
Storm frequency	= 50 yrs	Time to peak	= 26 min
Time interval	= 1 min	Hyd. volume	= 34,487 cuft
Drainage area	= 16.042 ac	Runoff coeff.	= 0.3
Intensity	= 4.594 in/hr	Tc by FAA	= 26.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



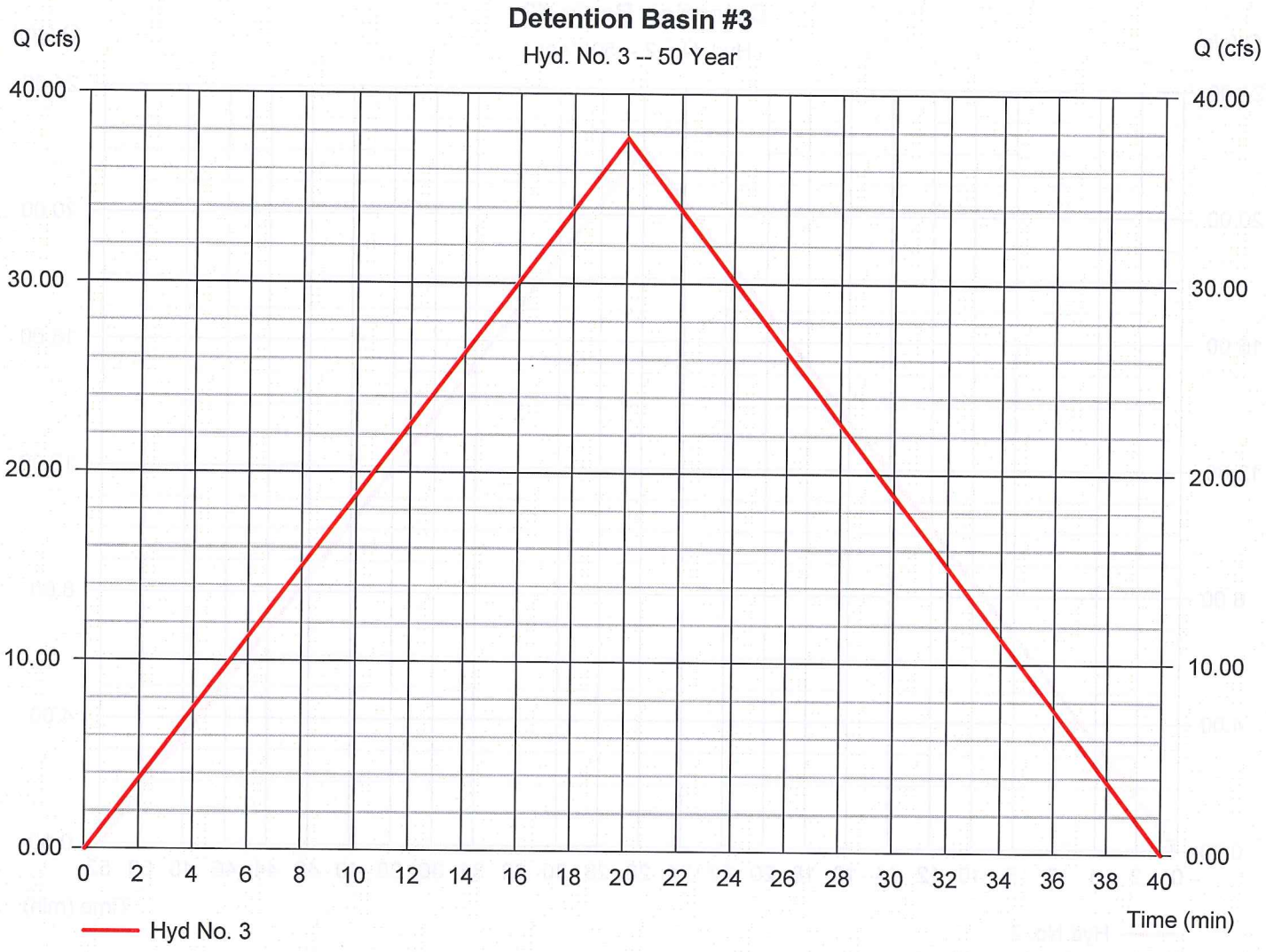
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 3

Detention Basin #3

Hydrograph type	= Rational	Peak discharge	= 37.68 cfs
Storm frequency	= 50 yrs	Time to peak	= 20 min
Time interval	= 1 min	Hyd. volume	= 45,218 cuft
Drainage area	= 24.431 ac	Runoff coeff.	= 0.3
Intensity	= 5.141 in/hr	Tc by FAA	= 20.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



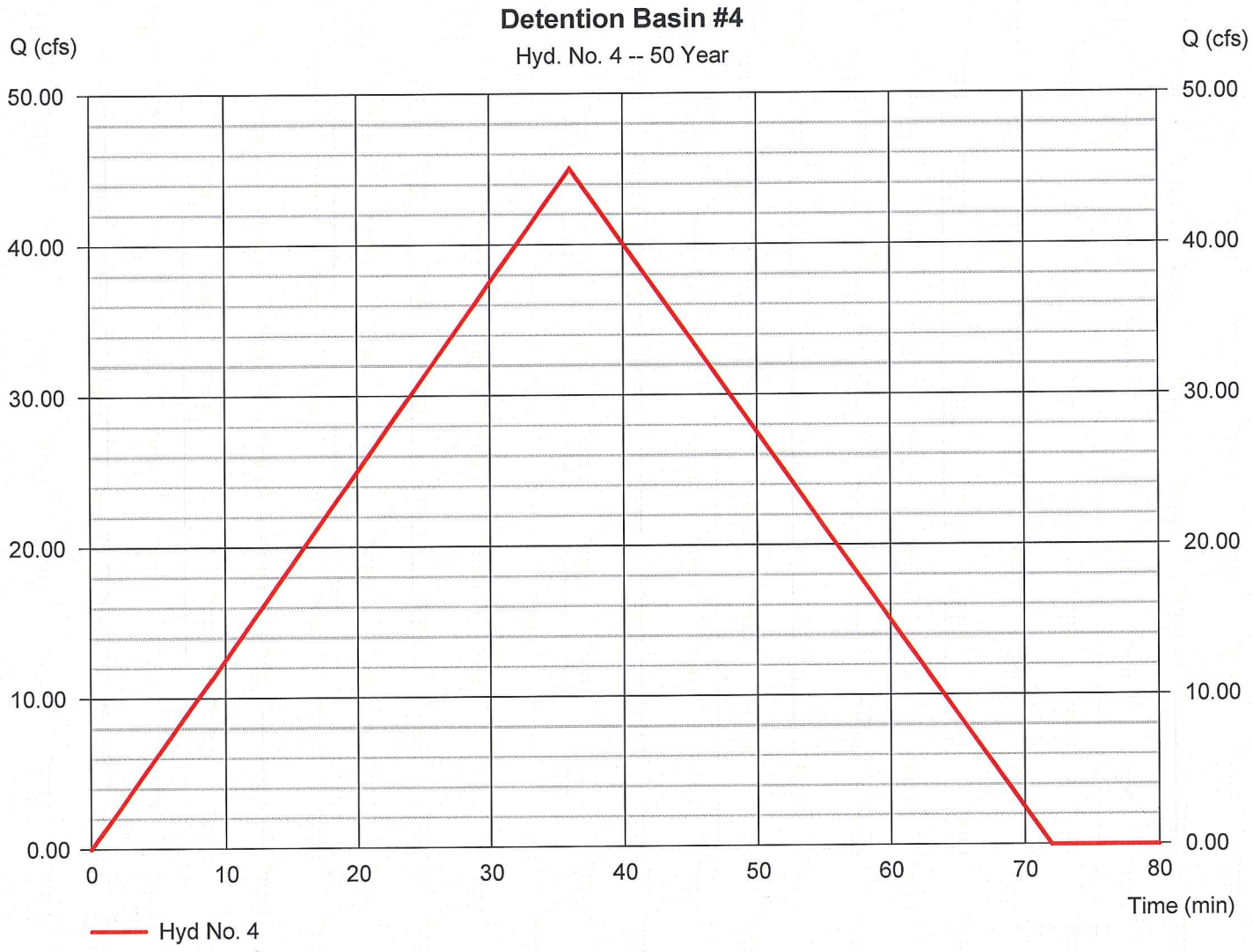
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 4

Detention Basin #4

Hydrograph type	= Rational	Peak discharge	= 45.04 cfs
Storm frequency	= 50 yrs	Time to peak	= 36 min
Time interval	= 1 min	Hyd. volume	= 97,293 cuft
Drainage area	= 38.150 ac	Runoff coeff.	= 0.3
Intensity	= 3.936 in/hr	Tc by FAA	= 36.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3

Monday, 04 / 27 / 2015

Hyd. No. 5

Detention Basin #5

Hydrograph type	= Rational	Peak discharge	= 8.299 cfs
Storm frequency	= 50 yrs	Time to peak	= 14 min
Time interval	= 1 min	Hyd. volume	= 6,972 cuft
Drainage area	= 5.039 ac	Runoff coeff.	= 0.28
Intensity	= 5.882 in/hr	Tc by FAA	= 14.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1

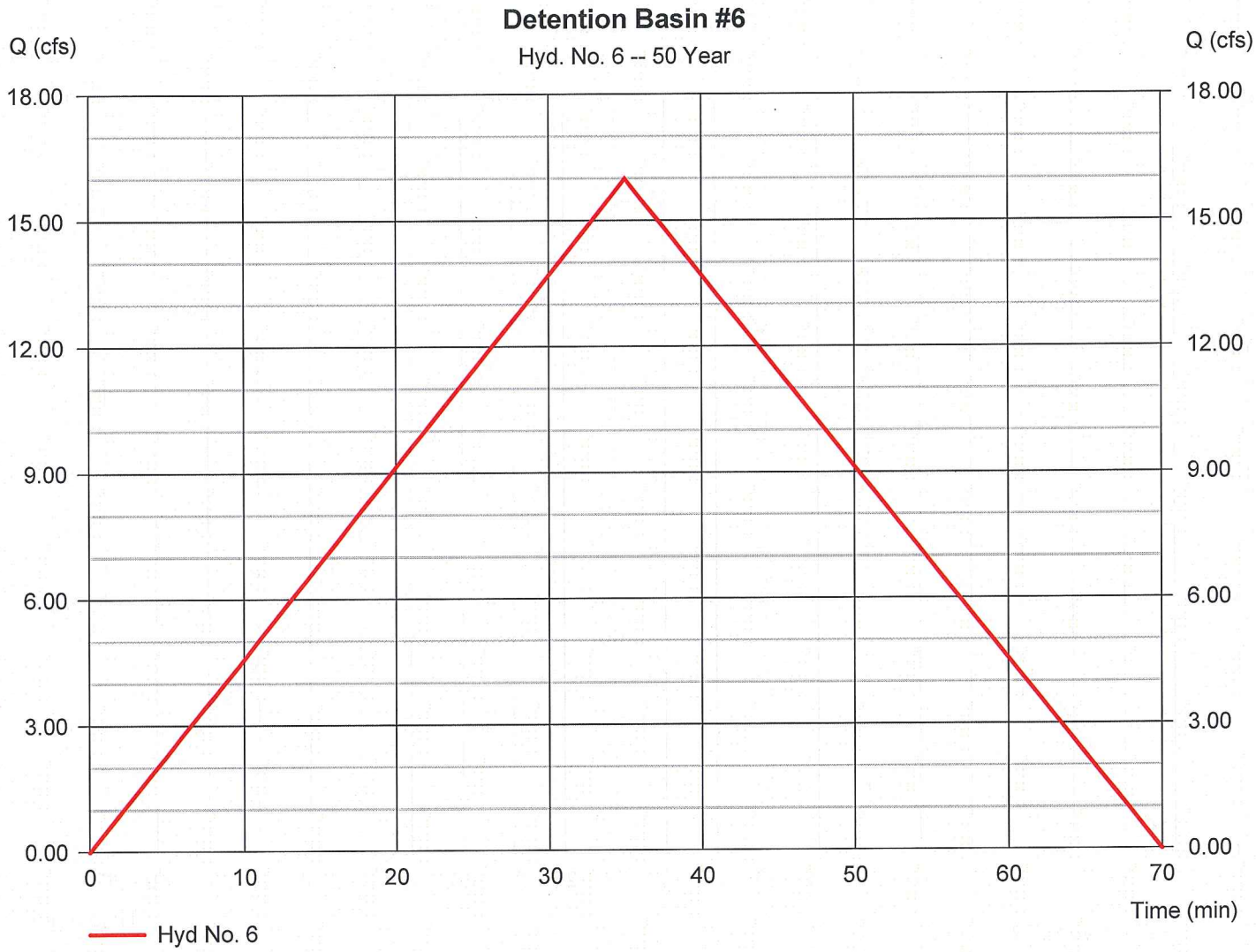
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 6

Detention Basin #6

Hydrograph type	= Rational	Peak discharge	= 15.99 cfs
Storm frequency	= 50 yrs	Time to peak	= 35 min
Time interval	= 1 min	Hyd. volume	= 33,587 cuft
Drainage area	= 13.358 ac	Runoff coeff.	= 0.3
Intensity	= 3.991 in/hr	Tc by FAA	= 35.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



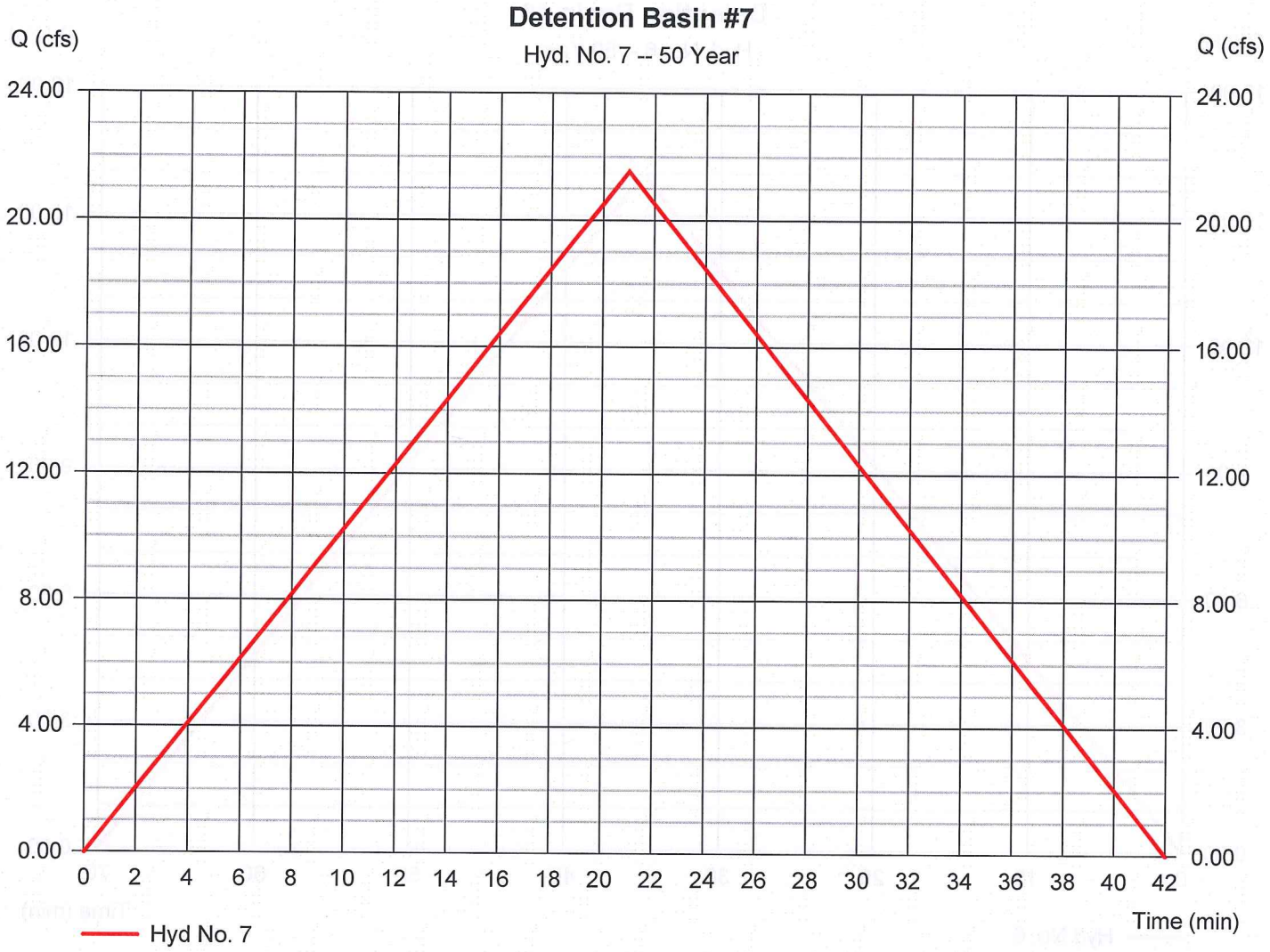
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Monday, 04 / 27 / 2015

Hyd. No. 7

Detention Basin #7

Hydrograph type	= Rational	Peak discharge	= 21.54 cfs
Storm frequency	= 50 yrs	Time to peak	= 21 min
Time interval	= 1 min	Hyd. volume	= 27,143 cuft
Drainage area	= 15.268 ac	Runoff coeff.	= 0.28
Intensity	= 5.039 in/hr	Tc by FAA	= 21.00 min
IDF Curve	= 3-0.IDF	Asc/Rec limb fact	= 1/1



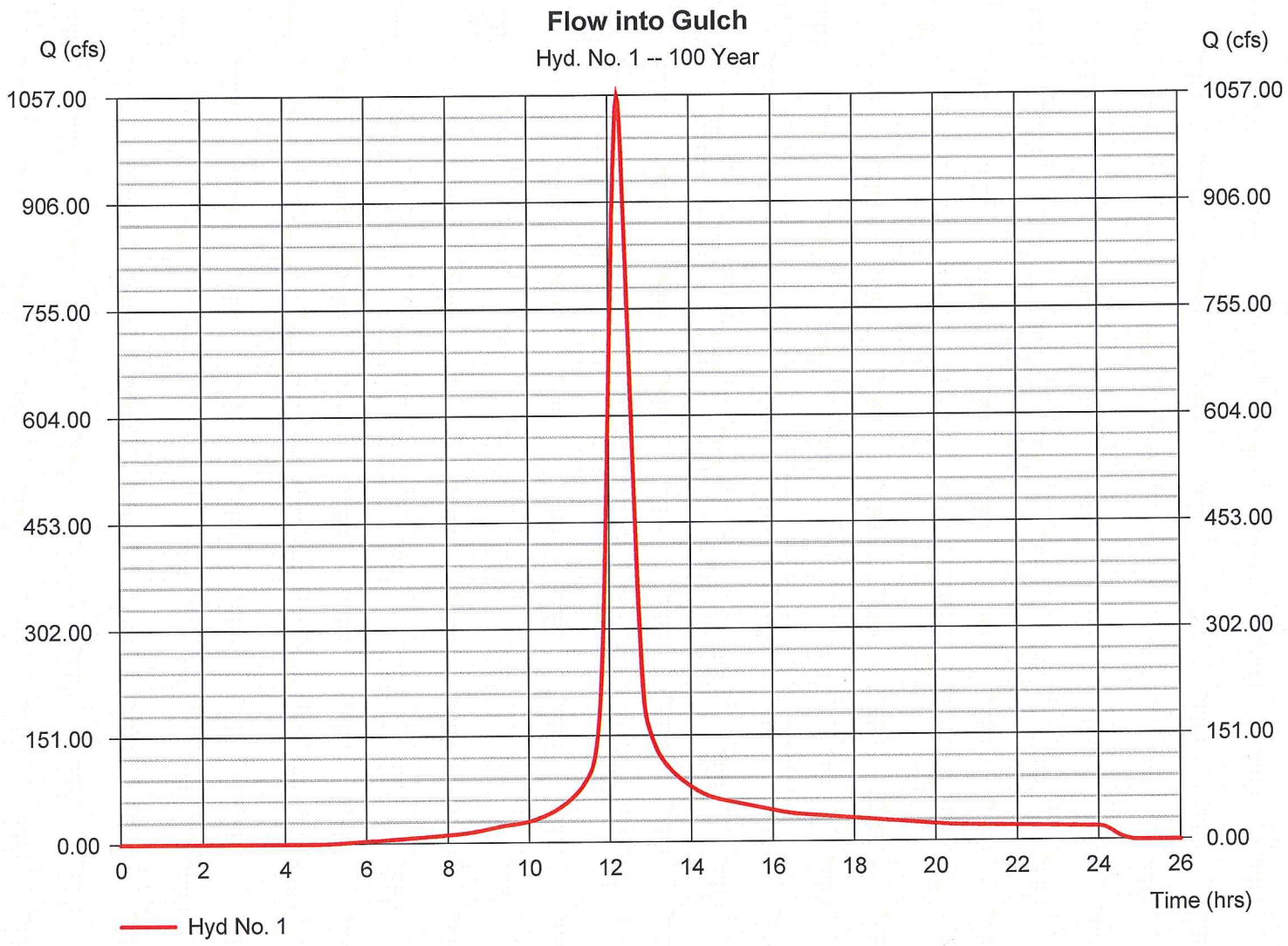
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 01 / 14 / 2015

Hyd. No. 1

Flow into Gulch

Hydrograph type	= SCS Runoff	Peak discharge	= 1055.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 4,831,316 cuft
Drainage area	= 148.100 ac	Curve number	= 74
Basin Slope	= 10.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 36.47 min
Total precip.	= 12.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



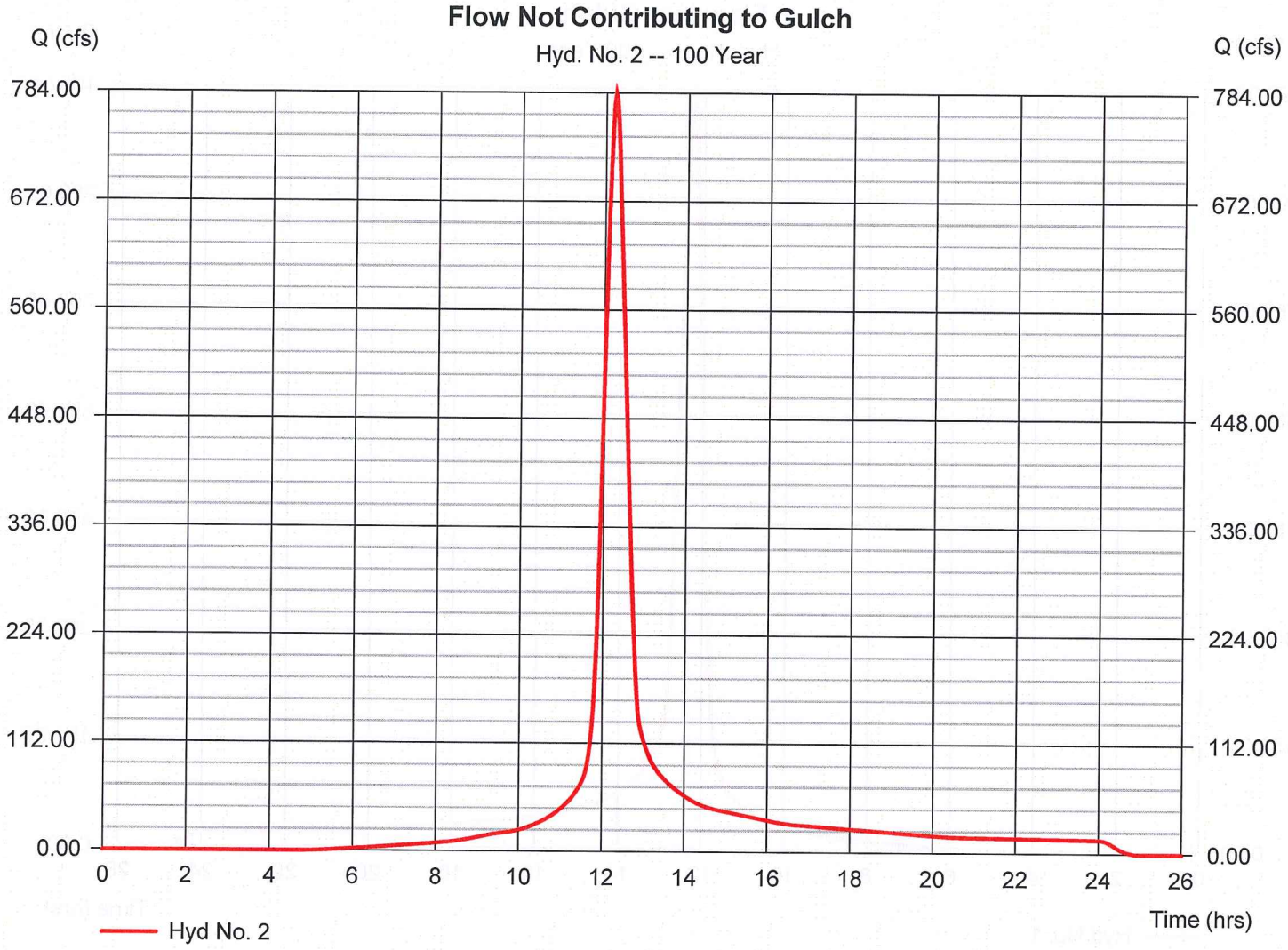
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2014 by Autodesk, Inc. v10.3 — Wednesday, 01 / 14 / 2015

Hyd. No. 2

Flow Not Contributing to Gulch

Hydrograph type	= SCS Runoff	Peak discharge	= 783.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 3,588,418 cuft
Drainage area	= 110.000 ac	Curve number	= 74
Basin Slope	= 10.0 %	Hydraulic length	= 4000 ft
Tc method	= LAG	Time of conc. (Tc)	= 36.47 min
Total precip.	= 12.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



APPENDIX B
WATER DEMAND CALCULATIONS

WATER DEMAND CALCULATIONS

Land Use	Area (Ac.) or Units	Average Unit Demand	Average Total Demand (gpd)
Rural Residential	21 Units	1,000 gpd/unit	21,000
Ohanas	21 Units	300 gpd/unit	6,300
Commercial/Employment	6,000 s.f.	140 gpd/1,000 s.f.	840
School	3 ac.	1,700 gpd/ac	5,100
Total Average Day Demand			**33,240 gpd**
Maximum Daily Demand			**49,860 gpd**

Reservoir Capacity:

1. Meet the maximum day consumption. Reservoir full at the beginning of the 24-hour period with no source input into the reservoir.

   Maximum Daily Demand = 49,860 gallons

   Reservoir Capacity = 50,000 gallons

2. Meet the maximum day rate plus fire flow for duration of fire. Reservoir ¾ full at start of fire, with credit for incoming flow from pumps, one maximum size pump out of service.

   Maximum Daily Demand = 49,860 gpd = 35 gpm

   Fire Flow = 2,000 gpm

   Total Required Demand = 2,035 gpm

   Fire Duration = 2 hours

   Incoming flow from pump = 205 (only one pump at well)

   Required Reservoir Volume = 2,035 – 205 = 1,830 gpm

   Reservoir Volume = [(1,830 gpm) x (60 min/hr) x (2 hr)] / 0.75

   = 292,800 gallons

USE CRITERION 2, 300,000 GALLON RESERVOIR REQUIRED FOR THE PROJECT.

APPENDIX C

ONSITE WASTEWATER TREATMENT

PRELIMINARY ENGINEERING REPORT:

HOKU NUI MAUI – ONSITE WASTEWATER TREATMENT

A. EXECUTIVE SUMMARY

Hoku Nui Maui, LLC (HNM) is a development company located in Makawao, Maui, Hawaii and is in the process of developing a sustainable community on 258 acres along Piiholo Road on TMKs: 2-2-12-4-5 (39-46). A primary goal is to develop a sustainable community that aims to manage its energy, water and nutrients onsite thus minimizing its ecological, energy and water footprints, while showcasing sustainable living and agricultural practices. HNM's sustainable practices will include organic food and energy production, composting, and using best management practices to collect, treat and (re)use nonpotable water and nutrient supplies.

The following Preliminary Engineering Report was produced by Roth Ecological Design Int. LLC (REDI) and EcoSolutions to provide an overview for the management of wastewater at HNM. The report includes the following:

A. Executive Summary
B. Onsite Wastewater Treatment Description
    i. Wastewater Design Flows
    ii. Wastewater Treatment Overview
C. Operations & Maintenance (O&M) discussion
D. References

HNM is taking a proactive approach to managing their water resources by proposing the installation of several onsite wastewater treatment systems, all designed to meet secondary treatment standards to serve the proposed new residential units (Kauhale), commercial facilities and agricultural activities. The HNM development is striving to achieve restorative and regenerative design goals. Achieving sustainable water management practices towards *Net-Zero Water* is a critical component of this and will offer both ecological and educational value for

both the HNM residents and visitors. As part of this strategy greywater reuse of the HNM produce (vegetable and fruit) washwater and several onsite natural wastewater treatment systems to treat effluent from the commercial, residential and other agricultural facilities to secondary standards (< 30mg/l Total Suspended Solids (TSS) and <30mg/l Biochemical Oxygen Demand (BOD)) will be installed prior to dispersal in planted, shallow absorption beds.

There are not any existing sanitary sewer systems on the property. The onsite natural systems wastewater treatment works for the residential, commercial and agricultural facilities will be installed in accordance with Hawaii Administrative Rules, Chapter 11-62 2002. The produce washwater, is not regulated by the State of Hawaii Department of Health Wastewater Branch (DOH). However, dirt materials will be filtered before the water would be reused for irrigation back onto the fields.

B. ONSITE WASTEWATER TREATMENT

i. DESIGN FLOW

The following is a list of the facilities that will be connected to an onsite natural systems wastewater treatment system:

- Farmer's Marketplace
- Hula Halau
- Residential Units
- Slaughterhouse Facility

The projected wastewater flow rate was determined by REDI based on the program numbers provided by HNM and then the estimated gallons per day (gpd) of wastewater were calculated following the DOH Hawaii Administrative Rules (HAR) 11-62 (2002). Appendix A of this report identifies the proposed locations of the various facilities on a site plan.

COMMERICAL -1 (FARMER'S MARKETPLACE)					
Building	**FTE # of people**	**Gallons per day (GPD)/person**	**# of times per week**	**Average GPD**	**Peak GPD**
Commercial Kitchen			2	1143	4000
Visitors (without restaurant/café)	200	5	7	1000	1000
HNM Staff	25	20	7	500	500
Subtotal				**2643**	5500

COMMERCIAL - 2	FTE # of people	Gallons per day (GPD)/person	# of times per week	Average GPD	Peak GPD
Hula Halau	30	5	4	86	150

RESIDENTIAL (KAUHALES)				
KAUHALE -1	# of bedrooms	Gallons per day (GPD)/per 1st bedroom	Gallons per day (GPD)/per additional bedroom	Average GPD
a (Community Hale)	6	200	200	1200
b	2	200	100	300
c	2	200	100	300
d	4	200	100	500
e	2	200	100	300
f	4	200	100	500
g	4	200	100	500
h	2	200	100	300
i	2	200	100	300
j	2	200	100	300
k	4	200	100	500
l	4	200	100	500
m	4	200	100	500
n	4	200	100	500
o	2	200	100	300
p	2	200	100	300
q	2	200	100	300
r	2	200	100	300
s	2	200	100	300
t	2	200	100	300
KAUHALE - 2				
a	2	200	100	300
b	4	200	100	500
c	2	200	100	300
d	4	200	100	500
e	2	200	100	300
f	4	200	100	500
g	4	200	100	500

h	2	200	100	300
i	2	200	100	300
j	4	200	100	500
k	2	200	100	300
l	4	200	100	500
m	2	200	100	300
n	4	200	100	500
o	4	200	100	500
p	2	200	100	300
q	2	200	100	300
r	4	200	100	500
to be added s	2	200	100	300
to be added t	2	200	100	300
to be added u	2	200	100	300
to be added v	4	200	100	500
KAUAHALE -3				
a	2	200	100	300
b	4	200	100	500
c	2	200	100	300
d	4	200	100	500
e	4	200	100	500
f	2	200	100	300
g	4	200	100	500
h	2	200	100	300
Subtotal				**20100**

The washwater treatment and reuse systems are designed for the produce washwater only. It is envisioned there will be 22 acres set aside for farming of organic fruit and vegetables at HNM. The washwater design flow is based on produce washwater volumes from a similar type and size organic farm (MA'O Farms in Waianae), which equates to 1000gal per acre.

	Average GPD	Peak GPD
PRODUCE WASHWATER	22000	22000

HNM is also proposing an onsite mobile slaughterhouse facility. The facility will be initially used for slaughtering up to 43 chickens one time per two weeks (4500 chickens annually, 2100 gallon per day one time every two weeks- see the slaughterhouse section of this report). It is expected that the facility will eventually expand to slaughter up to 60 cattle, 500 lambs, and 200 pigs annually, however it is expected to be 2-3 years away. The slaughterhouse wastewater treatment system would then be expanded to accommodate the additional flow when the timing is better known.

AGRICULTUAL (AG-1)	Average GPD	Peak GPD
Slaughterhouse	286	2100
Total	286	2100

ii. WASTEWATER TREATMENT SYSTEM OVERVIEW

Following primary treatment for the commercial and residential areas, secondary treatment will occur in clustered secondary treatment zones to minimize material required for conveyance and due to the topography to decentralize dispersal of the secondary treated effluent (See Appendix A). The zones include the following:

- Commercial – 1 (Farmer's Marketplace)
- Commercial – 2 (Hula Halau)
- Kauhale -1 (Residential)
- Kauhale -2 (Residential)
- Kauhale -3 (Residential)
- Ag-1 (Slaughterhouse)
- Washwater (Produce washwater)

a. COMMERICAL AND RESIDENTIAL

For the Commercial and Residential zones, the proposed onsite wastewater treatment system would include primary and secondary treatment stages with effluent that would be designed to meet <30mg/L TSS and BOD (similar to the DOH recycled water quality of R-3 as laid forth by the DOH Water Reuse Guidelines).

The treatment system elements include:

- For Farmer's Marketplace only: Grease Interceptor
- Primary Treatment Tanks at each building or group of buildings producing wastewater (septic tanks)
- Small diameter collection and force main system from the septic tanks to the secondary treatment site
- Subsurface Flow Constructed Wetlands (secondary treatment)
- Dispersal via shallow, planted absorption beds

PRIMARY TREATMENT TANKS WITH EFFLUENT FILTERS

Primary treatment tanks will be located at of each of the buildings within the listed "Zones." Below is a summary of estimated sizes of the primary treatment tanks at the various zones.

FARMER'S MARKETPLACE		
COMMERCIAL- 1		**Primary Treatment Tank Size (gal)**
Commercial Kitchen		8000
Visitors (without restaurant/café)		2000
HNM Administration Building		1000

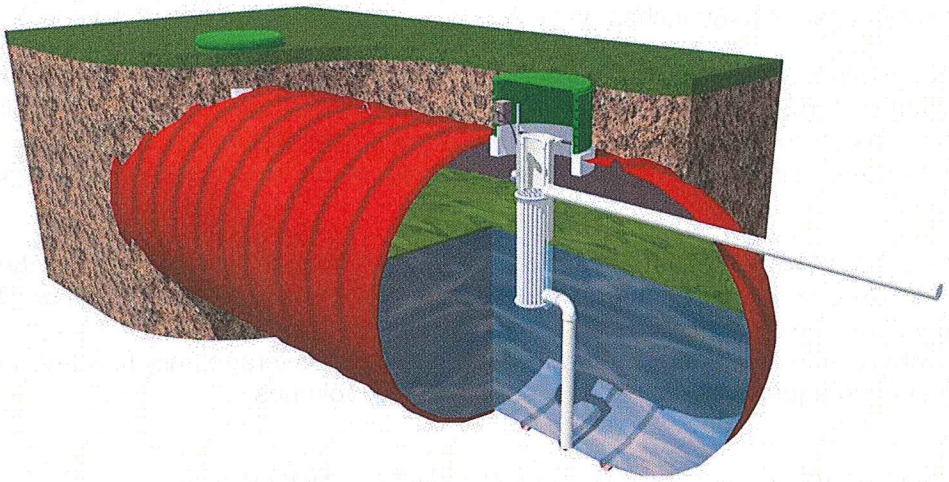
COMMERCIAL -2		**Primary Treatment Tank Size (gal)**
Hula Halau		300

RESIDENTIAL	
KAUHALE -1	**Primary Treatment Tank Size (gal)**
a (Community Hale)	2400
b	600
c	600
d	1000
e	600
f	1000
g	1000
h	600
i	600
j	600
k	1000
l	1000
m	1000

n	1000
o	600
p	600
q	600
r	600
s	600
t	600
KAUHALE - 2	
a	600
b	1000
c	600
d	1000
e	600
f	1000
g	1000
h	600
i	600
j	1000
k	600
l	1000
m	600
n	1000
o	1000
p	600
q	600
r	1000
to be added s	600
to be added t	600
to be added u	600
to be added v	1000
KAUAHALE -3	
a	600
b	1000
c	600
d	1000
e	1000
f	600
g	1000
h	600

Gravity flow from the primary treatment tank will pass through a septic tank effluent filter to the secondary treatment systems where gravity flow is feasible. Should gravity flow not be possible, a Septic Tank Effluent Pump (STEP) system is proposed for each of the septic tank zones. Following solids settling in the primary septic tank chamber, a duplex pump system will be located in the secondary tank/chamber within the screened effluent vault with filter. The use of tanks with filter screens, with or without pumps, has been documented to reduce raw wastewater BOD5 by more than 64% and total suspended solids by more than 90% (Bounds, 1997). The use of a single-model pump for collection and treatment greatly reduces pump maintenance and replacement costs. Should the filter screen clog, this would lead to higher water levels in the tank, which can activate a high-water alarm and a remote alert to the operator that the tank requires maintenance. Solids build up at this location prevents material that would otherwise cause difficulties from reaching the collection lines and the secondary treatment system. This feature enables the operator to solve the problem as inexpensively as possible by pumping out the tank and cleaning the screen, rather than repairing the conveyance and treatment works, which could compromise treatment efficiency.

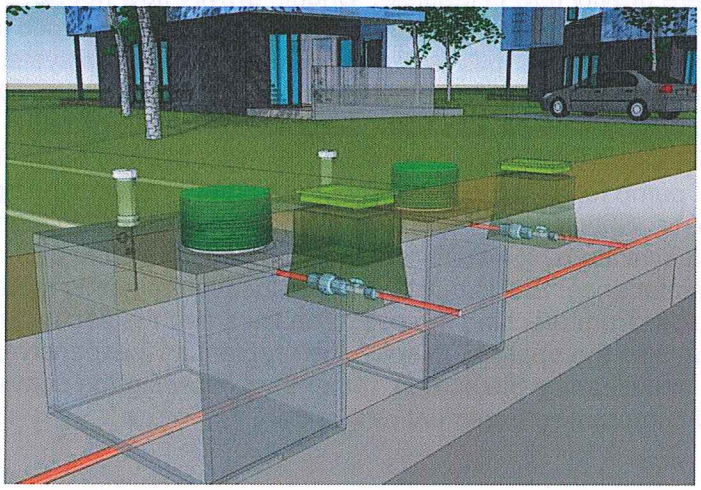
Figure 1: Primary treatment tank with effluent-filter



SMALL DIAMETER COLLECTION SYSTEM

The STEP system from each of the septic tanks will connect into singular small (2-4 inch) diameter pipe collection system to transport the water from the primary treatment tanks to an equalization tank/constructed wetland treatment system for secondary treatment. Because of the ease with which small diameter collection systems can be installed, smaller pipe size and their ability to be buried at shallow depths below grade, they are significantly less expensive than conventional sewer systems. Unlike conventional systems, maintenance costs are 5-10% of the costs of conventional sewers, primarily because only liquid is transported.

Figure 2: Small Diameter Collection System



The sewer lines from the pumped systems do not require manholes. Hence, gases are kept dissolved in the wastewater in the closed pipe conveyance system. Materials for piping are acid resistant and will not corrode. Shoring of trenches is not necessary because the small diameter sewer line is generally set at 24 to 60 inches below grade and follows the profile of the road.

Since 2/3 to 3/4 of the total costs of providing wastewater collection and treatment are in the costs of the collection system, significant capital savings can be realized with the use of small diameter sewer systems. In addition to allowing the use of small diameter systems, effluent pumping removes the constraints imposed on development by gravity and conventional sewer system designs.

For each zone, the STEP effluent will be conveyed to an equalization tank before entering the constructed wetlands for secondary treatment. The purpose of the equalization tank will provide regular set dosing volumes to the constructed wetlands, which can offset peak flows so that the secondary treatment systems can be downsized to treat "equalized" average daily flows while the primary treatment and equalization tanks can store the peak volumes.

SECONDARY TREATMENT: CONSTRUCTED WETLAND TECHNOLOGY

Pollution is just a resource out of place. Engineered wetland technologies mimic the natural 'composting' abilities of marshes found in nature by transforming 'pollution' into food for the wetland organisms. The living engine driving this technology employs the food web structure found in natural marshes including: microorganisms, zooplankton, algae, and higher plants. The technologies have been successfully designed and engineered to treat wastes generated by anthropogenically derived pollution including mine and landfill leachate, airport runoff, and municipal and industrial wastewater for over thirty years.

Subsurface flow constructed wetlands are a passive, aesthetically pleasing option for onsite wastewater treatment meeting effluent quality suitable for water reuse. They are either tank-based or lined fixed film reactors that are typically planted with native wetland plants from the

region and for tropical locations such as Hawaii, can also include flowering tropical plants such as gingers, heliconia and canna. In subsurface flow constructed wetlands all the water flows **beneath** the surface, which minimizes odors since the noxious gases are filtered through the media. For HNM, a HDPE (high density polyethylene) or PPE (polypropylene) liner will be used to provide a water-tight cell. A geotextile fabric will be laid underneath and often above to protect the liner. Once the liner is installed, the cell(s) will be filled with media and be planted with selected species that reflect a native Hawaiian landscape and/or ones that have economic value for the farm.

Primary treated effluent from the septic tanks will enter into an equalization tank located at each secondary wastewater treatment zone (See location of "constructed wetlands" for each zone in Appendix A). The equalization tank will allow for regular dosing into the subsurface flow wetland cells. Should there be more than one constructed wetland cell, a level adjustment sump (LAS) will be placed on the outside of each of the wetland cells to connect the constructed wetland series at each zone. The LAS maintains the water level below the surface, serving much like a standpipe.

All surrounding site grading from the treatment works will be such that stormwater runoff is diverted away from the constructed wetland treatment systems. Therefore only the rain that falls within the wetland cells themselves will need to be accounted for and managed. To account for the potential excess water in the open wetland treatment systems during large storm events, the berms/free board of the constructed wetlands will be sized minimally for the 100yr/24hr storm, to temporarily hold the excess water allow for continued operations and prevent overflows during these events.

Figure 3: Image of a Subsurface Flow Constructed Wetland

Treated effluent from the constructed wetland series will be designed to meet 30mg/L TSS and BOD before it moves into the planted, absorption bed disposal systems.

b. AGRICULTURAL WASTEWATER

There are several sources of agricultural wastewater:

- Slaughterhouse
- Produce washwater

Slaughterhouse Wastewater

Livestock including cattle, sheep and chickens will be raised in free ranging pastures to help restore land that was previously used for pineapple cultivation through the incorporation of manures into the soil through contour tilling. Poultry chickens will be slaughtered onsite and egg laying chickens will also be raised. Should it become feasible to slaughter the other livestock onsite, the slaughterhouse treatment system would require expansion. For purposes of this Preliminary Engineering Report, only poultry slaughter will be discussed. Should slaughter of the cattle, lamb and pigs occur the treatment system will be expanded to accommodate these additional design flows. The wastewater system therefore, is considered modular and will have the capability to expand as needed. The food products produced from the livestock along with fruits and vegetables grown on the property will be sold at a farmer's market and possibly at local markets.

Slaughterhouse Wastewater Flows and Characteristics

HNM is proposing a cost effective method to mitigate the waste products and wastewater generated from the slaughtering of poultry chickens. HNM is proposing to construct an (expandable) slaughterhouse wastewater treatment facility to process this wastewater to a level that meets 30mg/L BOD and TSS.

***Poultry Slaughter (initially 2 days/month, ultimately 4 days/month)**:*

The principal sources of wastewater from the slaughter process will be manure, blood, carcass washing and clean-up operations. For broilers that average 4 lbs. in weight, 3.5 – 7 gallons of wastewater are produced through processes including scalding, eviscerating and chilling.

A total of 300 broilers will be slaughtered when slaughtering occurs. Therefore the daily range of wastewater produced is calculated as follows:

- Lowest volume: 3.5 gallons per broiler x 300 broilers = 1,050 gallons
- Highest volume: 7.0 gallons per broiler x 300 broilers = 2,100 gallons

Thus, the daily range of wastewater produced will be **1,050 to 2,100 gallons per slaughtering day (Peak flow)**.

Slaughterhouse Wastewater Characteristics

The BOD and TSS of the wastewater are expected to range from approximately 500 to 2,200 mg/L since the blood from the slaughtering process will be captured and diverted away from the wastewater treatment facility, thus significantly reducing the BOD of the wastewater. The blood will be used for creating blood meal products and or diluted to be land applied per USDA and DOH regulations (<1000lbs of BOD per acre injected into the soil <6" from the surface).

Slaughterhouse Treatment Plant Process

The Agricultural wastewater system is proposed to include the following:

- Screening
- Primary Treatment
- Flow Equalization
- Moving Bed Bioreactor with vegetated lid
- Activated Sludge Basin with vegetated lid
- Surface flow constructed wetlands planted with duck weed
- Effluent Absorption System

Screening

Floor drain screens at the slaughterhouse facility will capture residual solids from the slaughtering process.

Primary Treatment

Primary treatment will consist of a 2000gal septic tank. The purposed of the primary treatment is settle any larger solids.

Flow Equalization

Similar to the commercial and residential systems, the agricultural wastewater system will include an equalization tank to offset peak flows so that the secondary treatment systems can be downsized for "equalized" average daily flows and peak flows can be stored. The equalization tank will be 1000gal.

Moving Bed Bioreactor Basin with Vegetated Lid

The first stage in the secondary treatment system will be a 500gal Moving Bed Bioreactor (MBBR) with a vegetated lid. The vegetated lid will add root mass into the system which helps to trap and digest the organic solids, making this conventional technology more efficient. In addition the plants in the planted lid are planted in thick coconut coir which helps to minimize noxious odors.

Activated Sludge Basin with Vegetated Lid

The second stage in secondary treatment system would be a 500gal activated sludge basin. Similar to the MBBR vegetated lid, the added root mass into the system helps to trap and digest the organic solids, making the activated sludge technology more efficient and helps to minimize odors.

Surface flow Constructed Wetland

Similar to the constructed wetland described above, a series of surface flow wetlands would serve to help remove remaining suspended organic material and extract remaining nutrients. The wetlands would be planted with duck weed and selectively harvested to be dried for chicken and pig feed. The wetlands would be sized to meet average evapotranspiration rates such that the production of the duck weed can be maximized, currently estimated at approximately 2500 sf. The wetlands would be designed to include freeboard space and have a backup absorption bed sized for 2100gpd to dispose of the effluent safely in the event of significant rain or required maintenance to prevent overflow. The design effluent quality coming out of the duck weed wetlands is targeting 30mg/l TSS and BOD.

c. *PRODUCE WASHWATER*

HNM is expected to produce approximately 22,000 gpd of produce washwater. Washwater that stems from only washing fruits and vegetables is not regulated by the DOH. HNM sees this as a valuable resource and plans to reuse it for irrigating the agricultural fields. Washwater will be collected and filtered of soil particles through a surface-flow wetland planted with taro (*loi*). The loi will serve to settle of remaining dirt particles before entering into a mechanical filtration system prior to returning the water to an irrigation holding pond/tank.

C. WASTEWATER SYSTEMS OPERATIONS AND MAINTENANCE

Operation and maintenance (O&M) tasks are crucial for the proper and safe function of wastewater collection, treatment, and dispersal. Typically, maintenance staff should be able to perform or supervise all required tasks for a successful system including water quality sampling, compiling operation logs, and regulatory permit compliance reports. Standard activities may include periodic adjustment of pump timers, pump dosing schedules, review and analysis of water quality testing, basic maintenance tasks and system troubleshooting (in the event of pump or equipment failure). The Engineer of the system should provide onsite operator training, an O&M Manual, and offer technical support (via phone, internet and/or email). In addition, remote monitoring could be added into the systems components via telemetry such that the operator, the Engineer and HNM would all have access to knowing the operational performance of any given mechanical component in the system at any time, which will help coordinate and streamline operations for the lifetime of the project and could also play into educational opportunities for HNM.

General O&M Tasks are the following:

Primary and Equalization Tanks - Annual inspection should include:

- Inspection of effluent filter, sludge and scum depths and general condition; clean effluent filters.
- Pump out solids as required (typically 1-4 years).
- Check and ensure proper operation of floats and pumps (for tanks with effluent pumps).

Constructed Wetland

- Adjusting water level
- Checking and recycling solids back to the Mixing Tank and scheduling any pump outs of the septic tanks as necessary.
- Clearing of dead vegetation
- Leveling the gravel

Dosing/Storage Tank(s)

- Maintain berms and landscape condition. Ensure that lids are secure and watertight.
- Inspect level monitoring equipment to ensure proper operation.
- Check pump operation, adjust timers as needed.

Testing

- Collect and deliver grab and/or composite samples as needed to a certified laboratory.
- Maintain data logs and monitor long-term performance.
- Record flow meter readings.

Provide written reports to appropriate regulators as required by permit. The proposed natural treatment system is low-energy and mechanically simple. The most complicated pieces of equipment are pumps and control panels. Pumps are easily replaceable in the case of failure. The control panel can be designed to be accessible remotely by the system operator to assist in troubleshooting and response to alarm conditions.

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Appendix A

ROTH ECOLOGICAL DESIGN INTERNATIONAL, LLC
NATURAL SYSTEMS TECHNOLOGIES

HOKU NUI MAUI: Wastewater

Prepared by Lauren Roth Venu
07/23/2015

LEGEND		
Color	Type of Facility	Treatment Tank size (gal)
	Residential	600
	Residential	1000
	Residential	2400
	Halau	300
	Visitor Center	2000
	Commercial Kitchen	8000
	Compost Toilet	
	Constucted Wetland	
	Washwater loi	

COMMERICAL -1 (FARMER'S MARKETPLACE)					
Building	FTE # of people	Gallons per day (GPD)/person	# of times per week	Average GPD	Peak GPD
Commerical Kitchen			2	1143	4000
Visitors (without restaurant/café)	200	5	7	1000	1000
Hoku Nui Staff	25	20	7	500	500
Subtotal				2643	5500
Constructed Wetland Treatment Size (sf)				1762	

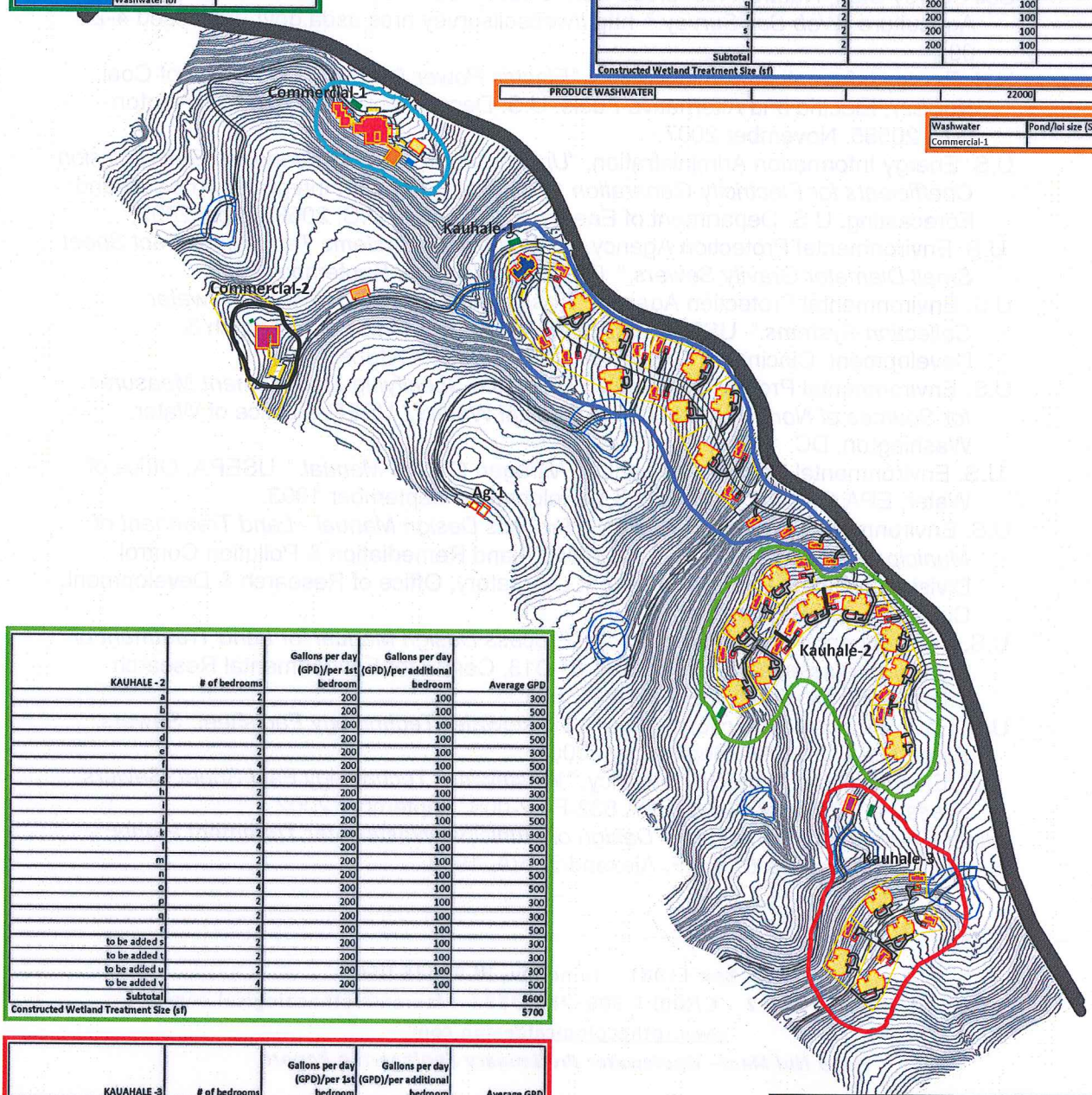
COMMERICAL -2	FTE # of people	Gallons per day (GPD)/person	# of times per week	Average GPD	Peak GPD
Halau	30	5	4	86	150
Constructed Wetland Treatment Size (sf)				100	

AGRICULTUAL	Average GPD	Peak GPD
AG-1 (Slaughterhouse)	286	2000

RESIDENTIAL				
KAUHALE -1	# of bedrooms	Gallons per day (GPD)/per 1st bedroom	Gallons per day (GPD)/per additional bedroom	Average GPD
a (Community Hale)	6	200	200	1200
b	2	200	100	300
c	2	200	100	300
d	4	200	100	500
e	2	200	100	300
f	4	200	100	500
g	4	200	100	500
h	2	200	100	300
i	2	200	100	300
j	2	200	100	300
k	4	200	100	500
l	4	200	100	500
m	4	200	100	500
n	4	200	100	500
o	2	200	100	300
p	2	200	100	300
q	2	200	100	300
r	2	200	100	300
s	2	200	100	300
t	2	200	100	300
Subtotal				8300
Constructed Wetland Treatment Size (sf)				5500

PRODUCE WASHWATER			22000	22000

Washwater	Pond/loi size (SF)
Commercial-1	2900



KAUHALE -2	# of bedrooms	Gallons per day (GPD)/per 1st bedroom	Gallons per day (GPD)/per additional bedroom	Average GPD
a	2	200	100	300
b	4	200	100	500
c	2	200	100	300
d	4	200	100	500
e	2	200	100	300
f	4	200	100	500
g	4	200	100	500
h	2	200	100	300
i	2	200	100	300
j	4	200	100	500
k	2	200	100	300
l	4	200	100	500
m	2	200	100	300
n	4	200	100	500
o	4	200	100	500
p	2	200	100	300
q	2	200	100	300
r	4	200	100	500
to be added s	2	200	100	300
to be added t	2	200	100	300
to be added u	2	200	100	300
to be added v	4	200	100	500
Subtotal				8600
Constructed Wetland Treatment Size (sf)				5700

KAUAHALE -3	# of bedrooms	Gallons per day (GPD)/per 1st bedroom	Gallons per day (GPD)/per additional bedroom	Average GPD
a	2	200	100	300
b	4	200	100	500
c	2	200	100	300
d	4	200	100	500
e	4	200	100	500
f	2	200	100	300
g	4	200	100	500
h	2	200	100	300
Subtotal				3200
Constructed Wetland Treatment Size (sf)				2133

TOTAL WASTEWATER VOLUMES	AVERAGE GPD	PEAK GPD
Residential (Kauhale 1-3)	20100	20100
Commerical -1	2643	5500
Washwater	22000	22000
Commerical -2	86	150
Ag -1 (Slaughterhouse)	286	2000
Subtotal (wastewater)	23114	27750
Subtotal (washwater/greywater)	22000	22000

PRELIMINARY ENGINEERING REPORT:

HOKU NUI MAUI – ONSITE WASTEWATER TREATMENT

A. EXECUTIVE SUMMARY

Hoku Nui Maui, LLC (HNM) is a development company located in Makawao, Maui, Hawaii and is in the process of developing a sustainable community on 258 acres along Piiholo Road on TMKs: 2-2-12-4-5 (39-46). A primary goal is to develop a sustainable community that aims to manage its energy, water and nutrients onsite thus minimizing its ecological, energy and water footprints, while showcasing sustainable living and agricultural practices. HNM's sustainable practices will include organic food and energy production, composting, and using best management practices to collect, treat and (re)use nonpotable water and nutrient supplies.

The following Preliminary Engineering Report was produced by Roth Ecological Design Int. LLC (REDI) and EcoSolutions to provide an overview for the management of wastewater at HNM. The report includes the following:

A. Executive Summary
B. Onsite Wastewater Treatment Description
    i. Wastewater Design Flows
    ii. Wastewater Treatment Overview
C. Operations & Maintenance (O&M) discussion
D. References

HNM is taking a proactive approach to managing their water resources by proposing the installation of several onsite wastewater treatment systems, all designed to meet secondary treatment standards to serve the proposed new residential units (Kauhale), commercial facilities and agricultural activities. The HNM development is striving to achieve restorative and regenerative design goals. Achieving sustainable water management practices towards *Net-Zero Water* is a critical component of this and will offer both ecological and educational value for

both the HNM residents and visitors. As part of this strategy greywater reuse of the HNM produce (vegetable and fruit) washwater and several onsite natural wastewater treatment systems to treat effluent from the commercial, residential and other agricultural facilities to secondary standards (< 30mg/l Total Suspended Solids (TSS) and <30mg/l Biochemical Oxygen Demand (BOD)) will be installed prior to dispersal in planted, shallow absorption beds.

There are not any existing sanitary sewer systems on the property. The onsite natural systems wastewater treatment works for the residential, commercial and agricultural facilities will be installed in accordance with Hawaii Administrative Rules, Chapter 11-62 2002. The produce washwater, is not regulated by the State of Hawaii Department of Health Wastewater Branch (DOH). However, dirt materials will be filtered before the water would be reused for irrigation back onto the fields.

B. ONSITE WASTEWATER TREATMENT

i. DESIGN FLOW

The following is a list of the facilities that will be connected to an onsite natural systems wastewater treatment system:

- Farmer's Marketplace
- Hula Halau
- Residential Units
- Slaughterhouse Facility

The projected wastewater flow rate was determined by REDI based on the program numbers provided by HNM and then the estimated gallons per day (gpd) of wastewater were calculated following the DOH Hawaii Administrative Rules (HAR) 11-62 (2002). Appendix A of this report identifies the proposed locations of the various facilities on a site plan.

COMMERICAL -1 (FARMER'S MARKETPLACE)					
Building	**FTE # of people**	**Gallons per day (GPD)/person**	**# of times per week**	**Average GPD**	**Peak GPD**
Commercial Kitchen			2	1143	4000
Visitors (without restaurant/café)	200	5	7	1000	1000
HNM Staff	25	20	7	500	500
Subtotal				**2643**	5500

COMMERCIAL - 2	FTE # of people	Gallons per day (GPD)/person	# of times per week	Average GPD	Peak GPD
Hula Halau	30	5	4	86	150

HOKU NUI MAUI RESIDENTIAL:	43 Homes 1 Multi-Unit Dwelling

KAUHALE-1

# 2-bedroom	Ave daily flow (gpd) each	subtotal gpd
14	300	4200
# 4-bedroom		
9	500	4500
# 6-bedroom (B&B)		
1	1200	1200
TOTAL		**9900**

KAUHALE -2

# 2-bedroom	Ave gpd	subtotal gpd	Septic Tank size for each house (gal)
6	300	1800	600
# 4-bedroom			
6	500	3000	1000
TOTAL		**4800**	

KAUHALE -3

# 2-bedroom	Ave gpd	subtotal gpd	Septic Tank size for each house (gal)
4	300	1200	600
# 4-bedroom			
4	500	2000	1000
TOTAL		**3200**	

The washwater treatment and reuse systems are designed for the produce washwater only. It is envisioned there will be 22 acres set aside for farming of organic fruit and vegetables at HNM. The washwater design flow is based on produce washwater volumes from a similar type and size organic farm (MA'O Farms in Waianae), which equates to 1000gal per acre.

	Average GPD	Peak GPD
PRODUCE WASHWATER	22000	22000

HNM is also proposing an onsite mobile slaughterhouse facility. The facility will be initially used for slaughtering up to 43 chickens one time per two weeks (4500 chickens annually, 2100 gallon per day one time every two weeks- see the slaughterhouse section of this report). It is expected that the facility will eventually expand to slaughter up to 60 cattle, 500 lambs, and 200 pigs annually, however it is expected to be 2-3 years away. The slaughterhouse wastewater treatment system would then be expanded to accommodate the additional flow when the timing is better known.

AGRICULTUAL (AG-1)	**Average GPD**	**Peak GPD**
Slaughterhouse	286	2100
Total	286	2100

ii. WASTEWATER TREATMENT SYSTEM OVERVIEW

Following primary treatment for the commercial and residential areas, secondary treatment will occur in clustered secondary treatment zones to minimize material required for conveyance and due to the topography to decentralize dispersal of the secondary treated effluent (See Appendix A). The zones include the following:

- Commercial – 1 (Farmer's Marketplace)
- Commercial – 2 (Hula Halau)
- Kauhale -1 (Residential)
- Kauhale -2 (Residential)
- Kauhale -3 (Residential)
- Ag-1 (Slaughterhouse)
- Washwater (Produce washwater)

a. COMMERICAL AND RESIDENTIAL

For the Commercial and Residential zones, the proposed onsite wastewater treatment system would include primary and secondary treatment stages with effluent that would be designed to meet <30mg/L TSS and BOD (similar to the DOH recycled water quality of R-3 as laid forth by the DOH Water Reuse Guidelines).

The treatment system elements include:

- For Farmer's Marketplace only: Grease Interceptor
- Primary Treatment Tanks at each building or group of buildings producing wastewater (septic tanks)
- Small diameter collection and force main system from the septic tanks to the secondary treatment site
- Subsurface Flow Constructed Wetlands (secondary treatment)
- Dispersal via shallow, planted absorption beds

PRIMARY TREATMENT TANKS WITH EFFLUENT FILTERS

Primary treatment tanks will be located at of each of the buildings within the listed "Zones." Below is a summary of estimated sizes of the primary treatment tanks at the various zones.

FARMER'S MARKETPLACE		
COMMERCIAL- 1		**Primary Treatment Tank Size (gal)**
Commercial Kitchen		8000
Visitors (without restaurant/café)		2000
HNM Administration Building		1000

COMMERCIAL -2		**Primary Treatment Tank Size (gal)**
Hula Halau		300

HOKU NUI MAUI RESIDENTIAL:	43 homes 1 Multi-unit dwelling		
KAUHALE-1			
# of 2-bedroom	Ave daily flow (gpd) each	subtotal gpd	Septic Tank size for each house (gal)
14	300	4200	600
# of 4-bedroom			
9	500	4500	1000
# 6-bedroom (B&B)			
1	1200	1200	2400

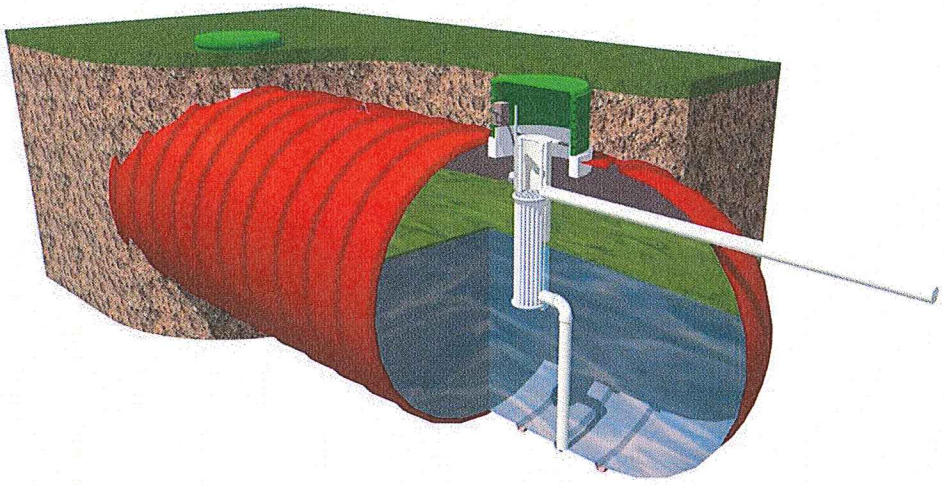
KAUHALE -2			
# of 2-bedroom	Ave gpd	subtotal gpd	Septic Tank size for each house (gal)
6	300	1800	600
# of 4-bedroom			
6	500	3000	1000

KAUHALE -3			
# of 2-bedroom	Ave gpd	subtotal gpd	Septic Tank size for each house (gal)
4	300	1200	600
# of 4-bedroom			
4	500	2000	1000

Gravity flow from the primary treatment tank will pass through a septic tank effluent filter to the secondary treatment systems where gravity flow is feasible. Should gravity flow not be possible, a Septic Tank Effluent Pump (STEP) system is proposed for each of the septic tank zones. Following solids settling in the primary septic tank chamber, a duplex pump system will be located in the secondary tank/chamber within the screened effluent vault with filter. The use of tanks with filter screens, with or without pumps, has been documented to reduce raw wastewater BOD5 by more than 64% and total suspended solids by more than 90% (Bounds, 1997). The use of a single-model pump for collection and treatment greatly reduces pump maintenance and replacement costs. Should the filter screen clog, this would lead to higher water levels in the tank, which can activate a high-water alarm and a remote alert to the operator that the tank requires maintenance. Solids build up at this location prevents material

that would otherwise cause difficulties from reaching the collection lines and the secondary treatment system. This feature enables the operator to solve the problem as inexpensively as possible by pumping out the tank and cleaning the screen, rather than repairing the conveyance and treatment works, which could compromise treatment efficiency.

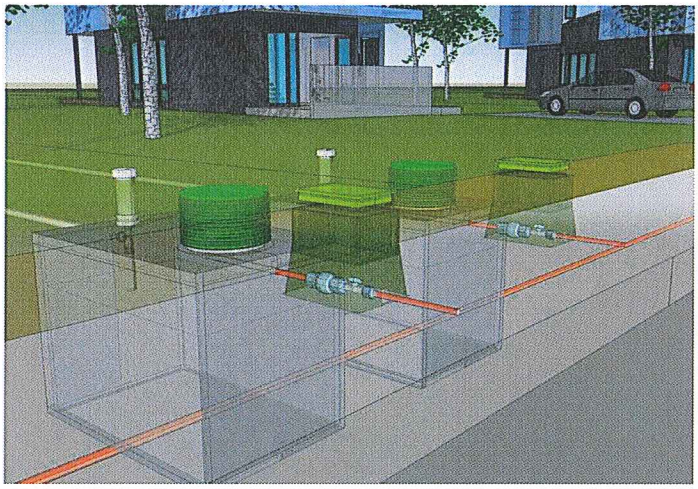
Figure 1: Primary treatment tank with effluent-filter



SMALL DIAMETER COLLECTION SYSTEM

The STEP system from each of the septic tanks will connect into singular small (2-4 inch) diameter pipe collection system to transport the water from the primary treatment tanks to an equalization tank/constructed wetland treatment system for secondary treatment. Because of the ease with which small diameter collection systems can be installed, smaller pipe size and their ability to be buried at shallow depths below grade, they are significantly less expensive than conventional sewer systems. Unlike conventional systems, maintenance costs are 5-10% of the costs of conventional sewers, primarily because only liquid is transported.

Figure 2: Small Diameter Collection System



The sewer lines from the pumped systems do not require manholes. Hence, gases are kept dissolved in the wastewater in the closed pipe conveyance system. Materials for piping are acid resistant and will not corrode. Shoring of trenches is not necessary because the small diameter sewer line is generally set at 24 to 60 inches below grade and follows the profile of the road.

Since 2/3 to 3/4 of the total costs of providing wastewater collection and treatment are in the costs of the collection system, significant capital savings can be realized with the use of small diameter sewer systems. In addition to allowing the use of small diameter systems, effluent pumping removes the constraints imposed on development by gravity and conventional sewer system designs.

For each zone, the STEP effluent will be conveyed to an equalization tank before entering the constructed wetlands for secondary treatment. The purpose of the equalization tank will provide regular set dosing volumes to the constructed wetlands, which can offset peak flows so that the secondary treatment systems can be downsized to treat "equalized" average daily flows while the primary treatment and equalization tanks can store the peak volumes.

SECONDARY TREATMENT: CONSTRUCTED WETLAND TECHNOLOGY

Pollution is just a resource out of place. Engineered wetland technologies mimic the natural 'composting' abilities of marshes found in nature by transforming 'pollution' into food for the wetland organisms. The living engine driving this technology employs the food web structure found in natural marshes including: microorganisms, zooplankton, algae, and higher plants. The technologies have been successfully designed and engineered to treat wastes generated by anthropogenically derived pollution including mine and landfill leachate, airport runoff, and municipal and industrial wastewater for over thirty years.

Subsurface flow constructed wetlands are a passive, aesthetically pleasing option for onsite wastewater treatment meeting effluent quality suitable for water reuse. They are either tank-based or lined fixed film reactors that are typically planted with native wetland plants from the

region and for tropical locations such as Hawaii, can also include flowering tropical plants such as gingers, heliconia and canna. In subsurface flow constructed wetlands all the water flows **beneath** the surface, which minimizes odors since the noxious gases are filtered through the media. For HNM, a HDPE (high density polyethylene) or PPE (polypropylene) liner will be used to provide a water-tight cell. A geotextile fabric will be laid underneath and often above to protect the liner. Once the liner is installed, the cell(s) will be filled with media and be planted with selected species that reflect a native Hawaiian landscape and/or ones that have economic value for the farm.

Primary treated effluent from the septic tanks will enter into an equalization tank located at each secondary wastewater treatment zone (See location of "constructed wetlands" for each zone in Appendix A). The equalization tank will allow for regular dosing into the subsurface flow wetland cells. Should there be more than one constructed wetland cell, a level adjustment sump (LAS) will be placed on the outside of each of the wetland cells to connect the constructed wetland series at each zone. The LAS maintains the water level below the surface, serving much like a standpipe.

All surrounding site grading from the treatment works will be such that stormwater runoff is diverted away from the constructed wetland treatment systems. Therefore only the rain that falls within the wetland cells themselves will need to be accounted for and managed. To account for the potential excess water in the open wetland treatment systems during large storm events, the berms/free board of the constructed wetlands will be sized minimally for the 100yr/24hr storm, to temporarily hold the excess water allow for continued operations and prevent overflows during these events.

Figure 3: Image of a Subsurface Flow Constructed Wetland

Treated effluent from the constructed wetland series will be designed to meet 30mg/L TSS and BOD before it moves into the planted, absorption bed disposal systems.

b. *AGRICULTURAL WASTEWATER*

There are several sources of agricultural wastewater:

- Slaughterhouse
- Produce washwater

Slaughterhouse Wastewater

Livestock including cattle, sheep and chickens will be raised in free ranging pastures to help restore land that was previously used for pineapple cultivation through the incorporation of manures into the soil through contour tilling. Poultry chickens will be slaughtered onsite and egg laying chickens will also be raised. Should it become feasible to slaughter the other livestock onsite, the slaughterhouse treatment system would require expansion. For purposes of this Preliminary Engineering Report, only poultry slaughter will be discussed. Should slaughter of the cattle, lamb and pigs occur the treatment system will be expanded to accommodate these additional design flows. The wastewater system therefore, is considered modular and will have the capability to expand as needed. The food products produced from the livestock along with fruits and vegetables grown on the property will be sold at a farmer's market and possibly at local markets.

Slaughterhouse Wastewater Flows and Characteristics

HNM is proposing a cost effective method to mitigate the waste products and wastewater generated from the slaughtering of poultry chickens. HNM is proposing to construct an (expandable) slaughterhouse wastewater treatment facility to process this wastewater to a level that meets 30mg/L BOD and TSS.

***Poultry Slaughter (initially 2 days/month, ultimately 4 days/month)**:*

The principal sources of wastewater from the slaughter process will be manure, blood, carcass washing and clean-up operations. For broilers that average 4 lbs. in weight, 3.5 – 7 gallons of wastewater are produced through processes including scalding, eviscerating and chilling.

A total of 300 broilers will be slaughtered when slaughtering occurs. Therefore the daily range of wastewater produced is calculated as follows:

- Lowest volume: 3.5 gallons per broiler x 300 broilers = 1,050 gallons
- Highest volume: 7.0 gallons per broiler x 300 broilers = 2,100 gallons

Thus, the daily range of wastewater produced will be **1,050 to 2,100 gallons per slaughtering day (Peak flow)**.

Slaughterhouse Wastewater Characteristics

The BOD and TSS of the wastewater are expected to range from approximately 500 to 2,200 mg/L since the blood from the slaughtering process will be captured and diverted away from the wastewater treatment facility, thus significantly reducing the BOD of the wastewater. The blood will be used for creating blood meal products and or diluted to be land applied per USDA and DOH regulations (<1000lbs of BOD per acre injected into the soil <6" from the surface).

Slaughterhouse Treatment Plant Process

The Agricultural wastewater system is proposed to include the following:

- Screening
- Primary Treatment
- Flow Equalization
- Moving Bed Bioreactor with vegetated lid
- Activated Sludge Basin with vegetated lid
- Surface flow constructed wetlands planted with duck weed
- Effluent Absorption System

Screening

Floor drain screens at the slaughterhouse facility will capture residual solids from the slaughtering process.

Primary Treatment

Primary treatment will consist of a 2000gal septic tank. The purposed of the primary treatment is settle any larger solids.

Flow Equalization

Similar to the commercial and residential systems, the agricultural wastewater system will include an equalization tank to offset peak flows so that the secondary treatment systems can be downsized for "equalized" average daily flows and peak flows can be stored. The equalization tank will be 1000gal.

Moving Bed Bioreactor Basin with Vegetated Lid

The first stage in the secondary treatment system will be a 500gal Moving Bed Bioreactor (MBBR) with a vegetated lid. The vegetated lid will add root mass into the system which helps to trap and digest the organic solids, making this conventional technology more efficient. In addition the plants in the planted lid are planted in thick coconut coir which helps to minimize noxious odors.

Activated Sludge Basin with Vegetated Lid

The second stage in secondary treatment system would be a 500gal activated sludge basin. Similar to the MBBR vegetated lid, the added root mass into the system helps to trap and digest the organic solids, making the activated sludge technology more efficient and helps to minimize odors.

Surface flow Constructed Wetland

Similar to the constructed wetland described above, a series of surface flow wetlands would serve to help remove remaining suspended organic material and extract remaining nutrients. The wetlands would be planted with duck weed and selectively harvested to be dried for chicken and pig feed. The wetlands would be sized to meet average evapotranspiration rates such that the production of the duck weed can be maximized, currently estimated at approximately 2500 sf. The wetlands would be designed to include freeboard space and have a backup absorption bed sized for 2100gpd to dispose of the effluent safely in the event of significant rain or required maintenance to prevent overflow. The design effluent quality coming out of the duck weed wetlands is targeting 30mg/l TSS and BOD.

c. *PRODUCE WASHWATER*

HNM is expected to produce approximately 22,000 gpd of produce washwater. Washwater that stems from only washing fruits and vegetables is not regulated by the DOH. HNM sees this as a valuable resource and plans to reuse it for irrigating the agricultural fields. Washwater will be collected and filtered of soil particles through a surface-flow wetland planted with taro (*loi*). The loi will serve to settle of remaining dirt particles before entering into a mechanical filtration system prior to returning the water to an irrigation holding pond/tank.

C. WASTEWATER SYSTEMS OPERATIONS AND MAINTENANCE

Operation and maintenance (O&M) tasks are crucial for the proper and safe function of wastewater collection, treatment, and dispersal. Typically, maintenance staff should be able to perform or supervise all required tasks for a successful system including water quality sampling, compiling operation logs, and regulatory permit compliance reports. Standard activities may include periodic adjustment of pump timers, pump dosing schedules, review and analysis of water quality testing, basic maintenance tasks and system troubleshooting (in the event of pump or equipment failure). The Engineer of the system should provide onsite operator training, an O&M Manual, and offer technical support (via phone, internet and/or email). In addition, remote monitoring could be added into the systems components via telemetry such that the operator, the Engineer and HNM would all have access to knowing the operational performance of any given mechanical component in the system at any time, which will help coordinate and streamline operations for the lifetime of the project and could also play into educational opportunities for HNM.

General O&M Tasks are the following:

Primary and Equalization Tanks - Annual inspection should include:

- Inspection of effluent filter, sludge and scum depths and general condition; clean effluent filters.
- Pump out solids as required (typically 1-4 years).
- Check and ensure proper operation of floats and pumps (for tanks with effluent pumps).

Constructed Wetland

- Adjusting water level
- Checking and recycling solids back to the Mixing Tank and scheduling any pump outs of the septic tanks as necessary.
- Clearing of dead vegetation
- Leveling the gravel

Dosing/Storage Tank(s)

- Maintain berms and landscape condition. Ensure that lids are secure and watertight.
- Inspect level monitoring equipment to ensure proper operation.
- Check pump operation, adjust timers as needed.

Testing

- Collect and deliver grab and/or composite samples as needed to a certified laboratory.
- Maintain data logs and monitor long-term performance.
- Record flow meter readings.

Provide written reports to appropriate regulators as required by permit. The proposed natural treatment system is low-energy and mechanically simple. The most complicated pieces of equipment are pumps and control panels. Pumps are easily replaceable in the case of failure. The control panel can be designed to be accessible remotely by the system operator to assist in troubleshooting and response to alarm conditions.

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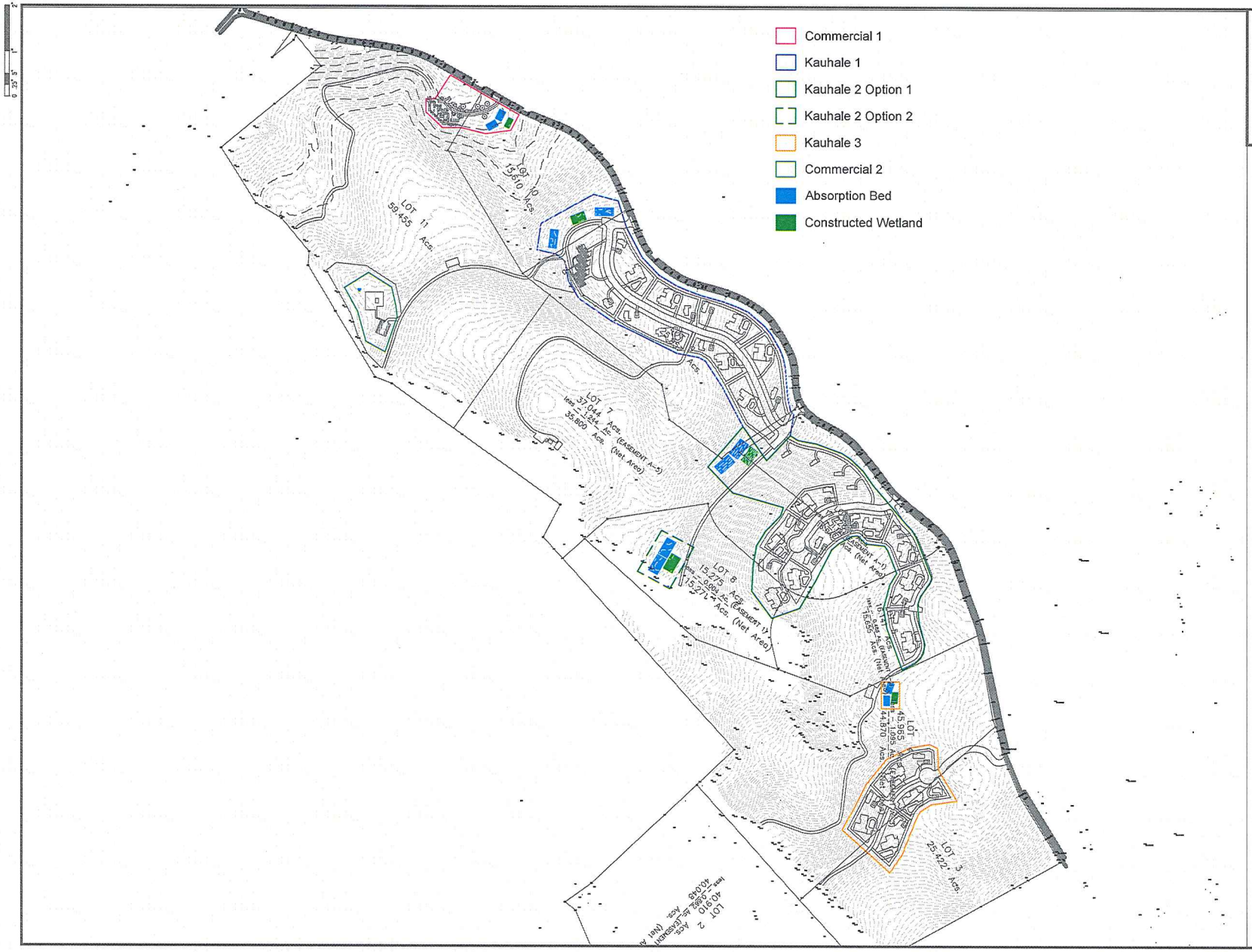
APPENDIX A:

PROPOSED LOCATIONS FOR WASTEWATER TREATMENT SECONDARY TREATMENT AND DISPOSAL SYSTEMS

P.O. Box 11081 · Honolulu, HI 96828 USA
T/(00) 1 808-737-1512 · C/(00) 1 808-781-7583 · lauren@rothecological.com ·
www.rothecologicaldesign.com



ROTH ECOLOGICAL
9 N. Pauahi St. Suite 302
Honolulu, HI 96817
Phone: 808.781.7583
www.rothecological.com

stamp

project

HOKU NUI MAUI

TMK: (2) 2-6-012:005 & 039 - 040
O Pohaku Road
Makawao, Maui
(808) 572-1403

phase

job number

date MARCH 14, 2016

drawing title

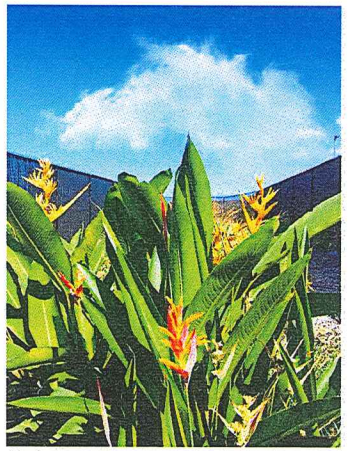
sheet number

APPENDIX B:

GENERAL INFORMATION ABOUT CONSTRUCTED WETLANDS AND ABSORPTION BED DISPOSAL

P.O. Box 11081 · Honolulu, HI 96828 USA
T/(00) 1 808-737-1512 · C/(00) 1 808-781-7583 · lauren@rothecological.com ·
www.rothecologicaldesign.com

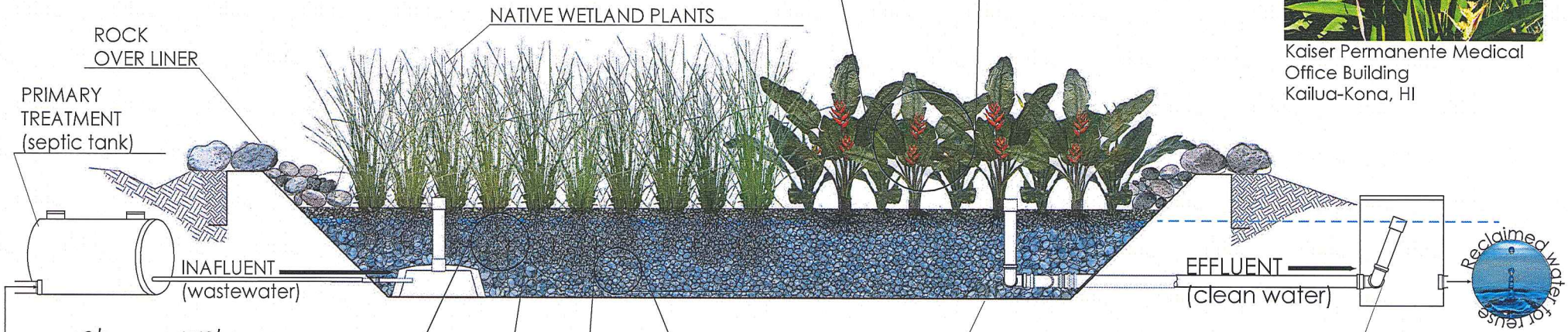
Subsurface Flow Constructed Wetland

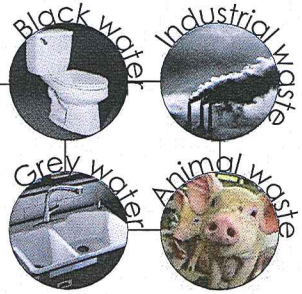


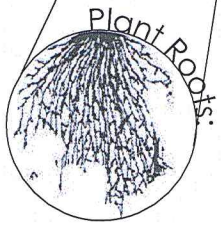
Kaiser Permanente Medical
Office Building
Kailua-Kona, HI

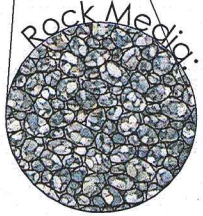
1. Economic byproduct

2. Aesthetic Value









1. Provide habitat, surface area, O2, & carbon for the microorganisms

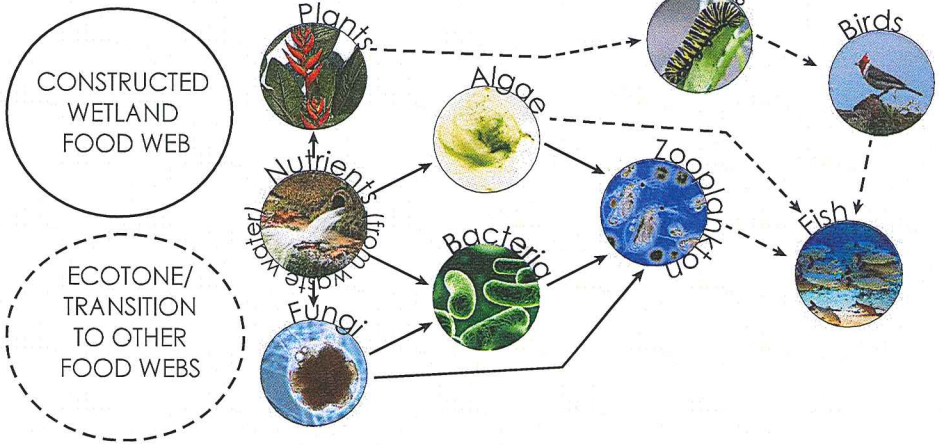
2.Uptake pollutants & heavy metals

3. Put out anti bacterial & anti viral compounds

1. Habitat & surface area for biofilm development

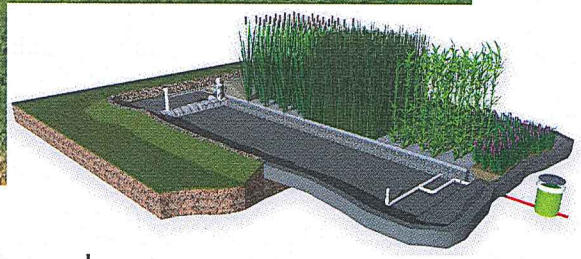
2. Diverse ecology

3. Waste = Food = Biomass



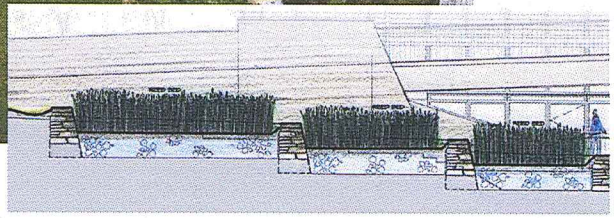
ROTH
ECOLOGICAL
DESIGN INTERNATIONAL, LLC
NATURAL SYSTEMS TECHNOLOGIES

Subsurface Flow Constructed Wetland



University of Hawaii West Hawaii Campus,
Kailua-Kona, HI (LEED Platinum)

Terraced Treatment Wetlands



Sidwell Friends School,
Washington D.C. (LEED Platinum)

Constructed wetlands

Constructed wetlands are engineered to be mechanically simple, yet ecologically complex. In subsurface flow (SSF) wetlands all water flows below the surface and the plant roots and rock material provide substrates for microorganism attachment and biofilm creation, which is critical for efficient biological treatment. The diversity of substrates also diversifies ecological habitats that allow for both aerobic and anoxic bacteria to reside in the same ecosystem which accelerates the food chain to efficiently breakdown and assimilate of a range of pollutants. In doing so the wetland ecology converts waste into resources such as clean water and plant matter to harvest. A significant advantage of a SSF wetland compared to open water systems is lack of odor since the all the water flows beneath the surface and noxious odors are filtered by the top humic layers of the wetland. They generally also require less land since surface areas are increased for biological treatment. In addition, subsurface flow systems significantly reduce the incidence of mosquitoes, which can protect public safety especially in tropical regions where communities are located nearby. Lastly unlike open water systems, SSF wetlands are not required by the State of Hawaii Departmnet of Health (DOH) to have 6' high fence surrounding the treatment system. Other benefits of the wetland treatment systems include showcasing native and tropical plants that promote the local culture, regional biodiversity and can provide opportunities for commercial harvest. SSF wetland technologies are a proven technology in the state of Hawaii and have been successfully applied locally to treat municipal, agricultural and medical wastewater. The technology has a proven track record with the DOH to meet water quality standards suitable for acquiring a recycled water permit for irrigation. In addition the systems are excellent in removing nutrients such as ammonia and nitrates, which protect fragile ecosystems and groundwater supplies where disposal/water reuse occurs.

Terraced Treatment Wetlands

In areas where topography limits the space available for a single-cell constructed wetland treatment, a terraced multi-cell treatment system can be applied. Terraced constructed wetland systems mimic traditional agricultural systems that are designed using the natural grade and often offer an architecturally visual aesthetic.

9 N. Pauahi St. Suite 302, Honolulu, HI 96817 • 808-781-7583 • www.rothecological.com

Absorption Beds

Infiltration Trenches

Gravel Media

Complete (Before Planting)

(Optional) "Reuse"

Absorption beds are an accepted method of dispersal of treated municipal wastewater by the State of Hawaii Department of Health. Absorption beds are suitable for use on flat (usually parallel distribution) or slightly sloping sites (usually serial distribution) with good soil absorption. They are similar to absorption trenches, but are typically much shallower (18''-24'') below grade. They can be used with all types of primary and secondary wastewater treatment units. Absorption beds are excavated and the bottom filled with aggregate or crushed rock. Either perforated piping, self-supporting arch trenching or box trenching is placed in the trench. Effluent flows into the trenches where it is absorbed through the trenching material and into the surrounding soil. The absorption process and the action of bacteria in the soil provide some additional treatment of the effluent. The the depth and size is based on the volume of daily flow, percolation rate of the soil and it accounts for precipitation events at the location such that the inflow into the dispersal system is able to percolate through the gravel and soil at a faster rate than the rate of the inflow. This minimizes the likelihood of "ponding," which is not permitted by DOH. Absorption beds can be planted with a variety of non-edible plants such a flowers so that some "reuse" and economic byproducts are possible.

Tropical Flowers

Animal Feed

Nature Plants

ROTH ECOLOGICAL DESIGN INTERNATIONAL, LLC
NATURAL SYSTEMS TECHNOLOGIES

APPENDIX B.

Sustainability Plan

HOKU NUI
MAUI

Sustainability Plan

October 2015

Prepared by: Susty Pacific

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1. Introduction

1.1 Project Summary

Hoku Nui Maui land management group (HNM) is developing an innovative sustainability project. It is located on a 258 acre property that was purchased by the Frost Family in 2012 (see Appendix A for property map). HNM's vision is to have a thriving and regenerative relationship between community and agriculture. Its mission is to re-establish a diverse native and endemic Hawaiian habitat and foster a productive agricultural operation, integrating a small community of sustainable, affordable residential homes. HNM understands its role, in the broader context of sustainability, is to improve economic, environmental, social, and cultural conditions for Maui, Hawaii and the national and global community. HNM defines sustainability using the Quadruple Bottom Line (QBL) of environment, economy, society, and culture. This means optimizing environmental, social, and cultural impacts (both internally and externally), while operating a financially viable business model that can be sustained and expanded over time.

1.2 Project Information

Project Name:	Hoku Nui Maui
Location:	Makawao, Hawaii
TMK:	2-2-4-12-5 (39-46)
Total Area:	258 acres
Existing Use(s):	Vacant, undeveloped, former pineapple land; livestock grazing
County Zoning:	Agricultural
General Plan Land Use Designation:	Agricultural
State Land Use:	Agricultural
Moku:	Hāmākua Poko
Ahupua'a:	Makawao
Approvals Required:	Building Permits, Zoning and Use Permits, County Council Approval

1.3 Project Overview

1.31 Land Use Summary

Land use will encompass 258 acres of the following areas:

- 20 acres of residential homes
- 120 acres of grazing pasture for cattle and chickens with 10-20 acres of rotating horticulture
- Remaining 118 acres to include native habitat, open space, greenways, and access laneways (fruit and nut trees are proposed to line the access laneways, and sheep will be utilized to maintain and control understory grasses)

1.32 Housing Summary

Residential lots will be subdivided into 1 acre lots and then condominiumized into .5 acre lots comprised of:

- 21 Single Family Affordable Homes
  - Price range: $350,000-$575,000
- 21 Single Family
  - Price range: $1,500,000 to $1,800,000
- Total above includes 42 homes on site
  - Price range: $350,000 - $1,800,000
- Additional farm labor dwellings may be developed based on county guidelines

1.33 Agricultural Summary

- Livestock grazing is currently grazing on 250 acres and will reduce to 120 when development begins
- The property will include cattle, sheep, goats, pigs, chicken broilers, and egg-layers that rotate throughout the pastures using a regenerative agricultural approach
- Row crops will be implemented throughout the property
- Fruit and nut trees will be planted throughout the property
- Native habitat will be integrated throughout the agricultural areas
- Enterprises that support agricultural operations will include the following:
  - Farm Store
  - Commercial kitchen
  - Hula Halau

1.34 Infrastructure Summary

The property will be enhanced through a sustainable infrastructure that seeks to address some of Maui's key sustainability issues related to water, energy, and transportation.

Water

- Detailed self sufficient Water Master Plan
- Water well on site that will be used as the primary potable water source for the property
- Integrated rooftops, roadways, and pond system will capture water as the primary source of non-potable water system for agricultural irrigation and landscaping

Energy

- Off-grid energy system powered primarily by solar with backup battery storage will be installed for all of the property energy needs
- Other forms of energy that may include anaerobic digestion and biogas

Transportation

- Multimodal roads[1] that support alternative forms of transportation, such as biking, walking, electric farm vehicles, and horseback riding paths will be implemented throughout the property
- Dwellings intentionally placed near the existing main access road to free up the majority of the property for agriculture and native forest

1.4 Consistency with Global, National, and Regional Land Use Planning

Across the nation and throughout the world, leaders are recognizing the importance of sustainable development and land use. With forecasted population increases, food and water shortages, and volatile energy resources and prices, land management has become an increasingly important sustainability topic, as it relates to environmental, social, and economic impacts. Sustainable development has been at the forefront of many global, national, and regional initiatives.

1.41 Global

In 1987, the UN's Bruntland Report, Our Common Future, defined sustainable development as "development that meets the needs of current generations without compromising the ability of future generations to meet their own needs" (United Nations)[2]. This is the most commonly used definition of sustainability today. The strategy behind the Bruntland Report was to address the needs of the poor, impose limits on ecological depletion, protect future generations, create a more just world, and promote harmony between people and their environments.

The UN has also set goals for the Pacific region to begin addressing paramount sustainability issues. There are 20,000-30,000 islands in the Pacific Region, at least 7,000 are inhabited islands, and all of them are experiencing dependencies on oil and food, resource scarcity, and waste management problems. The UN has allocated resources to begin addressing these issues and working toward a more sustainable future for this area of the world.

1.42 National

The U.S. government allocates financial and technical resources to support sustainable development in communities across the nation. For example, the U.S. Partnership for Sustainable Communities is an Interagency Partnership that was created in 2009 with the U.S. Department of Housing and Urban Development (HUD), U.S. Department of Transportation (DOT), and the U.S. Environmental Protection Agency (EPA) that helps communities improve access to affordable housing, increase transportation options, and lower transportation costs while protecting the environment. Another example is the EPA

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[1] A multimodal road means having at least two forms of transport. Can also be referred to as a "Green Street."

[2] http://www.unece.org/oes/nutshell/2004-2005/focus_sustainable_development.html

Building Blocks for Sustainable Communities, which provides technical assistance, tools, partnerships, and grants/funding for Smart Growth.[3]

1.43 State

Hawaii is becoming a leader in sustainability for islands around the world. It has many natural resources for employing clean energy (e.g., sun, wind, waves, and geothermal), a thriving culture, mild temperatures for land cultivation, and an active political climate that encourages approaches that increase sustainability. Several key initiatives are helping to guide sustainability efforts in Hawaii.

The Hawaii 2050 Sustainability Plan was produced from comprehensive community-planning effort that serves as a blueprint for a Sustainable Hawaii. It defines sustainability as a Hawai'i that achieves the following:

- Respects the culture, character, beauty and history of the state's island communities
- Strikes a balance between economic, social and community, and environmental priorities
- Meets the needs of the present without compromising the ability of future generations to meet their own needs

The goals of the Plan include:

- Way of Life: Living sustainably is part of the daily practice in Hawai'i
- Economy: Diversified and globally competitive economy enables meaningful living, work and play in Hawai'i
- Environment and Natural Resources: Natural resources are responsibly and respectfully used, replenished and preserved for future generations
- Community and Social Well-Being: Community is strong, healthy, vibrant and supportive, providing safety nets for those in need
- Kanaka Maoli and Island Values: Kanaka Maoli and island cultures and values are thriving and perpetuated

In addition, the Aloha + Challenge, a joint leadership commitment to launch a Culture of Sustainability, was signed by Governor Abercrombie, Hawaii's four mayors, and the Office of Hawaiian Affairs (OHA) in 2014. The initiative was inspired by the Global Island Partnership (GLISPA), an international group that seeks to create resilient and sustainable island communities around the world.

HNM's goals are in alignment with global, national, and state sustainability projects. The focus areas in the Aloha + Challenge—clean energy, waste reduction, local food prduction, natural resource management, smart communities, and green workforce—are all addressed in this HNM Sustainability Plan. In addition, HNM's plan is guided by the sustainability issues addressed by the UN in the Pacific region and by the EPA at the national level.

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[3] http://www.epa.gov/smartgrowth/sg_implementation.htm

1.44 County

Maui County has many existing and emerging initiatives that support HNM's position in pursuing a QBL strategy and creating positive environmental, economic, social, and cultural impacts. The Maui Island Plan (MIP) calls for low-impact development and conservation subdivision design, the protection of Maui's small towns and rural character, affordable housing, protection of watersheds and coastal resources, and economic diversification. HNM's plans and desired areas of impact are in direct alignment with those of the MIP in the areas of affordable housing, native habitat introduction, and agriculture that supports increased food security (see Appendix C for how HNM is in alignment with the goals of the MIP).

The County Environmental Program is another initiative that addresses renewable energy, agricultural sustainability, native flora and fauna, watershed protection, and invasive species. Maui County was also selected as a target community for EPA Building Blocks for Sustainable Communities in 2013. These projects included creating a green streets strategy and sustainable strategies for small cities and rural areas[4]. In addition to the County initiatives, several large landowners in Maui Nui have committed to various aspects of sustainability.[5]

1.45 Community

HNM is located in Makawao, Hawaii, a small rural town in upcountry Maui. The Makawao Community Association (MCA) serves to benefit the community and its cultural and natural resources. HNM presented its plans to the MCA during the summer of 2014 and discussed how the project aligns with the vision and mission of Makawao. HNM also presented to the Olinda Community Association (the small rural community above Makawao and HNM) in 2012 and 2013. HNM is committed to ongoing engagement with the Makawao community throughout its planning stages to ensure that it serves the community in the most positive ways and provides continual support in keeping the community beautiful, and in providing cultural and natural resource benefits to local residents.

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[4] "Green" Streets are streets that minimize environmental impact, taking into account issues such as drainage and storm water runoff issues, alternative forms of transportation, and natural landscaping.

[5] Molokai Ranch: clean energy, local food, animal husbandry; Lanai: clean energy, local agriculture, economic improvement, habitat restoration, etc.; Haleakala Ranch: holistic land management, permaculture principles; Oprah Winfrey: organic farming; Hana Ranch: sustainable agriculture; Kaanapali 2020: Affordable housing, community development; Olowalu Community: LEED for Neighborhood Development

2.0 Key Areas of Sustainability

HNM aims to contribute to the QBL through various approaches, including providing healthy, local food production; achieving net-positive energy and water; having negative green house gasses (GHG); providing local jobs; ensuring cultural appropriateness; restoring previous pineapple land through a regenerative agricultural approach; and supporting micro-enterprises that support Maui-made and value-added agricultural products. HNM's desire is to influence positive economic change and set an example for other landowners in Hawaii, as well as the land development industry, by using tested strategies to illustrate the possibilities. HNM plans to collaborate with other entities across the islands to share acquired techniques and provide transparency of all operations for stakeholders and the general public. On a global scale, HNM plans to contribute and adhere to tested best practices regarding its supply chain, GHGs, and approach to regenerative land management.

HNM owners, project managers, and team members worked with Susty Pacific through a series of meetings and charrettes to develop the sustainability plan. HNM also engaged key stakeholders throughout the process. Below are HNM's planned areas of sustainability, followed by the goals and strategies for achieving them.

2.1 Hawaiian Culture

The Hawaiian state motto, *Ua Mau ke Ea o ka 'Āina i ka Pono*, is translated as "the life of the land is perpetuated in righteousness." State mottos generally reflect the beliefs and character of the people. This motto provides a reflection of ancient Hawaiian culture and its strong connection to the land.

Prior to European contact, Hawaiians lived in harmony with the earth. They lived in a culture where ecological limits were the basis of survival. The *'āina* (that which feeds, nourishes, and supports life) supported them, and it was their *kuleana* (obligation) to *Mālama* (care for) the *'āina*. It was a spiritual relationship between people and their environment. All of their material needs were met by their immediate surroundings and within their *ahupua'a* system, the land boundaries of each community that ran from the mountains to the sea. Within this system, they harvested trees from the mountains to build shelter and other material needs, grew taro with the fresh mountain stream water to feed their communities, and had plenty of fish for hunting on the ocean side of the *ahupua'a* system.

The HNM property is in the *Moku of Hāmākua Poko* and *Ahupua'a of Makawao*. HNM respects these views and is committed to integrating culture into its land use, recognizing its ecological limits, and providing a space for cultural education for the local community, which will include a *hula hālau*.

2.2 Regenerative Agriculture

A primary component of HNM's approach is to move beyond "sustainable" agriculture and operate using a regenerative agricultural approach. This approach uses integrative farm

practices that help to build soil health or regenerate unhealthy soil. It not only "sustains" the property, but it moves it forward by regenerating natural resources. HNM is employing the Regrarians system of regenerative agriculture to design and manage ecosystem restoration activities. The goal of Regrarians is "...to maintain creative, intergenerational family & community lives built around regenerative & profitable production, management & educational systems."[6] It is a holistic management framework developed by Darren Doherty in Australia that promotes the regenerative enhancement of the biosphere's ecosystem processes.

As part of HNM's regenerative agriculture approach, it is investigating the development and implementation of a sensed landscape network to monitor landscape and ecological changes over time. Current planned sensor products may include but are not limited to the following:

- Weather Stations: Collects ongoing data on barometric pressure, wind, rainfall, UV radiation, solar radiation, and temperature
- Soil Sensors: Collects ongoing data on hydrology, pH levels, carbon, and dissolved oxygen

Other potential sensor areas include energy, microbiology, and water monitoring.

2.3 Clean Energy

Hawaii is currently 85% dependent on fossil fuels for all of its energy needs. The electric utilities in Hawaii primarily use fossil fuels to generate electricity. Due to higher oil prices, and the state dependency on oil, finding alternatives has become an imperative of the Hawaiian government. Many initiatives have been implemented to support greater energy independence and a clean energy economy.

Several initiatives include the Hawaii Clean Energy Initiative (HCEI), Hawaii Energy, and the Energy Excelerator. The goal of the HCEI is to achieve 100% clean energy for Hawaii by 2045. Through the direction of this program, Hawaii Energy was contracted through the Hawaii Public Utility Commission to create greater energy efficiency in Hawaii to help meet the goals of HCEI. Electric utility ratepayers pay a small amount each month to support this goal. The Energy Excelerator is a project that was launched in 2013 to support clean energy innovation in Hawaii.

HNM is committed to being a fossil fuel free community. Its plan is to meet the goals of the HCEI by implementing an energy system that is off-grid and 100% renewable. This strategy will use a mix of renewable energy alternatives to serve the HNM community (see Section 4.0).

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[6] http://www.regrarians.org

2.4 Food Security

Hawaii is 85% dependent on food imports. It is estimated that if food imports were halted due to a natural disaster, shipping strike, or other unforeseeable circumstance, there are only 5-7 days worth of food to feed people in the state. HNM is committed to working to increase food security by providing local food to reduce imports and fill the gaps in the Maui agricultural economy. Its selection of products is based on an extensive market research analysis of the Maui food system that determined the key gaps in local food production. Meat and produce will be produced on the land using regenerative agriculture approaches.

2.5 Local First

HNM believes in investing in the local community first. HNM is dedicated to providing responsible, positive environmental, cultural, human, and economic inputs to strengthen the resources of the local community. The strategy at HNM is to focus on developing on-site inputs that support a resilient ecosystem, local workforce, affordable housing for Hawaii residents and local farmers, and food that is produced on the property and sold locally. HNM understands that its success hinges on relationships within the local community and human resources, and therefore, uses a proactive approach to building trusting relationships with its stakeholders and the local community.

2.6 Natural Resource Conservation and Restoration

Natural resource conservation is represented by biodiversity, native habitat, and the wise use of the earth's resources. HNM is committed to conserving natural resources and introducing native habitat into the property. Native trees and plants will be incorporated throughout the property, including agricultural, open space, residential, and gulch areas.

2.7 Responsible Governance

HNM understands that in order to operate in a manner that is conscious of QBL impacts it must engage in business practices that consider life-cycle impacts. HNM will use the Benefit Corporation (BCorp) framework developed by BLab to guide the development of business practices, policies, and management systems at HNM. BCorp ensures that QBL is considered in HNM's practices in areas such as policies, accounting, engagement, strategy, and purchasing. HNM is currently in the process of developing a formal sustainability policy that is consistent with the sustainability goals and strategies outlined in this plan.

It is important to measure QBL performance over time to effectively manage environmental, social, economic, and cultural impacts. HNM will use the Global Reporting Initiative (GRI) framework to guide the development of QBL metrics, managements systems, and reporting structure. GRI is the world's most widely accepted framework for sustainability and corporate social responsibility (CSR) reporting. By using GRI as the basis for QBL metrics and reporting, HNM is able to rely on an established framework to guide its efforts and streamline decision-making.

2.8 Smart Growth and Livability

Smart growth is a new strategy that is employed worldwide to support sustainability in new developments. There are six guiding principles provided by the Partnership for Sustainable Communities for pursuing smart growth. They include:

1. **Provide more transportation choices.** Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
2. **Promote equitable, affordable housing.** Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.
3. **Enhance economic competitiveness.** Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services and other basic needs by workers, as well as expanded business access to markets.
4. **Support existing communities.** Target federal funding toward existing communities—through strategies like transit oriented, mixed-use development, and land recycling—to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.
5. **Coordinate and leverage federal policies and investment.** Align federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
6. **Value communities and neighborhoods.** Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods—rural, urban, or suburban.

Each of these guidelines are embedded in the goals and strategies set forth by HNM. In addition, HNM is conducting a traffic impact study to assess and ensure viable and effective transportation strategies for the local community.

2.9 Sustainable Development and Building Design

Buildings often have significant environmental impacts through carbon emissions, energy usage, waste production, and water use. Creating a sustainable development and designing buildings that support responsible construction is a key element of HNM's strategy. HNM's planned construction is consistent with the standards of the Leadership in Energy and Environmental Design (LEED), the Living Building Challenge, and the Hawaii BuiltGreen Program.

2.10 Stakeholder Engagement

Since HNM ownership and the HNM location are located within the Makawao and Olinda communities, there is a synergy between the community and project goals. Transparency and communication are core components of HNM's project implementation. HNM seeks to build trust through transparency with the local community and is committed to being a leader in community involvement, employee satisfaction, education, cultural appropriateness, and environmental responsibility. HNM strives to positively impact internal (e.g., employees, residents) and external (e.g., community members, local businesses) stakeholders and is actively engaged in identifying and addressing any concerns.

3.0 Sustainability Goals

3.1 Goal 1: Community Design and Sense of Place

- Create a community where members are conscious of the community's mission to regenerate natural, human, cultural, and economic resources and capital.

3.2 Goal 2: Green Affordable Housing

- Provide a mix of affordable and market-rate environmentally friendly housing in a live-work agricultural community.

3.3 Goal 3: Clean Energy

- Develop a 100% off-grid energy community using a combination of renewable energy, energy efficient design and operations, and micro grid technology.

3.4 Goal 4: Clean Sustainable Water

- Source, use, and treat water on site. All outdoor water including agricultural and landscaping will be sourced from non-potable water from rainwater harvesting and greywater reuse. Potable water will be sourced from an on-site well. Wastewater will be treated onsite using biological processes.

3.5 Goal 5: Zero Waste

- Create a zero waste community.

3.6 Goal 6: Carbon Neutral or Positive

- Reduce carbon emissions through energy, water, and waste best practices. Sequester carbon through rotational grazing, green space, and habitat restoration.

3.7 Goal 7: Local Sustainable Food and Agriculture

- Produce 100% locally grown food for the Maui community using regenerative agricultural practices.

3.8 Goal 8: Respect of Culture

- Respect and honor Native Hawaiian and Upcountry Maui cultural sites on the property and develop a center for Hawaiian cultural practice in conjunction with a highly respected halau.

3.9 Goal 9: Clean Transportation

- Use electric and biofuel vehicles on the property as much as possible and promote biking and walking throughout the neighborhood.

3.10 Goal 10: Positive Economic Impact

- Support the local economy through incubating and financing onsite enterprises, offering local employment, and prioritizing purchases from locally owned businesses.

3.11 Goal 11: Native Habitat Restoration and Open Space

- Introduce native habitat and remove invasive species. Provide open space for outdoor activities.

3.12 Goal 12: Community Health

- Create trails, parks, and greenways to encourage an active lifestyle and provide access to healthy food produced onsite.

3.13 Goal 13: Sustainability Education

- Provide sustainability education in the form of classes, projects, and on-site demonstrations in energy, agriculture, native habitat introduction, water management, and culture that support Maui resident and youth, local businesses, and the local Maui community. Partner with local sustainability organizations to increase educational capacity and opportunities.

3.14 Goal 14: QBL Governance

- Operate from a quadruple bottom line perspective of people, profit, planet, and culture by achieving B-Corp Certification implementing a sustainable purchasing policy, and provide greater transparency through sustainability reporting.

4.0 Planned Sustainability Strategies

Aspect	Strategies	Actions
Community Design & Sense of Place	Regenerative Community	• Develop a live-work community • Provide active, agricultural employment opportunities for residents to improve well-being • Provide opportunities for community members to get involved in the restoration and regeneration of native habitat, soil, wildlife, community, businesses, and culture • Include community gathering spaces to build a sense of place and increase human interaction • Develop residential, commercial, and community CC&Rs to encourage regenerative and responsible living among residents, workers, and community members • Encourage community-building and native planting events to build awareness and develop a culture for regenerative communities • Restore and protect agricultural land and native habitat for future generations • Identify, preserve, and enhance natural resources, cultural sites, and open spaces
	Responsible Building Design	• Incorporate efficient and responsible building design, construction, and orientation • Source locally-available building materials as much as possible, including compressed earth blocks made on-site, hempcrete, and bamboo • Utilize environmentally and health friendly building materials and construction methods • Cluster housing to minimize impact and footprint on the natural environment and increase the amount of agricultural land available for food and habitat restoration • Pursue conservation subdivision design • Integrate sustainable site, water, energy, and indoor air quality best practices
Housing	Housing Opportunities	• Provide up to 50% affordable housing • Maximize the amount of onsite workforce (farming) housing for those who work within the project boundary and in the local community • Provide clean and affordable home energy options for residents • Develop healthy, green homes
Energy (Net-zero Energy)	Energy Production & Sourcing	• Seek to have 100% renewable energy on buildings • Create a net-zero or net-positive energy property • Utilize a mix of renewable and energy efficient energy sources for buildings, operations, and residences • Use leading energy storage technology to ensure firm, reliable energy

Aspect	Strategies	Actions
		• Use biodiesel or other renewable fuel sources for equipment and vehicles
	Energy Use & Efficiency	REAL ESTATE • Design buildings to reduce energy use by at least 30% above a conventionally designed building • Use up-to-date green building design and operations standards to promote energy efficiency and improve energy management • Utilize appropriate insulation, natural ventilation, and building orientation • Use energy efficient windows • Install submeters at each building to encourage residential and commercial energy consumption awareness • Install energy efficient equipment, such as Energy Star appliances, as much as possible • Provide clotheslines for each building • Use solar hot water in every building • Provide operable windows and lighting controls • Encourage reduction of artificial lighting through the use of daylighting • Install energy efficient lighting • Use smart building designs
		FARM EQUIPMENT & FLEET • Use energy efficient farming and building equipment when available • Encourage the use of electric cars and other alternative transportation for residents, workers, and businesses • Use biofuels when possible • Provide EV charging stations on the property
		OPEN SPACE & COMMON AREAS • Install energy efficient street lights and common area lights • Reduce light pollution at night
		INFRASTRUCTURE ~~• Develop community-wide micro grid~~
Water (Net Zero Water)	Water Production & Sourcing	BUILDINGS • Provide fresh, well water from on-site well
		AGRICULTURE & LANDSCAPING • Use 100% non-potable water for irrigation • Capture rainwater to be held in ponds throughout the property for agricultural use and landscaping • Use filtered or treated greywater from buildings for non-potable uses
	Water Use & Efficiency	BUILDINGS • Reduce potable water use by at least 20% compared to a typically designed building • Install dual-flush or low flow toilets • Install low-flow water fixtures • Use non-potable water for toilet flushing where possible

Aspect	Strategies	Actions
		• Use non-potable water for landscaping and irrigation
		LANDSCAPING & OUTDOORS • Plant native and climate-appropriate plants to reduce water needs and regenerate watershed resources • Use drought tolerant plants where feasible • Maximize green space and open space to encourage percolation and aquifer recharge
		AGRICULTURE • Use 100% non-potable water for irrigation • Use water efficient irrigation methods and technologies for agricultural needs • Implement Yeoman's plow methods to maximize soil water retention, reduce water needs, and minimize soil erosion and nutrient loss • Use regenerative techniques to increase soil water retention and reduce water needs
		INFRASTRUCTURE • Install sub-meters throughout property to effectively manage and track water and reduce leaks
	Water Treatment & Reuse	BUILDINGS • Use greywater to the extent possible for non-potable water needs • Comply with all appropriate county, state, and federal laws and regulations for water treatment
		STORMWATER & RUNOFF • Use runoff from roads, hardscapes, and green space for non-potable irrigation to the extent possible • Direct additional runoff to bioswales and other green space to harvest rainwater and increase groundwater recharge • Maintain aesthetics and good smells at runoff ponds
Waste & Resource Recovery (Zero Waste)	Community Buildings/Areas	• Implement recycling receptacles and sorting stations throughout the community to increase landfill diversion. • Provide bins for HI5, paper & cardboard, plastic, metals, glass, food/green waste, and landfill waste.
	Commercial & Residential Buildings	• Provide bins for HI5, green waste, food waste, glass, plastic, metals, paper & cardboard, and landfill waste throughout the property.
	Infrastructure	• Include a small-scale materials recovery facility (MRF) for community members to drop off sorted materials. • Capture compostable material (green & food waste) for agricultural use. • Provide pickup by a waste hauler for all materials and containers that cannot be recycled or composted.
	Agriculture	• Compost all agricultural and green waste produced on property • Follow state and federal regulations for livestock waste
Carbon (Carbon Neutral or	Energy	• Reduce carbon emissions by implementing an off-grid energy (net-zero energy) design that includes

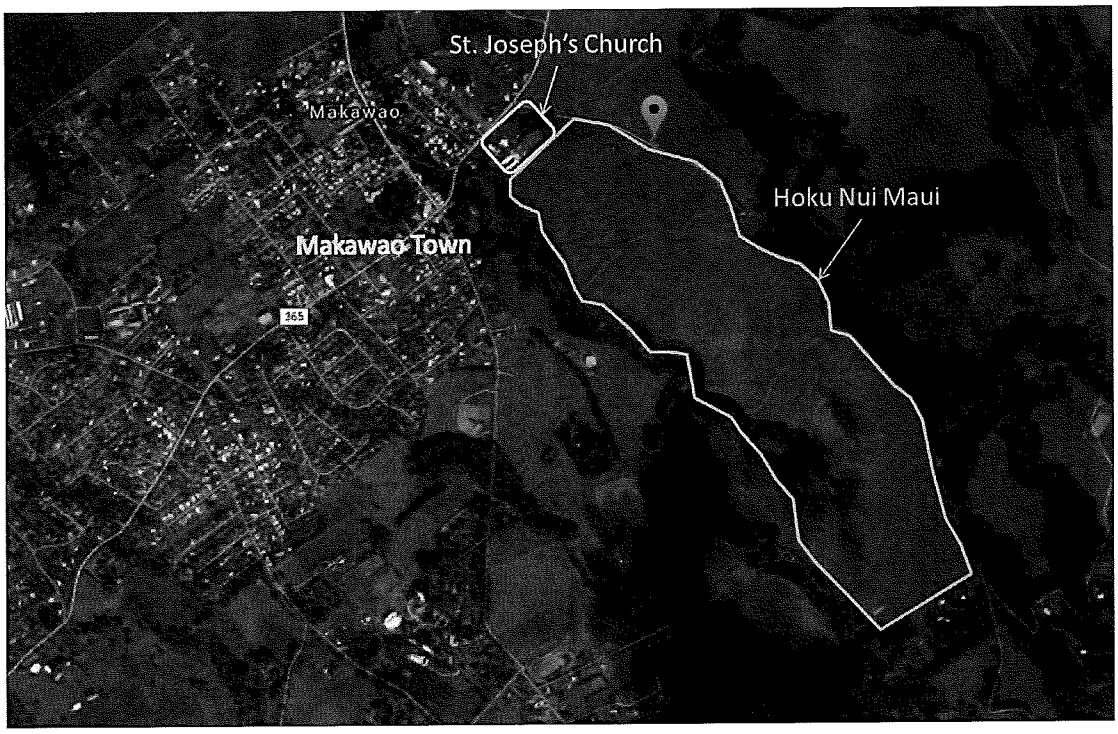
Aspect	Strategies	Actions
Negative)		renewable energy and energy efficiency best practices
	Water	• Source, use, and treat all water onsite, reducing the carbon footprint associated with water use and distribution • Implement catchment ponds in strategic locations on property to take advantage of gravity-fed irrigation that minimizes energy use from pumping and carbon emissions
	Waste	• Reduce carbon related to waste by increasing landfill diversion and maximizing the amount of material recycled, reused, and composted for use on-site.
	Sequestration (Agriculture & Restoration)	• Use regenerative agricultural techniques, such as rotational grazing to increase soil regeneration and increase carbon sequestration • Introduce native habitat and trees to act as a carbon sink and sequester carbon from the atmosphere
Food & Agriculture	Local Food Production	• Implement regenerative agriculture practices • Follow regenerative agricultural techniques and practices to minimize agricultural inputs while maximizing healthy outputs • Leverage best practices from permaculture, organic, and holistic management • Minimize or eliminate harmful pesticides, herbicides, and other inputs • Provide local agricultural products to buffer Maui's dependency on imported goods • Provide training programs for on-site farm workers • Provide a site-specific agricultural protection buffer
	Food Consumption	• Seek to sell food products produced on-site to local markets, primarily targeting Maui County community members • Provide fresh, healthy, and local meats and produce
	Food Access	• Provide convenient access to healthy, local food through a farm store and/or buyers club • Sell food at affordable prices
Culture	Cultural Resources	• Comply with any applicable SPHD requirements or cultural protocols • Collaborate with local cultural practitioners to generate cultural resources for the community
	Cultural Appropriateness	• Consult cultural practitioners and leaders to ensure appropriate cultural naming, practices, and protocols are followed • Introduce native plants that are appropriate to the place and culture • Develop project with respect and honor for Native Hawaiian culture and Upcountry Maui culture
	Cultural Engagement	• Implement a hula halau on-site to encourage continuous cultural engagement and activity • Collaborate with Native Hawaiians and community

Aspect	Strategies	Actions
		members for stakeholder engagement • Provide access to property, as appropriate, to any cultural practitioners
Transportation	Auto-use Reduction	• Create a work-live community where residents work and live on site • Encourage carpooling
	Public Transit	• Provide bike and walking paths (separate from roadways) throughout the community that connect to main roadways and/or bike lanes on majority of roadways • Provide trails to main road through property.
	Pedestrian and Bike Friendly	• Maximize the amount of safe and continuous walking areas (i.e. sidewalks or greenspace buffer) along roadways • Create walking areas that are wide enough for two people to walk comfortably together
Economic Impact	Local Enterprise & Economy	• Incubate local agricultural micro-enterprise onsite by providing start-up funding, operating capital, human capital, and business expertise • Support local businesses by purchasing products and services from local vendors • Stimulate short-term economic growth through construction and long-term economic growth through agricultural jobs • Provide a shared community commercial kitchen for local farmers and vendors • Provide venue for local vendors to sell their goods at an onsite Farm Store
	Local Employment	• Maximize the amount of locally-hired employees • Seek to hire Native Hawaiian employees or employees that were born & raised on Maui when appropriate • Maximize the amount of locally-source consultants
	County Infrastructure	• Reduce economic impacts on county infrastructure through off-grid energy and water sources
Native Habitat & Open Space	Native Habitat & Restoration	• Use native species and climate appropriate species for landscaping in areas by buildings, roadways, parks and open spaces, trails, and common areas • Integrate native species for agricultural use as much as possible • Remove invasive species from the property, including the gulch, and introduce native species • Collaborate with neighboring landowners and community groups for native habitat introduction
	Open Space & Parks	• Provide ample open space and parks community gathering and outdoor activities for resident members • Ensure open spaces and parks are within walking distance from all homes and buildings • Develop greenways for pedestrians to travel throughout the community separate from roadways

Aspect	Strategies	Actions
Community Health & Lifestyle	Healthy, Fresh Food	• Create opportunities for residents to purchase onsite produce and meat products
	Active Lifestyle	• Encourage the use of trails, parks, and open spaces through education and events • Route trails and greenways so they lead to key community destinations such as parks, Farm Store, homes, and agriculture facilities
Education	Youth	• Provide education to Maui youth on topics such as: gardening, health, native habitat and native species, water, energy, and culture • Collaborate with local educational organizations
	Community	• Provide educational opportunities to the local community in topics such as: backyard gardening, energy and water use reduction, recycling and waste management, Hawaiian culture, habitat introduction and native species, healthy and active lifestyles • Collaborate with local educational organizations
	Residents	• Provide residential education in areas such as: backyard gardening, energy and water reduction in homes, signage along trails and open spaces (sense of place, culture, native species, distance), infrastructure and how it relates to them (PV, water catchment, materials recovery, constructed wetlands, etc.), recycling and waste management, Hawaiian culture, habitat introduction, native species, healthy and active lifestyles
	Business & Organization	• Provide educational opportunities for local businesses such as: regenerative agriculture, clean energy, micro-enterprise, and socially responsible investing
Governance	Governance	• Seek BCorp certification to verify that HNM will operate as a for-benefit organization that is obliged to positively benefit the community, natural environment, employees, entrepreneurs, and consumers. • Follow a Sustainable Purchasing Policy to increase the purchase amounts of responsible and low-impact products and services • Ensure company vision and mission reference regenerative agriculture, native habitat and affordable housing • Operate from a Quadruple Bottom Line perspective - People, Planet, Profit, Culture • Track and manage sustainability indicators • Produce periodic sustainability reports to communicate and be transparent of the project's sustainability progress and performance

5.0 Appendices

Appendix A: HNM Property Map



Appendix B: Sustainable Development Case Study Examples

- Case studies:
    - Third Street Cottages, Langley, Washington (http://switchboard.nrdc.org/blogs/kbenfield/smaller_more_sustainable_livin.html)
    - Village Homes, Davis California (http://www.cardinalgroup.ca/nua/ip/ip01.htm)
    - Southeast False Creek, Vancouver, BC (http://www.cardinalgroup.ca/nua/ip/ip01.htm)
- Recent Topics in the News
    - National Food Supply:
        - http://www.nytimes.com/2013/07/22/opinion/our-coming-food-crisis.html?pagewanted=all&_r=0
    - Energy
        - http://theenergycollective.com/nrdcswitchboard/356131/what-president-obamas-budget-means-our-clean-energy-future
        - http://www.economist.com/news/united-states/21598666-future-bright-solar-power-even-subsidies-are-withdrawn-let-sun-shine

Appendix C: HNM Alignment Areas with Maui Island Plan

- Low Impact Development (LID) and Conservation Subdivision Design (CSD) - (pg. 2-28)
  - Heritage Resources
    - *2.5.1-Action 4* - "Establish design guidelines that integrate techniques such as development clustering, greenbelts, and open space buffers, site plan configuration to protect view planes, building design and height limitations, setbacks from public roadways, landscaping, and other techniques." (Pg. 2-47)

  Housing

  5.1.1-Action 1 - "Amend development codes to facilitate different types of housing, including mixed use, mixed housing types, clustering, and conservation subdivisions."

  Land Use

  "The Agricultural District Ordinance could be reviewed and revised to further decrease fragmentation by considering such tools as decreasing the number of 2-acre lots, or clustering of the 2-acre lots into smaller parcels, or developing CSD provisions as described below." (Pg. 7-5)

  Policy 7.1.1.a - "Allow, where appropriate, the clustering of development on agricultural lands when approved as a CSD plan or similar approval mechanism."

  7.2.1-Action 4 - "Revise subdivision regulations to permit clustering and CSD within the Rural Districts and extend Hawaii Right to Farm Act protections to rural subdivisions."

APPENDIX C.

Botanical and Faunal Survey

BOTANICAL AND FAUNAL SURVEY

HOKU NUI SUSTAINABLE COMMUNITY

PIIHOLO, MAUI

Prepared By:
FOREST & KIM STARR
STARR ENVIRONMENTAL

Prepared For:
HOKU NUI INC.

JANUARY 2014

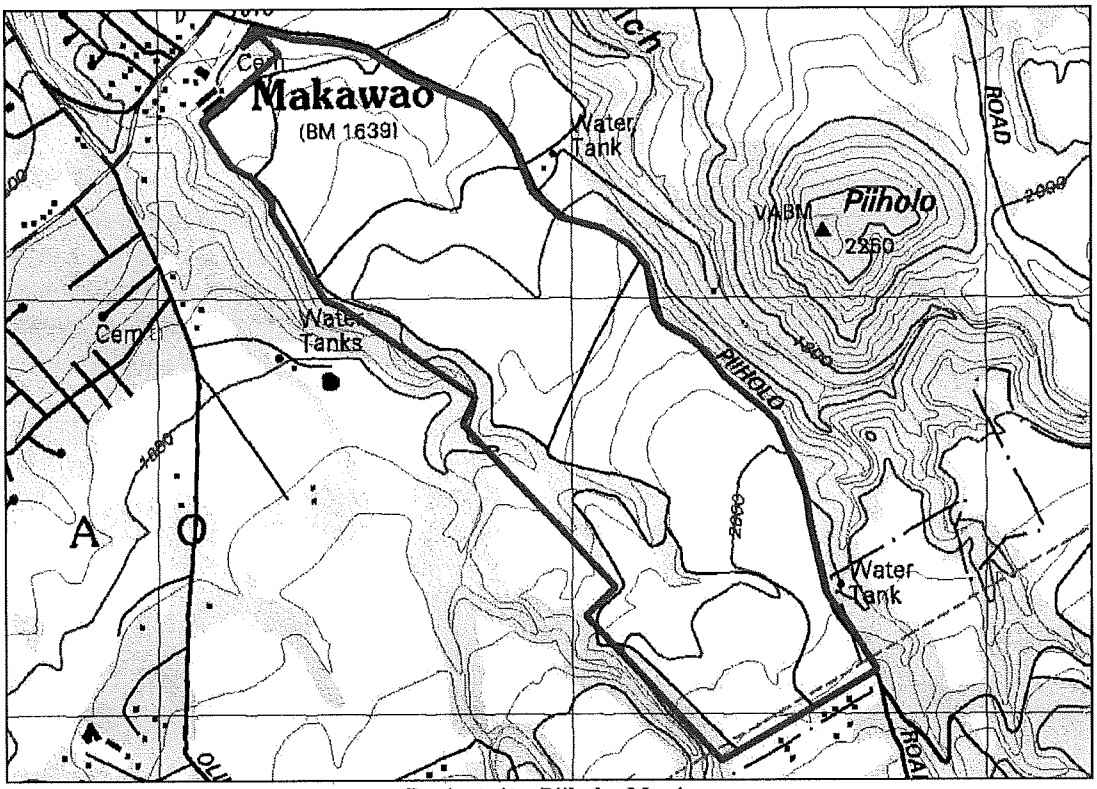
BOTANICAL AND FAUNAL SURVEY
HOKU NUI SUSTAINABLE COMMUNITY
PIIHOLO, MAUI

INTRODUCTION

The Hoku Nui Sustainable Community Project lies on 258 acres in Piiholo, Maui TMKs (2-4-012:005, 039, 040, 041, 042, 043, 044, 045, 046, 047, & 048). The project area is upslope of Makawao Town, with Piiholo Road forming the eastern boundary, a tributary of Maliko Gulch approximating the western boundary, a University of Hawaii Extension Station the mauka (upslope) boundary, and St. Joseph's Church the makai (downslope) boundary. The goal of the project is to develop a sustainable community. This study was initiated to gather information about the flora and fauna of the project area.

SITE DESCRIPTION

The project area is situated on land previously cultivated in pineapple. Most of the land is moderately sloped and vegetated with pasture grasses and other forage. The western edge of the property contains steeper land with forested gullies. The project elevation ranges from 1630 to 2080 feet above sea level. Annual rainfall averages 70-90 inches. Annual air temperature averages 67 degrees Fahrenheit.



Project site, Piiholo, Maui.

BIOLOGICAL HISTORY

The original vegetation on the site would have been a diverse mesic native forest. Typical canopy species would have included koa (*Acacia koa*), ohia (*Metrosideros polymorpha*), halapepe (*Chrysodracon auwahiensis*), and olopua (*Nestegis sandwicensis*).

After the arrival of humans, a series of forces including fire, agriculture, and introduced plants, animals, and diseases transformed the site to predominantly non-native vegetation. Major uses of the land included cattle grazing and pineapple cultivation.

Today the bulk of the site is open pasture consisting of non-native grasses that are grazed by cattle, sheep, and goats. The forested gulches are comprised of predominantly non-native kukui nut (*Aleurites moluccana*), Christmasberry (*Schinus terebinthifolius*), black wattle (*Acacia mearnsii*), and Eucalyptus (*Eucalyptus* spp.).

SURVEY OBJECTIVES

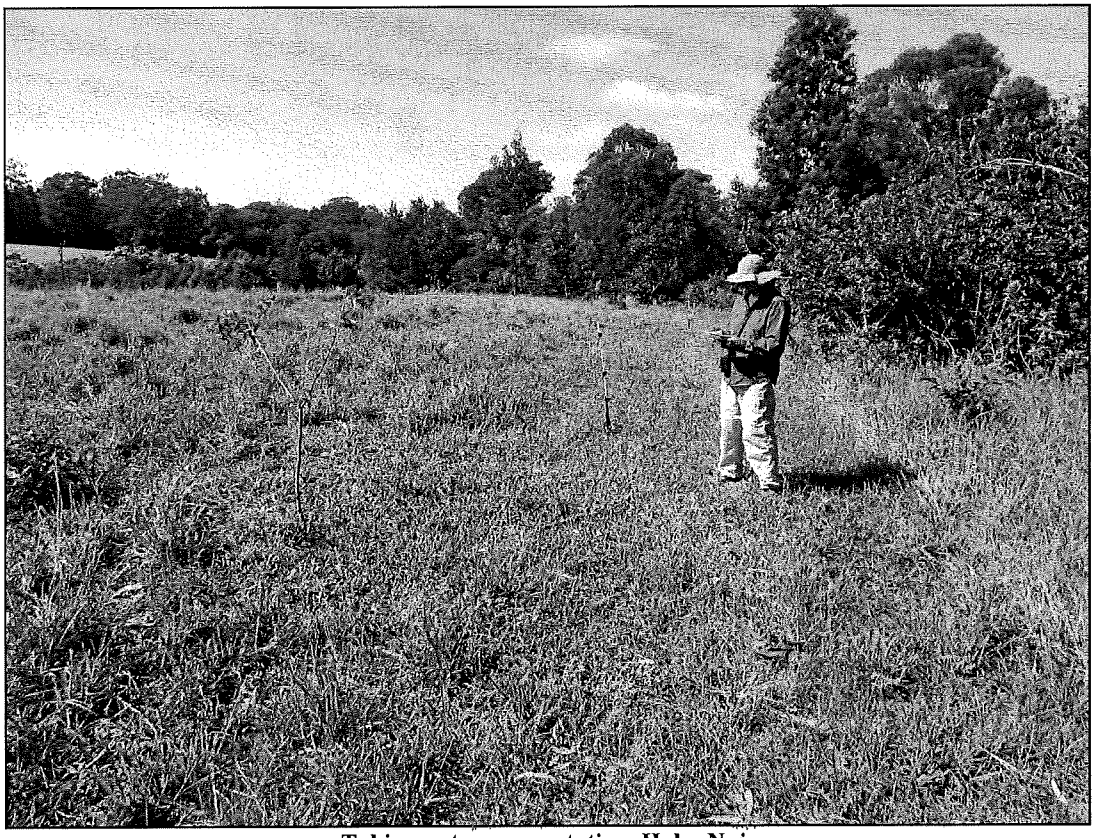
The objectives of the survey were to:

- Document what plant and animal species occur on the site or may likely occur in the existing habitat.
- Document the status and abundance of each species.
- Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.
- Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.

BOTANICAL SURVEY

SURVEY METHODS

A walk-through botanical survey method was used following a route to ensure coverage of different habitat types. Notes were made on plant species, distribution and abundance. Extra emphasis was placed on areas with high diversity and areas where management was most feasible and likely. The site was surveyed on December 29 & 30, 2014.



Taking notes on vegetation, Hoku Nui.

DESCRIPTION OF VEGETATION

The vegetation on the site is predominantly non-native. There are two main vegetation types, open pasture and forested gulch. Naturally occurring native plants of note include scattered patches of indigenous palapalai fern (*Microlepia strigosa*) in the gulches.

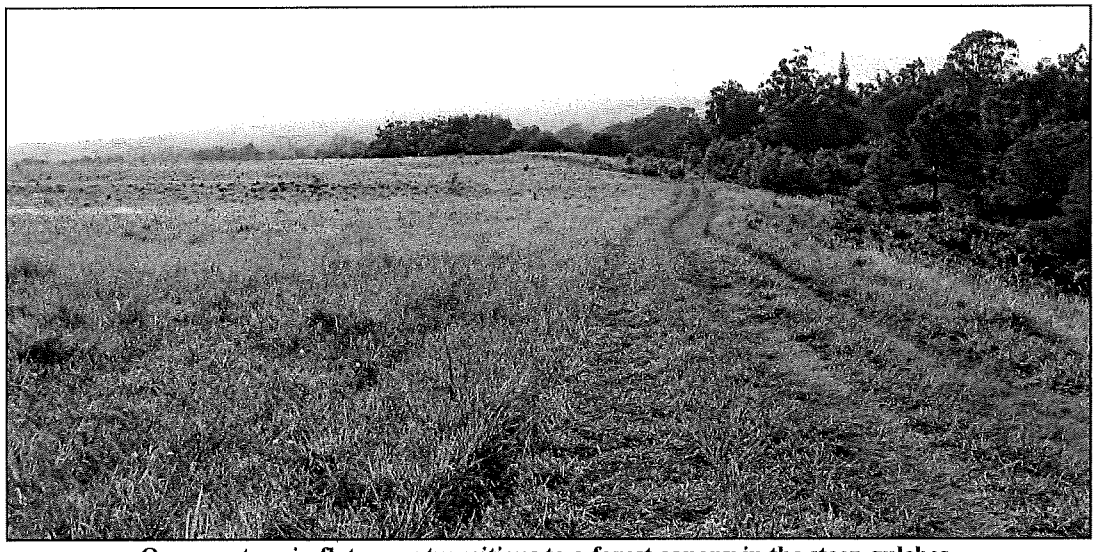
The relatively flat open areas that make up the bulk of the site are an open grassland of numerous non-native pasture grasses. The most common grasses in the pastures include Guinea grass (*Megathyrsus maximus*), molasses grass (*Melinis minutiflora*), Natal red top (*Melinis repens*), broom sedge (*Andropogon virginicus*), Kikuyu grass (*Cenchrus clandestinus*), cane grass (*Cenchrus purpureus*), pangola grass (*Digitaria eriantha*), sourgrass (*Digitaria ciliaris*), and vasey grass (*Paspalum urvillei*).

Herbaceous plants in the pastures include fireweed (*Senecio madagascariensis*), tick clover (*Desmodium* spp.), partridge pea (*Chamaecrista nictitans*), Spanish needle (*Bidens pilosa*), hairy cat's ear (*Hypochoeris radicata*), and balloon plant (*Asclepias physocarpa*).

Some savannah occurs in the SW corner of the property, where the pastures include young trees of non-native black wattle (*Acacia mearnsii*). This area also contains non-native tree species escaping from the nearby University of Hawaii Agricultural Station, predominantly pines (*Pinus* spp.) and Acacia (*Acacia* spp.).

The only native plants in the pastures are uhaloa (*Waltheria indica*) and popolo (*Solanum americanum*), both species are considered questionably indigenous and are common in Hawaii and elsewhere.

In a few spots are cultivated edible plants, such as bananas (*Musa* spp.), taro (*Colocasia esculenta*), and sugar cane (*Saccharum officinarum*). There are also a few cultivated native plants including dwarf koa (*Acacia koaia*) and anapanapa (*Colubrina asiatica*).



Open pasture in flat areas transitions to a forest canopy in the steep gulches.

The gulches that approximate the western boundary of the property are forested. The mauka portion of these gulches is generally dominated by eucalyptus (*Eucalyptus* spp.) and black wattle (*Acacia mearnsii*). The makai portion is mostly dominated by kukui nut (*Aleurites moluccana*) and Christmasberry (*Schinus terebinthifolius*).

Other, less common, tree species in the gulches include strawberry guava (*Psidium cattleianum*), java plum (*Syzygium cumini*), jacaranda (*Jacaranda mimosifolia*), camphor (*Cinnamomum camphora*), and tropical ash (*Fraxinus uhdei*).

The understory is rather open, in many places it is bare soil. Predominant in some areas of the gulch bottom are ape (*Xanthosoma robustum*). Other non-native understory plants include Jerusalem cherry (*Solanum pseudocapsicum*), bamboo grass (*Osplimenus hirtellus*), panic veldt grass (*Ehrharta erecta*), and thimbleberry (*Rubus rosifolius*).

There are two native fern species in the gulch. The most common of these is palapalai (*Microlepia strigosa*), of which patches of various sizes can be found scattered about the gulch understory, especially where there are kukui nut trees. The other native fern in the gulch is pakahakaha (*Lepisorus thunbergianus*), which was on tree trunks. On the gulch edge was koali awa (*Ipomoea indica*), a common indigenous vine.

Kukui nut trees and palapalai ferns are common in the gulches.

DISCUSSION AND RECOMMENDATIONS

Most of the project area has been heavily impacted by previous human disturbances and is currently dominated by hardy non-native plants. The native plant species found on the site are all common throughout Hawaii and elsewhere and are of no special conservation concern. No special native plant habitats occur on the project site. The proposed project is not expected to have a significant negative impact on the botanical resources in this part of Maui.

There is an opportunity to propagate the hardy native Palapalai ferns (*Microlepia strigosa*) naturally occurring in the gulches, for use in the housing landscaping and native plant restoration portions of the project.

PLANT SPECIES LIST

Following is a checklist of all those vascular plant species inventoried during the field studies. Taxonomy and nomenclature of the flowering plants are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

- Scientific name
- Common English or Hawaiian name.
- Bio-geographical status. The following symbols are used:
    - Endemic = Native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.
    - Indigenous = Native to the Hawaiian Islands and also to one or more other geographic area(s).
    - Non-native = All those plants brought to the islands intentionally or accidentally after western contact.
- Abundance of each species within the project area:
    - Dominant = Forming a major part of the vegetation within the project area.
    - Common = Widely scattered throughout the area or locally abundant within a portion of it.
    - Occasional = Scattered sparsely throughout the area or occurring in a few small patches.
    - Rare = Only a few isolated individuals within the project area.

PLANT SPECIES LIST

Scientific names	Common name	Nativity	Abundance
Abutilon grandifolium	Hairy abutilon	Non-native	Rare
Acacia koaia	Koaia	Endemic	Rare
Acacia mearnsii	Wattle	Non-native	Dominant
Acacia spp.	Non-native Acacia	Non-native	Occasional
Adiantum hispidulum	Rough maidenhair fern	Non-native	Occasional
Adiantum raddianum	Maidenhair fern	Non-native	Occasional
Ageratina adenophora	Maui pamakani	Non-native	Rare
Ageratum conyzoides	Billygoat weed	Non-native	Occasional
Aleurites moluccana	Kukui Nut	Polynesian	Dominant
Alpinia sp.	Ginger	Non-native	Rare
Amaranthus spinosus	Spiny amaranth	Non-native	Occasional
Andropogon virginicus	Broomsedge	Non-native	Common
Arachis sp.	Ground peanut	Non-native	Rare
Asclepias physocarpa	Balloon plant	Non-native	Common
Axonopus compressus	Wide-leaved carpetgrass	Non-native	Occasional
Axonopus fissifolius	Common carpetgrass	Non-native	Occasional
Azolla pinnata	Ferny azolla	Non-native	Rare
Bidens alba var. radiata	Beggartick	Non-native	Occasional
Bidens pilosa	Spanish needle	Non-native	Common
Blechnum appendiculatum	Blechnum	Non-native	Rare
Brassica oleracea	Kale	Non-native	Rare
Broussonetia papyrifera	Wauke	Polynesian	Rare
Cajanus cajan	Pigeon pea	Non-native	Occasional
Capsicum annuum	Pepper	Non-native	Rare
Cenchrus clandestinus	Kikuyu grass	Non-native	Dominant
Cenchrus purpureus	Cane grass	Non-native	Dominant
Centella asiatica	Asiatic pennywort	Non-native	Occasional
Cerastium sp.	Chickweed	Non-native	Rare
Cestrum nocturnum	Night blooming jasmine	Non-native	Occasional
Chamaecrista nictitans	Partridge pea	Non-native	Common
Cinnamomum camphora	Camphor tree	Non-native	Occasional
Cirsium vulgare	Bull thistle	Non-native	Occasional
Cocos nucifera	Coconut	Polynesian	Rare
Colocasia esculenta	Taro	Polynesian	Rare
Colubrina asiatica	Anapanapa	Indigenous	Rare
Commelina diffusa	Honohono	Non-native	Occasional
Conyza bonariensis	Hairy horseweed	Non-native	Common
Cordyline fruticosa	Ti leaf	Polynesian	Rare
Crassocephalum crepidioides	Crassocephalum	Non-native	Occasional
Crotalaria pallida	Smooth rattle pod	Non-native	Occasional
Crotalaria pumila	Small rattlepod	Non-native	Occasional
Croton guatemalensis	Copalchi	Non-native	Occasional
Cucurbita sp.	Squash	Non-native	Rare
Cupressus macrocarpa	Monterey cypress	Non-native	Occasional

Scientific names	Common name	Nativity	Abundance
Cyclosorus sp.	Christella	Non-native	Occasional
Cynodon dactylon	Bermuda grass	Non-native	Occasional
Cyperus gracilis	McCoy grass	Non-native	Occasional
Cyperus involucratus	Umbrella sedge	Non-native	Rare
Cyperus rotundus	Purple nut sedge	Non-native	Common
Delairea odorata	Cape ivy	Non-native	Rare
Desmodium intortum	Tick clover	Non-native	Occasional
Desmodium triflorum	Tick clover	Non-native	Occasional
Digitaria abyssinica	African couchgrass	Non-native	Occasional
Digitaria ciliaris	Henry's crab grass	Non-native	Common
Digitaria eriantha	Pangola grass	Non-native	Dominant
Digitaria insularis	Sourgrass	Non-native	Dominant
Dysphania ambrosioides	Mexican tea	Non-native	Rare
Ehrharta erecta	Panic veldt grass	Non-native	Occasional
Eichhornia crassipes	Water hyacinth	Non-native	Rare
Eleusine indica	Wire grass	Non-native	Common
Emilia sp.	Pualele	Non-native	Occasional
Eragrostis pectinacea	Carolina love grass	Non-native	Common
Eribotrya japonica	Loquat	Non-native	Occasional
Eucalyptus botryoides	Bangalay	Non-native	Occasional
Eucalyptus globosa	Blue gum	Non-native	Common
Eucalyptus robusta	Swamp mahagany	Non-native	Common
Eucalyptus tereticornis	Forest red gum	Non-native	Occasional
Ficus cairica	Fig	Non-native	Rare
Fortunella sp.	Kumquat	Non-native	Rare
Fraxinus uhdei	Tropical ash	Non-native	Occasional
Geranium homeanum	Cranesbill	Non-native	Rare
Gliricidia sepium	Gliricidia	Non-native	Rare
Gossypium sp.	Cotton	Non-native	Rare
Grevillea robusta	Silky oak	Non-native	Occasional
Hypochoeris radicata	Hairy cat's ear	Non-native	Common
Indigofera suffruticosa	Upright indigo	Non-native	Common
Ipomoea batatas	Sweet potato	Non-native	Rare
Ipomoea indica	Koali awa	Indigenous	Rare
Ipomoea ochracea	Yellow morning glory	Non-native	Rare
Jacaranda mimosifolia	Jacaranda	Non-native	Occasional
Justicia betonica	White shrimp plant	Non-native	Rare
Kyllinga brevifolia	Green kyllinga	Non-native	Occasional
Lantana camara	Lantana	Non-native	Occasional
Leonotis nepetifolia	Lion's ear	Non-native	Rare
Lepisorus thunbergianus	Pakahakaha	Indigenous	Rare
Lotus subiflorus	Lotus	Non-native	Occasional
Macroptilium lathyroides	Cow pea	Non-native	Occasional
Malvastrum coromandelianum subsp. coromandelianum	False mallow	Non-native	Occasional
Megathyrsus maximus	Guinea grass	Non-native	Dominant

Scientific names	Common name	Nativity	Abundance
Melinis minutiflora	Molasses grass	Non-native	Dominant
Melinis repens	Natal red top	Non-native	Dominant
Microlepia strigosa	Palapalai	Indigenous	Common
Monstera deliciosa	Swiss cheese plant	Non-native	Rare
Moringa oleifera	Drumstick tree	Non-native	Rare
Musa acuminata	Banana	Non-native	Rare
Musa x paradisiaca	Banana	Non-native	Rare
Neonotonia wightii	Glycine	Non-native	Occasional
Nephrolepis sp.	Sword fern	Non-native	Occasional
Odontonema cuspidatum	Firespike	Non-native	Rare
Osplimenus hirtellus	Bamboo grass	Non-native	Occasional
Oxalis corniculata	Yellow wood sorrel	Non-native	Occasional
Oxalis debilis var. corymbosa	Pink wood sorrel	Non-native	Occasional
Paspalum conjugatum	Hilo grass	Non-native	Common
Paspalum urvillei	Vasey grass	Non-native	Dominant
Passiflora edulis	Passion vine	Non-native	Occasional
Passiflora subpeltata	White passion flower	Non-native	Occasional
Persea americana	Avocado	Non-native	Occasional
Phlebodium aureum	Lauae haole	Non-native	Occasional
Phyllanthus debilis	Phyllanthus	Non-native	Common
Phytolacca ocatandra	Pokeweed	Non-native	Common
Pinus sp.	Pines	Non-native	Occasional
Plantago lanceolata	Narrow-leaved plantain	Non-native	Common
Plectranthus amboinicus	Mexican oregano	Non-native	Rare
Polygala paniculata	Milkwort, root beer plant	Non-native	Occasional
Psidium cattleianum	Strawberry guava	Non-native	Dominant
Psidium guajava	Guava	Non-native	Common
Ricinus communis	Castor bean	Non-native	Occasional
Rubus rosifolius	Thimbleberry	Non-native	Occasional
Saccharum officinarum	Sugar cane	Non-native	Rare
Schinus terebinthifolius	Christmas berry	Non-native	Dominant
Senecio madagascariensis	Fireweed	Non-native	Common
Senna occidentalis	Coffee senna	Non-native	Occasional
Setaria palmifolia	Palmgrass	Non-native	Rare
Setaria parviflora	Yellow foxtail	Non-native	Occasional
Sida rhombifolia	Sida, Cuban jute	Non-native	Common
Sigesbeckia orientalis	Small yellow crown beard	Non-native	Occasional
Solanum americanum	Glossy nightshade	Indigenous?	Occasional
Solanum pseudocapsicum	Jerusalem cherry	Non-native	Rare
Sollanum linnaeanum	Apple of sodom	Non-native	Occasional
Sonchus oleraceus	Sow thistle	Non-native	Occasional
Spathodea campanulata	African tulip tree	Non-native	Rare
Sporobolus sp.	Sporobolus	Non-native	Common
Stachys arvensis	Staggerweed	Non-native	Occasional
Stachytarpheta cayennensis	Vervain	Non-native	Occasional
Symphytum officinale	Common comfrey	Non-native	Rare

Scientific names	Common name	Nativity	Abundance
Syngonium podophyllum	Arrowhead plant	Non-native	Rare
Syzygium cumini	Java plum	Non-native	Occasional
Triumfetta semitriloba	Sacremento bur	Non-native	Common
Urochloa mutica	California grass	Non-native	Occasional
Verbena littoralis	Vervain	Non-native	Occasional
Waltheria indica	Uhaloa	Indigenous ?	Occasional
Xanthosoma robustum	Ape	Non-native	Occasional

Native palapalai ferns are relatively abundant in the gulches of Hoku Nui.

FAUNAL SURVEY

SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species, abundance, activities and location as well as observations of trails, tracks, scat and signs of feeding.

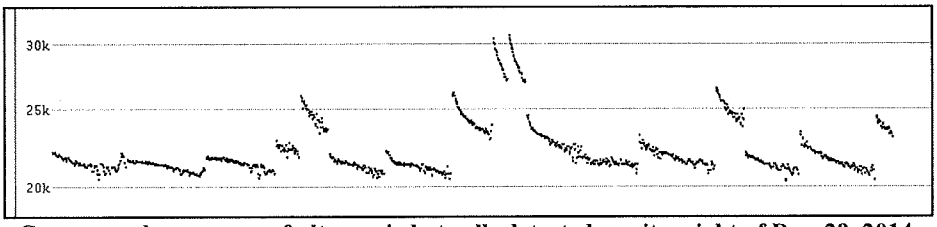
Conspicuous insects were noted. A sweep net was used to help with identification of insects that were difficult to get close looks at.

An evening visit was made to record crepuscular activities and vocalizations and to look for presence of Hawaiian Hoary Bats (*Lasiurus cinereus semotus*). Along with visually scanning the sky for bats, active and passive ultrasonic bat detectors were used to help detect bats. The site was surveyed on December 29 & 30, 2014.

Sunset, Hoku Nui.

BATS

Bats are relatively common in the Olinda/Piiholo area of Maui, and are regularly observed on and near the Hoku Nui property. However, during the night survey, only a single lone bat was viewed off the property at a distance, and just a few ultrasonic bat calls were detected, with most of the calls long and drawn out, suggesting a bat transiting through the area, rather than utilizing the site for roosting or foraging.



Compressed sonogram of ultrasonic bat calls detected on site, night of Dec. 29, 2014.

Hawaiian Hoary Bats roost in tall trees in sheltered areas, such as on the branch tips of mature Eucalyptus trees. The bats give birth to and raise their young in the summer. Avoiding cutting large trees during the summer months will help minimize potential impact to young bats that have not yet learned to fly.

There appeared to be no suitable trees for bat roosts in the area planned for housing. The water features and areas of native plants proposed may provide additional food, shelter, and water resources for the bats in the area.

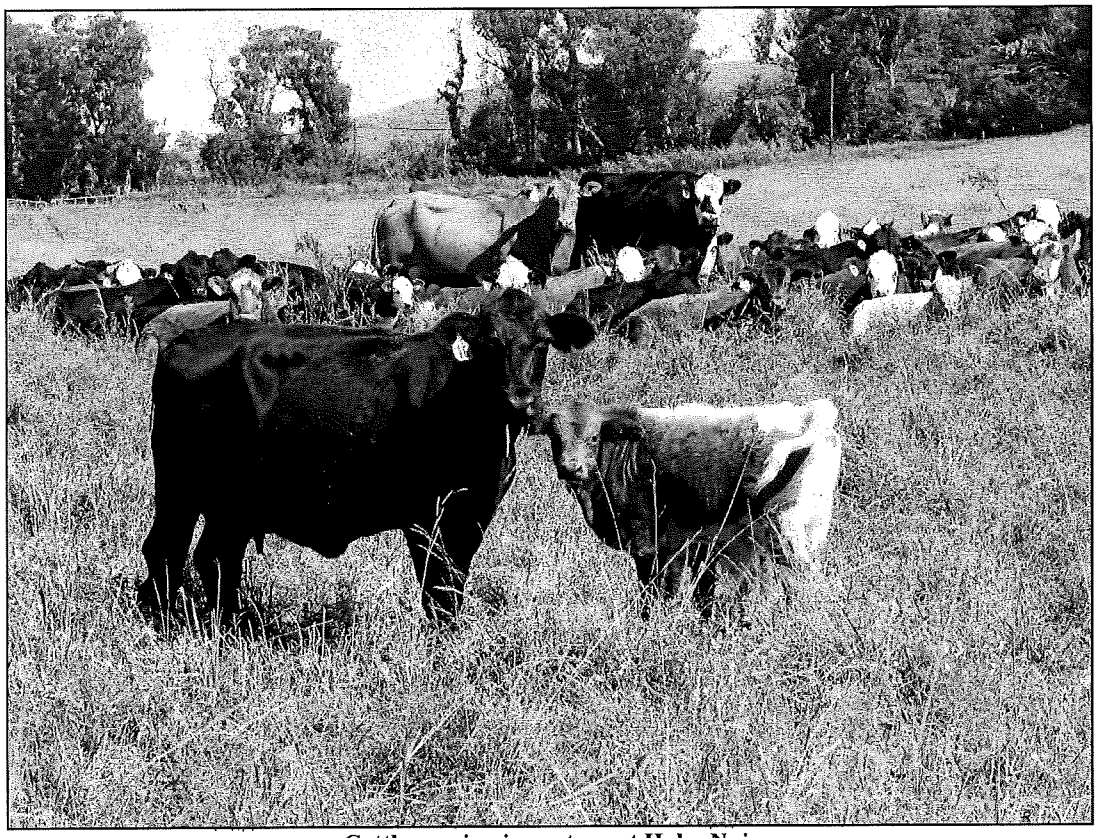
Hawaiian Hoary Bat found dead in nearby Olinda. Sep, 2010.

NON-NATIVE MAMMALS

The bulk of the Hoku Nui project area is pasture actively grazed by cattle (*Bos taurus*), goats (*Capra hircus*), and sheep (*Ovis aries*). In the gulches trails and tracks of wild axis deer (*Axis axis*) were visible.

A few mongoose (*Herpestes javanicus*) were observed running across the roads into the grass. Dogs (*Canis familiaris*) were heard barking from nearby residential housing.

Other mammals likely to utilize this property, but which were not observed or heard include wild pigs (*Sus scrofa*), rats (*Rattus* spp.), mice (*Mus domesticus*), and cats (*Felis domesticus*).



Cattle grazing in pasture at Hoku Nui.

BIRDS

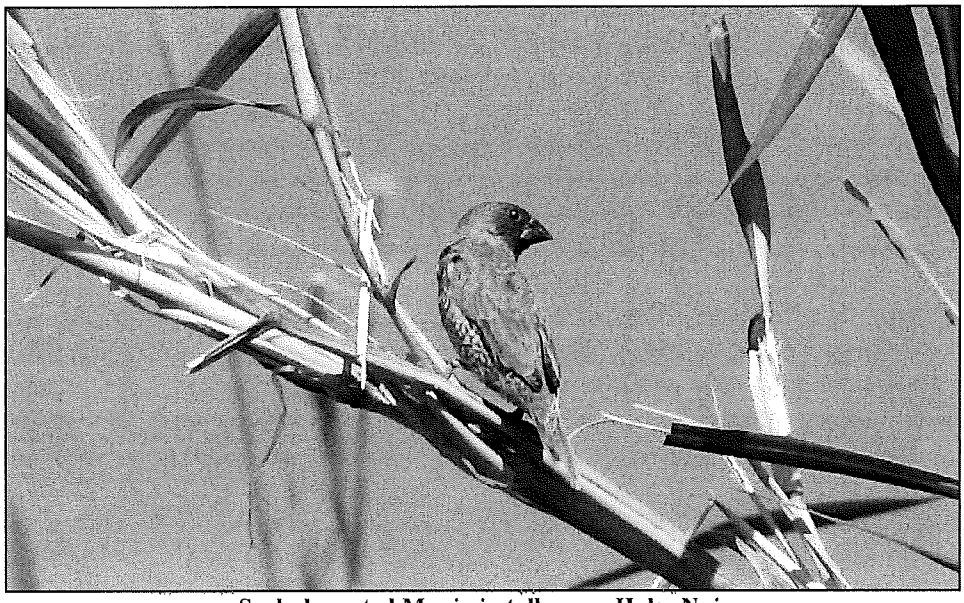
Other than two Nene (*Branta sandvicensis*) that flew over the site, and a Pacific Golden-Plover or Kolea (*Pluvialis fulva*) foraging in the pasture, all the birds observed on the site were common non-native species.

Some of the most prevalent birds on the site were Scaly-breasted Munia (*Lonchura punctulata*), that regularly flew by in flocks up to a few dozen birds. Also conspicuous were Cattle Egrets (*Bubulcis ibis*), Common Mynas (*Acridotheres tristis*), Skylarks (*Alauda arvensis*), and Ring-necked Pheasants (*Phasianus colchicus*).

Though not observed during surveys, the Hawaiian Short-eared Owl or Pueo (*Asio flammeus sandwichensis*) was mentioned by site workers as occasionally present. This native owl likely utilizes the pastures for hunting and possibly nesting. The project calls for continued grazing and pasturage, which would continue to benefit this native owl.

Nene were not observed utilizing the site, but are known from Piiholo and regularly fly over the site. If Nene breeding is found to be occurring on the site, the Department of Land and Natural Resources (DLNR) should be contacted to determine appropriate actions. Generally, this involves minimizing activity around the nesting site until the eggs hatch and the Nene are mobile enough to be relocated or leave on their own.

Hawaiian Petrels (*Pterodroma sandwichensis*) and other seabirds raise their young in Haleakala National Park and other upland sites of East Maui. After feeding at sea during the day, the birds fly up to the mountain burrows at night, using the moon, stars, and land features for navigation. Bright lights can disorient the birds. Using downward facing lights will help minimize distractions to these night flying birds.



Scaly-breasted Munia in tall grass, Hoku Nui.

INSECTS

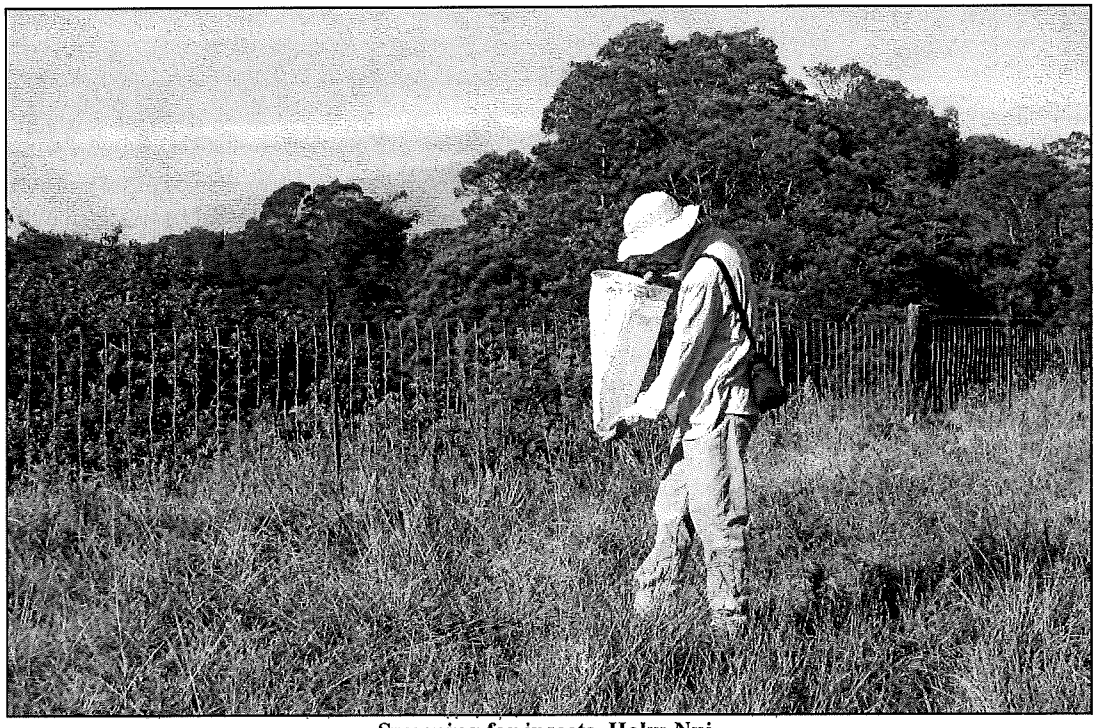
A complete inventory of the insects was beyond the scope of this survey. Conspicuous insects were noted and special effort was made to look for native insects of conservation concern.

The only native insect observed on the site was the indigenous Green Darner Dragonfly (*Anax junius*), which is common in Hawaii and elsewhere. More intensive surveys would undoubtedly turn up many more cryptic native species, though it is unlikely any would be of conservation concern.

Some of the more conspicuous non-native insects on the site were butterflies, including Passion Butterfly (*Agraulis vanillae*), Monarch Butterfly (*Danaus plexippus*), and Bean Butterfly (*Lampides boeticus*). Additionally, there were two species of butterflies relatively new to Maui, the Sleepy Orange Butterfly (*Abaeis nicippe*) and the Lesser Grass Blue Butterfly (*Zizina otis*).

Honey bees (*Apis mellifera*) were commonly observed, and numerous hives were being maintained on the site.

No tree tobacco (*Nicotiana glauca*) plants were observed. All solanaceous plants were checked for signs of Blackburn's Sphinx Moth (*Manduca blackburni*) eggs, larvae, frass, or damage. No signs of this endangered moth were observed.



Sweeping for insects, Hoku Nui.

DISCUSSION & RECOMMENDATIONS

Most of the animals observed on the site are non-native and of no special conservation concern. Nene transit over the site, but apparently don't currently utilize it. Hawaiian Short-eared Owls utilize the pastures on the site and will continue to be able to do so in the proposed project. Hawaiian Hoary Bats transit over the site, may roost in the gulch areas, and will be able to continue to do so. The lone native insect species observed, Green Darner Dragonfly, hunts for insects on the site and will continue to be able to do so. No signs of the Blackburn's Sphinx Moth or Tree Tobacco were observed.

By contacting DLNR if Nene are thought to be nesting, not cutting large trees during summer months while bats are pupping, and using downward facing lights so as to not disorient night flying native seabirds, the proposed project is not expected to have a significant negative impact on the faunal resources in this part of Maui.

ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged within three groups: Mammals, Birds and Insects. For each species the following information is provided:

- Common name
- Scientific name
- Bio-geographical status. The following symbols are used:
    - Endemic = Native only to Hawaii; not naturally occurring anywhere else in the world.
    - Indigenous = Native to the Hawaiian Islands and also to one or more other geographic area(s).
    - Non-native = All those animals brought to Hawaii intentionally or accidentally after western contact.
    - Migratory = Spending a portion of the year in Hawaii and a portion elsewhere.
- Abundance of each species within the project area:
    - Abundant = Many flocks or individuals seen throughout area at all times of day.
    - Common = A few flocks or well scattered individuals throughout the area.
    - Uncommon = Only one flock or several individuals seen within the project area.
    - Rare = only one or two seen within the project area.

ANIMAL SPECIES LIST

Scientific name	Common name	Status	Abundance
Mammals			
Axis axis	Axis deer	Non-native	Occasional
Bos taurus	Cow	Non-native	Occasional
Capra hircus	Goat	Non-native	Occasional
Herpestes javanica	Mongoose	Non-native	Occasional
Lasiurus cinereus semotus	Hawaiian Hoary Bat	Endemic	Occasional
Ovis aries	Sheep	Non-native	Occasional
Birds			
Acridotheres tristis	Common Myna	Non-native	Occasional
Alauda arvensis	Skylark	Non-native	Common
Branta sandvicensis	Nene	Endemic	Rare
Bubulcis ibis	Cattle Egret	Non-native	Common
Cardinalis cardinalis	Northern Cardinal	Non-native	Occasional
Francolinus francolinus	Black Francolin	Non-native	Rare
Francolinus pondicerianus	Grey Francolin	Non-native	Occasional
Gallus gallus	Chicken	Non-native	Rare
Garrulax canorus	Chinese Hwamei	Non-native	Occasional
Geopelia striata	Zebra Dove	Non-native	Occasional
Lonchura punctulata	Scaly-breasted Munia	Non-native	Common
Paroaria coronata	Brazilian Cardinal	Non-native	Occasional
Passer domesticus	House Sparrow	Non-native	Occasional
Phasianus colchicus	Ring-necked Pheasant	Non-native	Occasional
Pluvialis fulva	Pacific Golden-Plover	Migratory	Rare
Streptopelia chinensis	Spotted dove	Non-native	Occasional
Zosterops japonicus	Japanese White-eye	Non-native	Occasional
Insects			
Abaeis nicippe	Sleepy orange butterfly	Non-native	Occasional
Adoretus sinicus	Chinese rose beetle	Non-native	Common
Aedes sp.	Mosquito	Non-native	Common
Agraulis vanillae	Passion butterfly	Non-native	Common
Anax junius	Green darner dragonfly	Indigenous	Occasional
Apis mellifera	Honey bee	Non-native	Common
Danaus plexippus	Monarch butterfly	Non-native	Common
Gasteracantha sp.	Crab spider	Non-native	Occasional
Herpetogramma licarsisalis	Grass webworm	Non-native	Occasional
Lampides boeticus	Bean butterfly	Non-native	Common
Pheidole megacephala	Big-headed ant	Non-native	Common
Polistes aurifer	Paper wasp	Non-native	Occasional
Spoladea recurvalis	Beet webworm	Non-native	Occasional
Vespula pennsylvanica	Western yellow jacket	Non-native	Occasional
Xylocopa sonorina	Sonoran carpenter bee	Non-native	Common
Zizina otis	Lesser grass blue butterfly	Non-native	Common

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APPENDIX D.

Cultural Impact Assessment

Cultural Impact Assessment for a 258-acre Sustainable Community and Farm Development Project Located in TMK: (2) 2-4-12-005, 039-046, Makawao Ahupua'a, Hāmākua Poko Moku (Traditional District), Maui Island.

Final Draft

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Kua'āina Consultants Maui
Kula, Hawai'i
April 2016

Acknowledgments

The cultural impact assessment process is a community effort. A great deal of time and energy is required of community participants and Kua'āina Consultants Maui would like to send a sincere *mahalo nui loa* to all of the individuals and groups who gave their time and shared personal stories and insights about the Makawao Ahupua'a. Deep thanks goes to *kūpuna* Mr. Jimmy DeRego, Mr. Doug McClure, Mrs. Elaine Foo Sum, and Mr. Sam Ka'ai for sharing their *mana'o* and longstanding knowledge of the area. Many thanks to Mr. Billy Abreu, Mr. Alan DeCoite, Mr. Herman Louis DeCoite, Mr. Patrick Fisher, Mr. Kenneth Freitas, Mr. Bob Hobdy, Kumu Keali'i Reichel and Mr. Hugh Starr for sharing their knowledge and childhood recollections of Makawao's plants, animals, waterways, place names and history. Much gratitude goes to Mrs. Wendy Rice-Peterson who took the time to share a history of Ka'ono'ulu Ranch and Mrs. Lois Farrington, historian of the Po'okela Church, for taking the time to sit and talk, and share the history of Po'okela Church and Rev. Jonathan S. Green, a man who played a tremendously important role in the Makawao community in the mid-1800s, during one of the most significant cultural shifts in Hawaiian history, the *Māhele 'Āina*. Thank you all for your time, recollections and willingness to share knowledge.

Section 1 Management Summary

Reference	Cultural Impact Assessment for a 258-acre Sustainable Community and Farm Development Project Located in TMK: (2) 2-4-12-005, 039-046, Makawao Ahupua'a, Hāmākua Poko Moku (Traditional District), Maui Island.
Date	September 2015
Project Location	The project area is located in the uplands of Hāmākua Poko District, Makawao Ahupua'a, Island of Maui. More specifically, the project area is located directly *mauka* (towards the mountain) of St. Joseph's Catholic Church, on Pi'iholo Road.
Project Funding and Land Jurisdiction	The proposed project area is owned by the Hoku Nui Maui LLC and is privately funded.
Reviewing Agency	This CIA will be included in the project Environmental Assessment and reviewed by the State of Hawai'i Office of Environmental Quality Control (OEQC) and the Maui County Dept. of Housing & Human Concerns. This CIA study was performed following the OEQC Guidelines for Assessing Cultural Impacts (Appendix A)
Project Description	The Hoku Nui Maui LLC plans to subdivide and develop a 258-acre sustainable farming community. This community will include a clustered housing component consisting of 42 housing units, of both market value and affordable housing value, and a 238-acre farm to include livestock and poultry, garden crops, fruit and nut orchards, native Hawaiian habitat restoration, a *hula hālau*, and an on-site Farm Market.
Project Acreage	258 acres
CIA Focus Area	Cultural Impact Assessment (CIA) focused on the Makawao Ahupua'a and expanding to include areas within the Hāmākua Poko Moku and Hāmākua Loa.
Project Related Ground Disturbance	Ground Disturbance resulting from grading, grubbing and construction activities as well as typical agricultural activities.
Historic Preservation Regulatory Context	This CIA is a requirement of Chapter 343, Hawai'i Revised Statutes (HRS), and will be included in the environmental assessment document (EA). The requirement of the EA has been triggered by the need for offsite road improvements along Pi'iholo Road associated with the proposed project.

Historic Properties within the Project Area	Single human burial, SIHP 50-50-06-5501 Stacked basalt retaining wall and associated soil terrace, SIHP 50-50-06-6274
Archaeological Monitoring Recommendation	Based on SHPD letter dated June 11, 2008, archaeological monitoring plan acceptance letter Log No. 2028.2197, Doc No. 0806PC16, archaeological monitoring is required for all ground disturbing activities.
CIA Recmmendations	• It is recommended that best management practiced are utilized during all phases of project development to keep all streams and gulches free from construction and agricultural debris and run-off as these sediments may interfere with and contaminate nearby fresh water resources as well as coastal ocean resources by way of siltation and the addition of an imbalance of nutrients into waterways. • Burial SIHP 50-50-06-5501 is located in southeastern corner of the current project area. Upon further consultation with SHPD it has been determined that the Burial Preservation Plan for this site must be completed and formalized. • It is recommended that activities associated with the proposed development do no adversely impact the neighboring St. Joseph's Church and their continued religious practices. • It is recommended that considerations to the viewshed be made that retain elements in alignment with the lands traditional forested, agricultural and pastoral character. To minimize the impacts of viewable housing, strategic planting of indigenous and endemic tree and shrub species such as *koa*, *'ōhi'a*, *'iliahi*, *halapepe*, *etc.*, to maintain and preserve traditional viewshed corridors is further recommended. • The project area contains a historic access trail, the Bridle Path, Consideration should be given to re-establishing this historically significant feature of the property. Consultation with the State agency Na Ala Hele is recommended for further guidance regarding historic access trials. • It is recommended that plant communities known to have

	grown here historically be reestablished and that cultural practitioners (artists, traditional healers, *hula* practitioners, etc.) be allowed to gather such items. Consultation with these practitioners and local botanists will help to establish both the most desired species and the most appropriate plant species for reestablishment. • It is recommended that the project principals, in conjunction with a recognized hydrological expert, address these concerns with the public. • Based on community concerns and suggestions, it is recommended that farming operations are established prior to the development of housing.

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Section 2 Introduction

2.1 Project Background

At the request of Mr. Joshua Chavez, Project Manager for Hoku Nui Maui LLC, Kua'āina Consultants Maui has conducted a Cultural Impact Assessment (CIA) for the proposed 258-acre Sustainable Community and Farm Development project located in TMK: (2) 2-4-12-005, 039-046, Makawao Ahupua'a, Hāmākua Poko Moku (Traditional), Maui Island. The goal of the proposed project is to create a community based on sustainability practices drawing on both modern technologies and traditional Hawaiian land management practices.

More specifically, the Hoku Nui Maui land management group, aspires to develop an innovative sustainability project that reestablishes a connected relationship between people and the land. In this way, Hoku Nui Maui seeks to create a viable agricultural operation while integrating a sustainable housing community and implementing native Hawaiian habitat restoration. (Susty Pacific; 2015, in draft)

Of the 21 lots currently entitled, 20 lots are proposed for a clustered housing development of 20 one-acre house lots. The remaining 238 acres will be a farm lot, which will remain dedicated to agriculture and native Hawaiian habitat in perpetuity. Further details of the proposed project are as follows:

- Farm operations will include approximately 120 acres of grazing pasture for cattle and chickens with 10-20 acres of rotating horticulture. Fruit and nut trees are proposed to line the access laneways and sheep will be utilized to maintain and control understory grasses.
- Holistic land management will be facilitated by clustering the housing development and therefore maximizing continuity of agricultural lands. The housing development will include both market value and affordable housing, and possibly farm employee housing.
- Housing will be consolidated on 20 one-acre lots following a clustered housing concept, with each lot containing one main dwelling and one accessory dwelling. Additionally, one main dwelling and one accessory dwelling would be located on the larger farm lot. Together, the total housing build-out would include 42 housing units.
- Areas of native Hawaiian habitat restoration may be focused near gulches.
- A farm market.
- An agricultural commercial kitchen, utilized as needed to process farm-raised goods to be sold at on-site farm market and available for public sale.
- Three acres donated to a *hula hālau.*
- Infrastructure improvements are proposed to include on-site water sources via a well (existing) for potable water, and collection of rainwater into ponds for irrigation use.
- Renewable energy systems will be developed for energy needs with the intention to keep energy production off-grid.

The area of study for this CIA will be delineated by first understanding the area of potential effect (APE), identified as "The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist." The APE for this CIA hereafter will be referred to as the "focus area," the upland region of Hāmākua Poko Moku including Makawao Ahupua'a. The property boundaries of the proposed development will be referred to as the "project area." Research will extend into neighboring regions as deemed necessary (see Figure 1 and Figure 2).

2.2 Scope of Work

1. Examination of historical documents, Land Commission Awards and historic maps with the specific purpose of identifying traditional Hawaiian activities, including gathering of plant, animal and other resources or agricultural pursuits as may be indicated in the historic record.
2. A review of the existing archaeological information pertaining to archaeological sites within the study area to reconstruct traditional land use activities, identify and describe the cultural resources, practices and beliefs associated with the parcel, and identify present uses as appropriate.
3. Interviews with persons knowledgeable about past and present cultural practices in the project area and surrounding areas.
4. Preparation of a report summarizing information gathered related to traditional practices and land use, and the results of items 1-3. The report will assess the impact of the proposed undertaking on the indentified cultural practices and features.

2.3 Environmental Setting

2.3.1 Natural Setting

The island of Maui was once a part of a large ancient, 6,200-square-mile landmass called Maui Nui, which included the volcanoes of West Maui, East Maui (Haleakalā), Lāna'i, West Moloka'i, East Moloka'i, Kaho'olawe and the Penguin Bank (a broad volcanic shoal west of Moloka'i, now submerged). This land mass subsided and then separated into its current formation of the four-island group that constitutes Maui County (Juvik and Juvik 1998; 44).

The project area is situated at an elevation ranging between 1700-2100 feet amsl (above mean sea level), on the slopes of Haleakalā in the Makawao Ahupua'a. Haleakalā is a dormant shield volcano comprised of the Honomanu Volcanic Series soils (MacDonald et al. 1983:388). The project area features the Makawao Silty Clay (MfC) soil type generally located at an elevation of 1,200 to 2,500 feet with a seven to 15 percent slope and with an average rainfall of 60 to 90 inches. These soils are moderately sloping to strongly sloping, and comprised of volcanic ash and weathered igneous rock. Makawao soils are associated with Hā'iku, Kailua and Olinda soils. These soils have been known for use as pasture, pineapple cultivation and small home sites (Foote et al, 1972:89-90). Vegetation identified within the project area includes *'ape*

(*Alocasia macrorrhizos*), *kukui* (*Aleurites moluccana*), coffee (*Coffea Arabica*), various grasses, Silver Oak (*Grevillea robusta*) and *waiawi* (Strawberry Guava, *Psidium cattleianum*), Night Blooming Jasmine (*Cestrum nocturnum*), *pepeiao* (wood ear fungus, *Auricularya cornea*), Christmas Berry (*Schinus terebinthifolius*), Black Wattle (*Acacia mearnsii*), and Eucalyptus (*Eucalyptus spp.*).

The project area is located atop a plateau land bordered on the northeast by Pi'iholo Road, and on the south by a gulch known as Ku'aihulumoa or Makawao Gulch. Beyond the *mauka* end of the project area the land becomes more wooded and is dissected by the Waiohiwi and Kahakapao Stream systems. Essentially, the Waiohiwi and Kahakapao Streams originate in the Makawao Forest Reserve. They flow *makai* (seaward) where they join to form Kalena Pond, located at the southeast side of Pu'u Pi'iholo. As they drain from Kalena Pond they become one stream known by several different names including 'Alelele and Māliko. This same stream continues seaward where it is known as Māliko Stream/Gulch. The Waihou Springs (now damaged and waters diverted) feeds Kailua Gulch. Māliko Gulch and Kailua Gulch form the northeastern and southern boundaries, respectively, of the traditional Hāmākua Poko Moku.

2.3.2 Built Environment

The built environment is primarily concentrated in the project "baseyard" located on the western end of the property, *mauka* of St. Joseph's Church. The baseyard consists of shipping containers used for storage as well as field-office space. Additionally, there are heavy-duty canvas and tarp tents used as maintenance and repair workshops, and a well with associated tank and pumping mechanisms. A chicken coop is located further east along the property's southern boundary.

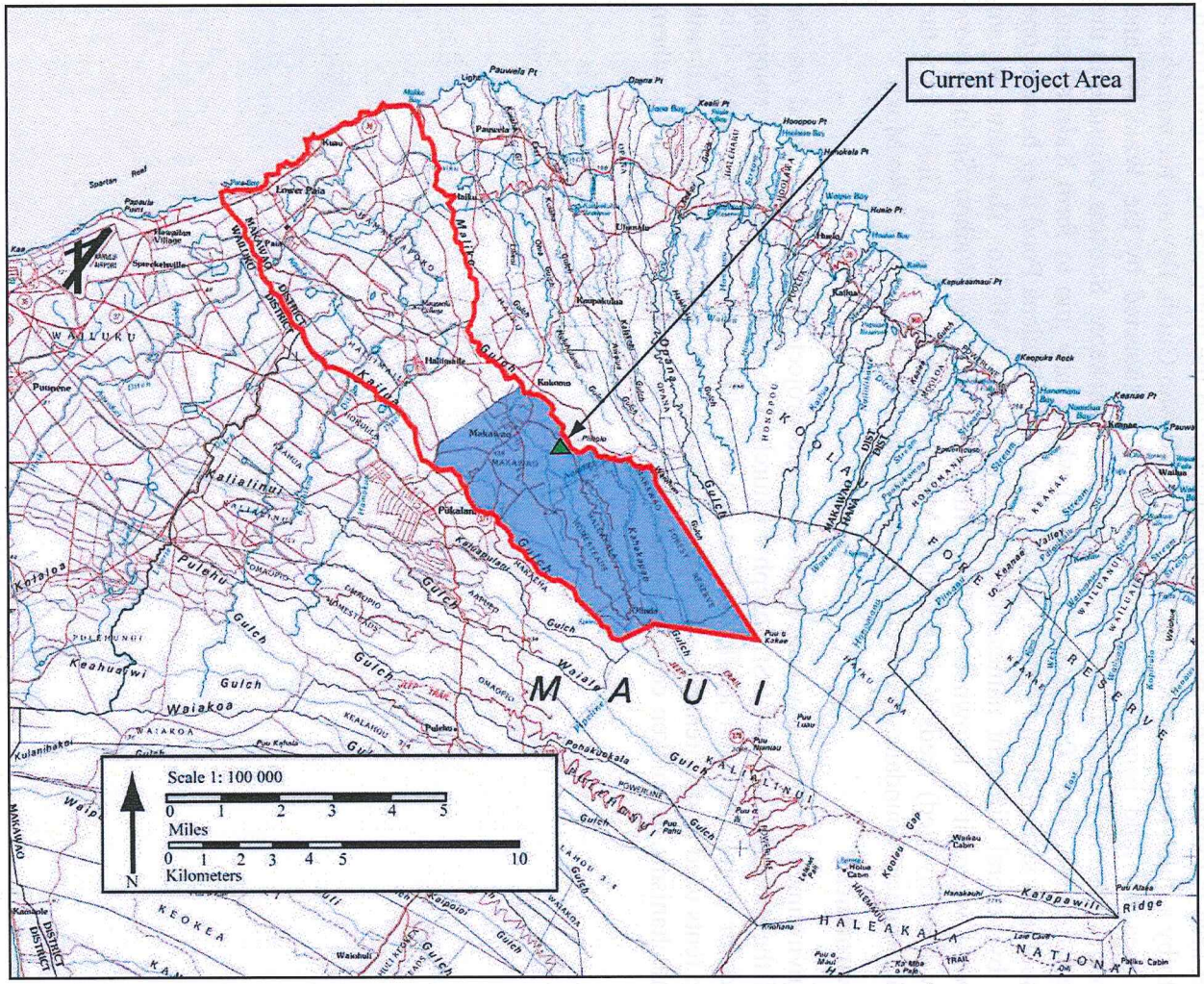

Figure 1. Portion of 1975 30-minute USGS map of East Maui showing current project area (green point) in relation to traditional Hāmākua Poko Moku boundary (outlined in red), and Makawao Ahupua'a boundary in blue (approximation).

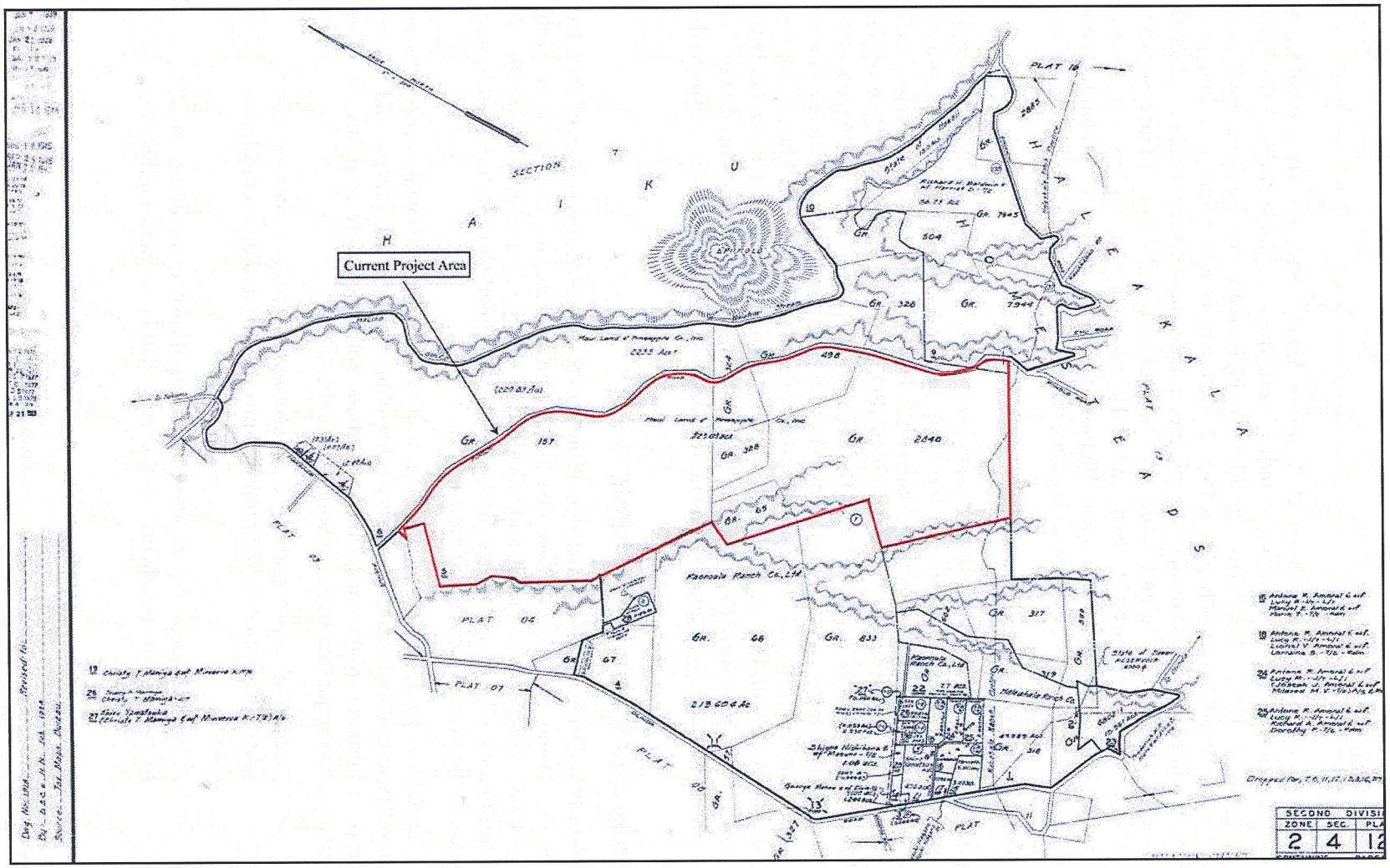

Figure 2. TMK map showing proposed project area.

Section 3 Methods

Principal researcher, Ms. Colleen Medeiros, B.S. of Kua'āina Consultants Maui, conducted field interviews and consultations over a five-month period, from May-September 2015; two field visits were conducted in May 2015. To identify individuals and organizations with traditional cultural expertise for the study area, a formal contact letter was mailed to community members, cultural practitioners and Hawaiian organizations. Document research was conducted by Ms. Medeiros along with contributing researchers, Robert H. Hill, B.A (of Cultural Surveys Hawai'i, Inc. Maui Office) and Scott Fisher, Ph.D.. Hawaiian language newspapers were consulted and translated by Mrs. Kekai Robinson. Methods used by Kua'āina Consultants Maui during fieldwork and preparation of this cultural impact assessment are detailed below.

3.1 Document Review and Research

Numerous published and unpublished accounts, surveys, reports, maps and photographs found in public and private collections pertaining to the study area were investigated by Kua'āina Consultants Maui. English and Hawaiian language historical documents, maps and archaeological studies were researched at the DLNR/SHPD library; the Survey Office of the Department of Accounting and General Services (DAGS); online at ulukau.org and nupepa.org. Hawaiian language translations were conducted by Ms. Kekai Robinson of the Bailey House Musuem. Background research was aided by Cultural Surveys Hawai'i (CSH) library and the private library of Robert H. Hill, B.A. as well as the private library of Principal Researcher, Ms. Colleen Medeiros. Land Grants were studied using historic maps and cross-referenced with the Waihona 'Aina online database (waihona.com) and downloaded copies are included in Appendix E .

3.2 Scoping and Community Outreach

In order to identify individuals with knowledge of the traditional cultural practices of the CIA study area for the proposed project, Kua'āina Consultants Maui initiated contact with government agencies, advisory councils and local community organizations (Section 6 Community Consultation). Letters and project area maps were mailed showing the project area location in relation to the overall focus area (Appendix B)

The goal of the CIA is to discover and report on traditional cultural Hawaiian practices as well as the cultural practices and resources of any other ethnic group, past, present and future, and how the proposed project might impact these practices both negatively or positively. The following information was requested from community members:

- Traditional trails, pathways, *mauka-makai* access routes or any other such routes in the proposed project area and/or overall focus area.
- Collection areas for plants used in traditional ceremonies, *hula*, *lā'au lapa'au* (medicinal uses), etc., within or surrounding the project area.

- Knowledge of historic sites, archaeological sites and burial sites located within or surrounding the project area.
- Referrals to *kūpuna* who possess first-hand and/or generational knowledge of the focus area.
- General history, and present and past land use of the focus area.
- Cultural associations of the focus area, such as legends and traditional practices.
- Any other cultural concerns the community might have related to Hawaiian or other cultural practices in the focus area.

3.3 Group Consultation, Informal and Formal Interviews

Interviews and community consultations were conducted informally via telephone or as a part of a sit-down interview between the researcher and participating individual. Handwritten notes were made of all consultations and interviews with participant permission; oral history interviews were both recorded using an Olympus VN-722PC digital voice recorder and/or handwritten. Transcriptions of recorded interviews were completed by Ms. Stephanie Brown, M.A. using Sony Digital Voice Editor Software.

All digitally recorded formal interview transcriptions were reviewed by participant for clarification and accuracy prior to inclusion in this study. Authorized transcriptions from digitally recorded interviews and associated release forms are included in Appendix D .

Section 4 Background Research

4.1 Settlement of the Hawaiian Islands

The latter half of the 20th century witnessed significant progress towards understanding the date of human arrival in the Hawaiian archipelago. Evidence for human arrival comes from a number of sources, including known sites of early human occupation, material evidence these individuals left behind, and indirect threads that provide evidence of human activity. Material evidence of early occupation include such items as fishhooks and adzes that retain a shape, form and style more closely related to other areas of Polynesia. Indirect lines of evidence of early human occupation include habitat modifications to the landscape that are clearly anthropogenic. Indicators have been found in such locations as wetland sediment cores that demonstrate a significant increase in charcoal, as well as avifaunal remains associated with the remains of the anthropogenically introduced Polynesian rat (*Rattus exulans*).

Considering the recently recalibrated Carbon 14 dates, as well as these 'proxy' lines of evidence, Kirch (2011: 22) argues that "a lower bound on the settlement date for Hawai'i...has to be AD 900-1000." Considering that this first group of settlers would have been few in numbers and likely left only minimal evidence of their presence, the indirect or 'proxy' forms of evidence play a key role in understanding both the timing of these first arrivals and the rate at which their impacts are perceptible across the landscape. As Kirch (2011: 22) points out, "'proxy' paleoenvironmental evidence for human presence in Hawai'i, which now comes almost exclusively from O'ahu and Kaua'i Islands, leaves no doubt that human activities were creating significant disturbances on both of these islands by AD 1200." Although evidence is relatively thin for a comparable date on Maui, the first settlers of Maui are generally thought to have arrived at approximately the same time.

4.1.1 Social Development in Hawai'i

In spite of the amount of research conducted on the settlement of the Hawaiian Islands, the process of cultural development remains incompletely understood; however, through archaeological study researchers have traced the complex pattern of societal transformation as the first Polynesian voyagers' culture evolved from that of their parent society to the emergence of a society that, while sharing elements of their ancestral stock, displayed unique and distinguishing patterns. This process of constructing a cultural-historical framework, known as periodization, remains useful for convenience while in reality cultural evolution unfolds continuously (Kirch 1996: 3).

Colonization Period (approximately AD 850-1000):

The first generally agreed upon era, the Colonization Period, remains the least well-known period, primarily due to the dearth of sites from this time; however, a consensus has emerged that the first people to arrive came from southern Polynesia with most, if not all, of the "essential biological basis" for their survival (Kirch 1996:4). These include a floral component of taro, coconut, bananas, breadfruit, sugarcane, yams and possibly sweet potato (which also could have come later). Animals included chickens, dogs, pigs and, most likely inadvertently, the Polynesian rat (Ibid. 4-5). The cultural kit, particularly fishing gear and adzes, demonstrate a marked

similarity to those made in the Marquesas Islands, directly south of the Hawaiian Archipelago; thus researchers have concluded that these immigrants arrived from the Marquesas.

Linguistic evidence, particularly the synchronous term for chief in Hawai'i (*ali'i*) and the Marquesas (*ariki*), indicates the retention of paramount leadership in hereditary chiefs (Kirch 1996:5). Although this suggests the presence of a stratified society in this early period, Kirch (Ibid.) points out that this division seems not to have been as intense or divisive as in later periods of Hawaiian history. It also seems very likely that voyages between Hawai'i and the home islands continued, perhaps contributing to the perpetuation of cultural norms found in the ancestral homeland.

As noted above, very little is known with certainty about the Colonization Period, due to the limited number of sites found from this time; however, one worth noting comes from Hā'iku, Maui, relatively close to the project area. During the early 1970s, archaeologists discovered a collection of five adzes identical to the well-documented *koma* style from the Marquesas Islands. Although these were surface finds and their provenance remains somewhat unclear, Kirch (1985: 185) speculates that this find "raise[s] the suspicion that they were brought on an early settlement voyage from the Marquesas."

Development Period (approximately AD 1000-1200):

The second phase in this process of cultural evolution, the Development Period, represents the time when this Polynesian society evolved into "distinctively Hawaiian cultural patterns" (Kirch 1996: 5). Pole and thatch home sites from this period tend to be clustered in small hamlets around highly productive coastal fishing areas. Materially, this era is marked by a new and uniquely Hawaiian form of both adz and fishhook, and the bowling game *'ulu maika*, as well as well as the necklace adornment *lei niho palaoa* are found in archaeological sites dating from this period (Ibid.). Stories and legends from this time also indicate that voyaging trips between Hawai'i and southern Polynesia continued well into this period (Kirch 2014).

Expansion Period (approximately AD 1200-1600):

The transition between the Development Period and its subsequent era, the Expansion Period, occurred when this early Hawaiian community ventured from the lush valley bottoms of the windward coast to the leeward parts. As Kirch suggests, the Expansion Period represents the most significant and critical time for "the emergence of classic Hawaiian culture." (1996:5). Kirch notes that the population across the archipelago had expanded to several hundred thousand and a need had developed to put more land under intensive agricultural cultivation. In leeward areas, rain-fed agricultural systems were developed in the Kona, Waimea and Kohala areas of the Big Island as well as in Kaupō and Kahikinui on Maui. Along the leeward coast, pond field irrigation systems expanded significantly fed by aqueducts (*'auwai*) that formed networks of taro fields (*lo'i*). Along the coast, Hawaiians developed large fishponds, also unique to Hawai'i, for the cultivation of numerous varieties of coastal and near-shore fish. Most often fishponds were constructed along the leeward coast, with several notable exceptions, while the largest number of fishponds were found on the islands of Moloka'i and O'ahu.

Perhaps the most significant social transformation comes from the development (or perhaps modification) of the land tenure system across the archipelago, a feat ascribed to the O'ahu chief Ma'ilikukahi (Kirch 1996:6). Fornander (1973: 89, Vol. II) describes this chief as

occupying a prominent place in the history of Hawai'i as a "wise, firm, and judicious" leader. He points out that Ma'ilikukahi "caused the island to be thoroughly surveyed, and the boundaries between the different divisions of land to be definitely and permanently marked out, thus obviating future disputes between neighboring chiefs and landholders" (Ibid.). Perhaps because of the efficiency with which ali'i could manage the land and resources the land produced, the idea of ahupua'a land divisions quickly caught on. The idea was imported to Maui by Chief Ka'ulahea who, with his sons Kaka'e and Kaka'alaneo, "soon instituted a parallel land reform on Maui" (Kirch 1996:6).

The development of the ahupua'a-based land tenure system, while founded on the necessity of providing resources for a growing population, demonstrates a remarkable degree of sophistication as the lands "were divided vertically, often in units of watersheds, and horizontally, in zones of ecosystem significance" (Mueller-Dumbois 2007: 24). Mueller-Dumbois (Ibid.) goes on to point out that "the functionality of the individual zones was well understood as to their bioenvironmental potential." With the establishment of an effective and widely-adopted land tenure system, the population continued to grow while formerly unpopulated areas came under agricultural production. With the highest quality valley bottom and windward agricultural lands under cultivation, the leeward slopes and coasts also came under intensified agricultural use via the adoption and perfection of rain-fed irrigation techniques. These lands produced sweet potato as the primary crop, although numerous others were cultivated, including those formerly limited to windward areas such as banana, breadfruit, sugar cane and cultivars of taro adapted to drier conditions.

Proto-Historic Period (approximately AD 1600-1800's):

Agricultural intensifications can be thought of as both the result of and driving force behind the emergence of the highly stratified society described by Cook and other European visitors after 1788. As Kirch (1996:6) points out, this final phase, known as the Proto-Historic Period, consisted of an "elaborate, hierarchical system of chiefs, priests, occupational specialists, and common farmers and fishermen." The culmination of this stratification came in the establishment of an internationally recognized monarch, or Mo'i, Kamehameha the Great, who successfully united the archipelago (although Kaua'i and Ni'ihau are generally agreed upon to be only under Kamehameha's nominal control), thereby staving off the annexation by European and North American powers for nearly a century.

The role of the mo'i during the proto-historic phase compares favorably to other state-level societies, such as the pharaohs of Egypt or pre-Columbian Aztec society. What seems to have distinguished this phase of Hawaiian history is the association of the mo'i with the personification of divinity. As Valeri (1985: 142) points out, "that the king consecrates the supreme form of sacrifice to the supreme gods implies that he is the closest instantiation of what these gods stand for: the human species in all its aspects. It is precisely this that gives him authority over men, since it makes his actions more perfect and efficacious than theirs."

It was this form of leadership, divine at its core, which persisted through the early years of contact with the outside world. The death of Kamehameha the Great in 1819, the overthrow of the strict system of laws and regulations known as the *'aikapu* that same year, and the arrival of Congregationalist missionaries in 1820 began to slowly erode the perception of divinity of the mo'i. The monarchy survived until 1893, when Queen Lili'uokalani's government fell to a group

of foreign and national businessmen, with the support of the U.S. Navy. The United States ultimately annexed the Hawaiian Islands in 1898 with support from the provisional Republic of Hawai'i.

4.2 Traditional and Historical Accounts of Hāmākua Poko and Makawao

This section will detail accounts of Hāmākua Poko and Makawao from the pre-contact timeframe (prior to 1778 and the arrival of Captian Cook) together with more recent accounts, yet with information to specifically detail traditional Hawaiian practices and landscapes of Hāmākua Poko and Makawao that relate to traditional land division, fishing, agriuclutre, warefare, burial practices, settlement and *mele* (songs and chants). This section includes excerpts from several Hawaiian language newspapers.

The division of Maui's lands into political districts occurred during the rule of Kaka'alaneo, under the direction of his *kahuna* Kalaiha'ōhi'a (Beckwith 1970:383). This division resulted in twelve districts, or *moku,* during traditional times: Honua'ula, Kahikinui, Kaupō, Kīpahulu, Hāna, Ko'olau, Hāmākua Loa, Hāmākua Poko, Wailuku, Ka'anapali, Lāhainā and Kula. The *moku o loko*, or *moku* as it is most commonly called, literally means "to cut across, divide, and separate" (Lucas 1995:77). When used as a term of traditional land tenure, *moku* is akin to a political district, an overall land division that can contain smaller divisions of land such as *'okana, kalana, ahupua'a, 'ili,* and *mo'o* (Figure 3).

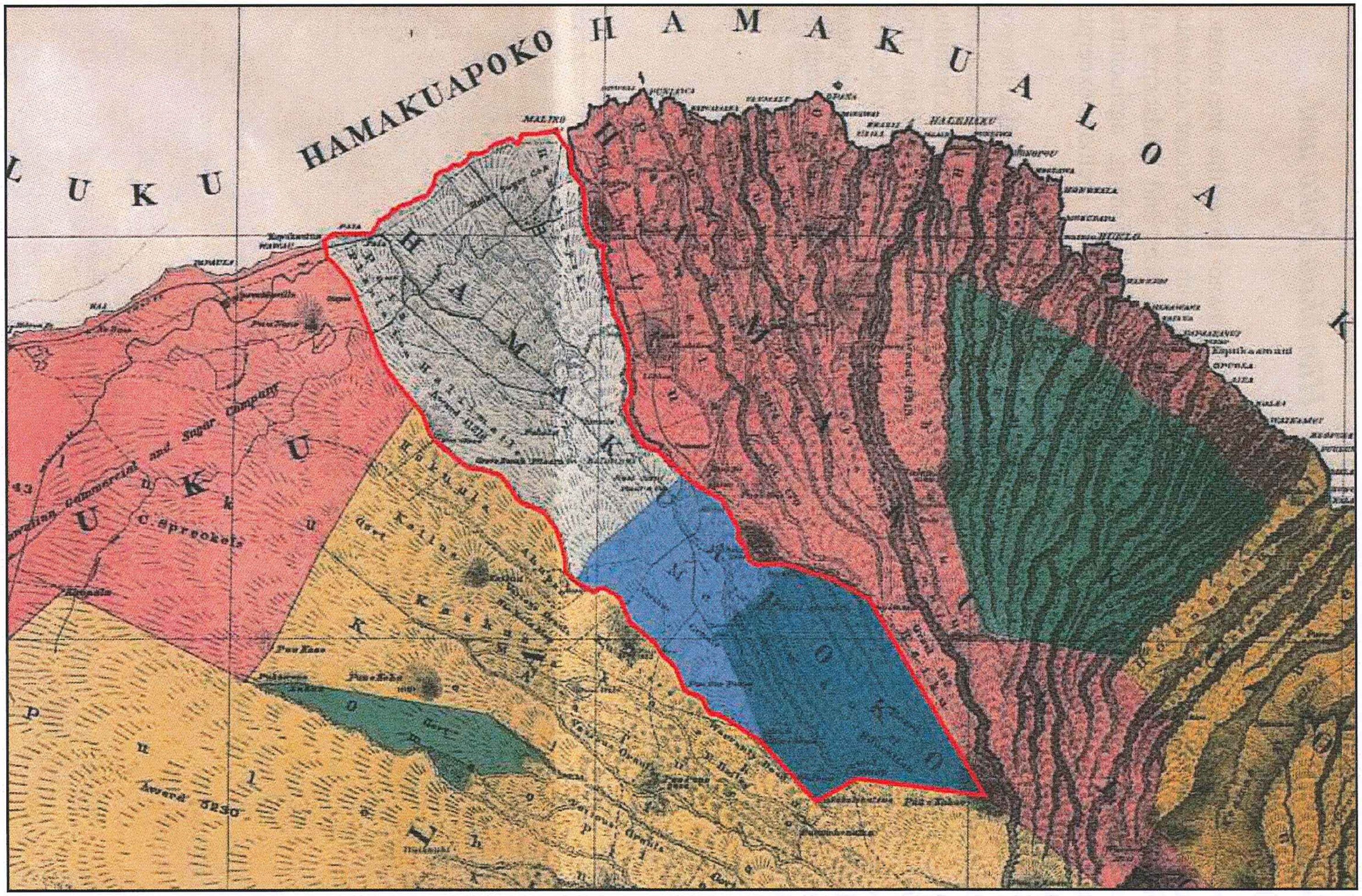

Figure 3. 1885 Hawaiian Government Survey map by F.S. Dodge showing traditional *moku* boundaries; Hāmākua Poko outlined in red and Makawao Ahupua'a colored blue.

According to the prevailing archaeological cultural sequence for the Ha'ikū-Makawao region, Native Hawaiian settlement of both the upland and shoreline portions of the Ha'ikū region and Hāmākua Poko occurred about A.D. 1400-1600. Extensive dryland cultivation was developed here in the windward uplands of Makawao, with evidence of both sweet potato cultivation and pig husbandry (Kurashima and Kirch 2011:3664). Kirch notes the importance of and emphasis on dryland agriculture on Maui, whereas *taro* irrigation was the dominant agriculture on Kaua'i, O'ahu and Moloka'i (Kirch 1984:189-190).

Fishing communities were also located at the mouths of shoreline streams. The Hāmākua area, noted for an accessible low coastline indented by several small bays, would have provided excellent opportunities for fishing and *limu* (seaweed) gathering. According to Kahā'ulelio (2006:81), spearing *he'e* (octopus) at Hāmākua Poko was done where the sea was deep and blue, a fishing zone that Mr. Leslie Kuloloio (2011) calls *pō walewale*. Kahā'ulelio goes on to recount a story of spearing for *he'e* (octopus) at Hāmākua Poko where a husband and wife battle a shark from the location in which they had caught the *he'e* to Kū'au, where the waves broke and the shark went no further (Kahā'ulelio 2006:81-82). Kuloloio (2011) notes that the fisheries of Hāmākua Poko supplied the fisheries of Wailuku through the currents and winds that cause a westward migration (Lee-Greig 2014).

4.2.1 Place Names

Hawaiian place names truly tell the story of the place, no matter how large or small; therefore, much can be learned through knowing an area's name. In Hawaiian tradition, place names offer a description of an area that may be more or less literal. Below is a table of place names within and surrounding the current focus area. Unless otherwise noted, the translations are taken from Pukui et al. (1974). An 1872 Hawaiian Government Survey map by C. J Lyons provides an illustration of where some of these places are located (Figure 4).

Table 1. Place names of Makawao *ahupua'a* and surrounding lands.

Place Name	Translation
'Alelele	Name for a portion of a gulch which feeds into the Māliko Gulch just before Kōkomo (Sterling 1998).
Hāli'imaile	*Lit.*, "*maile* vines strewn." The location of a village, an *ahupua'a* land division, and a congregational church.
Hāmākua Poko	*Lit.*, "short Hāmākua." The project area *ahupua'a,* and the *moku* land district encompassing both Hāmākua Poko and Hāli'imaile *ahupua'a.*
Huluhululi'ili'i	Huluhululi'ili'i Gulch, eastern fork of the gulch located within the project area, named in LG 65 and 68.
Kahaupali	*Lit.*, "the *hau* trees of the cliff." The region *makai* of Mauna 'olu school campus.
Kaluanui	*Lit.*, "the big pit." Given in place name chants as "standing by the twin hills, the palm houses of Kane" (Fornander 1916:286). Also, the region of the present-day Hui Noeau Visual Arts Center.

Place Name	Translation
Ka'ili'ili (Road)	*Lit.,* "the pebble." Site of a plantation village located further inland of Kōkomo.
Kailua (Gulch)	*Lit.,* "two seas." Name for the western boundary gulch of Hāmākua Poko Ahupua'a.
Kalena	*Lit.*, 'the lazy one." Name of a pool located at the foot of Pi'iholo hill (Turner 1929).
Kapalaea	*Lit.*,"the daubing with 'alaea (pala = to smear, daub; 'alaea = red, ocherous earth)." Pukui (In Sterling 1998:98) felt the reference to preparations made for dedicating a *luakini heiau* applied here. The *ahupua'a* boundary roadway was cleared of weeds, a stone altar was placed at each boundary of the *ahupua'a*, and a priest smeared with a mixture of *'alaea* and water offered a prayer and smeared the wooden image of a *pua'a* (pig's head) with the *'alaea.* The land known as Kapalaea was the site of the Haleakala ranch in Makawao (Sterling 1998:97) (Pu'u 'Alaea located *mauka* of Kapalaea at ~3200 ft. elevation).
Kōkomo	*Lit.*,"*koa* tree entrance." Sterling (1998:97) gives the original name as "Koa komo," subsequently shortened over time.
Ku'aihulumoa	*Lit.*, "butchered chicken feathers," a gulch which runs past Makawao and joins Māliko Gulch (Sterling 1998). (The gulch that runs along the southern boundary of the project area).
Kulihai	*Lit.*, Kuliha'i-Broken knee. Location in Māliko Gulch.
Maka'ehu	*Lit.*, "red eye." [irritated from dust] The region of Makawao-Kula boundary adjacent to Kapalaea (Sterling 1998:99).
Makawao	*Lit.*, "forest beginning." Name given to the town located *mauka*, in the mountainous region of the *ahupua'a.*
Māliko (Gulch/Stream)	*Lit.*, "budding." Once the site of an important coastal landing, where sugar was shipped out of the Pauwela region.
Maluhia	*Lit.*, Peaceful. Area above project area; approximate area of rodeo grounds. Name given to the Baldwin family home in Olinda.
Mauna 'olu	*Lit.*, "cool mountain." The site of Maunaolu Seminary, a school for women, established at the present site in 1900. The previous site of the school, between 1859 and 1899, was in Olinda.
Olinda	Name of Samuel T. Alexander's home here, said to have been the name of a place in Spain.
Pā'ia	*Lit.*, "noisy;" name given to the plantation town located *makai*, just inland of the northern coastline of the *ahupua'a.*

Place Name	Translation
Paholei (further *makai*)	Fornander (1918:606) states Paholei was the word used for awa (*Piper methysticum*), the intoxicating plant of Polynesia. Also, the place name in Hāli'imaile where early *paniolos* (cowboys) trained horses (Sterling 1998).
Paliuli	Located around Rainbow Park (Edward Baker to M.K. Pukui in Sterling 1998;97)
Papalanui (Papala-redup of *pala* and Pāpala, the "nui" implying a great or large Pala or Pāpala)	**Pāpala**; species of native shrubs and small trees (*Charpentiera*) belonging to the amaranth family. Fire brand. Haze, fog. Formerly on the north coast of Kauai. Hawaiians used the wood, which is light and inflammable, for fireworks throwing burning pieces from cliffs (Elbert and Pukui 1986; 318). **Papala**-redup of **pala**. 1. Ripe, mellow; yellow, as leaves; rotten, as taro corm. 7. A native fern, *Marattia douglasii*, 8. A variety of sweet potato, 9. A variety of taro (Elbert and Pukui 1986; 307). **Pāpala kēpau** (*Pisonia* sp.), Native species of trees. Lit., gum *pāpala*; the gum was used for bird catching (Elbert and Pukui 1986; 318) LG 2840 to Kekua describes the land location as being in "Papalanui Ahupua'a." Papalanui possibly an *'ili* name (see Table 4 and Figure 5).
Pi'iholo, Pu'u Pi'iholo	*Lit.*, Climb, run.
Po'okela (Church)	*Lit.*, Foremost.
Punaokeawe	Ravine named in LG 157 to McLane section in Māliko Gulch (Figure 4)
Pu'u 'Alaea	'Alaea; 1. Water-soluble colloidal ocherous earth, used for coloring salt, for medicine, for dye, and formerly in the purification ceremony called *hi'uwai*; any red coloring matter (Elbert and Pukui 1986; 17). Pu'u at ~3200 ft. elevation, *mauka* of Kapalaea (author's note)
Pu'u o Kakae	Kakae; Spry, lively, quick; to run. Kaka'e; Similar to *hakaka'*e, transparent (Elbert and Pukui 1986; 118).
'Ulalena	Noun. A reddish-hued rain associated with Ha'ikū, Maui…also a wind at Pi'iholo, Maui (Elbert and Pukui 1986; 367). Pu'u in Honopou Ahupua'a, Hāmākua Loa Moku.

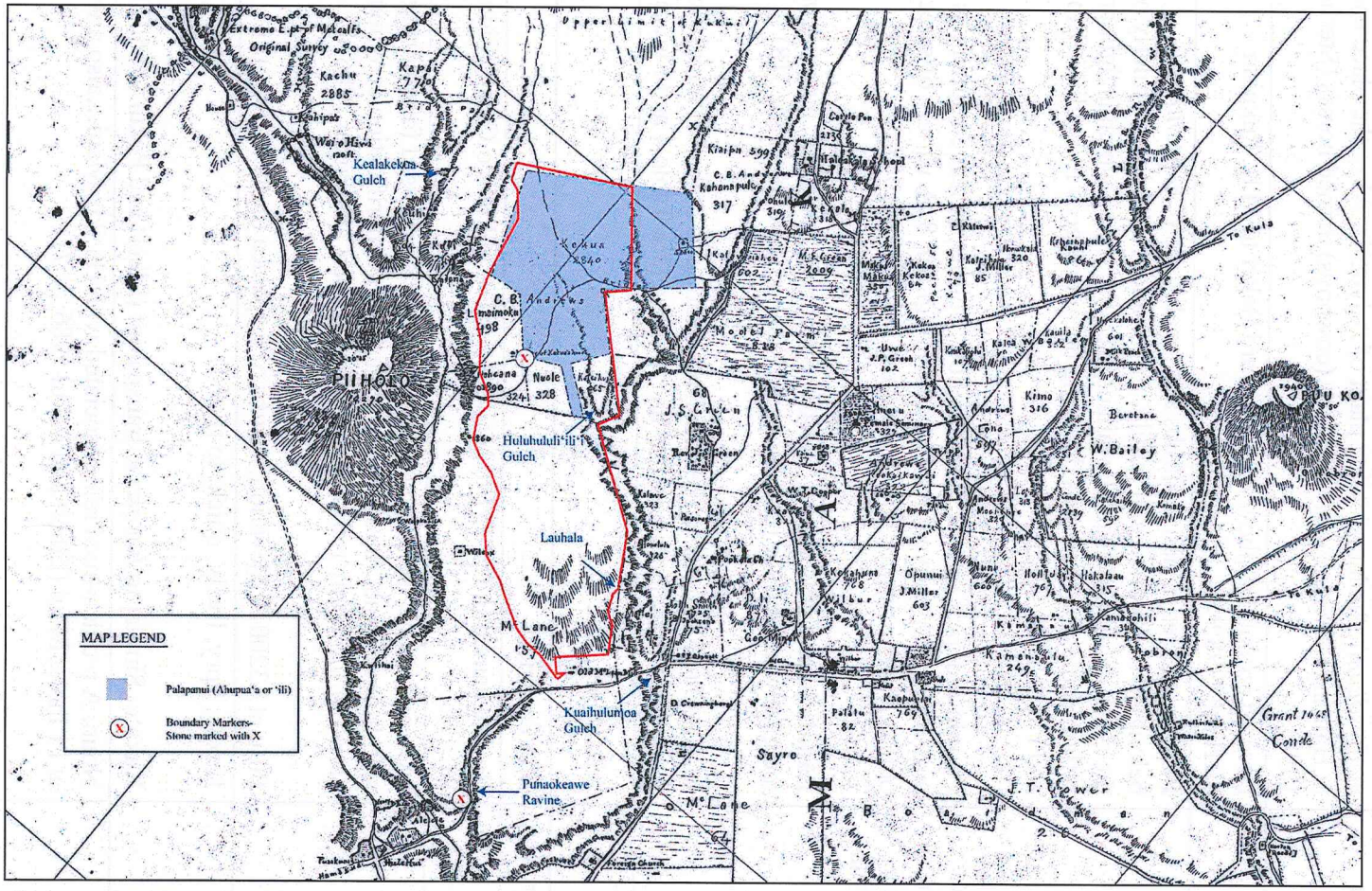

Figure 4. 1872 Hawaiian Government Survey map of Makawao by C. J. Lyons showing project area boundary in red (approximate) depicting place names.

4.2.2 Agriculture and Environmental Setting

The above place names, together with the environmental data, suggest that the lands within the upland region of Hāmākua Poko were fertile agriculturally, with ample rains. The two primary gulches that border Hāmākua Poko, Māliko and Kailua, as well as the gently sloping lands between the two, would have provided for excellent soils and water resources for traditional agricultural pursuits. Evidence of pre-contact agriculture and habitation in the upland portion of Hāmākua Poko begins within the sidewalls and valleys of the Māliko Stream, and areas less affected by widespread commercial cultivation of sugar and pineapple in historic times. According to Inez Ashdown (1970), a *heiau* named Kau-ma-ka-'ula was once found in Māliko Gulch. The *heiau* was originally associated with high chief Ka-me-ha-i-kau'a but it was later rededicated to the chief Ke-kua-o-ka-lani (Ashdown 1970:30).

The movement of people in pre-contact times between the coastal settlements and habitation areas further upland resulted in the establishment of ceremonial *heiau* structures (Kennedy 1990) along the upper reaches of the Kailua Gulch. It is between these two gulches, and entirely within this single *ahupua'a*, that an ascent can be made to the rim of Haleakalā Crater without great difficulty (Richards 1829). When the first Protestant missionaries made the ascent in 1828, they were undoubtedly guided by those who had traditionally made the climb from the isthmus many times before.

In the earliest traditions of the people of Maui, the place name of Makawao is identified with legends associated with rainfall. The place name "Makawao" translates to "forest beginning" (Pukui et al 1976), and is described as a transitionary zone into the forest by botanist Mr. Bob Hobdy (per communication May 2015). In one story, the *'ūkiukiu* rain of Makawao is measured as a soft drizzle, a phenomenon of the region that occurs when "the Kiu rain cloud of Makawao meets the Naulu rain cloud from Kula, then the rain comes, the typical Makawao rain" (Sterling 1998:99). Sterling recorded six additional words meant to differentiate the many wind and rain combinations found in the Makawao area. They include:

Makani kiu	Sharp wind, brings a tone of music that rises a semi tone
Makani kamaaina	(Of this area) calm, still wind-undisturbed, tranquil
Makani puahiohio	Whirlwind
Makani ā pa'apa'a	A wind that comes from all directions
Makani hoeha-ili	Stinging wind
Makani ho'olua	A wind that brings a rain that looks like it is standing still when seen out on the ocean [Pukui and Elbert, Hawaiian–English Dictionary, say name of strong north wind.]
'Ukiu rain	A soft drizzle (the ua kama'aina of Makawao)

(Sterling, 1998:99)

These traditional terms for the various rains of Makawao were also defined by Sam Ka'ai in an interview conducted by Cultural Surveys Hawai'i for the development of Kahakapao Loop and Waihou Springs Trail in Olinda (2003):

> Ūkiukiu is the rain proudly moving across the top of Pi'iholo... The mist rains of 'ulalena are the reddish-yellow rains, which is, the rain is falling and the light comes through from the dawn, and that is the water spirit, and it would be one of the lower manifestations of the kūohu, the cloud of Kāne's involvement—when the rain falls. You see, it's Kāne, it's the rains of Kāne falling on the forest of Haumea [a female spirit of the forest (Fornaner 1920:249)]. (Sam Ka'ai in Mann et al. 2003:44)

Māliko Gulch was known for extensive terracing that once supported dryland taro cultivation (E. S. C. Handy et al. 1991:498). An excerpt from E. S. C. Handy in *Sites of Maui* (Sterling 1998:93), describes cultivation along the Māliko Stream as:

> [Where] the deep gulch of Māliko Stream widens at its seaward end into a flat-bottomed valley which, in pre-sugar days, when the stream had a constant flow, harbored a number of terraces. The gradually rising land of Hamakuapoko in earlier times would have been suitable for dry taro but not for wet. It was probably well populated and cultivated, for the *kula* land east of Māliko was a small patchwork of *ahupua'a*.

Handy, Handy and Pukui (1991:498) also note the presence of good soil for planting sweet potatoes on the slopes between the gulches of Hāmākua. Kamakau relates the abundance of sweet potato cultivation in the area in the story of Kiha-a-Pi'ilani. Lono-a-Pi'ilani had ascended as ruler of Maui after the death of his father Pi'ilani. Kiha-a-Pi'ilani, his brother, was charitable in the community and gave them food. Lono-a-Pi'ilani became suspicious that his brother was doing this to gain favor and overtake him as ruler. The two brothers fought and eventually Kiha-a-Pi'ilani fled to Moloka'i then Lāna'i, knowing his brother's intention was to kill him. Eventually he and his wife returned to Maui and after many hardships came to live on the boundary of Kula and Makawao, in the area of Kapalaea:

> Kiha-a-Pi'ilani was befriended by a woman of the place, named La'ie, and they were made welcome by her. There they lived. Many people came there to play games and to go swimming in a pool, Waimalina. Kula and part of Makawao were waterless lands, and so this pool became a place where all enjoyed themselves and danced hulas. ...
>
> There was a famine in Kula and Makawao and the people subsisted on *laulele*, *pualele*, *popolo*, and other weeds. One night Kiha-a-Pi'ilani went to clear a patch of ferns to plant sweet potatoes, and on that same night he made a large one that would naturally require the labor of eighty men to clear. When morning came, the huge patch was noticed, an immense one indeed. The people said skeptically ... "Where will he find enough sweet-potato slips to cover the patch?" Next day Kiha-a-Pi'ilani went to Hāmākuapoko and Hāli'imaile to ask for potato slips. The natives gave him whole patches of them wherever he went. "Take a big load of the slips and the potatoes too if you want them" [they said]... Then he made a

> carrier (*'awe'awe*) of morning-glory vines, placed the bundles of slips in it, and lifted it with great strength on his back. The sunshine beat down on his back, the 'uki'ukiu breeze blew in front of him, the 'Ulalena rain added its share, and intense heat reflected from the 'ulei vines.
>
> One old man remarked to another, "There must be a chief nearby for this is the first time that a rainbow is spread before the trees." As they were speaking a man came from below with a huge load on his back, and they called to him to come into the house. He shifted his load, saw the old men, Kau-lani and his companion, let down his burden, and entered. Each of them gave him a bundle of popolo greens and sweet potato which he ate until he was satisfied. They asked, "Where are you going?" He answered, "I am returning to the boundary of Kula and Makawao." "Are you a native of the place?" they inquired. "Yes," he replied. They said, "There is not a native from Kula to Hamakua with whom we are not acquainted. You are a stranger." "Yes, I am a stranger." They said, "The god has revealed your identity. You are a chief, Kiha-a-Pi'ilani." He answered, "I am he. Conceal your knowledge of me and tell no one." (Kamakau 1992:23-24).

Other traditional references to the Makawao *ahupua'a* are made in Sterling's story of the land of Kapalaea (also called Kapala'ia) (Sterling 1998:98). Sterling states that the land known as Kapalaea extended to the Kula side of the present Haleakala Ranch Headquarters. 'Kapalai' stream extended between the ancient districts of Kula and Hāmākua Poko, in which Makawao is located. Sterling further writes, "The land of this name is comprised of at least twenty acres, for in 1858 a person by the name of Pi made an application to Ione Richardson, government land agent for Maui, for the purchase of a piece of land of the Government at Kapalaia, in Makawao. Pi, the applicant, stated that there were about twenty acres in this land. He wished to offer two dollars an acre. Richardson in turn wrote to Kamehameha V (Lot), Minister of the Interior in 1859. Richardson relayed the offer, stating, 'The piece of land which Pi made application for purchase is at Kapalaia, in Makawao, Maui. It is a remnant of Government land...'" Sterling further states, "In the Māhele, the *ahupua'a* of Makawao was designated as Government Land (Sterling 1998).

A landform which appears at the uppermost elevation of the Hāmākua Poko Ahupua'a is a cinder cone named Pu'u Alaea. The promontory name is noteworthy because *alaea* is a word of great import in the Hawaiian language. According to Fornander (1919), two separate priests, the *kualaea* priest (he who oversees the colored earth basin) and the *kahalaalaea* priest (he who is marked with colored earth) were both essential to the process of dedicating temples. In the following account, the importance of these priests becomes clear:

> After the king and the priest had come to a decision, and the day for the dedication of the temple was near, the king spoke to the kahalaalaea priest, saying: "Be prepared to go into sanctity, with your ordinances and your methods, and if it is favorable let me know." The kahalaalaea priest went into sanctity on the night of Kane, preparing and praying throughout the night; and in the morning, the day of Lono, there stood the basin of colored earth, necessary for the priest's duties; these were the essentials of the temple. And on the next day, that of Mauli, the king and a multitude of men came to hear the words of the

> kahalaalaea priest. The priest then performed the duties of his office. A certain man placed on his (the man's) head a covering of ancient human hair, a custom of his ancestors which was transmitted to him, and a duty also belonging to the temple. The priest praying meanwhile, the king reached the alaea image where the basin of colored earth stood before the priest; this being the diety with a white covering to make its impressiveness as a god more effective (Fornander 1919:8).

Fornander notes that the "Night of Kāne" referred to above, was the twenty-seventh of the lunar month; Lono the twenty-eighth, and Mauli the twenty ninth.

Further in the temple dedication ceremony, Fornander (1919) described a procession whereby the *alaea* image was used to consecrate blocks of *kukui* wood that had been carved with markings to resemble swine features for sacrifice. When the *alaea* god arrived at the place for the pig services, the *pua'a-kukui* (kukui-wood pig effigies) were prepared, and marked with red earth by the priest, who offered a prayer, and received tribute from the people in the form of pigs, foodstuffs, feathers, and cloth.

Following additional preparations for the sanctification of the temple, Fornander (1919) describes one of the most important steps:

> Then the priest who had the alaea arose and placed a hala wreath on the king, and one around the neck of the idol, and one around his own neck; this was an ordinance of the alaea priest. And then he said to the people, "Keep quiet, all of you people and all of you chiefs." He then turned to the king and said: "Listen to my prayer for you. During my supplication, if a chief interferes, he is a traitor to the land: but if a common man he shall die for your god" (Fornander 1919:16).

From these accounts, the importance of the landmark Pu'u Alaea, the highest promontory of the ahupua'a, is made known. In a similar manner, Fornander (1919) records an account of Kaluanui which attributes great significance to this region of Makawao:

> Kaluanui! Kaluanui!
>
> They stand as twin hills, the hat-palm houses
>
> Which Kane thatched;
>
> The birds are calling me from the kakio
>
> Which Kane cultivated;
>
> Tilled by Kikau of Hana
>
> During the oopu season of Waikolu
>
> I am going home to eat;
>
> Kala is the fish I will eat until satisfied,
>
> It is the fish sacred to my god; alas! (Fornander 1919:48)

In the earliest traditions of the people of Maui, the place name of Makawao is synonymous with legends associated with rainfall. In one story, the 'ūkiukiu rain of Makawao is measured as

a soft drizzle, a phenomenon of the region that occurs when "the Kiu rain cloud of Makawao meets the Naulu rain cloud from Kula then the rain comes, the typical Makawao rain" (Sterling 1998:99).

Maly translated a piece from the Hawaiian newspaper, *Nupepa Ku Okoa*, which states, "The last King of Maui was Kahekili. It is said that he was born at Hāli'imaile, Makawao. His father was Kalaniku'ihonoikamoku, and his mother was Keku'iapoiwa (the first)." This piece was written by J.W. Kaiole in 1863 (Kaiole in *Nupepa Ku Okoa*, June 20, 1863:4; Maly 2001; 28).

Documentation of the settlement patterns within Hāmākua Poko and Hāmākua Loa was made by E.S. Craighill Handy and Elizabeth Handy:

> Hamakua Poko (Short Hamakua) and Hamakua Loa (Long Hamakua) are two coastal regions where gently sloping kula [dry and open] lands intersected by small gulches come down to the sea along the northern coastline of East Maui. Maliko Stream, flowing in a gulch that widens and has a flat bottom to seaward, in pre-sugar plantation days had a considerable number of *lo'i kalo* [*lo'i kalo* are wet ponded fields maintained for the cultivation of irrigated taro (Colocasia esculenta)]. East of Maliko the number of named *ahupua'a* is evidence of habitation along this coast. Kuiaha Gulch, beyond Maliko, has a good stream and there were probably a few *lo'i*. Two kama'aina at Ke'anae said that there were small *lo'i* developments watered by Hoolawa, Waipi'o, Hanehoi, Hoalua, Kailua, and Na'ili'ilihaele Streams, all of which flow in deep gulches. Stream taro was probably planted along the watercourses well up into the higher kula land and forest taro throughout the lower forest zone. The number of very narrow ahupua'a thus utilized along the whole of the Hamakua coast indicates that there must have been a very considerable population. This would be despite the fact that it is an area of only moderate precipitation because of being too low to draw rain out of trade winds flowing down the coast from the rugged and wet northeast Ko'olau area that lies beyond. It was probably a favorable region for breadfruit, banana, sugar cane, arrowroot; and for yams and *'awa* [Piper methysticum] in the interior. The slopes between the gulches were covered with good soil, excellent for sweet potato planting. The low coast is indented by a number of small bays offering good opportunity for fishing. The *Alaloa*, or "Long-road", that went around Maui passed through Hamakua close to the shore, crossing streams where the gulches opened to the sea (E. E. S. Handy 1940:498).

4.2.3 Noted Burial Pit for People of Makawao

Specific mention of a burial pit said to have been used by the people of Makawao is made by Kamakau (in Maly 2001; 25) in his description of burial practices:

> The disposal pit of Ka'a'awa is a deep disposal pit inside the crater of Haleakala. It is on top of a lava mound in a pit *(lua)* on the north side, close to Wai'ale'ale [a swamp just outside the crater wall] and the rock that divides the lands [Pohaku Palaha, or Pohaku'oki'aina] on the eastern edge of the Ke'anae gap that opens at Ko'olau. It is a chasm, a *nupa*, or perhaps a deep pit, a *lua meki*, opened up from the foundations of the

> island by the forces of heaping lava, and may be several miles deep, with fresh or sea water at the bottom. Because of the insipid taste *('ono 'ole)* of the waters, some people have supposed that the waters of Waiu and Waipu at Kaupo have their source at this pit of Ka'a'awa, or from some [page 39] disposal pits *mauka* of Pu'umane'one'o. This pit of Ka'a'awa was like Waiuli; it was the disposal pit for the people of Makawao, Kula, and Kaupo. These pits could be visited in broad daylight because no evilly disposed people could get at the bones and take them away to work mischief. This is the character of *nupa* and *lua meki*—they are pits that mischievous people cannot get at.
>
> Burial caves, disposal pits, and caverns (*ana huna, lua huna, nupa)* were important from Hawaii to Kauai... [1968:40] (Maly 2001; 25).

4.2.4 Warfare in the Region

The earliest accounts regarding warfare are from the neighboring Hāmākua Loa *moku* and focus on warfare between Maui chiefs and the forces of Kamehameha I. These battle references also allow insight into the lives of Hawaiians in the various *ahupua'a* of the Hāmākua region. In his book *Account of the Polynesian Race*, the historian Abraham Fornander describes the warring events of the ruling chief of the Island of Hawai'i, Kalaniopu'u, after he had defeated the chiefs of Lāna'i and had sailed back to Maui, after having landed at Honokōhau for provisions:

> Then, rounding Kahaukuloa, he stood to the eastward, and landed at Hamakualoa, on Maui, where he plundered the country and committed fearful barbarities on the people, until Kahekili came to their support with his forces, and after several encounters, drove Kalaniopuu on board of his fleet.
>
> Foiled in Hamakuloa, Kalaniopuu made his next descent in the Koolau district, committing similar depredations and barbarities there. While there, he was joined by Mahihelelima the Hawaii governor of the adjoining Hana district, with a select force of warriors, and being thus enabled to rally and hold his ground against Kahekili, he again attempted the invasion of Hamakualoa, where the war was protracted, with varying success, for several months.
>
> It was during the early part of this campaign of 1778 that the English discovery ships Resolution and Discovery under the command of Captain James Cook, arrived in these islands (Fornander 1880:157).

Fornander provided additional accounts of warfare which Maui troops flee to Kokomo, along the boundary of Hāmākua Poko. During the 1790 campaign of Kamehameha I to engage the chiefs of Maui in war, Kamehameha's forces landed in Hana and describe a fortification of Kalanikupule taken by Kamehameha during an invasion:

> When Kalanikupule heard of the landing of Kamehameha at Hana, and that he was marching with his force through the Koolau district, he sent Kapakahili with the best troops he had through the Hamakua districts to meet and resist the

> progress of the invader. Of the campaign in Hamakualoa some momentos are still pointed out. The fortified position of Puukoae [Puukaae on later maps] on Hanawana, which was attacked and taken by Kamehameha, who had brought his fleet round from Hana. The hill is known as "Kapuai-o-Kamehameha", to the west of Halehaku stream, where he encamped for the night after taking Puukoae. Here his war-god *Kukailimoku* was paraded around the camp, to acertain by the usual auguries- the more or less erect position of the feathers, & - the issue of the campaign...the Maui forces were routed and fled as far as Kokomo, where a final stand was made. Fighting desperately, and with hardly a hope of retrieving the fortune of the day, Kapakahili encountered Kamehameha on the field, and with one of those single combats ensued in which the fate of the entire empire depends on the personal prowess of one or of the other of the combatants. Kapakahili was killed, the Maui men fled and dispersed, and the road to Wailuku lay open to Kamehameha (Fornander 1880:236).

4.2.5 *Mele* of Makawao (Songs and Chants)

In both historic and modern times, songs have been composed describing the environmental conditions of the Makawao and Pi'iholo areas. These *mele* provide insight into specific environmental characteristics the region was known for, such as winds, rain, temperature, ponds and vegetation. It is through these *mele* one can learn that Makawao is famous for its 'Ulalena rain and 'Ūkiukiu winds.

Mr. Keali'i Reichel is a Kumu Hula, music composer and songwriter who lives up Pi'iholo Road, within the focus area. Having lived in the area for the better part of 10 years and having drawn inspiration from this area, he titled his latest album, "*Kawaiokalena,*" for the region and the "waters of Kalena." He stated that places that are the subject of songs and chants must be worthy of such songs, and therefore it is possible that the many songs written for the area indicate that the lands of this region held a higher cultural significance. He describes Pi'iholo and the ponds of Kalena as a storied place, from which one experiences the 'Ulalena rain and the 'Ūkiukiu rain and clouds. Many of the songs presented here speak of these legendary rains and winds of Makawao. Kumu Reichel composed a *mele inoa,* or name chant, titled *A Pi'iholo*, giving a personal and poetic description of the area:

A Pi'iholo noho au ē	At Pi'iholo, I dwell
I ka welelau lima o ka makani	At the fringes of the wind
Kani ko'i kēkē ka lā'au ē	The trees resound like adze strokes
Hakuko'i kēkē i ka 'Ulalena	Thrashing in the 'Ulalena rain
No ka wai o Kalena ke aloha ē	Love enfolds the waters of Kalena
E walea i ka malu ulu kukui	To be at ease in the shade of the kukui grove
Kuilima kāua, e ke hoa ē	Let's you and I hold hands, dear friend
I ka ua 'Ūkiu o ka nahele	In the 'Ūkiu rain of the forest

Hele lua, kūlia i ka nu'u ē	In tandem, striving to the peak
Hoe mua, hoe pono i ke ala loa	Paddle on, paddle well on the long path
A he loa ka pilina kūpa'a ē	And long indeed is the enduring tie
Pili pa'a pū 'ia e ke aloha	Secured steadfastly by love
Ha'ina 'ia mai ka puana ē	May the tale be told in the refrain
No Kawaiokalena lā he inoa	A name song for Kawaiokalena
He inoa ē	A name song, indeed
He inoa no Kawaiokalena	A name song for Kawaiokalena
	(Reichel 2014)

The following anonymous *mele* is from *Ka Buke Mo'olelo O Hon. Robert William Wilikoki* (The Memoirs of Hon. Robert William Wilcox), written and edited by Thomas K. Nakanaela, published by K. H. P., Honolulu, 1890. Robert Wilcox, a second-generation missionary, was born in Kuhulu, Honuaula, Maui in 1855, and the book explains that his parents owned or leased 500 acres in Pi'iholo, Makawao, for the purpose of raising cattle. The *mele*, which speaks of the greatness of the Wilcox family, may have been penned by Wilcox himself; nonetheless, it speaks of Haleakalā and the *'Ūkiu* as a foggy rain that settles around Pi'iholo Hill, and the *Nāulu* cloud and north wind, all well know in this area:

ALANA IA NO WILIKOKI.	RISE UP, WILCOX!
Kuahiwi nani o Haleakala	*Haleakalā* is a glorious mountain
Ka Home o ka malamalama noeau,	The home of the enlightened and wise
No laila ka Ukiu, he ua Nohenohea	There belongs the *'Ūkiu*, a lovely foggy rain
Ke iho mai la e hoonani ia Piiholo.[1]	As it descends, it adorns *Pi'iholo*
Heleuluulu ke ao Naulu e paio ana	The *Nāulu* clouds agitate, contentious
Me ka makani kipi o ka Akau,	with the rebellious winds of the North
Ola na iwi o Kupuna ia oe	The ancestor's bones thrive because you
He ewe, he io, he koko no Hawaii.	Descendant, flesh, blood of Hawai'i

He lei kou e pawehi ai	You have a *lei* that does beautify
E ohu ai ka oiwi maloeloe,	Adorning the natives that stand firm
O ke aloha hiipoi a ka Lahui	Cherished love of the Nation
O ke ala ia me ke onaona.	He is chiefly and alluring
Makee au ia oe e Wilikoki	I have great affection for you, Wilcox
He Iholena oe, he Makahulu,	You are an *Iholena*, a *Makahulu*
No ke kiowai oe o ka Maemae	Yours is a fountain of purity
O ko'u makee ia, e ola oe!	This is my desire, you should thrive!
Ola oe, ola kaua, ola kakou	Thrive, heal us, salvation for all of us,
O ka I, o ka Mahi, a o ka Palena	of the great families of *'Ī*, of *Mahi*, and of *Palena*
E mau ke Ea o ka Aina i ka Pono	The life of the land endures in righteousness
E Uli e! E ola o Hawaii!! Oh *Uli*!	Hawai'i lives on!

(Nakanaela, 1890, translated by K. Robinson)

The following song, author unknown, was published in a 1929 printing of the Hawaiian Newspaper, *Ka Hoku o Hawaii*. This song again speaks of the familiar *ulalena* rain, the *kiu*, "a strong, northwesterly wind," referencing the *'Ūkiukiu* or *'Ūkiu* rain of the same area. The *nāulu* is defined as "sea breeze"; however, it is also the name of a specific rain and cloud formation of Kula:

Wai Hui Kalena[1]	The Bracing Waters of *Kalena*
Auhea wale ana hoi oe	Pay attention and listen
E ka noe lipo i ka nahele	Oh deep, dark mists of the forests
Lipolipo i ke oho o ka palai	Deep and dark in the fronds of the *palai* fern
Hoapili o ka Ulalena	Close companion of the *Ulalena*
A he kiu ka makani o ka aina	A strong, northwesterly wind (*Kiu*) is the wind of this land
Haehae ana i ka naulu	Yearning for the *Nāulu*

Kahiko i ka luna o Piiholo	Adornments above *Pi'iholo*
Haaheo i ka Ulalena	Proud in the *Ulalena*
A he aha ka hana a ka opua	And what are the clouds doing
Kahiko i ka luna o Kaala	Beautifying the tops of *Ka'ala*
A e honi mai ana ke aloha	And love touches here
E hoi maua e pili	Let us return to stay
Aole no e pakele	You cannot escape
I kahi wai huihui o Kalena	The tingling fresh waters of *Kalena*
Ia wai huihui aumeume	This contentious chilly water
Me ka rain ukiukiu	And the *'Ūkiukiu* rain

(Author unknown, *Ka Hoku o Hawaii*, 1929, translated by K. Robinson)

4.1 Immigration to Hawai'i (1778-1888)

The following sub-sections focus on the Chinese, Japanese and Portuguese immigrations to Hawaii. Thousands of individuals and families from these three immigrant groups would eventually settled in Makawao, some as entrepreneurs but most arriving as contract laborers for the growing sugar and pineapple plantations. Descendants of these first migrant workers, many of them would marry Hawaiians, Europeans and American missionaries, make up Makawao's population today. The coming together of these different ethnic groups has resulted in significant contributions to historic and current traditional cultural practices of Makawao.

Closely following the voyages of Captain Cook in the Hawaiian Islands (1778, 1779), European and American fur trading ships began to arrive in Hawai'i in the 1780s (Paratacharya 2003:1). The whaling industry began when the first whaling vessel arrived in Hawaii in, 1819, but was strongest between 1830-1870 (Kuykendall 1947:309). Hawai'i's agricultural industries began to develop and grow, yet the population of Hawaiians, and therefore the main source of labor, was in a sharp decline due to introduced foreign disease as well as emigration to the West Coast (Kuykendall 1947:328-330). As a result, the Hawaiian Kingdom enacted laws to allow for immigration specifically for the purpose of agricultural labor.

Beginning in the 1840s, the growth of the sugar industry spurred efforts to expand Hawai'i's sugar cane production under the plantation system. The need for a large, stable sugar plantation workforce led to the passage of the Masters and Servants Act of 1850, which enabled foreign indentured labor to be introduced to the Hawaiian Kingdom (Wu and Lamley 2010).

4.1.1 Chinese Immigration (1852-1896)

The first immigrants to arrive were from China and came from earlier trading ships; some settled in the Islands at this time. The further development of the sandalwood trade for the Chinese market saw American traders bringing British cotton, broadcloth and hardware to barter for sandalwood with Native Hawaiians. Kamehameha I endorsed this effort to enhance the economic status of his Kingdom, and Hawaiians were directed to the mountain forests to gather sandalwood for shipment to China. This trade continued from 1792 to about 1843 throughout the archipelago (Nordyke and Lee 1989:196), and contributed to the depletion of the sandalwood forests around Makawao, a forest cover reduction that, combined with the later introduction of non-native ungulates, reconfigured the landscape mosaic around the project area (W. D. Alexander 1889:37-53).

Some three hundred Chinese laborers arrived in 1851 and again in 1852 to bolster the declining labor force in the Hawaiian Islands. In December of 1874, the Kingdom entered into agreements with Honolulu firms to bring more Chinese into the islands. By 1876, some 1,800 more Chinese had arrived in Hawai'i; as the demand for plantation labor increased, Chinese immigrants and their families moved to the Hawaiian Islands with assistance from the Hawaiian Kingdom. Between 1852 and 1896, the population of Chinese in Hawai'i increased from 364 to 21,616, to become almost a quarter of the population of the Kingdom (Chang et al. 1988:16). The Chinese were the first of the immigrant labor groups in Hawai'i to leave the plantations and to urbanize, primarily in Honolulu (Nordyke and Lee 1989:203). Government regulations introduced between 1886 to 1892 virtually ended Chinese contract labor immigration (Nordyke and Lee 1989:196-199).

On Maui, a significant number of Chinese people lived in the Kula area, where they grew potatoes and other vegetables, since the 1840s. According to Kuykendall, the upland region of Kula produced a bounty of Irish potatoes that were carried down to the shore and taken to Lahaina, or sold directly to ships that called at Kalepolepo. Nowhere else in Hawai'i were Irish potatoes raised on the scale that they were in Kula (Kuykendall 1938:313).

The development of a Chinatown in Kula took place between the 1840s and 1890s. During this time, the majority of Kula's Chinese migrants were *Hakka* (a group that spoke with a unique accent and practiced unique traditions from the East River area of China) (Mark 1975). The Chinese who lived and worked in Kula enjoyed a healthy climate and became good friends and neighbors of the Hawaiians living there (Speakman 1978:140). Approximately 80 Chinese families moved to Kula between 1880 and 1910, and for a period of 30-40 years Kula supported a thriving community that included English and Chinese schools (Mitchell 1982:3), Christian churches, a *Hong Men* Society, general stores and dozens of farms and cattle ranches (Mark 1975:in Paratacharya, 2003).

4.1.2 Japanese Immigration (1868-1894)

Japanese immigrants were a third ethnic population that arrived in Hawai'i. Prior to the creation of formal treaties between Hawai'i and Japan, about 150 Japanese had come to Hawai'i under labor contracts. During 1871-1885, the Hawaiian Government and the Emperor of Japan negotiated conditions favorable to the Japanese to allow their emigration to Hawai'i. On February 8, 1885, The Pacific Mail steamer, *City of Tokio*, carried 943 Japanese immigrants to Honolulu. This first arrival was hailed as one of the major milestones of King Kalakaua's reign (Kuykendall 1967:165).

In June 1885, the second group of Japanese arrived in Honolulu—930 men, 34 women and 14 children. Both governments quickly realized Japanese translators would also been needed in Hawai'i to act as interpreters, along with Japanese physicians and inspectors. In 1886, because the Japanese government confirmed that agreements in place were successfully "safeguard the rights and interests of the Japanese in Hawai'i", they signed the Convention of 1886. Under this convention, all Japanese emigrants to Hawai'i were required to have a labor contract in place which did not exceed three years (Kuykendall 1967; 170). Immigration from Japan continued through 1894; after this time, the original convention terms became too expensive and the Hawaiian government began to renegotiate the conditions. As of December 31, 1894, there were 20,271 Japanese living in Hawai'i (Kuykendall 1967; 171-172).

4.1.3 Portuguese Immigration (1872-1888)

The first individuals of Portuguese ethnicity arrived in Hawai'i during the Whaling Era (1830-1870). As experienced watermen, these first arrivals had likely taken crew on whaling vessels and, for reasons of their own, decided to stay in Hawai'i (Marques in Freitas 1930; 151 and Kuykendall 1967; 123). In 1872, 395 individuals of Portuguese nationality were recorded to be living in Hawai'i (Thrum 1903; 34). This initial Portuguese population was noted as being exceptionally industrious, finding work on plantations and ranches and as farmers and dairyman.

As a result of the expansion of sugar and rice production, in 1876 the Kingdom of Hawai'i's Bureau of Immigration began a program to recruit individuals from the Portuguese islands of Madeira and the Azores for employment with the sugar plantations (Kuykendall 1967; 122). By

1878, the Bureau of Immigration, with Dr. William Hillebrand the commissioner in charge, had made all arrangements and received the first immigrants. The first individuals from Madeira arrived on the German bark *Priscilla* and included 60 men, 22 women and 38 children (Kuykendall 1967; 122-124). The second group arrived in Honolulu aboard the *Ravenscrag* on August 25, 1879, carrying 419 passengers. Over the next 10 years and concluding in 1888, 17 ships carrying over 11,057 Portuguese immigrants arrived in the Hawaiian Islands (Kuykendall 1967; 124). As immigration opportunities emerged from Japan, the Portuguese immigration program, which was very expensive due to the distance between the Portuguese islands and Hawai'i, was ended (Kuykendall 1967; 126).

The Portuguese continued to immigrate to Hawai'i for another 10 years, until 1898, independently and in lesser numbers, with nearly one-half continuing on to California in search of higher wages (Marques in Freitas 1930; 151). By the turn of the century, 1900, there were 18,000 Portuguese living in the Islands (Kuykendall 1967; 116), and the population that remained transitioned from exclusively field labor positions on the sugar plantations to higher paid positions as "lunas" (supervisors), teamsters and mechanics (Marques in Freitas 1930; 151). The second generation of Portuguese later established themselves as livestock men and cowboys, taking work at some of Maui's earliest stockyards. Families such as the DeRegos and Freitias', the Amorals, Venturas, Caires, DeCoites and Medeiros' worked at Grove Ranch and Haleakala Ranch—lands located in the current focus area (Harrisson 2013; 101-112). As they became rooted in these professions, a segment of the Portuguese population settled in Makawao and became landowners there. They started the St. Joseph's Catholic Church and School, which became a central part of the Makawao community.

4.2 Mid-To-Late 1800s

The following sections present information regarding pivotal events in Hawaiian history that have shaped land ownership, the economy, the physical environment, and the overall character of modern-day Makawao. The Māhele Aina, or, the introducing the foreign concept of private land ownership takes place during this time. Protestant missionaries become more deeply established and the following sections illustrate how missionaries become intertwined in Hawaiian politics influencing chiefly decision making in such areas as land ownership, the establishment of education centers, the sugar industry and the growing cattle ranching industry.

4.2.1 The Māhele Aina of 1848

The most significant change in land-use patterns and land allocation came with the Great Māhele of 1848 and the privatization of land in Hawai'i. This action hastened the shift of the Hawaiian economy from subsistence-based to market-based. During the Māhele, all of the lands in the Kingdom of Hawai'i were divided between *mō'ī* (king), *ali'i* (chiefs), *konohiki* (resident overseers of an *ahupua'a*), and *maka'āinana* (tenants of the land), which allowed the land to pass into the Western land tenure model of private ownership.

On March 8, 1848, Kauikeaouli (Kamehameha III) further divided his personal holdings into lands he would retain as private holdings and parcels he would give to the government. This act paved the way for government land sales to foreigners. With the exception of land sales offered by the Kingdom in 1845 at Makawao and at Mānoa, O'ahu, the legislature granted resident

aliens the right to acquire fee simple land rights in 1850 (Riley Roore Moffat and Gary L. Fitzpatrick 1995:41-51).

Under the terms of the Māhele, Native Hawaiians who desired to claim the lands on which they resided and cultivated were required to present testimony before the Board of Commissioners to Quiet Land Titles. Upon acceptance of a claim, the Board granted a Land Commission Award (LCA) to the individual. The awardee was then required to pay in cash an amount equal to one-third of the total land value or to pay in unused land. Following this payment, a Royal Patent was issued that gave full title of ownership to the tenant. In this way, the government of Hawai'i offered land for sale to both Native Hawaiians and foreigners. Such lands were referred to as Royal Patent Grants or as Grants (William DeWitt Alexander 1890:116-117).

Prior to the 1848 Māhele, approximately 80 tracts of land were offered for sale in fee simple by way of Land Grant Patents in the Makawao region of Hāmākua Poko. Most parcels were purchased in 1845 and 1846 from the Kingdom for one dollar per acre (Donham 1990). A map prepared in 1847 by Theophilus Metcalf shows that land in the region of the current project area was originally sold in parcels of almost 20 acres each, and were purchased as Land Grant Patents (see Table 2) (Waihona 'Aina 2000). The lands outlined in the Metcalf (1847) map were among the first parcels in the Islands to be sold to individuals(Riley Roore Moffat and Gary L. Fitzpatrick 1995:72). Missionaries Richard Armstrong (surveyor) and Reverend Jonathan Smith Green (agent for Kamehameha III) assisted in recording the land sales and establishing boundaries. The concentration of the Land Grant Patents, the acreage involved and the predominance of Native Hawaiian purchasers indicate that Native Hawaiians living within the *ahupua'a* of Makawao wanted to purchase land in fee simple (Waihona 'Aina 2002). Exempt from this sale were two parcels totaling 688.94 acres, which had been granted in the 1830s to the McLane Sugar Plantation. A portion of the McLane lands make up the current project area (see Figure 5).

There is some question as to the formal land designation of Makawao and Hāmākua Poko through history. Makawao has been referenced as both an *ahupua'a* and a *moku.* It is believed that this land designation status has changed through time, possibly a result of Makawao lands being singled out during the experimental sale of the area prior to the Māhele. Additionally, Hāmākua Poko is the only east Maui *moku* in which the highest point does not meet Pōhaku Pālaha, the flat rock along the ridgetop of Haleakalā. Maly (2001; 299-304) explains that Makawao is land-bound meaning it has no point that reaches the ocean.

Makawao's boundaries are as follows: its *mauka* extent is Pu'u Ka'ka'e, its northeastern boundary is Māliko Gulch, its southwestern boundary is Laniwai or Kailua Gulch, and its *makai* boundary is Hāli'imaile (Maly 2001; 304). Maly refers to articles from the publication *The Polynesian*, as well as letters written by King Kamehameha III, G.P. Judd, and Rev. Jonathan Green, where Makawao is indeed identified as a separate "district" (Maly 2001; 299-304). Others, describe both Hāli'imaile and Makawao as *ahupua'a* within Hāmākua Poko District (*moku*), a land designation they describe as remaining intact until further boundary designations were made in 1909 resulting from another reorganization of land boundaries from Act 84 of the Session Laws (Maly 2001;303)

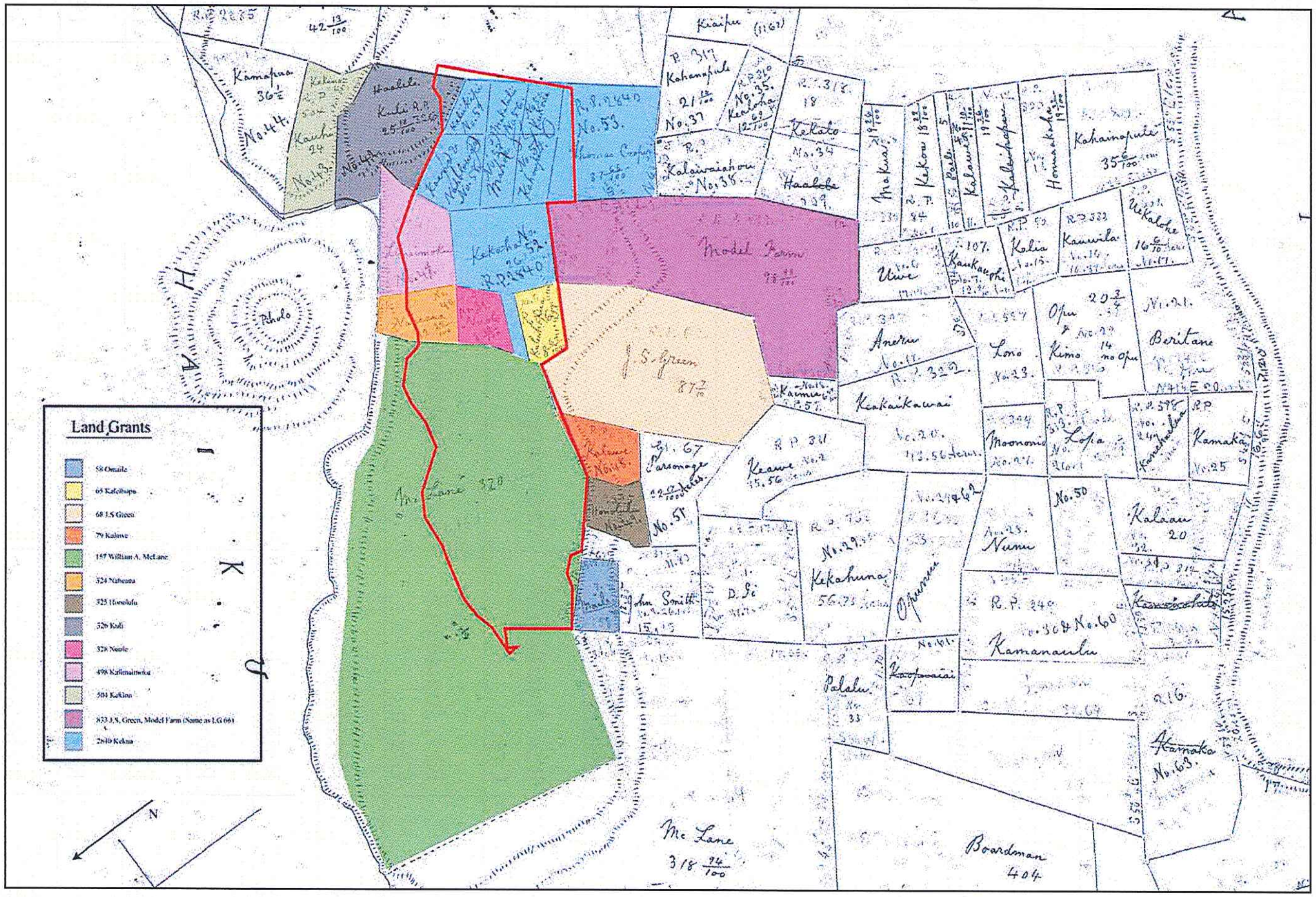

Figure 5. Metcalf's Makawao Map 1847, showing project area boundary in red and Land Grants of the region.

Table 2. Overall Land Grants Patents in Makawao Ahupua'a

LCA	Land Grant Number	Claimant	Comments	Acreage
		C.B. Andrews	Church	
		S. Moo		
		Kamaka		
	56	Paele		2.93
	57	Kaimu		6.48
	58	Omaile/Maile	Lauhala (*Pandanus tectorius*) described at the eastern corner of the property boundary, adjacent to current project area	2.89
	64	McLane		318.94
	65	Kaleihonu/ Kaleihopu		8.62
	67	Rev. Jonathan S. Green	Parsonage	22.17
	68	Rev. Jonathan S. Green	Farm/Plantation lot	87.07
	75	Kekahuna		26.14
	79	Kalawe		11.10
	82	Pololu		3.00
	84	Kekoa		18.22
	85	Kilaweau		19.79
	86	Kahainapule		35.06
	87	Daniel Ii		39.78

LCA	Land Grant Number	Claimant	Comments	Acreage
	90	Kalia		13.11
	102	Uwe		17.74
	107	Kaukauohi		12.90
	157	McLane	Majority of current project area	370.00
	216	John T. Gower/Boardman		404.00
	249	Kamanaulu		50.00
	313	Kalopa/Lopa		10.00
	314	Kamanohili		10.75
	315	Hakalaau/Kalaau		21.00
	316	Kimo		20.80
	317	Kahanapule		21.50
	318	Kekalo		18.00
	319	Kealoha		12.69
	320	Honuaakaha		19.22
	321	Keawe		35.56
	322	Keakaikawai		43.56
	323	Kalawe		11.83
	324	Naheana		2.69
	325	Honolulu	Mentions "*Akoko* tree" (*Euphorbia celastroides var. lorifolia*) and several landmarks noted as/by *koa* (*Acacia koa*) stumps, *koa* trees and a "clump of *koa* trees."	11.19

LCA	Land Grant Number	Claimant	Comments	Acreage
	326	Kuli	*Koa* trees and *kukui* trees noted as boundary markers.	13.00
	327	Aneru	Female Seminary	24.61
	328	Nuole	Ditch on property	2.88
	329	Moononio		13.40
	330	Makua		19.26
	331	Opu		2.49
	332	Kawila		16.39
	498	Limaimoku (Kalimaimoku)		23.35
	499	Kaaea		8.00
	504	Kekino		24.00
	597	Lono		22.74
	598	Ieremia/ Kanekailua		14.77
	599	Kiaipu		11.62
	600	Nunu		24.42
	601	Uekalohe	Dairy	16.60
	602	Kalawaiahou		21.18
	603	Opunui		2.75
	767	Richard Holliday		18.34
	768	Kekahuna		56.75

LCA	Land Grant Number	Claimant	Comments	Acreage
	769	Naheana		2.79
	770	Kapai		151.00
	833	Rev. Jonathan S. Green /Model Farm	Same as Grant 66.	98.93
	1725	John Smith		15.75
	1817	Kupaiuli		10.66
	2008	Danela Ii	Site of Po'okela Church, almost the same as LG 87	38.78
	2009	Mary E. Green		24.97
	2130		Haleakala School	
	2285	Kauwe		33.00
	2472	Ihu		38.60
	2639	Daniel T. Conde		16.77
	2840	Kekua		110.54
	2885	Kauwe	Haiku? Makawao?	33.00
	3084	Jas. Makee	Portion of Laniwai (Makawao and Kula)	506
	4937	H.P. Baldwin	Portion of Olinda	70.50
	7945	Costa/De Costa	Haleakala Homesteads, Originally to Kamapua	
11216		Miriam Kekauonohi	Hāli'imaile Plantation, (Royal Patent 7512)	4,260

The tables below represent only those Land Grants located within and immediately adjacent to the current project area.

Table 3. Land Grants within Current Project Area Boundary

Land Grant No.	Claimant	Comments (see Appendix E for complete Land Grant document)	Acreage
65	Kaleihopu	This grant appears to straddle the eastern branch of a small gulch located within the current project area. In the boundary description, this eastern tributary is referred to as "Huluhululi'ili'i Gulch"	8.62
157	McLean, William A.	Boundary description referrs to "a rock marked X on the east side of Punaokawe Ravine [approximate location of 'Alelele stream] at the west corner of this land."	370
324	Naehana	Mentions the "deep gulch" here as being the boundary between "Makawao nei" and Haiku. Also mentions "old ditch."	2.69
328	Nuole	Describes "old ditch" at north corner of this land.	2.88
498	Kalimaimoku	Describes northeastern boundary as the "...*koa* tree area on the edge of the cliff..."	23.35
2840	Kekua	This grant describes it as being in "Papalanui Ahupua'a." Papalanui possibly an *'ili* name.	110.54

Table 4. Land Grants Immediately Adjacent to Project Area

Land Grant No.	Claimant	Comments	Acreage
58	Omaile/Maile	**Lauhala (*Pandanus tectorius*) described at the eastern corner of the property boundary, adjacent to current project area**	2.89
68	Jonathan S.	Shared boundary in Huluhululi'ili'i Gulch, *kukui* tree as	87.07

	Green	boundary marker, also mentions Manawainui Gulch (aka Ku'aihulumoa Gulch).	
79	Kalawe		11.10
325	Honolulu	Mentions "*Akoko* tree" (*Euphorbia celastroides var. lorifolia*) and several landmarks noted as/by *koa* (*Acacia koa*) stumps, *koa* trees and a "clump of *koa* trees"; mentions Manawainui Gulch (aka Ku'aihulumoa Gulch).	11.19
326	Kuli	*Koa* trees and *kukui* trees noted as boundary markers.	13.00
504	Kekino/Kauhi	Boundary description refers to Kealakeakua Gulch, *mauka* and northeast of the project area.	24.00
833	Jonathan S. Green	Same as LG 66 "Model Farm"	98.93

As evidenced above in Tables 1, 2 and 3, a great many Hawaiians lived in Makawao and purchased these lands during the experimental sale of 1848. Both the Metcalf (1847) and the Lyons (1872) survey maps are relied on heavily for this study. Over the course of the next 40 years and for reasons unknown, Hawaiians mortgaged and sold their lands (Maui News 1928, letter by Laura Green).

The boundary descriptions in the Land Grant (LG) records listed above in Table 2 and Table 3 (Appendix E) describe vegetation, place names and land features that provide some evidence of the natural environment during that time. The LG boundaries discussed below are only those that fall within and immediately adjacent to the current project area (see Figure 5).

Many boundary descriptions, such as that of Grant 65 to Kaleihopu (located in the southern and *mauka* section of the project area), describe a "large *kukui* tree" as a boundary marker. Grants 65 and 68 to Jonathan S. Green, 324 to Naheana, and 326 to Kuli all illustrate *kukui* trees (*Aleurites moluccana*) as points in their boundary descriptions. Koa is also referenced as a boundary marker. Land Grants 325 to Honolulu and 326 to Kuli describe *koa* trees (*Acacia koa*) and a *koa* stump (possible evidence of logging) in their boundary descriptions, whereas Grant 325 notes a "clump of *koa* trees" or a *koa* grove, near the property's western boundary marker. *Lauhala* is described in LG 58 to Omaile as being located on "McLane and Miners old land." This is notable as "*lauhala*" refers to the leaves of the *hala* tree, traditionally used for weaving and in the manufacturing of mats and other textiles. Generally, the trees or a grove would be referred to as a "*hala* tree" or "*hala* grove." The term *lauhala* used here, coupled with Makawao's location at a higher elevation than *hala* typically grow, imply this tree was intentionally brought to Makawao and planted for the purpose of making goods.

An "old ditch" is described as being near the northern corner of Nuole's land, Grant 328, which is now part of the current project area; water tanks are also mentioned in several descriptions. The boundary descriptions also speak of gulches that exist in the project area today; these gulch names include "Huluhululi'ili'i" (LG 65 and 68), "Manawainui" (LG 68 and 325), "Punaokeawe" (spring of Keawe) (LG 157), and "Alua Gulch" (LG 2840). It appears that the gulch that forms the southern boundary of the project area was referred to by two names:

Ku'aihulumoa and Manawainui. These were possibly different names for different points in this gulch, or the name Manawainui was used as a more generic term in reference to any large gulch with lots of water (there are Manawainui Gulches in Kahikinui and Kaupo), or it was simply known by these varying names. At its eastern end, Ku'aihulumoa Gulch splits and the northeastern branch was called Huluhululi'ili'i. A ravine called Punaokeawe was described as being the westernmost boundary point for LG 157 to McLean. This location is in what we know as Māliko Gulch today. Alua Gulch is further east, near Kahakapao Stream.

Land Grant 2840 makes up virtually one-third of the project area and is described as being in an area called "Papalanui." Although described as an "*ahupua'a*" in the LG, Papalanui might have been the name of the *'ili*, a subdivision of the *ahupua'a*, located here. There are three definitions of the word Papalanui given in Table 1. Two of them refer to a tree/shrub species, one of which bird catchers used the sap from for catching birds. Another definition refers to a yellowing or ripening quality or a fern and *kalo* variety.

These boundary descriptions illustrate that project area lands were home to a substantial native Hawaiian population, many of whom were motivated to purchase land. They show that the lands contained *kukui*, *hala* and *koa* trees and included waterways, both natural and constructed. The existence of water tanks provides evidence of water collection and mention of an "old ditch" implies that water was diverted and transported, feeding other localities.

Moffat and Fitzpatrick (1995:73) note that the pattern of properties sold in Makawao in the 1848 experimental land sale, and specifically their configuration with regards to stream patterns, did not correspond with the traditional *kuleana* land model, where parcels are smaller and conform to the geography of the land. Although there are references to roads in the boundary descriptions, Moffatt and Fitzpatrick (1995:73) note the lack of visible roadways or other access ways on early maps.

4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao via Missionary Reports, Hawaiian Language Newspapers and other Early Publications

Written letters and publications provide important documentation of the landscape, agriculture and social climate during the mid-19th century. Key documents include letters written by missionaries of the American Board of Commissioners for Foreign Missions (ABCFM) when reporting back to their headquarters. Both Hawaiian-language and English-language newspapers, such as *The Polynesian*, also provide important source material and include articles with descriptive accounts of various aspects of life during this time, including education. Excerpts related specifically to Makawao and the greater focus areas are presented below.

The Protestant missionary Jonathan Smith Green is a central and pivotal figure in the history of Makawao. His letters provide insight to the social, political and environmental climate of Makawao around the time of the *māhele*. Rev. Green arrived in the Islands in 1828 with the third group of missionaries sent by the ABCFM. Rev. Green was stationed at the Wailuku mission house (currently the Bailey House Museum) where he spent 11 years acting as pastor, preacher, teacher and doctor, and launching the Wailuku Female Seminary. After 14 years with the ABCFM, Rev. Green decided to disconnect himself from the group as his abolitionist views conflicted with the Boards tolerance towards slavery (Whitney 1968).

At the invitation of a district chief named Kiha (Laura Green 1948), Rev. Green established a church for Hawaiians at Makawao called the Po'okela Independent Church (Section 4.2.3.1 The Po'okela Independent Protestant Church), today less than one mile from the project area. Kamehameha III donated land and materials for the church, hereby introducing Christianity to the Makawao population. In 1845, when the Kingdom of Hawai'i announced that 900 acres of land in Makawao would be made available for fee simple purchase, Rev. Green became an agent for the Kingdom and collected monies due the government (Donham 1990). Lands originally granted to Rev. Green are located adjacent to the project area. Rev. Green referred to his home in Makawao as "Mount Pleasant". It is noteworthy to highlight the fact that one of the largest parcels in Makawao, measuring 98.93 acres (Royal Patent/Land Grant 833) and titled "Model Farm" on two separate land survey maps dated 1847 and 1872 (Metcalf and Lyons) was awarded to Rev. Green. Other Makawao lands awarded to Green included an 87.7-acre parcel (Land Grant 68) northeast and adjacent to the lands of the Po'okela Church, as well as parsonage lands including the Po'okela Church itself (Land Grant 67: 22.07 Acres) (Moffat and Fitzpatrick 1995).

4.2.2.1 Education in Makawao 1832

In an 1832 journal entry, Rev. Green makes the following observations on the advance of public education in the region of Makawao:

> September 22, 1832
>
> I have spent the greater part of this week examining schools. Rode to Kalepolepa (sic), about eight miles distant [from the Wailuku station], on Monday, examined the schools of Kula, preached a lecture, and returned the same day. Tuesday, rode to Maliko, eight or ten miles, examined the schools of Hamakualoa, and staid [sic] one night. Wednesday, rode homeward. On my way examined the schools of Hamakuapoko, and Halimaili, preached a lecture and returned. Thursday, examined the schools of Wailuku. Yesterday visited the neighboring villages and made arrangements for the better conducting of schools. I examined only those who could read, and found 1,463 (American Board of Commissioners for Foreign Missions 1832: 238).

Another excerpt from the Hawaiian Newspaper, *Ka Lama Hawaii* (1834) notes the following regarding the new education system:

> REGARDING THE SCHOOLS OF EAST MAUI
>
> In the month of August, just this past year, one of the missionaries of Wailuku traveled throughout East Maui. The reason for this journey - to examine all of the schools; to marry those betrothed - and to speak the blessed words of Jesus to the impoverished. During that congregational convention, a count of only the educated was obtained. Here's a table that elucidates the educated people in East Maui:

	Men	Women
Hamakuapoko	30	24

Hamakualoa	97	109
Koolau	137	154
Hana	187	153
Kipahulu	125	144
Kaupo	195	203
Kahikinui	26	32
Honuaula	140	142
Kula	103	104
Makawao	27	24
Kalepolepo	18	15
Haliimaile	38	29
Total	1,117	1,138

Here are the educated people accounted for here in Wailuku at this time.

	Men	Women
Waikapu	170	155
Waikapu	84	54
Napoko	31	29
Waihee	20	21
Waiehu	53	61
[Total]	311	323

All of them combined demonstrates 2884 educated students.

Here's what disturbed the Missionaries' thoughts as they traveled around the island; children were not observed. There were many children from place to place, but they did not study the scriptures (literature) and they were not enrolled in school! I think the ignorance of these lands hasn't been eliminated and illiteracy has not ceased and children should be educated. Who's fault is it that they do not attend school? I think it is right for the rulers, the teachers, and the parents to constantly encourage and direct all the children of these lands towards literature, and they will all learn reading. Then damage to our lands will be limited.

> Regards to you, Andrew, and your students. Continue to reflect upon the things that will enrich our schools (Unknown author, *Ka Lama Hawaii*, 1834).

During this period in Hawai'i's history, the Hawaiian culture and its oral tradition was beginning to shift under the influence of Christian missionaries. As a part of their work, missionaries such as Rev. Green were charged with teaching the population to read and write. The numbers illustrated above likely represent only those individuals who were literate.

4.2.2.2 Agriculture in Makawao 1850s

In a letter dated May 11, 1846 Rev. Green describes his current living conditions in Makawao since moving there in 1843:

> ... '[W]e have lacked nothing'...Scarcely nothing for our table have we obtained by foreign sources, from the simple fact that nothing have we needed. ...I will mention some of our comforts, that you may bless God on our behalf who has inclined the hearts of our people to afford us so much substantial aid. Our wheat, corn, potatoes, our friends from Kula supply. The last year we had more wheat than usual. Kalo, sweet potatoes, pia [arrowroot], and other articles, are suppied from Hamakua. We had also from various parts of the field, banana or plantain, melons, squash, onions, and cabbage; fowls, turkeys, eggs, &c. Goats are abundant, and the people would gladly furnish us with meat from their flocks. We however, seldom taste goats' flesh. We fatten our own pork, and make our own butter. We hope soon to obtain beef from our growing heards. These are the productions of our field and from these our wants have been abundantly, promptly, and we believe cheerfully supplied.
>
> During the year we made an addition to our house. The people furnished us such assistance as they were able. They collected stone for the foundation of the building, and assisted in laying them. The timber they collected two years ago. Two sides of the house, and the roof, were covered with native material. This they furnished, and thatched the house. In addition to this, they have recently paid me some two hundred and ten dollars in money. This has enabled me to pay for the building of the house, which is a cheap one (Green 1846).

After the collapse of the potato boom of 1849-1851, Rev. Green became a pioneer wheat farmer and encouraged others in the Makawao region to expand their acreage for wheat production. Rev. Green grew wheat on his property as well as oats, figs, peaches and orange trees; this property was located in Makawao adjacent to the current project area. An article from the *Maui News* (1928) written by his daughter, Laura Green, quotes Rev. Green describing his introduction to cultivating wheat on Maui:

> From a letter written to the Royal Hawaiian Agricultural Society, I have gleaned the following notes, 1852. 'In or near 1835 while living at Wailuku, a native from Kula came to me one day with a Hingham box and removing the cover, he asked me to see and tell him what he had there. I

> looked into his box, and great was my pleasure on seeing some two quarts of fine looking wheat which he had raised. I told him its name and value; purchased it, and charged him to sow again, and to tell his neighbors that they, too, might cultivate it.' ...
>
> ...He told of seeing it planted in small patches at first, and how difficult it was to obtain seed in Kula that he might experiment with it in Wailuku. 'All I could find was a small quantity, say about a peck, which enclosed in a strong cloth was used as an u-luna or Hawaiian Pillow.' ... 'When in February, 1843, I removed to Makawao, the pledge having been given me by the people, of a support, so far as anything they could produce from the soil was concerned, I told the Kula people that I should need ten bushels of their good wheat for my family use. This they furnished for two of three years. I soon found, however, that the raising, or rather the cleaning of wheat was a costly service. The grain they rubbed out on rough lava stones and the chaff they blew off with the mouth. As they could earn much more by cultivation the Irish potato...I concluded to try the experiment of wheat growing at Makawao. I planted in drills about one acre, and though I lost some of it by the wind throwing it down, and by the rats, yet I gathered twenty-seven bushels of excellent quality. ...
>
> 'In the winter of 1846 some eight or ten of my neighbors living near the boarders of Makawao, united in planting a field which they called Palaoa Mahina Hou, or Monthly Concert Wheat, being planted and tended on a portions of the first Monday of the month, the proceeds of which were devoted to benevolent objects' (Rev. Green, quoted by daughter Laura Green in the Maui News 1928).

In the November 23, 1844 issue of *The Polynesian*, Rev. Green gives a report on the state of wheat production in Kula and Makawao. His report details important information regarding land use at the time, not only describing the lands in wheat cultivation but also noting traditional Hawaiian activities of the time, including canoe building in the higher elevations and the cultivation of sweet potato, banana and dry land taro in Makawao and Hāli'imaile:

> You will please bear in mind that the experiment of raising wheat on East Maui, has been made to a very limited extent only. One or two konohiki's have cultivated small fields for government, raising annually from five to ten bushels; but this they have not done for the last two years. Besides this, I do not think that twenty individuals have raised wheat in Kula. ...I will however speak of lands capable of being sown to wheat, and some portions of which, I doubt would produce plentifully. 1st. there is a strip or belt of land of from *two* to *four* miles in width [approximately] gradually ascending and terminating at the base of Haleakala, the high mountain of East Maui. The upper part of this belt is, I presume, in the region of frost, it being 4,000 feet or more above the level of the sea. This land is higher up the mountain than the land occupied by the people, only now and then a house being seen, and these occupied temporarily by canoe makers. This

> belt of land extents from Makawao, say from Mr. McLane's sugar plantation to Honuaula, some fifteen miles I should judge. 2d. The land below the belt above described, among the habitations of natives, and where they cultivate the sweet potato, banana and sometimes dry kalo, is capable, much of it, of being cultivated with wheat. Nearly all the wheat that has been raised was produced here. ...

Rev. Green continues with additional descriptions of the land and vegetation:

> ...On the upper belt, near the base of Haleakala, the land is covered with long coarse grass, ohelo bushes and strawberry vines. Now and then may be seen a tree of considerable size, and clumps of young koa are frequently met with; but on the whole there is a destitution of timber (Green 1844)

Rev. Green also mentions native Hawaiian attitudes towards growing wheat:

> You are aware that the natives of the island do not wish it [wheat] for their own consumption. They might be taught to love it...They do not need nor do they desire, the change from their favorite "*fish and poi*" to wheaten bread (Green 1844).

Rev. Green explains that raising the Irish potato (mainly in Kula and Honuaula) was more profitable than wheat (Green 1844). Speaking more to the climate of Kula and Honuaula of the water resources to run a mill, and of the Peelua caterpillar, Rev. Green responds:

> No, nothing of the kind [water driven mill], from Makawao to Honuaula. Scarcely water enough in Kula to save the cattle, which would be needed to cultivate the land, from dying. Water is the great desideratum in this part of the islands...I will however add, that vegetation in the whole region of Kula is frequently injured, and sometimes wholly destroyed by the Peelua, or worm of the caterpillar species, and no means of ridding the country of this destructive insect have been discovered. Its ravages often cause a famine. The drought too is often severe (Green 1844).

4.2.2.3 Experimental Land Sale in Makawao 1847

The cultural divide between the western concept of land ownership and the Hawaiian concept of *kuleana*, or responsibility, is touched on in the following experts from Rev. Green. Western missionaries believed that fee simple land ownership was superior, as it cultivated productivity and wealth—a foreign concept very much at odds with the traditional Hawaiian land tenure system based on subsistence farming and fishing. The implication from these excerpts is that Hawaiians were "listless" and that owning their lands would motivate them to be more productive:

> ...I am happy to say to my friends of the United States, that Makawao, the small district on which we are living, is for sale, and some 700 acres have been purchased by the people. I hope to see a change among my neighbors, now that they are becoming landowners (Green 1846).

As quoted by Moffat and Fitzpatrick from the September 26, 1846 issue of *The Polynesian*, Rev. Green writes:

> The district is offered for sale as an experiment on the people—as an incitement to awaken industry and thrift—as a test to the question—'Can the common people of Hawai'i be induced to abandon their listless, improvident habits, and acquire and maintain habits of enterprise and frugality, such as distinguish the common working population of England and the U. States?' (Green in Moffat and Fitzpatrick, 1995:72-73)

In a letter dated July 27, 1852, from Rev. Green to the ABCFM, he writes about purchasing land:

> Purchasing of land a thing which causes me much joy as it augurs a rising of the people to the dignity of man (Green 1852, Lois Farringdon).

4.2.2.4 Environmental Setting Makawao 1840s

In an article from *The Polynesian* dated August 1, 1846, part of the editorial correspondence, describes a journey from Lahaina to Makawao and up to Haleakalā Crater. Here again the writer paints a picture of the landscape describing Makawao as an exceptionally pleasing place with a mix of woods, pastures, views, the ocean, sufficient rain and a cool temperature. The author also provides a detailed description of Mr. McLane's sugar plantation, a portion of which makes up the current project area:

> The next day I took the inland road to Makawao. Pleasant enough it was for the first half-dozen miles, over a hilly country, along the side of the mountain, at an elevation of from three thousand to four thousand feet. The view downward was pleasing--beneath one's feet lay unnumbered strawberries, but I had eaten too many the day before to feel the slightest inclination then to pluck and eat. Copses, ravines, plantations and native hamlets afforded a sufficient variety for the eye, while my heel had enough to do in the way of exercising its spur on my steeds flank, by the steady application of which, at the rate of three kicks to a minute, I was enabled to reach Makawao, at a distance of twenty miles in seven hours…
>
> …Makawao affords a delightful range of country, with a corresponding climate. Hill and dale, woodland and pasture land, ocean and mountain, each in their most pleasing aspect are here combined to form one picturesque whole. This and the adjoining districts are unlike any other I have met with on the islands. Fields, groves and wooded knolls interspersed with shady ravines, luxuriantly verdant from the wash of the rich, surrounding soil, are scattered from sea-shore far up the mountain to where the denser belt of woods commence and the ascent becomes more abrupt. At this season the mountain to the very crest of the crater looked green and tempting. …
>
> …Makawao is more than sufficiently watered by rain, but the soil is too porous to allow of streams. Bathing spots, such as they are as to extent, are

> to be found among the rocky beds of some of the ravines. The drinking water is most lusciously cool and limpid. As to the temperature, nothing can be more refreshing to an enervated constitution. At times during the winter, a fire is comfortable, though the thermometer rarely if ever sinks below 49 [degrees]. ...
>
> ...At present, besides the patches of the natives who cultivate this region tolerably extensively, Mr. McLane is the only plantation. It occupies a most delightful situation. His house—and a real Yankeefied look it has, with its red sides and porticoed front, stands in the midst of a koa grove. Plants bloom in careless profusion about it; the rose bushes grow most luxuriantly, forming hedges crowned the year round with their rich flowers, filing the air with fragrance; geraniums rival them in numbers and sweetness; well kept fields of cane extend in front of the house over 100 acres; fences enclose it in part and separate it from verdant pasture ground; corn and pumpkins have their allotted space; clumps of trees here and there resemble orchards; nothing, in short, is wanting but the real apples, pears, peaches and plums themselves to render the coup d'ceuil as gratifying to the palate as to the eye. Perhaps these will appear in time.
>
> McLane's sugar mill is about a half-mile below his house. The sugar of this region ripens the same as at Mr. Torbert's place and is of excellent quality. The produce to the acre is about one ton. At present the mill is worked by animal power, but Mr. McLane proposes erecting a wind mill as more economical (*The Polynesian*, Unknown author 1846).

Other letters by Rev. Green provide vivid descriptions of the lands of the current focus area. In one such letter to the ABCFM, dated June 25, 1853, Rev. Green described the areas of Hāmākua Poko, Māliko, Hāli'imaile and Makawao. After crossing the central isthmus on horseback, he begins the ascent of eastern Maui:

> Slacking our horses pace I will point out some important places in this part of the field. A little to the left and near the sea beach you see a small fishing village with its school house which is often used for a place of meeting. Hamakuapoko is the name of the place. Leaving this to the left we will ride through a part of Hamakuapoko till we reach the deep valley of Maliko. This is the name of the valley and harbor. It has a school house and a grove of cocoa trees, and cotton is still growing in this valley. We will not cross over, but ride along the brink of the deep valley [Maliko] which separates Hamakuapoko and Hamakua loa. We thus see the stone meeting house at Kalanikahua the school house and small village. ...
>
> ...Toward the mountain from the meeting house the land is quite level for the distance of a half mile or more. As we ride along through Hamakuapoko and Haliimaile we see across the valley on the other side Liiliikoe, a farm 6 or 700 acres owned by two foreigners who have built a sugar mill, but who do nothing at present in the line of sugar making. Beyond this farm, you see, Pumalu [site of Pookela church? Meeting

> house?] a small but beautiful place built almost in the midst of Kukui groves. We pass in Haliimaile, two large sugar plantations for some 800 acres and two large sugar mills erected at a cost of some $160,000 or $170,000. This Haliimaile district was the place of some considerable interest for the fact that Boki, the Governor of Oahu on my arrival in 1828, was born here. In 1828, I accompanied Richards and Andrews on a tour round Maui for the purpose of examining schools. We found the school at this place in a more forward state than any we saw on the islands. The next year Boki called away the strength and the power of this place and ordered nearly all the people to accompany him on his wild chase for sandalwood from which expedition neither he nor any of the Haliimaile people returned. The district was thus so far as native residents were concerned, nearly ruined the few remaining being greatly discouraged and now only two or three families can be found. Still it is a part of my field and I may not neglect to speak of its features. In passing over the two miles remaining ere we reach Makawao we see large fields of sugar cane and waving fields of wheat which promise a fair remuneration for the labor bestowed upon them (Green 1853, transcribed by Lois Farrington).

4.2.2.5 *Ka Nupepa Kuokoa-Man Killed in Hāmāku Poko*

This excerpt is from Hawaiian language newspaper, *Ka Nupepa Kuokoa*, January 18, 1868, reporting the murder of a Hawaiian man named Kapua. The article mentions the *Kuna Manuokawai,* a- Schooner named *Manuokawai*, notable for its journey in 1857 to the Northwest Hawaiian Islands with King Kamehameha IV (Alexander Liholiho) aboard to formally annex the island of Nihoa for the Kingdom of Hawai'i and view, visit, and verify the existence of other lands. On this journey he visitited Mokumanamana, Gardner, Laysan, Lisianski, Pearl, and Hermes islands. Laysan and Lisianski were declared new lands under the domain of the Kingdom:

> PEPEHI KANAKA MA HAMAKUAPOKO - Ua lohe mai makou mai ke Kapena mai o ke Kuna Manuokawai[1], ma ka po o ka la 12 o keia malama, ua powa[2] a pepehiia a make loa kekahi kanaka[3] o Napua ka inoa, ma kela wahi maluna, na kekahi mau pake eha mai Haiku mai. O Napua a me kekahi elemakule iho o Kaauwaeaina kona inoa, e moe ana laua ma ko laua hale ku mehameha, a hele mai la kela poe pake, a pepehi mainoino iho la me ka houhou ana i ka pahi ia Napua. Lele aku hoi kekahi mau pake maluna o kekahi elemakule, a ulupa iho la iaia a kauo aku la me ka poalo i kona mau maka, a hikiikii i ke kaula, a hoopaa iloko o ka hale, me ko na pake manao ua make loa. Pupuhi ae la i ka hale i ke ahi me ke kino make o Napua maloko, a holo aku la lakou ma ko lakou ala. I ka holo ana mai o na kanaka e kinai i ke ahi, e waiho make ana o Napua, a ua lapalapa mai ke ahi ma kekahi o kona mau lala. Ua malama ia ae kona wahi okoa no ke kanu ana. Ua lohe wale mai makou, ua ike mua na pake i ua kanaka nei e pau mau ana me ke eke dala, a nolaila paha ke komo o ke kuko ino no kela

eke dala a kii keia poe pake e pepehi malu. He hanai hipa, kao, ka keia kanaka i noho ai malaila. O ka elemakule hoi no ka loihi o ke kaula i hikiikii ia ai, pau e kahi i paa i ka hale i ke ahi a pakele mahunehune mai ia, a e make ana no, pela ka ikeia. Ua loaa ekolu pake i ko makou lohe hope ana.

Man Killed in Hāmākuapoko - We've heard from the Captain of the Schooner Manuokawai that during the night of the 12th day of this month, a kanaka named Napua was robbed and beaten to death in that area by four Chinese from Ha'ikū. Napua and another elderly man, named Kaauwaeaina, were sleeping in their secluded house and these Chinese people entered and cruelly murdered, stabbing and knifing Napua. Some of the Chinese jumped onto the other aged man, threw him down and dragged him, gauged out his eyes, bound him with rope, and restrained him inside the house, the Chinese thinking he was long dead. The house was set ablaze with the dead body of Napua inside, and then they fled. When other men ran to extinguish the fire, Napua was left for dead, the fire having charred over his limbs. His entire property was preserved for planting. We also heard, the Chinese knew (first saw) this kanaka possessed a sack of money, and so perhaps this terrible lustful compulsion for that money bag was felt and these Chinese people went after it by illegal murder. These men living there had raised sheep and goats. About the other old man, he survived because of the length of the rope he was bound by, and when the place in the house he was fastened to was destroyed in the fire, he barely escaped death, but it is thought that he will soon die. Three of the Chinese were captured when we last heard (*Ka Nupepa Kuokoa*, January 18, 1868, Translation by K. Robinson, July 2015)

4.2.3 Christian Religious Centers in Makawao

With the settlement of American Protestant missionaries at Lahaina in 1820, the Christian faith became the accepted religion of the royal family at Lahaina. As the accepted religion in the Islands, both the royal family and the Protestant missionaries themselves highly discouraged the initial establishment of the Catholic missions in Hawai'i. However in 1826, two French ships, the *Héros* and the *Cométe*, set sail independently for Hawai'i. The unrelated expeditions carried necessities for trade along the California coast, agricultural enterprise in Hawai'i and Catholic missionaries for the establishment of Catholic missions. Receiving word while in California that Ka'ahumanu was not interested in receiving the Catholic missionaries, those missionaries on board the *Héros* did not continue on to Hawai'i. One of these individuals was the Frenchman John Rives, who years earlier had tried to promote a Catholic mission in Hawai'i and failed. The *Cométe* continued on and arrived in Honolulu on July 7, 1827, and although Ka'ahumanu ordered the captain to take the French missionaries away, they stayed without resistance. By January 1828, the Catholic priests had secured lands, constructed a house and opened a small chapel. In one year, by July 1828, they had baptized 65 adults, several children and led a group catechism (Kuykendall 1947; 138-140).

Between the years 1829-1839, Ka'ahumanu, with the support of the Protestant missionaries, imposed anti-Catholic policies that essentially banishing Catholic priests from Hawai'i and punished native Hawaiians who practiced Catholicism; Ka'ahumanu made a formal banishment order in January 1831. When at first the priests did not leave the Honolulu mission, the head priests who had established the mission, Fathers Alexis Bachelot and Patrick Short, were placed on a ship and sent to California. The remaining priests stayed at the Honolulu mission.

In 1836, upon the arrival of the French warship *La Bonite*, captained by A. N. Vaillant, and in the midst of government talks regarding foreigners' rights to land, Vaillant requested that Fathers Bachelot and Short be returned to their Honolulu mission peacefully. This request was granted, and would influence future policies and the eventual acceptance of Catholic missionaries in Hawai'i (Kuykendall 1947; 141-147). In 1839, King Kamehameha III (Kauikeaouli) decreed the Edict of Toleration, and Catholics were no longer punished for their faith (Kuykendall 1947; 163).

4.2.3.1 The Po'okela Independent Protestant Church

When the Protestant missionary Jonathan S. Green moved to Makawao in 1843, he helped to organize the construction of the Po'okela Independent Church as a spiritual sanctuary for Native Hawaiian Christians who had converted to the Protestant faith. Upon its completion in 1850, this church became an important part of the social and economic foundation for people living in the Hāmākua Loa, Hāmākua Poko and Kula Districts of Maui. The Po'okela Independent Church provides services to the present day.

In the 1830s-1850s, Protestant congregational churches, including the Po'okela Independent Church, provided educational opportunities for Native Hawaiian children and vocational training for Native Hawaiian young adults. The Po'okela Independent Church was an important spiritual resource during times of economic upheaval, ravages of disease and changes to the government of the Hawaiian Kingdom within the context of the early historic plantation period, 1850-1900 (News 1907).

4.2.3.2 The first "new" Makawao Union Church, 1889

A "foreign" church, which conducted services in English was established in 1861 near the site of the present Makawao Cemetery. This church was later known as the Makawao Union Church, and the cemetery holding the departed members of Maui's most prominent families remains as it was when the church moved to its present site, below Paliuli, in 1889 (Figure 6). This church was constructed on the foundation of the Paliuli Sugar Mill, once owned by Henry Perrine Baldwin. The present stone Makawao Union Church, designed by the prominent architect Charles William Dickey, is actually the second "new" Makawao Union Church, completed in 1917. The first "new" Makawao Union Church was a wooden structure completed at the site of the present church in 1889. Makawao Union Church was dedicated to the memory of H. P. Baldwin.

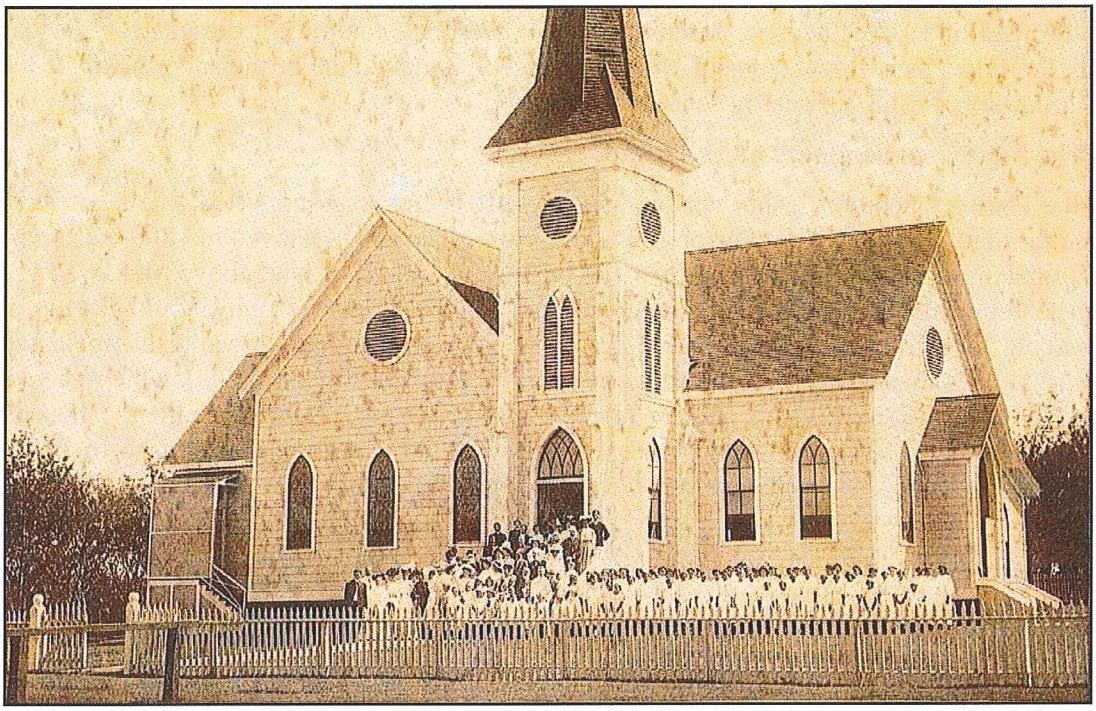

Figure 6. The first "new" Makawao Union Church, circa 1909. (Photo courtesy of Mary Cameron Sanford).

Makawao Union Church is also associated with Rev. Jonathan S. Green, founder of Po'okela Church, who served this church for a time while living in Makawao (Whiting 1985). Rev. Green, along with his first wife, are buried in the original church cemetery. This church is currently listed on the National and State Register of Historic Places, SIHP 50-20-1610.

4.2.3.3 The Catholic Mission at Makawao—St. Joseph's Church

Beginning in 1846, prior to the establishment of a Catholic mission at Makawao in 1851, congregations met at Mass at Ulumalu, inland along the Hāmākua Loa coast, and at Hāli'imaile. The Catholics of Hāli'imaile began the construction of a church there in 1848.

The first record of a Catholic baptism performed at Makawao, by Father Bouillon, took place on August 24, 1851 (Schoofs 1978:302-303). Many Portuguese settlers in the Makawao region became farmers and ranchers, and they formed the first large congregation of St. Joseph's Church in Makawao. In 1881, a newly-arrived priest, Father James Beissel, was appointed to the Makawao district.

A small wood-frame church was built just above the present-day Catholic Cemetery, which is located on the Kokomo-side of the present St. Joseph's Church. The framework was set on a six to seven foot-high stone wall, which according to Thurston was once the site of the Miner and McLane sugar plantation mill (Thurston 1906:42). A meeting hall was constructed at the stone wall to accommodate the first church services held at Makawao (Schoofs 1978:305).

By the end of 1911, a new St. Joseph's Church had been completed; designed in the Gothic style by Bishop Libert Boeynaems of Honolulu, and constructed under the supervision of Father John Couturiax of Lihu'e, Kaua'i (Schoofs 1978:307).

4.2.4 The Maunaolu Seminary at Makawao

In the 1860s, Upcountry Maui was a sparsely settled area that supported small graziers and dryland farmers. The Protestant Pastor C. B. Andrews moved to Makawao in 1860 in search of a better climate for his wife's health. In 1861 he purchased a piece of land above Makawao village where he founded the East Maui Female seminary at Maluhia, just uphill from the Po'okela Independent Church. The school was dedicated to the education of Hawaiian women, with a course of studies that included home economics and music. Borrowing $3000, which was added to the $1000 he had received from his father for emergencies, Andrews built the house that became the school (Andrews 1866). Attendance grew to 70 women (Beyer 2003). In 1864, the name of the institution was changed to the Mauna'olu Seminary.

In June 1869, the "home" was lost to fire. A student present during the disaster, Apokini Aheong, wrote:

> It was a bright Sunday afternoon, all the children had marched to the Pokela (sic) Church, two by two, as was the custom. All were listening intently to the sermon by Rev. J. Green, when a native shouted Fire! Fire! Everyone jumped and rushed to the door. My great grandfather, Hikiau, was at this service, and when the warning came he lifted me to his horse (I was a small child), mounted himself, and away we galloped to the scene. To our great sorrow, we saw the little school "Home" fast disappearing, and tears were running down our cheeks (C. L. Turner 1929:108).

Donations and materials for a new two-story building were collected across Maui, and the school reopened in 1871 as a special project of the Henry Perrine Baldwin family (C. L. Turner 1929). During this time in the school's history it was noted that the girls would, "[go to] Kalena [pond] at the foot of Pi'iholo hill for a bath, which was about a mile away [from the school]" (C. L. Turner 1929:110). Additions to the buildings and aid from both the government and the ABCFM led to enrollment of 100 students (Beyer 2003) Following a second fire in 1898, the school was moved to 'Sunnyside,' about three miles north of Makawao. The original administration building, constructed in 1900, is the present site of the Hawai'i Job Corps Center.

4.2.5 Maui Sugar Plantations

Beginning in the 1830s, Native Hawaiians in the Makawao region of East Maui became active as laborers on sugar cane plantations. According to Wilfong, by 1849, there were six plantations in the Makawao area, cultivating about seven hundred700 acres and employing some 200 Native Hawaiians during a large part of the year (Wilfong 1882). About 200 acres of these lands were owned and cultivated by Hawaiians themselves (MacLennan 1995:42).

Wilfong also describes several typical mills used on Maui. According to Wilfong, the typical sugar mill consisted of a battery of vertically-mounted wooden rollers, perhaps 18 inches in diameter and two feet long, driven by animal power and coupled with a series of three open try-pots bought from visiting whalers. The cane was presumably fed by hand, the juice concentrated

by successive boiling in open kettles. Wilfong makes no mention of the processes leading to crystallization and sugar recovery, but stresses the profits resulting from the sale of the thick syrup to whalers, presumably for rum-making (Wadsworth 1936:56).

By 1867, there were four plantations in Makawao, a total of 535 sugar workers and 2,675 acres in cane; all four were still in business in 1880 (MacLennan 1997:104). By 1874, a number of sugar planters had distinguished themselves as profitable. among them, A. H. Spencer of the Kaluanui Plantation (Norhoff 1874:61). As time progressed, landowners within the *moku* of Hāmākua Poko utilized most of the lands in the lower elevations for sugar, cleared land for ranching throughout Makawao and preserved the upper elevations for watershed.

The first successful commercial cultivation of sugar throughout Pā'ia was initiated by Samuel T. Alexander and Henry P. Baldwin in the 1880s, when the first large-scale ditch system to bring water from East Maui to the relatively arid area of Hāmākua Poko was developed (Dean 1950:30). The hillsides above Makawao became home to the *paniolo,* or Hawaiian cowboy, as cattle ranged across the lands of the Haleakalā Ranch (Von Tempski 1968). Ambitious projects to develop water resources for a growing upcountry population led to the construction of reservoirs at the very highest reaches of the *ahupua'a* (Stearns and McDonald 1942:209).

4.2.5.1 Miner & McLane Plantation, Makawao (Current Project Area)

As early as 1838, Edwin Miner and William McLane started a sugar plantation at Makawao by leasing land from Hoapili, Governor of Maui, for 50 dollars an acre. The mill for this venture was located on the site of the present day St Joseph's Church, as described earlier. Miner and McLane leased these lands for a few years. Around the time of the experimental Makawao land sale, McLane acquired fee-simple ownership of lands both from the government and directly from Hawaiians who had been granted Royal Patents. McLane's Makawao lands totaled 688.94 acres and include Land Grants 64 and 157 (see Table 2), and became a sugar plantation known as the McLane Plantation (Maly 2001; 303). Today, a portion of the McLane Plantation makes up the lands of the current project area.

The 688-acre McLane Plantation was sold to John T. Gower (MacLennan 1995:42) in 1949. By the end of the 1850s, Gower was forced to declare bankruptcy, and auctioned his plantation for $3,010, one-tenth of the amount he had invested. The price of sugar had fallen, following the slowing of the California Gold Rush, and smaller plantations began to consolidate into larger operations to save money. In spite of these difficulties, Stephen Reynolds, the owner of the Hali'imaile Plantation, purchased the Gower plantation and repaired the mill in anticipation of the coming growing season. Even in these difficult times, Maui remained the largest sugar producer of the Hawaiian Islands (MacLennan 1995:45).

In his extensive study of East Maui, Maly (2001; 294-295) presents the original (translated by Maly) lease agreement between Governor Hoapili, Miner and McLean, which describes the property boundaries as well as specification regarding life of lease, annual lease payments due, and specifications for the provisions of employees, which include requirements for building schools. Maly also notes that within this lease agreement are terms for water rights for cattle or other livestock as well as access trails to the coast for livestock shipment, possibly the first formalized agreement related to cattle ranching (2001; 57):

September 10, 1838

Hoapilikane, Governor of Maui; to Wm. A. McLane and Edwin Miner

Land Assignment – Portion of Makawao (Helu 426):

Here is this document, reporting on the full understanding of Hoapilikane, the

Governor of Maui and William A McLane and Edwin Miner for a land at Makawao, Maui; Hoapilikane gave a land at Makawao to William A. McLane and Edwin Miner for the term of fifty years from that day forward. It was for them and their own heirs. Here is the fee for the land from year to year, one hundred dollars.

The land is thus described. On the west of the gulch called Punaokeawe, the

cultivated field there, begins the boundary, and runs to the east to a gulch called

Alelele, there is a marked corner of the land there. From this corner, run to the

uplands along the channel at Manaia. There is a corner. Then from this corner, run to the gulch on the west of Manawainui. From that corner run to the boundary first mentioned at Punaokeawe.

This land is only for William A. McLane and Edwin Miner, from the water (pond) of Alelele to the place where the stones roll into the gulch of Punaokeawe.

The boundaries above and below are marked by stones. These boundaries were marked by William A. McLane, Edwin Miner, and some men with Hoapilikane.

Here also is this. The road for transporting their cattle is set aside, from said land to the landing at shore.

Here also is this. Hoapilikane has restricted (*hookapu*) said land for the term of fifty years, and no man may go to live on said land without the authorization of William A. McLane and Edwin Miner.

Here also is this, about the water. William A. McLane and Edwin Miner may take

water for their livestock, and no one can block them from the said water.

Here also is this. When the fifty years are ended and the land is returned to Hoapilikane or his heirs, the houses, walls, everything growing, and all other things can not be taken.

Here also is this. William A. McLane and Edwin Miner swear that they will build schools for all of the people who they employ.

Here also is this. William A. McLane and Edwin Miner agree that the men they hire shall dwell with them. They shall not refuse the working men, the land. They shall pay each year, three dollars for each men, hired. They two agree to fulfill all the words written in this document.

Executed at Wailuku, on this tenth day of September, in the year of the Lord, one-thousand eight hundred and thirty-eight.

By Hoapilikane, Governor of Maui.

I confirm the words above spoke.	Kamehameha III
Witnesses	(signed)
William Richards	Wm. A McLane
Kanakaole	Edwin Miner

[Copy in Native Register Volume 2:153_155; 1848; Maly, translator. See Register Map No. 603 for reference points.]

Records in Hawaiian Newspapers also reveal more personal aspects of life in this area. For example, Mr. William McLane married a Hawaiian woman named Maile Makalena. Adjacent to McLane's Grant 157, Grant 58 is to Maile or Omaile; it is unknown if this is his wife's land. McLane's obituary, written in *The Polynesian*, October 11, 1851, portrays his more personal aspects:

> McLane was born in Boston, Mass., August 1795. He went to sea young and after following that mode of life for many years and also serving in the U.S. Army, he came to these islands in a whale ship, and, in 1822, took up his residence on Maui, where he has ever resided up to the time of

> his death. For the last ten or twelve years he has resided at Makawao, for most of the time as a sugar planter, and here he finished his course, and entered, there is good reason to believe, upon the joys and employments of the heavenly world. Mr. McLane was remarkable for his amiable and guileless disposition, and for his fervent piety and faithfulness in all the relations of life. He was charitable to the poor, and a friend to the needy; he was a sincere friend to the Hawaiian race, and was ever ready to aid and advise them for their good. His memory is precious. "Let me die the death of the righteous, and let my last end be like his." (*The Polynesian* 1851)

As for Mr. Edwin Miner, he, too, seems to have married a Hawaiian woman. The following *kanikau*, or mourning chant, written by his daughter, Mrs. Apia Miner, was published in *Ka Hoku O Ka Pakipika*, Hawaiian language newspaper of 1861, translated below by K. Robinson:

He Kanikau no Edwin Miner o Makawao i make aku nei. He kanikau aloha keia nou e F. Miner, Ka pohaku kihi paa o Haiku, Ke keiki makua o Lilikoi, I hanai oe i Beritania, I hokanaka makua i Ladana, I noho oe a kupa i Hawaii nei, Kamahao oe no Tahiti mai, Noloko mai o Tahiki-ku, Tahiki-moe, No Tahiti Kapakapauakane, Nolaila mai ka makua, Aloha ino, aloha hoi e, Kuu makuakane mai ka malu halauloa o ke kukui, Mai ka moena haunu ole o ka nahele ke noho ia, A kaua e alo ai i kaua Puukoa o Kokomo, Ua komo ko aloha koni i ka Puuwai, Ke konikoni nei i kuu manao, Manao aku no au o oe ko'u makua e pono ai, E ku ai o kuu hoonaninani ana, Aloha ino, aloha hoi e, Kuu makuakane mai kaua Ulalena halii mai i ke alo o Piiholo, Mai kaua ukiukiu o Makawao, Mai ka la kanaka nui o Potera, Mai ka hau anu maeele o ke kuahiwi, Aloha wale hoi ia wahi a kaua e hele ai, Aloha ino, aloha hoi e, Kuu makuakane mai ka ai nana i ke kuahiwi ke ola, Mai ke kula e-a i ka la, Mehe kanaka la ke alualu mahope, He hihio na'u i ka moe uhane, Loaa oe ia'u i ke kino wailua, I ke aka kii iloko o ke aniani, Kuhi au he oiaio, Paee he alawa maka ka e, Aloha ino, aloha hoi e,	A Lamentation for Edwin Miner of Makawao, Deceased This is a lament of love for you, E. Miner, The firm corner stone of Haiku, The child of (Lilikoi?) Raised in Britain, Maturing to manhood in London, Then dwelling until becoming accustomed to here in Hawaii, Wondrous are you from Kahiki (Reference to coming from a far-off land), From Kahiki-the upright, Kahiki-the prostrate, From Kahiki-Kapakapauakāne, From there come our progenitors, Alas! So beloved! My beloved father in the canopy of shade of the Kukui, A bed of forest ferns and greenery he resides, And the rain that accompanies the Puu Koa rain of Kokomo, The love of a beating heart fills me, It's passionate thrumming overcomes my every thought, And I long for you, my prosperous father, You remain in my adoration, Alas! So beloved! My beloved father, from the Ulalena rains, blanketing Piiholo, From the 'Ūkiukiu rains of Makawao, From the (lā kānaka nui o Potera?) From the numbingly cold frosts of the mountain, These lands that we've journeyed are beloved indeed, Alas! So beloved! My beloved father, from the people of the lands, the life of the high hills, From the open fields in the sun, Like a person who follows after, For I have visions in my dreams, Where you are captured by me in your spirit form, A shadowy likeness in transparent as glass, I suppose the truth, And I'm mislead by my glances, Alas! So beloved!

Kuu makuakane mai ka makani Kaahaaha hai malie o ke kaha, Kaha ka uhane hele puoloolo i ke one o Kahului, Halawai aku la olua me Waihinano, E poi iho ana i ke aloha o ka makua aole e pau, Kuu hoa hele mai na wai eha, Eha la kamahao a ko aloha i hiki mai ai, Aloha ino, aloha hoi e, Kuu makuakane mai ka hau anu o Kanaio, Mai ka piina ikiiki o Aalaloloa, Loa ka hele ana a ka makua ike ole aku, Hele aku la oe i ke ala ula a Kanaloa, Mai ka ihona loa o Manawainui, He nui hoi au he hiwahiwa na ka makua, Kuu minamina pau ole ia oe e, Aloha ino, aloha e, Kuu makuakane mai ka makani kulai hale o Ukumehame, Mai ke one hanana e Mopua, Mehe pua lele la ka lae o Hekili i ke kai, O ua kahakai aloha la a kaua e noho ai, I ke kula la wela o Kulanaokalai, Ua lai Hauola i ka malu o ka ulu, Aloha ino, aloha wale e, MRS. APIA, MINER. Honolulu, Augate, 29, 1861.	My father from the gently swaying Ka'aha'aha winds, The lingering, wandering spirit in the sands of Kahului, You and Waihinano meet there, Overcome with love for the parent that is not yet completely gone, My friend that travels with me through Nā Wai 'Ehā (The Four Waters of Wailuku), Four astonishing days when your love arrived, Alas! So beloved! My father from the cold mists of Kanaio, From the foremost heat and humidity of Aalaloloa, The travels of my unseen father are long, You will journey on the sacred path of Kanaloa, From the long descending incline of Manawainui, I'm indeed important, a precious child for my progenitor, My grief for you is never-ending, Alas! So beloved! My father from the house-dashing winds of Ukumehame, From the overflowing sands of Mopua, Like a flying flower at Hekili point at the sea, These beloved seas were you and I dwell, On the hot plains of Kulanaokalai, Hauola is calm in the shade of the Ulu tree, Alas! So beloved (*Ka Hoku O Ka Pakipika*, 1861. K. Robinson Translation)

4.2.5.2 Alexander & Baldwin: Sugar Plantation Beginnings and Mergers

This section aims to detail the various sugar plantation mergers in Makawao, Pā'ia and Hā'iku that would eventually become Alexander & Baldwin Properties. In 1869, S. T. Alexander and H. P. Baldwin were ready to launch their own business. While still employed at the Waihee Sugar Plantation, they bought 12 acres of land in the Sunnyside area of Makawao to grow sugarcane. In 1870, Robert Hind built a mill at Paliuli to grind their cane in agreement with Alexander and Baldwin. The Alexander and Baldwin Plantation began growing cane on the first unit of a plantation that would eventually be incorporated as the Paia Plantation and was known at various times as Sam T. Alexander & Co., Haleakala Sugar Co., and Alexander and Baldwin Plantation (Pricher 1975:3).

In 1876, H. P. Baldwin lost his right arm in an accident at the Paliuli Mill at Sunnyside—an event that figured prominently in the future of this enterprise (Pricher 1975:6). Alexander then devised the ingenious scheme to bring water from Haleakalā's rainy windward slopes to irrigate their East Maui fields, paving the way for the creation of Hawai'i's most successful sugar plantation and creating a model for other irrigation projects throughout the Islands. The 25-mile-long Hamakua Ditch project needed to cross the Māliko gulch, which measured 800 feet across and 300 feet deep. At first, workers refused to lower themselves over the cliff and into the deep ravine, so Baldwin, who had lost his arm just months before, clutched a rope with his legs and his one arm and swung 300 feet into the gulch. Encouraged by this example, the workers followed him. He repeated the feat each day until the ravine had been spanned (Pricher 1975:4).

One of the original partners in the Hamakua Ditch Company, with the right to one-fifth of the water, was the Grove Ranch Plantation, established in the mid-1860s by Thomas. H. Hobron and

William O. Smith. It's lands lay along the Alexander and Baldwin property, on the sides toward Makawao and Wailuku, *makai* of Kaluanui Plantation. This 1,036-acre plantation was equipped with a new mill and steam power, and its manager, George Beckwith, stated that the mill's output was three and a half tons per day (Thurston 1906:42). In 1874, Hobron leased Grove Ranch Plantation to two co-partners, Messrs Delemar and Sharratt, with a purchase option (Harris 1877: 749). In 1881, an agreement was made with the Alexander and Baldwin Plantation to grind the Grove Ranch cane. The Grove Ranch Plantation operated independently until 1889, when it merged into the Alexander's and Baldwin's Paia Plantation Company (Dorrance and Morgan 2000:66); its rights in the Hamakua Ditch Company then passed to the Paia Plantation Company (Dean 1950:30).

The Kaluanui Plantation was organized by H. A. Spencer, and distinguished itself as the first to dry its sugar using a centrifugal machine, a process installed by the Honolulu Iron Works in 1851. The ruins of the plantation mill can still be seen today, on the grounds fronting the Hui No'eau Visual Arts Center. This plantation was purchased by the Haiku Sugar Company in 1886.

In 1849, the Hāli'imaile Plantation was started by Honolulu merchant Stephen Reynolds on land leased from the government. Its Paholei mill began operation in 1851; its ruins are visible today on the grounds of the Hawaii Commercial & Sugar Company (HC & S) manager's house at Paholei. This plantation was plagued by conflict among Chinese and Hawaiian workers. After Reynold's death, it produced 200 tons of sugar a year. Charles Brewer II, a nephew of Captain Charles Brewer (of C. Brewer & Co.), purchased the plantation and it became known as the Brewer Plantation. In subsequent years, the Brewer Plantation was sold to Gerrit Judd and renamed the Union Plantation as a patriotic gesture during the American Civil War (Murphy 2013).

4.2.5.3 Piiholo Sugar Plantation

Closest to the project area, the Piiholo Sugar Plantation was established in the late 1840s. In the 1880s, the plantation was described as run by T. Akanaliilii and W. P. A. Brewer. The plantation owned 1,250 acres, and rented an additional 10,500 acres in order to keep 500 acres under cultivation. It manufactured 500 tons of sugar, employed 60 men and utilized 220 yoke oxen, 20 horses and 15 mules (Maui News 1936:6, 3). By 1891, the Piiholo Sugar Plantation was converted to the East Maui Stock Company cattle ranch. According to an 1892 *Hawaiian Planter's Monthly*, Mr. W. P. A. Brewer, one the plantation's owners, had begun to grow coffee at the estate (Lloyd 1892:533).

4.2.5.4 Haiku Sugar Company

In 1860-61, the largest landowner of the upper Pā'ia region was the Haiku Sugar Company (Figure 7), whose lands were located along the Māliko Gulch; irrigation water was at first supplied by wells tapping sources along the Māliko Stream. The lands included the prominence Pu'u Kauhikoa and lands east to Pauwela.

In 1853, the government of the Kingdom of Hawai'i had set aside much of the Hāmākua Poko *ahupua'a* for the Board of Education (Burns 1991:54). Within the 5,000 acres transferred by the Kingdom were a number of large *kuleana* belonging to native Hawaiian owners. On May 31, 1858, a meeting of Castle and Cooke shareholders was held to consider the initiation of a sugar plantation at Ha'ikū. In 1860, the Board of Education deeded the Hāmākua Poko acreage, which

was unencumbered by native claims, to the Trustees of O'ahu College, who then sold the land to the Haiku Sugar Company (Dean 1950). In 1861, the Haiku Sugar Company erected a mill at Paliuli, designed by D. M. Weston, known as the original Pā'ia mill. The following is an excerpt from the Hawaiian language newspaper, *Ka Hae Hawaii*, from May 8, 1861 announcing the purchase of these lands by Haiku Sugar Company (Translation by K. Robinson July, 2015):

> Kuai Nui!
>
> Ua kuai iho nei ko Haiku Ahahui Wiliko i kekahi apana aina nui ma Maui, i kapaia ka inoa o Hamakuapoko, 5,500 ka nui o ka eka; ua pili ia aina i na palena o Haiku. Hookahi dala a me na keneta kaulele aku ke kumukuai o ka eka hookahi. Ua oleloia he aina kupono loa keia no ke kanu ko ana, e like loa me ka aina e mahiia nei. He hiki no i keia hale wili ko hou ke hana i 1,000 tona o ke kopaa iloko o ka makahiki hookahi. Ua lana loa ka manao o ka poe i komo iloko o keia ahahui e holo maoli io ana ka hana, e waiwai io ana hoi lakou, a me kolaila poe kanaka, a me ke aupuni kekahi, i keia hana nui.
>
> Large Purchase!
>
> Haiku Sugar Mill Company has purchased a large parcel of land on Maui called Hāmākuapoko, 5,500 acres, the lands being close to the boundary of Ha'ikū. One dollar and some cents extra is the price per acre. It is said that this land is extremely good for growing sugar cane, similar to the lands currently being cultivated. This new sugar mill is expected to process 1,000 tons of brown sugar in a single year. The people within this company are very hopeful that their operation will be managed well and worthily, and they will become truly wealthy, as will their workers, and the government as well in this great endeavor.

With its first crop of cane in 1862, the Haiku Sugar Company established commercial operations; the protestant missionary Richard Armstrong was one of the founders. The yield was 260 tons of sugar, which sold for $150 per ton. (Dorrance and Morgan 2000:63). By 1877, H. P. Baldwin had the Hāmākua Poko mill built on the southwestern side of Māliko Gulch; the Paliuli mill was shut down in 1879.

In 1868, the Haiku Sugar Company reported its landholdings at 5,500 acres and an additional undivided third of 9,000 acres (MacLennan 1997:119). In 1869, the engineer and mechanic Robert Robson Hind added a compound-boiler steam-powered mill to the company and the cultivation of additional acreage continued (Nellist 1925:115). By 1872, Haiku Sugar Company's production had risen to 650 tons per year. By 1880, the plantation was spread out over 6,000 acres, with 1,200 acres under cultivation in two parcels, separated by the Māliko Gulch; these parcels produced 2,600 tons of sugar. Shipping to and from Hā'ikū was not easy. As sugar manufacturing became concentrated at Hāmākua Poko, shipments of sugar were sent to the coast and loaded onto small interisland vessels at Kū'au, taken to Honolulu and transshipped. In the early 1880s, it became possible to transport the sugar to Pā'ia and send it by the Kahului

Railroad Company to the Kahului Harbor, where it could be loaded directly onto larger ships (Dean 1950:28-29).

In 1884, Alexander and Baldwin bought out the majority of Haiku Sugar Company stock and took control of the company. By 1897, Haiku Sugar Company and Paia Plantation had become business partners of Alexander & Baldwin, Ltd. Their company stores offered goods to the population of the plantation towns from Hāmākua Poko to Huelo. In 1904, Alexander and Baldwin merged the Haiku Sugar Company cane lands into the Maui Agricultural Company. In 1948 the Maui Agricultural Company merged with the Hawaiian Commercial and Sugar Company (Kiger 1986).

Many large-scale changes to the plantation system occurred in the early 1900s. The large influx of immigrant workers peaked in 1909, and large village areas of Pā'ia and Kahului were burned to control a 1910 smallpox outbreak. The construction of a trestle to span the Māliko gulch for the Kahului Railroad Company was undertaken in 1909 and completed in 1913; this bridge also carried the Hā'iku ditch pipeline across the gulch (Pricher 1975:4-5). The Makawao township was expanding, and Chinese-owned businesses began to mingle with those run by the plantations. Lumber was harvested in the lands of Ka'ili'ili (Figure 11), a dairy was started in Pukalani, and polo, 'the sport of kings,' became an important fixture of Upcountry life (Bartholomew and Bailey 1994). The plantation workforce continued to expand until 1917, when the United States declared war on Germany, and the accompanying draft for World War I significantly depleted the labor pool. By 1919, postwar requirements for sugar had driven the price to $471.40 per ton, an all-time high (Burns 1991).

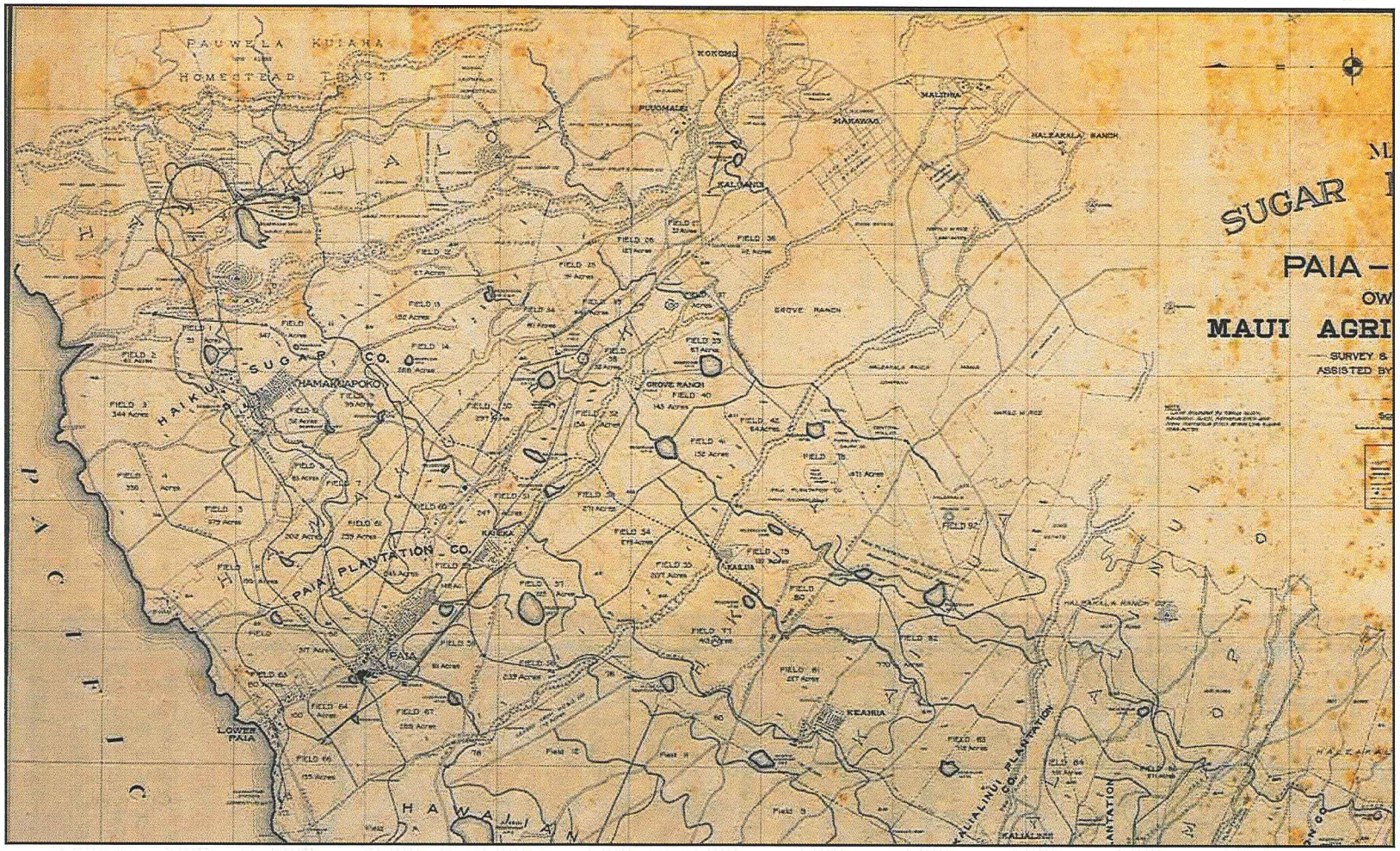

Figure 7. Map by A.W. Collins, 1917; showing relative boundaries of early Maui sugar plantations in the Makawao region. (Map courtesy of Alexander & Baldwin Company—Hawaiian Commercial & Sugar Company, Pu'unēnē, Maui).

4.2.6 Water Source Development

4.2.6.1 Hamakua Ditch

In August 1876, S. T. Alexander outlined his proposal to construct a ditch to the Haiku Sugar Company stockholders. The Hamakua Ditch Company was organized to share ownership of the construction and the water it would yield to ensure consistent irrigation water for the Pā'ia - Makawao region. A lease was obtained from the government of the Kingdom of Hawai'i to construct the aqueduct and collect the waters of East Maui between the Honopou and Nā'ili'ili - Haele streams. The Hamakua Ditch Company soon began construction of the Hamakua Ditch—at the time, the Islands' most important irrigation project. The costs and division of water was arranged in this manner: Haiku Sugar Company 9/20ths, Alexander and Baldwin 5/20ths, T. H. Hobron (acting for Grove Ranch Plantation, *mauka* of Alexander and Baldwin) 4/20ths, and James Alexander (owned a plantation *makai* of Alexander and Baldwin) 2/20ths. From the Hamakua Ditch Company, the East Maui Irrigation Company was created.

The value of agricultural land in the lower elevations of Hāmākua Poko dramatically increased following the construction of the Hamakua Ditch in 1879. The partnership of Samuel T. Alexander and Henry P. Baldwin engineered the delivery of vast amounts of water from East Maui to the 1,000 foot elevation above Pā'ia, Spreckelsville and Pu'unēnē, and began to irrigate portions of the central isthmus of Maui (Wilcox 1996:60).

4.2.6.2 Additional Ditch Construction

The Lowrie Ditch project, named for former H C & S manager William J. Lowrie, brought a second source of water to the dry Pā'ia lowlands, following the original construction of the Hamakua Ditch in 1879. Lowrie's plan was to begin the ditch in East Maui at the Pāpa'a'ea Reservoir, at the 1,000 ft. elevation, and maintain a four-foot drop per mile following the ditch's initial plunge from the Kailua reservoir. During construction in 1898, steep mountain gulches were traversed using the force of the constant weight of water flowing in a series of siphons. The Halehaku Gulch, at 250-feet deep, and the Māliko Gulch, at over 350-feet deep, were both crossed by giant siphons fabricated from three-eighths-inch iron, and set in place by Japanese laborers. Water allocation began at a weir located above Pā'ia. The first tenth of the water flow in the Lowrie Ditch was divided out to the Paia Plantation (an 11/20ths share) and the Haikū Plantation (a 9/20ths share). The distance traveled, from Kailua to the plantation's central isthmus boundary, was 21.9 miles (Thrum 1900).

In 1901, Samuel T. Alexander ordered the construction of a new ditch, tapping water sources from Nāhiku to Honomanū. It was determined that the Paia Plantation would receive a substantial percentage of the capacity from the enterprise (Dean 1950). Both the Alexander & Baldwin-owned Hali'imaile Plantation (Grove Ranch) and the East Maui Plantation also received water shares.

A fourth water system was developed at the highest elevation within the Hāmākua Poko *ahupua'a* to supply water to Olinda and Makawao. Fed by two river intakes at an elevation of 4,200 feet (amsl), the Haipua'ena and Waikamoi Streams were diverted into a ditch in Hā'ikū Uka *ahupua'a*, which then carried the water 3.5 miles to an Olinda reservoir. Below Olinda, water was stored at a reservoir in Maluhia, which then supplied water to Makawao Village (Stearns 1942).

A fifth water system supplied hydroelectric power to Pā'ia. Mountain water diverted to the Wailoa Ditch from streams in Alo and Halehaku was delivered to Mauna'olu, where the flow supplied water to two inclined penstocks. The resulting steep gradient applied such force to the water that hydroelectric power was generated at a plant located at Kāheka, supplying electricity to all of lower Pā'ia (Stearns 1942).

The majority of Hāli'imaile *ahupua'a* in the region west of the current project area was included in Royal Patent 7512 to Miriam Kekauonohi. This land transfer occurred in the 1840s but was recorded as a Royal Patent in 1880; Royal Patent 7512 from King David Kalākaua included the entire *ahupua'a* of Hāli'imaile (Waihona 'Aina 2002). The lands of Hāli'imaile are presently partially-owned and cultivated in pineapple by the Maui Land & Pineapple Company, on lands that include portions of the original Hamakua Ditch.

4.2.7 Makawao Corn

4.2.7.1 Makawao Corn Mill Company

Corn was grown at Makawao beginning in 1851 to provide feed for cattle; however, some corn grown in Makawao did find its way to market in Honolulu, for human consumption. Between the 1850s and 1890s, little is known about the quantity and quality of corn grown in Makawao, until the manager of the Haleakala Ranch Company, Louis von Tempsky, began the Makawao Corn Mill Company. This venture operated on two acres of land known then as the "David Crowningburg pasture," (off Makawao Avenue, around Makawao Hongwangi) which had been leased from the Haleakala Ranch Company (Duensing 2008:163-164).

According to the *Hawaiian Gazette*, Louis von Tempsky's corn mill was in operation and turning out "first-class cracked corn' by February 1892. Maui plantations reportedly placed large orders for cattle feed produced by the mill. Approximately 4,000 acres of corn were grown in Kula at the time, with the expectation that nearly all of the crop would be consumed on Maui. Louis von Tempsky purchased corn grown by famers in Ōma'opio and Pūlehu Nui. The mill was required to grind all of the corn grown by Haleakala Ranch before accepting corn from other customers. Other corn mill customers included the Paia Plantation and Louis von Tempsky's Erewhon Cattle Station (Duensing 2008:165).

4.2.7.2 Corn Mill Camp

In his interview (see Section 8.2.2) Mr. Doug McClure described "Corn Mill Camp" as being a 200-acre corn plantation that was located in the area of the current day Makawao Fire Station and Wai Ulu Farm. Mr. McClure explained that the mainly Japanese employees who worked there lived at the camp village. Additionally, onion, white rose potatoes and red rose potatoes were grown here to supply the west coast during the Gold Rush, before his time.

4.2.8 Ranching in Makawao

The region of Makawao is well known for its ranching history and *paniolo* (Hawaiian cowboy) traditions. With rolling hills and pastoral viewscapes, the land has been shaped by generations of ranching activities. Two of Maui's largest ranches continue operations in Makawao today: Haleakala Ranch, which owns the majority of ranch lands in Makawao and neighboring Kula district, and Ka'ono'ulu Ranch, whose Makawao lands include the Oskie Rice rodeo grounds, Oskie Rice Outdoor Polo field, and pastures adjacent to the current project area.

Smaller ranches exist belonging to individual, 'freelance' cattle ranchers who lease and own a mosaic of smaller pastures throughout the area.

According to an 1850 account by Robert Wyllie, an early member of the Royal Hawaiian Agricultural Society, the first cattle—a bull and a cow from California—was landed by Captain George Vancouver on February 19, 1793. They were given to Kamehameha I in the canoe of Kalani'ōpu'u, off the coast of Hawai'i Island. On the February 22, 1793, Vancouver landed five cows, two ewes and a ram at Kealakekua Bay for Kamehameha I. On the January 15, 1794, Vancouver landed a bull, two cows, two bull calves, five rams and five ewe sheep also from California for Kamehameha I (L. A. Henke 1929:8-9). Kamehameha put a strict *kapu* (*tabu*) on the cattle for a period of 30 years. The herd rapidly increased and was moved to the Waimea plains, where they spread inland to the slopes of Mauna Kea. When the *kapu* was removed in 1830, the interior plain and the three mountains of Hawai'i were full of cattle. These first cattle were of the longhorn Spanish type, but in time a large number of Aberdeen-Angus cattle were imported to Hawai'i to improve the herd.

According to the records of the government newspaper, *The Polynesian*, dated February 10, 1855, Dr. Robert Wood of the East Maui Plantation Company imported purebred Devon cattle to Maui about that time. Shorthorn cattle were brought into Hawai'i beginning in the 1850s as well, but it soon appeared that Herefords were better adapted to local grazing conditions; in time, Shorthorns were replaced by Herefords (L. A. Henke 1929:15). Hereford cattle were brought to Hawai'i in great numbers beginning about 1880. The first Holstein dairy cattle were brought to Hawai'i from California in the early 1880s. Robert Hind and Eben Low of Maui imported a number of Hereford bulls and cows from New Zealand around 1895. Among the first cattle to be imported specifically to Maui Island were Aberdeen-Angus to the Honolua Ranch in 1912, and Aberdeen-Angus cattle to Grove Ranch in the early 1900s. Samuel Baldwin of the Haleakala Ranch imported Herefords in 1919 (L. A. Henke 1929:13-14).

4.2.8.1 Haleakala Ranch

Haleakala Ranch successfully grew to its current size at nearly 29,000 acres, 126 years from the date of its incorporation in 1888. Haleakala Ranch continues to be owned by members of its founding Baldwin family. Haleakala Ranch has played a critical role in the economy of Maui and many aspects of the ranching lifestyle in Makawao originated here.

Originally formed from the consolidated landholdings of Charles Hodge Alexander, Edward H. Bailey and Lorrin A. Thurston acquired the Haleakala Ranch from C. H. Alexander's estate after his death. H.P. Baldwin then became a shareholder in partnership with L. Thurston and E. Bailey and incorporated Haleakala Ranch in 1888 (Harrisson 2013; 7). The Haleakala Ranch was actually a consolidation of two ranches: the Kapalaia Ranch (or Kapalaea), where a large ranch house had been constructed by Samuel A. Baldwin in 1916, and the Haleakala Ranch. In 1889, 1,000 acres of farmland at Maka'ehu, which had been farmed since the 1850s, became part of Haleakala Ranch. At that time, the Maka'ehu ranch lands were owned by E. H. Bailey and W. H. Bailey (Decker 2010:200). By 1890, H. P. Baldwin and L. A. Thurston each owned 600 of the 1,200 issued shares (Dean 1950:239). W. F. Pogue was Haleakala Ranch Manager from 1890-1895; he was then followed by Louis von Tempsky, who managed the ranch until 1916 (Henke 1929:56-57). Haleakala Ranch eventually grew to encompass 29,871 acres, even after the deeding of 9,500 acres to the National Park at Haleakalā in 1927 (Dean 1950:240-242). By the

1950s, the majority stockholder in the Haleakala Ranch Company was Samuel A. Baldwin, with the balance of the company stock owned by heirs of Harry A. Baldwin (Dean 1950:241).

Hereford cattle were introduced to the Ranch's Polled Angus herd during Louis von Tempsky's tenure as Ranch Manager (1895-1916). In the late 1920s, the Ranch carried about 30 heavy horses and 160 light horses (Henke 1929:56-57).

4.2.8.2 East Maui Plantation Company (Piiholo Sugar Plantation) and East Maui Stock Company (Ranch) merges with Haleakala Ranch Company

In October 1891, Haleakala Ranch Company accepted a merger with East Maui Stock Company, which included the East Maui Plantation Company. Also known as the Kaluanui Plantation, the East Maui Plantation Company was an early sugar plantation in the Makawao region, located south (*makai*) of the current project area, begun by Dr. Robert Wood and Ambrose H. Spencer in 1857 (Burns 1991). It consisted of 2,000 acres owned by the plantation, with 350 acres cultivated and employed 80 men and utilized 120 yoke oxen. The mill was located at Kaluanui, and both the mill and plantation were sold to W. F. Allan, T. Akanaliilii and Edward Hoffman around 1870. The East Maui Stock Company was incorporated in February, 1883, and in 1886 it was again sold, to Haiku Sugar Company, one year after its closure (Whitney 1886:170).

The merger brought in two new shareholders: Edward M. Brewer, Trustee; and C. Brewer and Company. In 1904, Mr. J. B. Castle acquired the Brewer interests in Haleakala Ranch, whereupon the agency of C. Brewer and Company was transferred to Alexander & Baldwin, Ltd. A few years later, Harry Baldwin acquired Mr. Thurston's shares and later a part of Mr. Castle's holding. Beginning in 1915, Samuel A. Baldwin began acquiring shares in Haleakala Ranch until he and his brother Harry finally owned all of the stock (Dean 1950:240).

4.2.8.3 Kaonoulu Ranch

The Kaonoulu Ranch was established by Harold Waterhouse Rice on the slopes of Haleakalā, following his purchase of the Cornwell Ranch in 1916. Mr. H. W. Rice became a member of the Territorial Senate in 1918, and thereafter was known on Maui as "Senator Rice." Senator Rice and Charlotte M. Baldwin, daughter of H. P. Baldwin, were married at Spreckelsville on December 7, 1907 (Nellist 1925:730).

It its early history, Kaonoulu Ranch included 10,000 acres within Ka'ono'ulu Ahupua'a and extended from the rim of Haleakalā (just below the conservation district) to the oceanfront in what is know today as Kihei. Between the 1940s and 1980s Kaonoulu Ranch sold some of their coastal lands. Today the *makai* boundary of the ranch is at Pi'ilani Highway.

Additionally, and relevant to the current study, Kaonoulu Ranch owns 250 acres in Makawao. These Makawao lands are adjacent to the current project area and were once owned by Rev. Jonathan Green, the founding minister of Po'okela Church. Kaonoulu Ranch's Makawao lands were purchased in 1916 from two families, one of which was Joey Carins family. Initially, these lands were used by the ranch as a stable and training facility for the Rice family's race horses and polo ponies. Their jockey and horse trainer, Kenji Ikeda, lived on the property in the house below the current day Oskie Rice Polo Field (the "outdoor" polo field). In the 1940s the ranch piggery was moved to Makawao from Kihei as a result of a land sale to the modern day Aston

Maui Lu Hotel. Kaonoulu Ranch also ran a dairy on their Makawao lands to supply milk for ranch use.

In the 1960s Henry Frederick "Oskie" Rice, son of H.W. Rice, became ranch manager. Mr. Oskie Rice built a small roping arena which eventually grew to become the current Oskie Rice Arena and rodeo grounds, which hosts the annual 4th of July Rodeo. In 1970 Mr. Oskie Rice built an outdoor polo field to perpetuate the tradition of polo in Makawao. In 1990 management of the ranch was passed on to Mr. Henry Rice, Oskie's son. Most recently, Mr. Henry Rice together with their newest ranch manager, Mr. Ken Miranda, created smaller pastures in the Makawao fields for the purpose of improving grazing quality. Today these same pastures are also used to rest bulls. Mr. Henry Rice has also recently completed construction of a new roping arena and corral facility on these Makawao lands. At present, the ranch runs between 1200-2000 head of cattle dependent upon pasture carrying capacity.

In addition to the above mentioned pastures, rodeo and polo facilities, there are five homes on the ranch's Makawao property. These homes are utilized as employee housing for cowboys and operations managers. Three of the homes are located above the outdoor polo field, and two others are across Olinda Road, above Po'okela Church. Today, several members of the Rice family live on Maui and remain active, supportive members of the Makawao and Kula communities. The Rice family continues longsatnding traditions in ranching and hosting both the annual Oskie Rice Memorial Polo Tournament and the 4th of July Rodeo.

(Kaonoulu Ranch history provided by Mrs. Wendy Rice-Peterson, great-granddaughter of Mr. Harold Waterhouse Rice and General Partner of Kaonoulu Ranch, via personal communication Sept. 4, 2015.)

4.2.8.4 Sun Mei Kama'ole Ranch at the Ahupua'a of Kama'ole

A well-documented example of the pursuit of success in ranching in the upcountry region of Maui can be seen in the story of immigrant rancher Sun Mei, older brother of famous Chinese revolutionary Sun Yat-sen. Sun Mei saw opportunities on Maui to continue his work recruiting Chinese laborers for plantation work, and to support Sun Yat-sen's efforts to lead a revolution in China. His prosperity was representative of many Chinese in Maui's uplands, including Makawao, where many businesses were Chinese-owned and farming had given way to merchandising.

In 1881, Sun Mei purchased a store in Kahului and intended to farm and raise cattle. In 1889, Sun Mei leased 3,900 acres of land from the Kingdom of Hawai'i, in the agricultural region of Kula, *ahupua'a* of Kama'ole, to start a cattle ranch. For the most part, the *ahupua'a* of Kama'ole consisted of rocky grazing land. By the early 1890s, Sun Mei had either leased or purchased an additional 2000 acres in Kēōkea, Kula, bringing the Kama'ole Ranch holdings to an estimated 6,000 acres (Sun 2011:66) (Cup Choy 2012). In 1893, Sun Mei subleased a pier and portion of his seaward land holdings to the Wilder Steam Ship Company. This land was described as situated at the waterfront of Kama'ole within Government Lease No. 407 (Sun 2011:171). By engaging in ranching, farming, lumbering, animal husbandry and brewing, Sun Mei's wealth at Kama'ole Ranch grew and he worked to accumulate land in Kama'ole in fee simple (Paratacharya 2003; Zanella 2010:9) (Sun 2011:127). This ranch was then purchased by Antoine F. Tavares.

In March 1928, the Kama'ole Ranch owned by Antone F. Tavares and Cyrus N. Tavares along with 500 head of cattle was sold to the Haleakala Ranch. Senator A. F. Tavares sold the Kama'ole Ranch to the Haleakala Ranch for approximately $110,000. At that time it was reported that Senator Tavares retained the title to the main ranch cottages and some 5.95 acres surrounding them. In 1928, the Kama'ole Ranch was reported to consist of some 1,500 acres, with 500 head of cattle, worth approximately $40 per head (Maui News 1928:1:4). At the time of this report, the former Kama'ole Ranch continues to be owned by the Haleakala Ranch Company.

4.3 Developments in Makawao from the 1900s into the Modern Era

The following section details developments and changes on Maui that further affect and shape the character of Makawao. Local demographic shifts in Makawao and Hāmākua Poko resulting from Hawai'i's annexation to the United States in 1898 had significant impacts on these rural areas in the late 19th century. Following the annexation, a number of farmers and ranchers in Makawao and Kula lost their leased land holdings and were threatened with dispossession now that U. S. Territorial law superseded laws of the former Hawaiian Kingdom. Many ranches faced lease expirations without the possibility of extension, and families sold their ranches and farms and left the region (Zanella 2010).

Anti-Chinese sentiments also abounded at this time. Much of the Kahului Chinatown was burned to control bubonic plague in 1900 (Lum and Lum 1999:16). In 1909, Chinese residents helped complete a water pipeline to carry water from Honomanū in East Maui to the parched fields of Kula. According to Mark, (1975) several Chinese women were hired to carry heavy pipes up a hillside to the construction site; four women carried each pipe a half mile. The County of Maui brought the new water line from the Ko'olau region of East Maui to a water station at Pi'iholo, and then on to Kula (Maui News 1908:1:2).

Further discussions are presented below regarding the continued role and influence of the Po'okela Church as a spiritual center in the community. The pineapple industry becomes a main industry in Makawao during this time, and the impacts of World War II on the community are highlighted here.

4.3.1 Po'okela Independent Protestant Church

During the first half of the twentieth century (1900-1941), the history of the Po'okela Independent Protestant Church reflected rapid changes in the social history of Makawao. During this time, the congregation was depleted when much of the district population moved to the lowlands of the central isthmus following new jobs in sugar and pineapple. In 1940, the church had only one active member, Mrs. Minerva Kalama. She was married to Samuel E. Kalama, the son of a previous pastor, John Kalama. In a time when there were no active services, "Aunty Kalama" continued to show up and hold Sunday school for the children (Farrington 2013; 2). Mrs. Kalama, together with Rev. Schultz, worked to successfully revitalize the church. Beginning in 1941, the number of United States military personnel stationed on the island of Maui during World War II (1941-1945) temporarily doubled the overall island population and brought new members to the congregation. Makawao regional community populations grew further in the postwar years with the return of Mauians from military service (Maui News 1907).

In the years following the war, the Po'okela Independent Church leadership became catalysts for political and spiritual change that continued to attract new members. As of June 2015, the Po'okela Independent Church conducts a preschool, Sunday school and Sunday services, and continues to be a place of cultural significance for all strata of modern Hawaiian society. The Po'okela Independent Church remains an important element of the cultural heritage of the Hawaiian people in the Makawao and Kula regions.

4.3.2 Makawao Forest Reserve

Beginning in 1904, preserving the watershed on the rainy slopes of Haleakalā became highly important. The Hawaiian Commercial & Sugar Company (HC&S), in conjunction with the Territorial Board of Agriculture and Forestry, proposed that the forestlands of Paia Plantation, Haiku Plantation and HC&S should be turned over to the Territory as a forest reserve. The 1908 declaration of the Makawao Forest Reserve "affect[ed] a portion of the district of Hamakuapoko, Island of Maui contained an area measuring 1,796 acres" (Judd 1918). Some Haleakala Ranch Company lands were affected by this plan. In the region of KaonouluRanch (formerly known as Cornwell Ranch), the owners fenced their *mauka* lands as forest reserve in (Giffard 1913).

According to the government survey of the Territory of Hawai'i, "The Makawao Forest Reserve was expanded along the west edge of the Kahakapao Gulch, to enclose an area including the top edge of Kahakapao Gulch along Lot 130 of the Haleakala Homesteads; and continuing along the top edge of the Kahakapao Gulch along Lot 131 of the Haleakala Homesteads; and continuing further along the top edge of Kahakapao Gulch to the south boundary of Grant 2885 to Kauwe, and including a portion of Waiohiwi Stream and including a portion of Piiholo Road; the expanded area containing some 263.32 acres" (Judd 1918:150). Today the Makawao community enjoys the open space that the Makawao Forest Reserve provides. There are horseback riding trails, mountain bike trails and hiking trails. This area provides a hint of what more areas of Makawao might have looked like in times when Makawao was more forested.

4.3.3 Pineapple Cultivation in Makawao

Pineapples were first planted in Hā'ikū in 1890 by David Dwight Baldwin. In 1903, both David along with his brother Henry Perrine Baldwin established the Haiku Fruit and Packing Company—Maui's first pineapple canning enterprise. Pineapple culture was begun both at the Maui Agricultural Company in Pā'ia, and at the Grove Ranch Plantation in Hā'ikū. In this way, pineapple became the main agricultural crop in the Makawao/Pi'iholo region through the turn of the century and into the early 1930s, during which time both the Hawaiian Pineapple Company and the Maui Pineapple Company had cultivated fields near Makawao, on lands which had been leased from the Haiku Pineapple Company (Hawkins 2011). In 1929 the difficulties in operating a cattle ranch and pineapple plantation at the same time led the two companies to partition their lands. The Haleakala Ranch Company was given title to all ranch lands and the Keahua Ranch Company received 7,700 acres of land, all buildings and personal property used in connection with Haleakala's pineapple business, and the assignment of the interest in the California Packing Corporation cannery at Kahului. The Keahua Ranch company was then renamed the Haleakala Pineapple Company. (Hawkins 2011:131). In 1931, J. Walter Cameron, manager of the Haleakala Pineapple Company was asked to draw up a plan to merge the interests of his company with that of the Maui Agricultural Company in order to cut costs. In 1932, Maui Pineapple Company, Ltd. was formed to take over Maui Agricultural Company's pineapple

division and the Haleakala Pineapple Company, Ltd. (Rho 1990:28). The lands of the current project area were included in these landholdings.

In the mid-1910s, the Libby, McNeill, and Libby Company constructed a pineapple cannery complex just outside of Ha'ikū, in Pa'uwela. By 1918, the Pauwela Pineapple Company of Ha'ikū, managed by Worth O. Aiken, also included a pineapple plantation in Makawao (Nellist 1925:206). Construction of the Pa'uwela facility included a garage in Kuiaha, and laborer camps in Ha'ikū, Pa'uwela, and Pukalani. Water was supplied to the cannery by way of the Wailoa Ditch (Stearns and MacDonald 1942:50). The cannery was bolstered by the construction of a 250-foot tall bridge spanning the 800-foot wide Māliko Gulch in 1913. This bridge allowed the Kahului Railroad Company to construct its' easternmost terminus at Ha'ikū, and transport fresh pineapple directly to the wharves at Kahului. The Haiku Fruit and Packing Company operated a cannery in Ha'ikū, an enterprise started by brothers Henry Perrine and D. D. Baldwin in 1903, which prospered greatly with the construction of the railroad through Hāmākua Poko (Dean 1950:166).

The cultivation of new fields demanded new sources of irrigation water. The commercial agricultural lands of Hāmākua Poko were irrigated by ditches maintained by East Maui Irrigation Company, and augmented with water supplied by pumping stations constructed by each individual plantation. Ownership of the upper Hamakua Ditch, the Kauhikoa and Keahua Ditches, as well as the Keahua Ditch extension all vested with the Maui Agricultural Company. The expansion of Pā'ia as a major commercial center occurred as pineapple cultivation in Pa'uwela accelerated, and Pā'ia village expanded with new housing construction (Wilcox 1996:114) (Figure 8).

By 1925, large areas of Maui Agricultural Company lands not adapted for the growing of cane were put into pineapple production. Pineapple grown in Hāli'imaile was canned in Kahului, and sent to the mainland. Operations were successful, and acreage was added to the venture until the effects of the Great Depression caused a cutback in production. At this time, the combined assets of both the Pineapple Department of the Maui Agricultural Company, and the Alexander & Baldwin-owned Haleakala Pineapple Company, were merged to become the Maui Pineapple Company. Sales slowly gained momentum based on the reputation of Hawaiian pineapple, and by the outbreak of World War II, product diversification included different grades of canned pineapple, and the successful introduction of canned pineapple juice (Dean 1950).

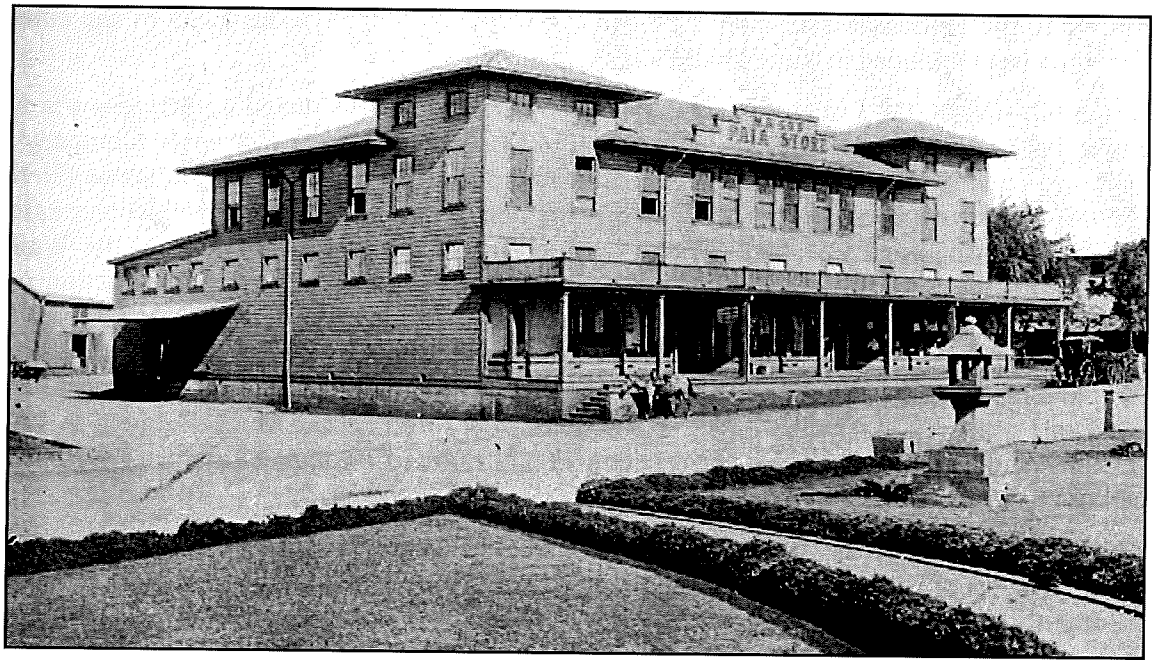

Figure 8. The Maui Agricultural Company Paia Store (Mid-Pacific Magazine 1919).

4.3.1 World War II (1941-1945)

Following the outbreak of World War II in December 1941, a succession of U.S. Army National Guard Divisions were assigned to occupation, guard, and training stations in the Territory of Hawai'i. Although the bulk of these defenses were placed along shorelines, ammunition depots were established across the upcountry regions of Ha'ikū, Makawao and Kula and defended by the 27th Infantry Division, and soon reinforced by the 40th Infantry Division. When elements of both divisions were combined and sent to the South Pacific for combat duty, they were replaced on Maui by regiments from the 33rd Infantry Division (Journal 1948). In April 1944, the 98th Infantry Division arrived for training on Maui, but left for occupation duty in Japan in 1945.

The "Seabees," construction specialists of the 39th, 48th and 127th Construction Battalions, were also on duty in upcountry Maui. Camps, training areas, depots and roads were constructed across the windward slopes of Haleakalā to house the vast numbers of soldiers, sailors and pilots who temporarily called Maui "home" (J. W. Turner 1945).

Impacts from the war on the town of Makawao are noted by individuals consulted for this study. Individuals interviewed for this study recall Makawao School being converted into a hospital for wounded soldiers. School children were placed in makeshift classrooms at Po'okela Church, St. Joseph's church and other locations at Kokomo. In 1943, the Army built a barracks-like building that housed the first through eighth grades. The current day Casanovas restaurant was the USO (see Section 8.1.5 Mrs. Elaine Kazue Kajihara Foo Sum). The 4th Marine Division Camp Maui was located near Pu'u Kauhikoa where there were training areas and facilities located throughout Hāmākua Poko. Several bunker systems were constructed at Keahua (below Hāli'imaile Village), under the church in Wailuku, by the McDonalds, under the Lahaina Cannery Mall Phase II; and at Hosmer's Grove, Haleakalā. Many believed there was a Japanese spy ring on Maui run by Japanese Naval officers where the storefronts of Hanzawas, Matsui and Pukalani Superette actually conducted spy activity (see Section 8.1.2 Mr. Alan DeCoite).

4.3.2 Olinda Honor Farm

Established by the Territorial government in 1953 to ease overcrowding at O'ahu prisons, the 30-bed Olinda Honor Farm (known as the Olinda Prison Camp per the 1957 U.S.G.S. Maui map) was located at Waihou Springs (Mann et al. 2003). The administration offices and dormitories were completed in 1957 (Wachter 1957), and low-security prisoners housed here were put to work digging up gorse (*Ulex europaeus*, invasive weed) that had overrun portions of upcountry Maui. Other prisoner work projects included the construction of the road which now circles West Maui (Honolulu Advertiser 1955), as well as the road that connected 'Ulupalakua with Kaupō (Norman Saito personal communication 2008). Budget problems within the Hawai'i State Prison System forced the facility's closure in 1973.

In the mid-1980s, renewed interest in the Olinda prison buildings by the Hawai'i State Department of Land and Natural Resources (DLNR) led to the establishment of the Olinda Endangered Species Propagation Facility by DLNR's Division of Forestry and Wildlife. The site is presently run by the DLNR as the Maui Forest Bird Conservation Center.

4.4 Modernization of Makawao

Modernization and consolidation characterized Makawao in the 1950s. Following the end of World War II, trucks replaced railroads, and the largest landowners of the region, the Maui Agricultural Company and the Hawaiian Commercial & Sugar Company, merged their operations. As the large agricultural interests began to shift their emphasis toward the central isthmus, the outlying plantation camps at Grove Ranch, Hāli'imaile, Kailua, Hā'ikū, Kāheka, Ka'ili'ili, Pukalani and Pa'uwela began to empty. New homes were developed in Kahului to accommodate plantation families and the return of Maui veterans from military service during WWII (Hee 1954). Pineapple cultivation expanded within the region of Hāli'imaile, then as profits began to taper eventually into financial losses, Maui Pineapple Company, Ltd. announced the end of their pineapple production in 2009, after nearly 100 years of business. Maui Pineapple Company, Ltd. then began to sell off their fallow pineapple fields and sales of these lands continues today.

By 1966, the Kahului Railroad Company had suspended its operations in Hāmākua Poko entirely, and sold off the various rights-of-way that had been owned by the railroad (Burnett 1966). Sugar operations east of the Māliko Gulch had been curtailed since the 1940s. Shortly after, pineapple-canning operations in Hā'ikū and Pa'uwela were shifted to the larger cannery in Kahului, signaling the railroad's demise. The Māliko Gulch trestle was dismantled and agricultural businesses related to the Hāmākua Poko region began to be centered on the HC&S Company Pā'ia Mill or the Pu'unene Mill. Between 1985 and 1990, both the Pā'ia Mill and the Pu'unene Mill were computerized. In 2000, the Pā'ia Mill closed, leaving only the Pu'unene Mill on Maui as the last operating sugar mill in the State of Hawai'i, operating today. (Dorrance 2000).

Beginning with the adoption of the Community Plan process in 1980, Makawao town adopted ordinances to preserve its rural ranching character (County of Maui 1996). The Makawao Rodeo, held each July 4th weekend at the Oskie Rice Arena in Olinda, is known as the most famous event in upcountry Maui. The rodeo is preceded by a parade that begins at the Makawao Veteran's Cemetery and travels through Makawao town.

Section 5 Previous Archaeological Research

5.1 Early Archaeology

The earliest systematic archaeological study in the *moku* of Hāmākua Poko was conducted by Winslow M. Walker (1931), who expanded on work by John F.G. Stokes (1916) that focused primarily on traditional Hawaiian ceremonial structures (i.e *heiau* and *ko'a*) and was intended for the B. P. Bishop Museum and Thomas G. Thrum (1908, 1916).

Walker completed surveys within the coastal region of Maui and ventured inland at Hāmākua Poko to investigate reports of a *heiau* structure named Kailua near Kailua Gulch. Thrum describes the location of Kailua Heiau as being a half-mile west of the Makawao-Wailuku Road (Thrum 1908:39). Conversely, Walker's location description in his manuscript *Archaeology of Maui* and reiterated by Elspeth Sterling in *Sites of Maui* (1998:97), places this *heiau* a half-mile west of Pā'ia Road (1931:86). While the location descriptions differ, both accounts of the structural dimensions of the *heiau* are consistent. According to both Walker and Thrum, the *heiau* had measured 50 by 80 feet; unfortunately, neither men were able to field-verify the location and condition of this *heiau*: Thrum (1908:39) stated that the "ruins (were) yet to be seen" and Walker (1931:86) documented the structure as "probably destroyed in cane." During background research for this study, the only *heiau* identified on historic maps was pinpointed on the 1872 Hawaiian Government Survey Map of Makawao (Lyons 1872): *Heiau Ahu a Kapiele* would have been located approximately a quarter-mile west of the road to Pā'ia Mill (current day Baldwin Avenue) and a half-mile east of the old Makawao-Wailuku Road (Lee-Greig 2014:54) (Figure 9Figure 9).

Walker and Thrum note two additional *heiau* in the vicinity of the current project region: Poaiwa Heiau at Kapukaulua (coastal, *makai*) (Walker 1931:86), and Papanene Heiau at Kapukaulua, Pu'unēnē (Thrum 1916:59; Walker 1931:86). As with Kailua Heiau, location notes on Papanene Heiau reveal discrepancies. The author of an 1865 newspaper article places this *heiau* in Wailuku at Kapukaulua, near Pā'ia; Thrum (1916:59) and Walker (1931:86) give the heiau a combined location of Kapukaulua and Pu'unēnē; the former account intimates that Papanene was located along the coast on the boundary of Wailuku and Hāmākua Poko moku, while the latter leads to the conclusion that Papanene was located nearer to the cinder cone of Pu'unēnē, southwest of Pā'ia Town (Lee-Greig 2014:54). By the time of Walker's 1931 survey, neither Poaiwa or Papanene had been observed, and both were documented as destroyed (Walker 1931:86).

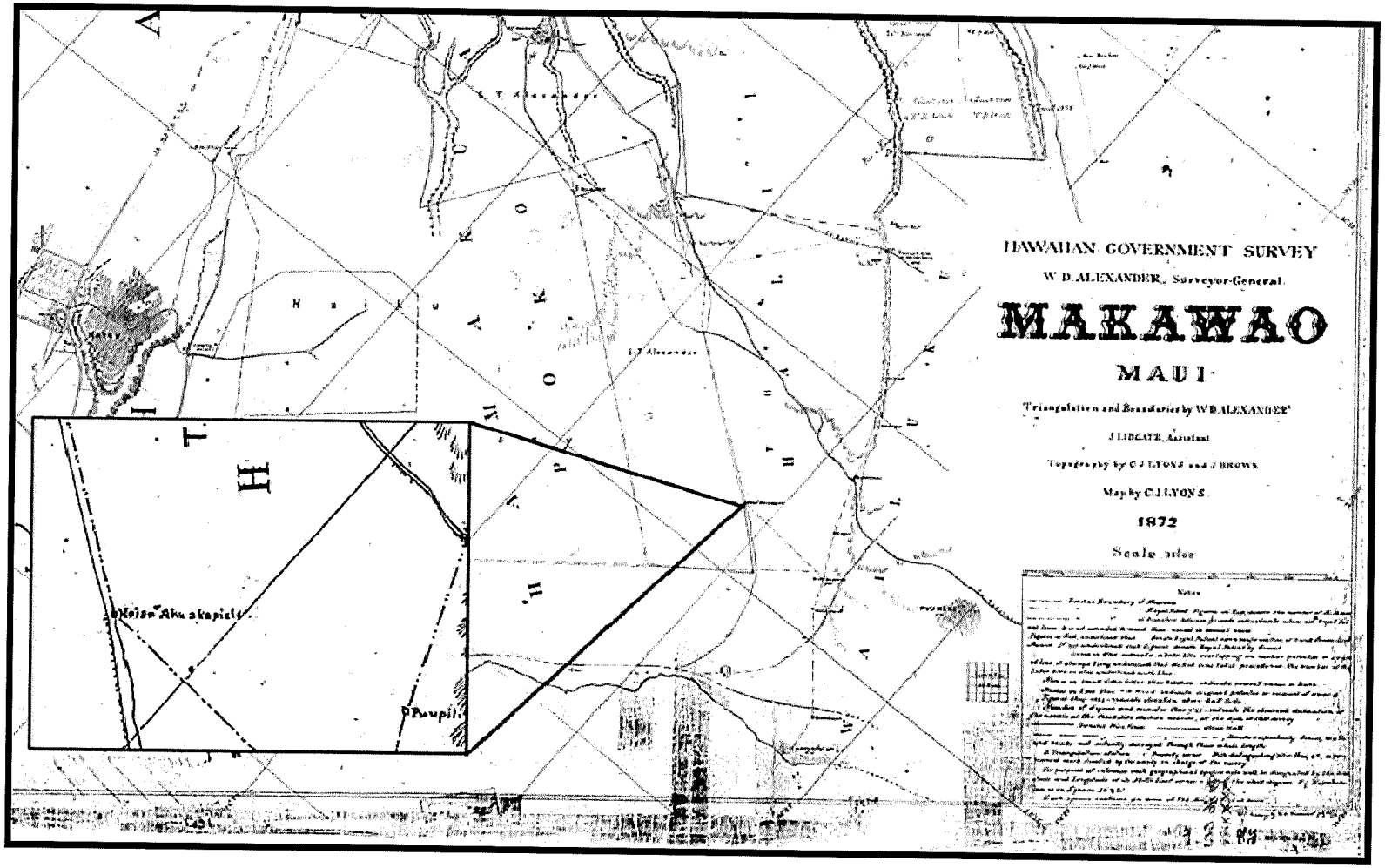

Figure 9. Portion of Hawaiian Government Survey Map (Lyons 1872), location of Heiau Ahu a Kapiele shown in blue.

Walker's 1931 study also reported the location of nine *heiau* structures in Hāmākua Loa, with one located in Pu'u o malei, somewhat proximate to the current project area:

> Heiau Site 77 – Kauhihale Heiau at Moii in Puuomaile(sic) on the *mauka* side of the road opposite the store. A big mango tree is growing in the center. A walled enclosure showing two and three terraces on the sides. It is also of the L-shaped type measuring 200 feet long and 137 feet at the widest part. The northeast corner is triple-terraced 10 feet high. Construction is of rough basalt. No coral or pebbles. (Walker 1931:165).

Besides Walker's work in the 1930s and investigations of the Kaulahao Burial Complex in Kū'au in the late 1960s and early 1970s, archaeological work in the region did not pick up until the mid- to late-1980s when Pā'ia was revitalized by windsurfing and coastal development. The *mauka* region notwithstanding, few archaeological reconnaissance and inventory surveys in the upper Pā'ia area have been performed with relatively little contribution to the archaeological data of the mid-elevation areas. This is likely due to few changes in regional land use and few triggers requiring archaeological studies, as little has changed in the region between lower Pā'ia and Makawao town. Makawao lands set aside for forestry, sugar cane, pineapple cultivation and ranching have remained in those uses for generations. The accompanying table provides a summary of current archaeological work completed in the area, followed by synopses of investigations where historic properties have been identified (Lee-Greig 2014:54).

That said, pre-contact settlement evidence does exist in the Makawao region. Researcher Inez Ashdown (1970) noted two *heiau* structures located in the vicinity of Makawao town and Pukalani, albeit both far from the current project area. References to other *heiau* structures in the region were noted by Kennedy (1991): none of them closer than Pu'u Pane, a cinder cone miles from the project area containing SIHP 50-50-11-1275.

Studies undertaken in each of the three distinctly different settlement regions within the Hāmākua Poko *moku* have yielded radiocarbon dates that suggest a pattern of settlement consistent with the Hawaiian Cultural Sequence established by Kirch (1985). Within this sequence, Kirch (1985) set date ranges for five periods of Polynesian colonization within the Hawaiian Islands. Following Kirch's model, evidence of the settlement of the coastal, stream, valley and upland regions of the *ahupua'a* of Hāmākua Poko can be organized and understood.

Additionally, because Makawao is a historic district, structures related to the early use of the area for ranching and agriculture are significant. The Frank and Theresa Gomes house, at 32 Pakani Place, Makawao, and the Hardy House, at 808 Makawao Avenue, were placed on the National Register of Historic Places in 2001 and 1984, respectively (see Table 5. Summary of Previous Archaeology of the Hāmākua Poko Ahupua'a.)

Table 5. Summary of Previous Archaeology of the Hāmākua Poko Ahupua'a.

Date	Author	Region	Nature of Study	Findings
1931	W. Walker	Entire Island	Reconnaissance Survey	Primarily concerned with the identification of monumental architecture or *heiau* identification. Location / Walker Number / Name / Comment Kapukaulua / 57 / Poaiwa Heiau / Destroyed (p.86) Kapukaulua, Pu'unēnē / 56 / Papanene Heiau / Destroyed (p.86) Near Kailua Gulch / 58 / Kailua Heiau / Platform 50 x 80 ft. Possibly destroyed by cane (p. 86)
1985	W. Kam	Makawao, Haleakala Homesteads	Field Inspection Report	No evidence of historic properties.
1988	Estioko-Griffin	Waikamoi Reservoir to Olinda Water Treatment Plant	Archaeological Inventory Survey	No evidence of historic properties.
1988	W., D., & E. Fredericksen	Pā'ia Town	Archaeological Inventory Survey	No evidence of historic properties.
1990a	D. Borthwick	Kahakapao Reservoirs	Reconnaissance Survey	No evidence of historic properties.

Date	Author	Region	Nature of Study	Findings
1990b	D. Borthwick	Kū'au Beach	Reconnaissance Survey	No evidence of historic properties in existing sugarcane field. Existence of "Kalahau Burials" in coastal strip of project area mandates preservation.
1990	W. Folk II	69-acre parcel at Kū'au	Reconnaissance Survey	No historic properties identified at surface, but two previously identified subsurface sites may extend into the project area.
1990	T. Donham	Hāli'imaile, Hōkū'ula, Kailua and Maka'eha Ahupua'a	Archaeological Inventory Survey	Five potential Maui High School sites were investigated in Hāli'imaile, Hōkū'ula, Kailua and Maka'eha, with no historic properties identified.
1991	Kennedy	Pukalani Highlands	Archaeological Inventory Survey	Three historic properties, two possible agricultural *heiau* and one probable burial, SIHP -2497, -2498, and -2499 respectively, were identified within the project area.
1994	D. and E. Fredericksen	Pukalani Highlands	Archaeological Inventory Survey	Two historic properties, a historic agricultural clear pile and a historic road right-of-way, SIHP -3526 and 3527 respectively, were identified within the project area.
1996	Wulzen et al.	A'apueo	Archaeological Inventory Survey	Formal documentation of the historic era site (50-50-10-4181) complex previously identified by Wulzen and Rosendahl 1996.
1997	H. Hammatt	Kū'au Beach	Archaeological Subsurface Testing	

Date	Author	Region	Nature of Study	Findings
1998	W. Folk and H. Hammatt	Hāli'imaile	Archaeological Inventory Survey	No evidence of historic properties.
1999	P. Conte	Kū'au Beach	Archaeological Data Recovery	Five partial sets of human remains were recovered from an eroding sand dune within the area of the "Kalahau Burials."
1999	D. and E. Fredericksen	Hōkū'ula	Archaeological Inventory Survey	Five previously unrecorded historic properties: four associated either with ranch-era activities or post-contact settlement of the area, and the fifth, an inaccessible cave, of an indeterminate time period.
2000	P. Titchenal	Pā'ia	Archaeological Inventory Survey	Backhoe testing within a 9.36-acre parcel a half-mile west of Pā'ia town revealed no cultural deposits.
2001	L. Morawski and R. Spear	Pā'ia	Archaeological Inventory Survey	Backhoe testing within a quarter-acre parcel revealed no significant cultural deposits.
2001	R. Rechtman and M. Clark	Pā'ia	Archaeological Inventory Survey	Backhoe testing within a three-acre parcel of vacant land in Pā'ia Town revealed no cultural deposits.
2003	L. O'Rourke	Kū'au	Archaeological Inventory Survey	Backhoe testing within a 0.16-acre residential parcel in Kū'au revealed no cultural deposits.

Date	Author	Region	Nature of Study	Findings
2003	J. Pickett, D. Guerriero, L. Rotunno-Hazuka and J. Pantaleo	Pukalani	Archaeological Monitoring Report	Ten burials within a historic Chinese cemetery (SIHP-5173), a pre-contact fire pit (SIHP-5469) and a historic irrigation ditch (SIHP - 5470) were documented during grading of the Kulamalu Commercial Subdivision.
2004	J. Pantaleo	Hāli'imaile	Archaeological Inventory Survey	Taylor-Fewell Subdivision and Grove Ranch Agricultural Subdivision No. 2 indentified two historic properties: SHIP: 50-50-06-5554, a Portuguese oven recommended for preservation and removal to the Sugar Museum. And SIHP: 50-50-06-5555, a cattle weighing scale.
2004	J. Pantaleo and K. Tsuha	Hāli'imaile	Archaeological and Cultural Assessment	Study for the proposed Pi'iholo well, no evidence of historic properties. Cultural assessment determined the area was used traditionally for *koa* wood harvesting as well as forest bird feather harvesting.

5.1.1 Archaeological Studies within the focus area

Estioko-Griffen (1988) conducted an archaeological investigation along the path of a proposed waterline improvement in upper Makawao. During the course of the inventory survey, Estioko-Griffen identified native trees within the study area but did not observe any significant historic properties within the project area corridor between Olinda and Waikamoi.

Douglas Borthwick (1990) conducted an archaeological inventory survey of a portion of the Makawao Forest Reserve. The project area contained two sets of concrete and basalt pylons that, during the late 1800s, supported an elevated water pipeline. Borthwick recommended no further archaeological work be performed in the project area.

Theresa Donham (1990) conducted an archaeological inventory survey of five potential upcountry sites for a new Maui High School campus. This inventory survey resulted in the discovery of three pre-contact lithic tools or tool fragments, and a lithic game stone fragment, all of which were associated with the subject property located along the north side of Makawao Avenue, in an area a half-mile from the current project area. Historic properties reflecting twentieth-century use (ceramics and glass) at Parcel 1 (Pukalani), pre-contact and historic occupation of Parcel 4 (Hōkū'ula), and an isolated pre-contact lithic adze at Parcel 5 (Hāli'imaile), were recorded during the course of this inventory survey.

An archaeological inventory survey of approximately 26 acres was conducted within Kailua *ahupua'a* at a place commonly referred to as Pukalani (Kennedy 1991). A total of three historic properties (SIHP No. -2497, -2498, -2499) were identified during the course of this study and recommended for preservation. Both SIHP -2497 and -2498 were classified as rock-filled platforms with similar construction features. SIHP -2499 was noted as significantly different from that of the other two sites and classified as a mound feature. Based on oral testimony, excavated materials and apparent elaborate construction of Sites -2497 and -2498, Kennedy (1991) postulated that these features were either agricultural *heiau* or burial mounds, or both. Due to the construction style, the mound feature (SIHP -2499) was interpreted as a probable burial feature.

Demaris and Erik Fredericksen (1994) conducted an archaeological inventory survey within a six-acre parcel of the Pukalani Highlands. Two historic properties were identified and tested. SIHP 50-50-05-3526, a historic agricultural clear pile, was deemed recent due to the presence of plastic mulch in the test unit. SIHP-3527 was found to be a recent plantation road extension. No further work was recommended.

William Folk II and Hallett H. Hammatt (1998) conducted an archaeological inventory survey in a 55-acre parcel at Hāli'imaile. No archaeological features were observed during the survey. The project area included features consistent with ongoing sugar cultivation. Irrigation ditches within the project area were deemed to be of no consequence if removed during development of the project area parcel.

Xamanek Researchers (1999) conducted an archaeological inventory survey of a waterline corridor of approximately 3,675 feet (1.12 kilometers), and a water tank area of approximately 1.041 acres within Hōkū'ula *ahupua'a* (D. Fredericksen and E. Fredericksen 1999). A total of five previously unrecorded historic properties were documented on the outskirts of the waterline

and tank project area. Four of the historic properties were interpreted as post-contact or historic-era sites likely associated with ranching or post-contact settlement of the area. A fifth site was tentatively identified as a shelter; however, the inaccessible location of this site made verification difficult. Site 50-50-10-4677 consists of a dry-stacked ranch-era retaining wall at the base of northern bank of Kailua Gulch. SIHP -4678 is a culturally modified shelter or storage cave that was interpreted as a post-contact shelter based on the presence of a metal fork and modification to the *pahoehoe* lava flow that appear to have been accomplished by metal pick. SIHP -4679 is a cave located along an inaccessible portion of cliff on the northern side of Kailua Gulch and was tentatively interpreted as a shelter. SIHP -4680 is located near the floor of Kailua Gulch and consists of a retaining wall that appeared to be associated with an unimproved road to the west of the wall. SIHP -4681 is a multi-component site located atop a *pu'u* and, based on location and structure, was tentatively identified as comprising burials.

Jeffrey Pantaleo (2003) conducted a surface survey and dug 26 backhoe test units within a 28.7-acre parcel proposed for the Kualono Residential Subdivision in Pukalani. SIHP 50-50-05-2701, a *heiau* structure, was previously identified by Joseph Kennedy in 1990. Kennedy (1990) carbon-dated the structure to AD 1620-1770. In the survey report by Pantaleo (2003), the *heiau* was recommended for protection within a 2-acre reserve. All subsurface backhoe tests performed during the survey revealed no cultural deposits within the project parcel.

Maui Land & Pineapple Company employees (December 16, 2003) who were excavating a waterline located on the edge of Pi'iholo Road inadvertently discovered a single burial in the southeast corner of the current project area. (Kirdendall 2003). Dr. Melissa Kirkendall (SHPD Maui archaeologist) and Dr. Manukian (Maui County Medical Examiner) identified the burial as a human female of Asian ethnicity of approximately 30 years of age. The burial was located in a clay matrix and there was no evidence of a coffin. The burial was assigned State Site Number 50-50-06-5501. Additional archaeological testing performed by Archaeological Services Hawaii determined that there were no additional burials in the immediate area. The burial Preservation Plan (in-draft) indicates that the burial was in a flexed position and is that of an adult female probably of Native Hawaiian ancestry. The burial remains were bundled and reinterred in an adjacent pit measuring 2-feet by 2-feet and 1-foot deep. The pit/burial was then backfilled and six inches of fill placed over the pit, then capped with a concrete slab measuring 3-feet by 2-feet by 4-inch thick with the site number inscribed on it; an upright boulder was placed over the burial. A 2004 Maui/Lāna'i Island Burial Council meeting recommended that the burial be treated in the following way: a platform constructed to a distance of five feet around the existing upright stone; native Hawaiian plantings used as ground cover; a 50 foot rock/boulder buffer created where possible; use of plaques/signage.

Archaeological Services Hawai'i (Pantaleo 2004) conducted an archaeological inventory survey for the 57-acre Taylor-Fewell Subdivision and Grove Ranch Agricultural Subdivision No. 2 (TMK: 2-4-001: 004, 019). The survey identified two historic sites: 50-50-06-5554, a Portuguese oven, and Site 50-50-06-5555, a cattle-weighing scale. The sites were assessed as significant under criteria "c" and "d". Subsurface testing was conducted on the property and no additional cultural materials or historic properties were observed. The Portuguese oven was recommended for removal and preservation at the Sugar Museum. The Taylor-Fewell

Subdivision and Grove Ranch Agricultural Subdivision No. 2 are located approximately 1.5 miles northwest of the current project area. No further work was recommended.

Jeffrey Pantaleo Consultants (2004) conducted an Archaeological and Cultural Assessment for a proposed Pi'iholo well in Hāli'imaile *ahupua'a*, (TMK 2-4-12: por. 6). The proposed well site was located across Pi'iholo Road and northwest of the current project area (Pantaleo and Tsuha 2004). The cultural assessment determined that in traditional times the area would have been used for harvesting *koa* and collecting native bird feathers. No cultural material or historic properties or were identified. No further work was recommended.

Scientific Consultant Services, Inc., (Pickett and Dega 2005) conducted an archaeological inventory survey for a 13-acre parcel in Pi'iholo and Ha'ikū *ahupua'a* (TMK: (2) 2-4-013-075). A single site, SIHP 50-50-06-5675, historic in nature, consisted of a privy, cistern, Portuguese oven and "a hole with an associated internal chamber." No cultural materials or deposits were encountered during subsurface testing. The project area was located *mauka* of the present project area. No additional archaeological work was recommended.

McIntosh and Cleghorn (2007) conducted an archaeological inventory survey for the lands of the current project area and including additional parcels, TMK (2) 2-4-12: 5, 9; the total acreage surveyed included an area of 325 acres. One burial was located on the property (described above and recorded in 2003), SIHP 50-50-06-5501; and one new historic property, SIHP 50-50-06-6273, a large basalt retaining wall and associated soil terrace, was located in the gulch on the southern boundary of the project area. An isolated polished basalt adze fragment was also discovered on the surface of an eroded pineapple road. GPS points were taken on the adze fragment, a concrete slab, an active galvanized pipeline, a large corrugated pipe, a cast iron waterline and PVC pipes. These items were not determined to be historic properties and no other historic properties were documented.

5.1.1.1 Kaulahao Burial Complex 50-50-05-1064

A number of archaeological studies have either examined or made mentioned of the features and human burial interments associated with the Kaulahao Burial Complex located in a sand dune *makai* of Hāna Highway along the west end of Kū'au Bay (Table 6). Over the years, the area has been known for exposed burials that have periodically eroded out of the sand dune and cliffside (McQuagge and Mish 1989), particularly during the winter high surf season. Formal investigations into the site began in 1968 when Robert Bowen conducted field school excavations at the site and assigned a site number (50-MA-B26-2) in accordance with the Bishop Museum's site numbering convention. In 1973, the site was recorded as part of the statewide survey and given the current State Inventory of Historic Properties (SIHP) number 50-50-05-1064 and named the Kaulahao Burial Complex" (Lee-Greig 2014:69).

It generally appears that the Kaulahao Dune Site is representative of substantial occupation during traditional times, when the site's major focus was marine exploitation. Later, the site focus appears to have shifted to one more directly associated with human burials. Bowen asserts the hypothesis of an initial focus on habitation followed by a more intensive use of the area as a burial ground; he derives this from stratigraphic interpretation of three burials where he observed that the burial pits were "intrusive from Level 2, cutting through all cultural strata below and continuing into sterile clay" (Bowen 1968:Stratification), further noting that "much erosion has

taken place along this coast in recent years." Erosion continues to threaten the Kalahau Dune Site. Over the years, Ms. Theresa Donham, formerly of State Historic Preservation Division (SHPD), has rescued over 50 burials (Conte 1999:1; Hammatt 1997:8) from the wave-cut face of this site.

Table 6. Summary of Archaeological Studies Specific to SIHP 50-50-05-1064 (Kaulahao Burial Complex)

Reference	Year	Description
Bowen	(1968)	Field notes: Excavation of three, one-meter units identifying four distinct strata with cultural layers recorded in Strata 2 and 3. Three *in situ* burials identified in two of three test units.
Mitchell	(1983)	Documentation: Identification of seven localities along the cliff face where human remains were exposed due to wind and sea erosion. It is unknown if the remains were collected at the time of documentation.
McQuagge and Mish	(1989)	Maui Community College Student Report: Under the direction of Demaris Fredericksen, Ph.D. two students recovered the remains of three individuals exposed due to erosion, while two were left *in situ* as they were not in immediate danger.
Conte	(1999)	SHPD In-house Report: Partial recovery of at least five individuals from the cliff face.

5.2 Archaeological Background Summary and Predictive Model

The chronological timeline for settlement of the Hāmākua Poko coast can be confidently postulated based on area archaeological research. Based on the discovery of *in situ* midden deposits and burials functionally attributed to a pre-contact fishing village population by Clark and Toenjes (1987), habitation in the Hāmākua Poko coastal region may date to as early as A.D. 1420-1810. The same study recorded a basalt boulder displaying petroglyphs (SIHP -1063) at Kū'au as well as an associated boulder believed to have been used as a polishing stone for adzes. Midden evidence of habitation, the widespread use of this coastal area for burials, and the location of ceremonial sites, including a *heiau* site at coastal Kailua described by Walker (1931), leads archaeologists to believe that habitation in the windward coastal region of Hāmākua Poko was permanent and perhaps sizable.

Evidence of pre-contact pondfield irrigation within the Māliko Gulch was established by ethnographic research performed by E. F. Craighill Handy and Elizabeth Handy in the 1930s. Permanent habitation in the gulches was consistent with the care of crops irrigated by the flowing streams: "Maliko Stream, flowing in a gulch that widens and has a flat bottom to seaward, in pre-sugar-plantation days had a considerable number of lo'i" (Handy and Handy 1995:498). Plentiful marine resources found at the landings at Pā'ia and Kū'au would have allowed for a portion of the inland population to travel to and along the shoreline and exchange

wetland and dryland crops for fish. The establishment of inland pond agriculture in this region is consistent with Kirch's (1985) definition of the Expansion Period (A.D. 1100-1650).

According to Folk (1998), the accepted land use for the Makawao region of Hāmākua Poko is one of dryland agriculture, as indicated by his research of claims presented for Land Commission Awards (LCA) in the region. The LCA's documented "kula land" uses are consistent with late pre-contact use for sweet potato, banana, paper mulberry trees (*Broussonetia papyrifera)*) and pasture (Folk 1998). This fits with the model that the more intensive use of the Makawao area was a later pre-contact development that corresponded with the continued expansion of upland permanent habitation, ceremonial construction and agricultural clearing in the Makawao-Pukalani region.

Further support for permanent habitation in the Makawao-Pukalani region comes from local historian and author Inez Ashdown (1970), who recorded evidence of pre-contact activity in the Makawao area in the form of two *heiau* structures. Ashdown (1970) described the site of one *heiau* as adjacent to the "old Makawao Post Office" on lands "once owned by Louis von Tempski (*sic*)." The other *heiau* "was just above where Bullock's [restaurant] is now on the Pukalani road. That entire area was upland farming for natives."

A Puakalani *heiau* [SIHP 50-50-05-2701] described by Kennedy (1991) and Pantaleo (2003) provided evidence of on-site toolmaking in the form of volcanic glass, basalt flakes, and kukui. Charcoal sampled from the site's test excavation indicated settlement in the vicinity of Pukalani by circa A. D. 1620-1770, dates which again place the occupation of the region in Kirch's (1985) Proto-Historic Period (A.D. 1650-1795).

From these studies, a strong outline for an overall settlement pattern in Hāmākua Poko can be postulated. Permanent populations were concentrated in gulch areas in the vicinity of fresh water sources as well as in areas providing access to dryland agriculture in the uplands (Donham 1990). The population required to construct and maintain the taro *lo'i* (terraces), and the evidence of wetland cultivation within the valley areas of Māliko Stream documented by Handy and Handy (1995), coupled with the concentration of pre-contact human burials in the region of the Baldwin Beach Park and both the Pā'ia and Kū'au coasts, all indicate a somewhat sizable, politically-centralized, permanent settlement along the coastal region, bounded by both Kailua and Māliko Streams.

The coastal sites may have been settled as early as A.D. 1420, according to Clark and Toenjes (1987), with settlement of the region of Makawao occurring as early as A.D. 1620 (Kennedy 1990). Toolmaking, construction of *heiau* structures, and access to forest resources, such as sandalwood (*Santalum sp.*) and *koa* (*Acacia koa*) trees in the region of Pukalani, is estimated to have occurred in the century just prior to European contact, 1778 (Kennedy 1991). Abundant coastal resources and rich soils of the alluvial plain of Hāmākua Poko notwithstanding, the forest resources of Makawao Ahupua'a and the trail systems were of equal importance to the people of these lands.

While the region's traditional landscape has been thoroughly altered by commercial sugar production from the 1850s through modern times, pre-contact features discovered within the current project area may mirror that of similar environments elsewhere on Maui Island. These site types would have consisted of dispersed, low-intensity, dryland agricultural features such as

mounds, small terraces and alignments, as well as temporary habitation terraces and shelters (Chaffee et al. 1997; Donham 1990; Miura 1982) and trail markers such as *ahu* (stone cairns). While surface indications of such features may exist as either a scatter or ruin, intact subsurface deposits indicative of habitation or ceremonial use may remain.

Based on the historic literature and the development of the sugar industry in the easternmost extent of Wailuku *ahupua'a* and Hāmākua Poko *moku* overall, it is likely that historic properties associated with historic era plantation agriculture and infrastructure (e.g. clearing mounds, water control features, concrete foundations, and transportation features), as well as historic habitation and town/village development (e.g. historic buildings and historic cultural material scatters representative of former plantation villages) exist in the immediate vicinity of the project area (see Section 4.2.5 Maui Sugar Plantations) (Lee-Greig 2014:70-71).

Section 6 Community Consultation

Throughout this study, a concerted effort was made to contact and consult Hawaiian and other cultural organizations, government agencies and individuals who might have knowledge of and/or concerns about traditional cultural practices related to the focus area. Information pertaining to traditional cultural practices was attained by way of letter, e-mail and telephone calls. Contacts were mailed a letter on May 5, 2015 that introduced and outlined the type of information being sought, as well as maps and photographs of the project area. Table 7 below presents those individuals consulted, along with affiliated organizations and agencies.

Table 7. Alphabetical Listing of Individuals Consulted for this CIA

Name	Organization	Contacted	Personal Knowledge (Y/N/S)	Comments
Key: Y=Yes N=No A=Attempted (at least 2 attempts were made to contact individual, with no response) S=Some knowledge of project area DC=Declined to comment DP=Declined to participate R =Referral made U=Unable to contact, i.e., no phone or forwarding address, phone number unknown				
Mr. William (Billy) Abreu	*Kama'āina*	Y	Y	Referral to Mr. Harold Amoral, Phyllis Abreu. (see Section 8.1.1)
Mrs. Phyllis Abreu	*Kupuna*	Y	DP	
Mr. Harold Amoral	*Kupuna*	Y	D	Referred author to his previous oral history interview on Akaku *Recollections*
Mr. Peter Baldwin	*Kupuna*	Y	D	
Mr. Ryan Churchill	Former Vice President-Maui Land & Pineapple Co.	Y	S	Mr. Churchill left Maui Land & Pineapple Co. in June 2015. He explained that there was a burial located at the northeastern corner of the project area, near Pi'iholo Road. He also made a referral to Mr. Doug McClure, a retired manager of Maui Land & Pineapple Co. (see Section 8.2.2)
Ms. Doreen Napua Canto	President, Maui Native Hawaiian Chamber of Commerce and Maui Island Commissioner, Hawaiian Homelands Commission	Y	N	Referral to Lyons Naone

Name	Organization	Contacted	Personal Knowledge (Y/N/S)	Comments
Ms. Mervina Cash-Kaeo	CEO, Alu Like	2x		
Father Geronimo Castro and Ms. Donna Pico	St. Joseph's Church	Y	--	Added referral request to church bulletin
Ms. Joyclynn Costa	Aha Moku Hāmākua Poko Moku Representative	Y	Y	
Dr. Kamanao'pono Crabbe	CEO, Office of Hawaiian Affairs	Y	R	Referral to: • Mr. Ke'eamoku Kapu • Ms. Joyclynn Costa • Ms. Christine Tavares • Ms. Virginia Nary • Mr. Kyle Nakanelua • Mr. Basil Oshiro • Mr. George Kaimiola • Ms. Gerry Harmon • Mr. Hinano Rodrigues • Mr. Joey Iokepa Naeole • Ms. Kekai Robinson
Ms. Morgan Davis	Maui Archaeologist State Historic Preservation Division	Y	S	Recommended completion of Burial Preservation Plan. (see Appendix C)
Mr. Alan DeCoite	Military Historian/ *Kama'āina*	Y	Y	(see Section 8.1.2)
Mr. Herman Louis DeCoite	*Kama'āina*	Y	Y	(see Section 8.1.3)
Mr. Patrick Fisher	*Kama'āina,* Wildlife Biologist, hunting guide	Y	Y	(see Section 8.1.4)
Mr. Kenneth Freitas	Referral from Anders Lyons	Y	Y	(see Section 8.1.6)
Mr. Duane Hamamura	President, Makawao Community Association	Y	R	(see Section 7.1 Makawao Community Association Meeting June 16, 2015)
Mr. Morris Haole	Referral from OHA	N	--	
Ms. Gerry Harmon	Referral from OHA	Y	N	
Mr. Robert Hobdy	Hawaiian Ecologist/Botanist	Y	Y	(see Section 8.1.7)

Name	Organization	Contacted	Personal Knowledge (Y/N/S)	Comments
Mr. Jason Jeremiah	Senior Cultural Resource Manager-Kamehameha Schools Bishop Estate, Land Assets Division	A	--	Mailed consultation letter
Mr. Sam Ka'ai	*Kama'āina*	Y	Y	Believes farming should be primary, housing secondary. Skeptical that the farming component will be realized as virtually no other Maui housing developments in agricultural zoning actually uphold the agricultural requirements. Believes this will be another "Gentlemen's Estate." (see Section 8.1.8)
Mr. George Kaimiola	Referral from OHA	A	--	
Mr. Ke'eamoku Kapu	Chairman, Native Hawaiian Historic Preservation Council (Office of Hawaiian Affairs)	Y	R	Referral to Aha Moku Council Reps. Joyclynn Costa and Leona Nomura
Ms. Melissa Kirkendall	Professor of Anthropology, UH Maui College	Y	Y	
Ms. Sissy Lake-Farm	Executive Director, Bailey House Museum	Y	N	Invited to utilize Museum archives
Mr. Anders Lyons	*Kama'āina*	Y	Y	Referral to Mr. Kenneth Freitas and Henry Silva (see Section 8.1.9)
Ms. Jobi Masagatani and Mr. William Aila Jr.	Chair and Deputy to the Chair, Hawaiian Homes Commission, Department of Hawaiian Home Lands	A		
Mr. Joey Iokepa Naeole	Referral from OHA	A		
Mr. Kyle Nakanelua	Po'o, Mokupuni o Maui-Aha Moku Council	Y	R	Forwarded to Moku Reps Joyclynn and Leona.
Ms. Wendy Rice-Peterson	Descendant of H W Rice, owners of Ka'ono'ulu Ranch.	Y	Y	Provided Ka'ono'ulu Ranch history.
Ms. Virginia Narry	Maui Office Manager, Alu Like	Y	R	Referrals to families; she said she would contact them and forward my contact info:

Name	Organization	Contacted	Personal Knowledge (Y/N/S)	Comments
				Baltizar, Celine Suda, Marciels, Freitas.
Ms. Leona Nomura	Aha Moku Hāmākua Poko Moku Representative	Y	Y	
Mr. Basil Oshiro	Referral from OHA	Y	R	Passed referral on to Joyclynn Costa and Leona Nomura
Aunty Patty Nishiyama	Na Kupuna o Maui	A	--	No mailing address, did not respond to calls.
Ms. Wendy Rice Peterson	*Kama'āina* Kaonoulu Ranch 'Ohana, General Partner	Y	Y	Shared ranch history (see Section 4.2.8.3)
Kumu Keli'i Reichel and Punahele Krauss	Kumu Hula	Y	Y	(see Section 8.1.10)
Ms. Kekai Robinson	Referral from OHA	Y	Y	Employee of Bailey House Museum, performed Hawaiian language newspaper research and translation.
Mr. Hinano Rodrigues	Culture and History Branch Chief, State Historic Preservation Division	Y	Y	Explained that the burial preservation plan needs to be completed.
Ms. Thelma Shimuoka	Maui Island Supervisor, Office of Hawaiian Affairs	Y	R	see OHA referrals (Appendix C)
Mr. Henry Silva	Referral from Mr. Anders Lyons	U		
Ms. Janet Sixx	Chairwoman, Maui County Cultural Resource Commission	A	--	Sent letter to Annalise Keheler to forward to MCCRC
Mr. Hugh Starr	Olinda resident	Y	Y	(see Section 8.1.11)
Ms. Christine Tavares	*Kama'āina*	Y	Y	Ms. Tavares's husband was from Makawao and lived at Corn Mill Camp. She made referrals to Phyllis Abreu, Kili Haole, Morris Haole.

Section 7 Hawaiian Community Organization

7.1 Makawao Community Association Meeting June 16, 2015

Representative and Principal Researcher Ms. Colleen Medeiros attended the Makawao Community Association meeting on June 16, 2015. Traditional cultural practices information as well as historical information was requested from the community. Contacts were made with individuals who were familiar with Makawao; Mr. Brendan Baltizar, Mr. Hugh Starr and Mrs. Erin Starr, Mr. Jeremy Baldwin and Mr. Calvin Shibuya. Meeting attendees asked questions related to project concept, design and construction.

7.2 Aha Moku Council-Hāmākua Poko Moku, July 10, 2015

Ms. Medeiros met with Ms. Leona Nomura and Ms. Joyclynn Costa, Hāmākua Poko representatives for the Aha Moku Council on July 10, 2015. Ms Nomura and Ms. Costa were familiar with the proposed project and had been out to the property several months earlier with Mr. Joshua Chavez.

Ms. Nomura and Ms. Costa expressed their concerns regarding the amount of chemicals; pesticides and fertilizers, the land has seen throughout the years while under pineapple cultivation. They mentioned a chemical dump site near the Mauna'olu Estates residential development (near the former Mauna'olu College location), further expressing their concern regarding the amount of chemicals believed to be in the soils from previous agricultural activities. They recalled a contamination of cow's milk due to the pineapple bran they were fed.

Regarding recreational activities in the focus area, Ms. Nomura recalls swimming in 'Alelele Pond and Pi'iholo Ponds and describes walking from Hāli'imaile to swim at Pi'iholo Pond. Ms. Nomura also describes having the freedom to walk anywhere as children, explaining that there was a different sentiment, landowners did not try to keep people off their lands. They were freely allowed to access Pi'iholo Ponds, for example.

Ms. Nomura was born at Paia Hospital, is also a member of St. Joseph's Church. She was baptized at the church and married there as well, as was her mother. She explained that her entire family is buried at the church cemetery.

Section 8 Summaries of Community Member Interviews

Thirteen informal and formal interviews were conducted for this study, with community elders or *kūpuna*, longtime residents, individuals connected with area industry, and *kama'āina* who are connected to these areas and area families. Summaries of these oral history-style interviews are below.

8.1 Informal Interviews

Informal interviews were conducted between May and August 2015 over the telephone and in person; verbal permission was obtained to share resulting information in this document. Written responses were accepted via email and/or post mail.

8.1.1 Mr. Billy Abreu

Mr. Billy Abreu is the son of Mr. Willy Abreu and Mrs. Phyllis (DeCoite) Abreu and was born at the Paia Hospital. Mr. Abreu is fourth-generation Portuguese living on Maui. His maternal great-grandmother emigrated from the Azores with her parents at the age of 10, in the late 1800s to early-1900s. Mr. Abreu's father worked for Haleakala Dairy, which at the time was owned by the Baldwin family. Mr. Abreu stated that his father worked for four generations of Baldwins at the dairy, until its closure approximately 10 years ago. The Abreu family lived in a home at the dairy along with a handful of other employee families. Haleakala Dairy was located off the current-day Kealaloa road, near the Haleakala Ranch headquarters. Mr. Abreu attended St. Joseph's school then went to St. Anthony's. He mentioned that a portion of the St. Joseph's property was originally owned by the neighboring plantation in the early 1900s. The plantation owner gifted the church a portion of the lands for helping him extract his car from the mud one rainy night. Mr. Abreu grew up as member of the church. Mr. Abreu said he worked summers to pay his tuition at St. Anthony's.

Growing up at the dairy, Mr. Abreu learned a lot about cattle. Today, he maintains a herd that he keeps in various Makawao pastures and sells wean-outs, dairy cows, beef cows and steers for roping; he also maintains a sheep herd. Between 1986 and 1997, Mr. Abreu operated his own meat market located at the Kaupakalua intersection. He explained that Polly's used to be "Tam's" Meat Market. Mr. Abreu also maintains a sheep herd.

On May 14, 2015, Mr. Abreu, who has lived his life thus far in Makawao, took Ms. Medeiros on a tour of the project area and Makawao Town that began at the Hoku Nui Maui property above St. Joseph's church. There, Abreu explained that when he was a young boy the area had been owned by Grove Ranch, a cattle ranch that raised Angus cattle for beef. The current day Hoku Nui project area includes fields 1, 2 and 3 (*mauka* to *makai*) of the former Grove Ranch. Abreu explained that the project area was in sugarcane prior to Grove Ranch.

We drove back towards Makawao, where we stopped at "Tam Gulch", the gulch just past Polly's, over which the Baltizar Bridge is constructed. The stream that flows under Baltizar Bridge/Makawao Ave. likely joins the larger Māliko stream/gulch which, further *mauka*, forms a portion of the southern boundary of the Hoku Nui property. A possible name of Tam Gulch, is Ku'aihulumoa (Sterling 1998; 97). Mr. Abreu explained that this area is owned by Anthony Tam, whose family once lived in a house located here. The house was situated in a flat, broad

area in the gulch; the intermittent stream flowed on the Hā'iku-side (northeast) of the house. Although their house was destroyed by arson in the 1970s, several fruit trees the Tams planted still grow here, including navel oranges, *longan*, *lychee* and avocado.

During a walk up Ku'aihulumoa Gulch, Mr. Abreu said Makawao has had a great deal of rain this year and that that gulch is almost never wet. He believes *pohole* (*Diplazium sandwichianum*) fern would grow well in this gulch, as well as taro. Vegetation in the gulch once consisted of coffee plants (*Coffea Arabica*), *'ape* (*Alocasia macrorrhizat*), *kukui* nut trees (*Aleurites moluccana*), night blooming jasmine (*Cestrum nocturnum*) and *pepeiao* (wood ear fungus, *Auricularya cornea*), which Mr. Abreu said was collected and sold for food. Christmasberry (*Schinus terebinthifolius*), black wattle (*Acacia mearnsii*) and Eucalyptus (*Eucalyptus* spp.) were also seen during this visit. "Blue weed," a plant with an indigo/purple flower, was present in Tam gulch; Mr. Abreu said it could be made into a poultice for wounds and was used on horses. Mr. Abreu also said that *'Inia* trees (pride of India, *Melia azedarach L.*) were fed to cattle during times of drought. He also mentioned that *poha* berries *(Physalis peruviana)* grow in Olinda.

Evidence of pig rooting was visible in the area, and Mr. Abreu said there are pigs in the area in addition to axis deer. We came upon SHIP: 50-50-06-6274, the retaining wall and possibly the associated soil terrace, which Mr. Abreu explained might have been part of an old piggery and also used to contain cattle. Mr. Abreu pointed out what he believes to be an old trail, possibly the old bridle path depicted on the 1872 Hawaiian Government Survey map by C.J. Lyons. In this map, the bridle path crosses this gulch (Figure 9). Mr. Abreu recalls riding horses to the ponds near Pi'iholo, and mentioned that previously he could ride anywhere and people didn't mind. He explained that there used to be riding stables owned by Sue DeCoite where they took tourists for rides. Ka'ono'ulu Ranch owns adjacent pasture that extends southwest towards Olinda road, and the Ka'ono'ulu Ranch owners, the Rice family, has owned these lands in Makawao since 1916, including the Oskie Rice Arena and rodeo grounds, the Oskie Rice polo field and a house across Olinda Road just above Po'okela Church.

When discussing cattle, Mr. Abreu recalled moving cattle from the dairy to their breeding location at Pi'iholo on a path that went along the current day Kealaloa Road, by Haleakala Ranch headquarters, to Hanamu Road, which intersects Olinda Road at Oskie Rice rodeo grounds. They would guide the cattle *mauka* along Olinda Road for a short distance and then take a left onto Maluhia Place. At the point where Maluhia Place intersects the Hoku Nui property (by the chicken coops), the cattle were again turned *mauka* and driven approximately to the *mauka* extent of Hoku Nui's property boundary, where they changed direction again and headed northeast across Pi'iholo Road to Waiohiwi (stream) and finally to Pi'iholo, in the region of the current day Pi'iholo Ranch arena. Mr. Abreu referred to this area above the rodeo grounds as Maluhia. When owned by Haleakala Ranch, the pastures here were known as pastures 1, 2, and 3.

Mr. Abreu contacted two individuals, Mr. Harold Amoral and Mr. Racky Santos, to inquire about sharing area information; they both declined. Mr. Amoral suggested referring to the book about the 125-year anniversary of Haleakala Ranch for further information.

8.1.2 Mr. Alan DeCoite

Mr. Alan DeCoite was born 1953 and is the son of Tony DeCoite, the owner and founder of the DeCoite slaughterhouse, which opened in 1951 and remains in operation today. Although all the ranches once had their own slaughterhouse, the DeCoite slaughterhouse is the only permitted slaughterhouse on Maui today. He has worked in Maui's cattle and beef industry for over 40 years.

Mr. A. DeCoite's family also founded the first meat company in Makawao and in addition to the slaughterhouse, owned a cattle ranch, feedlot and dairy. Their family cattle ranch was located by Pi'iholo Hill; his grandfather purchased their lands at the turn of the century. Today Mr. A. DeCoite lives on a family parcel of 100 acres above Olinda. Earlier on, his family's dairy was abandoned and in the 80s, the family was forced to close at least one of its three beef cattle businesses because they were in violation of the 1927 Meat and Stockyard Act; they also chose to close their feed lot. After this time, they utilized other feedlots such as the Nobrigas on Waiko Road, or the Sakugawas (pre-1960s), where they would finish their cattle on such feed as pineapple husks, which sweetened the meat.

Mr. A. DeCoite attended St. Joseph's School and then St. Anthony's. He went on to Seattle University before joining the Marines in 1973. He returned to Maui in the 1980s and worked for his family's business running cattle at Pi'iholo (from 80s-90s). Mr. A. DeCoite also worked in the slaughterhouse and delivered meat to several area markets, including Tam's Meat Market, Silva's Meat Market, (currently the Pi'iholo Zipline office off Makawao Ave.; Silva's was owned by the Cabral and Silva families), Yoshito's Meat Market (currently Rodeo General Store), Horiuchi Meat Market in Pā'ia, and Noda Market in Kahului Shopping Center.

Although the family owned some of the lands around Pi'iholo Hill, they also leased other lands in the area from Mrs. Harriet "Haku" Baldwin, including Pi'iholo Hill itself; Mr. Peter Baldwin later bought these lands from his mother, Haku, and developed the current day Pi'iholo Ranch. In 1985, Mr. A. DeCoite cleared Pi'iholo Hill and other lands for grazing, using a large-scale mower that his father purchased and shipped from Australia—the first of its kind to arrive on Maui. He said he mowed down guava trees in 'Alelele Gulch. While clearing Pi'iholo Hill, Mr. A. DeCoite said he found a *pohaku ma'a*, or a traditional Hawaiian slingstone. Mr. A. DeCoite also recalls when and how he believes the invasive Waddle Tree was spread upcountry. He explains that between 1983-1986, HC&S Company spread silica on their fields, and not long after he noticed Waddle Trees began to grow from it. Their seeds were further spread with the moving of tractors to all parts of Maui. Additionally, the Soil Conservation Service plus Civillian Conservation Corps planted many of trees seen today, including the eucalyptus.

As well as being a lifelong cattleman, Mr. A. DeCoite is a military historian. He has spent his lifetime collecting military artifacts and memorabilia, including aircraft, several of which he has restored and are on display in Naval and Aviation museums across the country. He spoke of a F3F-Flying Barrel which crashed on hill in kula.

He told other stories, of the von Tempsky family and the famous von Tempsky wall. He explained that prior to and throughout WWII, Alexa von Tempsky Zabriskie hosted servicemen and officers at her Kula estate. When the servicemen arrived at La Perouse bay, Mrs. Zabriskie sent carriages down to bring the officers up to her house. This tradition persisted and she hosted

many officers. A tradition of signing a wall in her home began until it became known as the "Von Tempsky Wall." Edward Buch O'Hare, the Navy's first "flying ace," was one of Mrs. Zabriskie's guests and signatories on the wall. Mr. DeCoite explained that prior to the sale of the von Tempsky house, he was tasked with arranging to have the wall dismantled and shipped to Florida to be put on display at the National Naval Aviation Museum. He also flew to receive it in Florida, and meet the Museum curators.

Mr. A. DeCoite explained that the 4th Marine Division Camp Maui was located near Pu'u Kauhikoa with training areas, facilities and operations throughout Hāmākua Poko. He also mentioned a large bunker system at Keahua (below Hāli'imaile Village); bunkers under the church in Wailuku, by the McDonalds; bunkers under the Lahaina Cannery Mall Phase II; and bunkers at Hosmer's Grove.

Mr. A. DeCoite described a Japanese spy ring on Maui where the following stores owned and run by Japanese Naval officers and served as "fronts" for spying activity: Hanzawas, Matsui and Pukalani Superette. Mr. DeCoite has spoken with Mr. Antone Kauila Costa, a cowboy who worked at Kūheia Ranch on Kaho'olawe, who said that just prior to the bombing of Pearl Harbor, he noticed blinking lights on Maui and thought it odd. Mr. A. DeCoite now believes these were signals, and mentions that a B-17 crashed in Makawao Forest but was never recovered or found.

Regarding historic paths near the current project area, Mr. A. DeCoite describes an old road at the top of project area that was the path cattle were driven to get from the Dairy to Pi'iholo grazing area, and like Mr. Abreu, explains there is an easement in place along the same path. Rice Camp was located right above the outdoor polo field (Oskie Rice Polo Field), and this land is the Rice family's property (owners of Ka'ono'ulu Ranch). Mr. A. DeCoite also explained that there was a sawmill owned by Hubbard near Pi'iholo, up Ka'ili'ili Road, and that Ka'ili'ili Road used to be called "Haiku Wood Road" and used to connect to Awalau Road (now overgrown) in Hā'iku used to connect to. He also recalls green frogs and goldfish in streams in the area.

8.1.3 Mr. Herman Louis DeCoite

Born to Mr. Herman Harrison DeCoite and Mrs. Abelina in 1952, Mr. H. L. DeCoite Grew up in Makawao, Maui. Currently the Club Pro at the Maui Polo Club, Mr. DeCoite is well known for his skill as a professional Polo player and horse trainer. Polo was introduced on Maui in 1888 by George von Tempsky who brought the sport from England; since its introduction, Polo has become an Upcountry Maui tradition. Mr. H. L. DeCoite explained that during the 70s most of the Upcountry Maui ranches had a Polo team: 'Ulupalakua Ranch; Haleakala Ranch; Ka'ono'ulu Ranch, who had several players but not enough for their own team; and Team 'Ohana made up by members of the George Manoa family.

Mr. H. L. DeCoite began playing "Cowboy Polo" t Eddie Tam field, which was once managed by Makawao Recreation Council. Prior to its modern sports fields, there was a horse racing track and an open field. In the 70s, Mr. H. L. DeCoite played polo here with friends using a broomstick and volleyball until they were approached by Peter Baldwin, "Sunny boy" Manoa, and Uncle Racky—all polo players themselves prior to WWII—who asked if they were serious about learning the game. It was from this start that Mr. H. L. DeCoite began learning polo. Being a cowboy first and foremost, Mr. H. L. DeCoite also rode bulls; in 1978, he broke his leg riding a

bull and had to take time off from polo. He returned to the game in 1979. Horseracing was also very popular on Sunday's at Eddie Tam. The racing that took place here was for fun and only ponies were entered. The high-stakes racing took place at the Kahului race track.

Mr. H. L. DeCoite is very familiar with the project area lands and explained that they used to be part of the Grove Ranch cattle ranch. Mr. H. L. DeCoite recalls watching the cowboys move the cattle down the road from his grandmother's house along Kokomo road, near 'Alelele stream. During this time, Grove Ranch was owned by Harry Baldwin, and the Grove Ranch headquarters were at "Clarke Hill". Prior to pineapple, "old man Clarke" used to live at the bottom of the hill (Hāli'imaile-hill across from Kaluanui Road), and Mr. H. L. Decoite hunted birds and pheasant with Clarke. The Grove Farm ranch manager lived at the top of this hill. There was another house at Pi'iholo where Mr. Eddie Cooper (known as Eddie "Kupa'a"), the Maui Pineapple company luna lived.

As a boy Mr. H. L. DeCoite recalls swimming in the ponds near the project area. The ponds were aligned and he know them as: Kalena Pond, Tavage (Tavares) Pond (near Kokomo Road, across from his grandmother's house), 'Alelele Pond, Temple Pond, 1st. Pond, 2nd Pond, Devil Pond, and Honeymoon Pond. There was a 300-foot waterfall with a small pond. Mr. DeCoite recalls an abundance of *'ōpae* (shrimp) in the upper ponds at Pi'iholo. He also recalls goldfish and green frogs in the ponds and said that some people caught them for food. He recalls crawfish in the ponds as well. His father used to collect goldfish from Honopou (Ko'olau Moku) to put in his watering troughs to eat algae and keep the troughs clean. He explains that Māliko used to run more steadily, today he notices it does not have as much waterflow. He says the water is possibly diverted further *mauka*. The names of the stream as it flows below Makawao Town is 'Alelele and Māliko. Mr. H. L. DeCoite said that Haleakala Dairy leased the lands around Pi'iholo Hill, and Polly's restaurant was a meat market for a short time.

8.1.4 Mr. Patrick Fisher

Mr. Patrick Fisher is a wildlife biologist and professional hunting guide on Maui. Mr. Fisher is familiar with the project area lands and the surrounding lands, as he has hunted in the area since boyhood. Mr. Fisher explained that several herds of axis deer live in the focus area as well as Chinese ring-neck pheasant (*Kolohala, Phasianus colchicus*) and wild pigs (European boar, *Sus scrofa*). Mr. Fisher also explained that deer prefer wooded areas as they provide cover and in areas like the project area, will stick to the wooded gulches. Deer generally come out into open fields at dusk and dawn. Additionally, wild dog packs have formed that prey on deer, and they are very dangerous to people. The deer will hide from them near housing as the dogs don't generally come to housing areas.

Mr. Fisher also explained that Axis deer have become a part of the current local ecosystem. Because there are no natural predators to deer on Maui and due to the moderate climate year-round, their populations have grown exponentially since first introduced in 1960. Regarding the Hoku Nui Maui project, Mr. Fisher stated that deer generally don't like cattle but may be drawn to garden crops: "When deer get into more urban areas they become even more problematic; since there is no hunting pressure on them, their population booms. If they [Hoku Nui Maui] plan to have housing and crops, they may need to manage and control the herds on the property. The deer will eat everything; they will eat your garden, especially in times of drought. Herd

management with bow hunting/archery and/or low powered rifle (.22) is generally a good solution to keeping population under control in these areas."

Regarding the observed flora, fauna and trials in the area, Mr. Fisher noted that 2015 has been an unusually wet year in Makawao. He described a trail that leads down to Kalena Pond from Pi'iholo Road, and believes it may be an old trail. Mr. Fisher also described seeing the *Koloa maoli* (endangered native Hawaiian duck, *Anas wyvilliana*) and *A'eo* (Hawaiian stilt, *Himantopus Knudseni*) at these ponds. He described one of the streams in the area, Waiahiwi Stream, just *mauka* of Pi'iholo Hill, and notes two variations in the name of this stream: Waiahiwi and Waiohiwi. He also notes that there are many *Kukui* nut trees (*Aleurites moluccana*) in the gulches.

8.1.5 Mrs. Elaine Kazue Kajihara Foo Sum

Mrs. Elaine Foo Sum was born in Lahaina in 1930 and raised in Makawao by her parents, Mr. Sakae Kajihara and Mrs. Hitoe (Ichiki) Kajihara; she is one of eight children. Mr. and Mrs. Kajihara moved from Lahaina to Makawao in 1932 to open and run Mrs. Kajihara's brother's store, the M. Ichiki Store. Mrs. Foo Sum is an active member of the Po'okela Church.

Mrs. Foo Sum shared newspaper articles and personal notes that describe some of her great-Uncle Masaji Ichiki's life, beginning with his arrival to Maui in 1913 from Fukuoka, Japan. Mr. Ichiki left Japan to avoid the military draft and first lived and worked in Lahaina at the Pu'ukoli'i Plantation Store. In 1925, after settling in and learning the plantation store business, he opened his own store on Front Street. Over time, he opened additional stores which his siblings operated. The Maui stores were located in Lahaina, Honokowai, Olowalu, Papohaku, Wailuku, Happy Valley, Pā'ia and Makawao (Imada, *The Maui News*,1986). Masaji Ichiki came to own 15 stores on Maui and O'ahu by 1950 (Notes from J. Perreira, R. Frampton, and E. Foo Sum 1991).

The M. Ichiki Store was located in what is currently Homme by Nature. In a telephone conversation (July 2015), Mrs. Foo Sum explained that her family constructed an addition off the side of the main store, which acted as an extension of the store, for large bags of grain and feed. Today, this is the location of the Makawao History Museum. Mrs. Foo Sum also explained that her family lived in a small home behind the store until 1960; after this time they moved to Maha Road. Mrs. Foo Sum's mother, Hitoe, ran the Makawao store until 1972 when they sold the business to L. J. Costa (Mrs. Foo Sum, telephone communication July 2015).

In a brief memoir shared for Makawao Elementary School's 75th anniversary, Mrs. Foo Sum recalls attending Makawao School as a first grader in 1936 and ending her career as a second grade teacher at the same school in 1986—a time period spanning 50 years. Mrs. Foo Sum also remembers her first teacher, Mrs. Dorothy Char, and explained how WWII impacted her elementary education when in 1942 the U. S. Army took over Makawao School and turned it into a hospital for wounded soldiers. The school children were displaced and classrooms were set up around Makawao at Po'okela Church, St. Joseph's church and locations at Kokomo. In 1943, the Army built a barracks-like building that housed the first through eighth grades (Mrs. Elaine Foo Sum, personal notes, May 2011). Mrs. Foo Sum explained that she was a member of the school choir, led by Music Teacher Mrs. Anna Pacheco, and they performed at the Makawao USO (current day Casanovas restaurant) and Camp Maui.

Mrs. Foo Sum eventually went on to attend the University of Hawai'i Teachers College in 1953, where she graduated and then returned to Makawao School as a Kindergarten teacher assigned to her original first grade classroom. After spending a few additional years teaching on O'ahu and Hawai'i Island, Mrs. Foo Sum returned to Makawao School where she retired in 1986 (Mrs. Elaine Foo Sum, personal notes, May 2011).

In January 1991, Mrs. Foo Sum attended a Maui County Planning Commission at the Makawao Library where Representatives Mrs. Jocelyn Perreira and Mr. Rory Frampton requested historical information on Makawao Town. Mrs. Elaine Foo Sum and others shared their knowledge of the area's history. Meeting notes describe that in the late 1800s, Chinese contract laborers were brought to Maui from Kim Chow province, China by Mr. Tam Awana. Some of these laborers included Tam Sing, Tam Chow and Tam Apo, who later became store owners and operators in Makawao Town:

> The Tam Chows and Tam Sings had stores in Makawao around that period. In the 1920's, half of the town of Makawao was owned by Miss Crook. In 1933, Tam Sings built the Crossroad Service Station for Hajime Karakawa.
>
> Mr. Komoda learned bread making from the Portuguese. He got property from Miss Crook to start the Bakery and Store. The Tam Sings owned Matsui Store, Crossroads Service Station and many of the Property not owned by Miss Crook. The two Char brothers married sisters of Tam Apo and they received the properties that they build their homes on lower Olinda Road near the Makawao Town crossroads. Mrs. Char, who was the first grade teacher at Makawao School was instrumental in the sidewalk being built on Baldwin Avenue to the New Makawao School in 1936. She was thinking of the safety of the children who walked to school (J. Perreira et al 1991).

At the meeting, Mrs. Foo Sum described a Japanese shrine once located where Pizza Fresh is now located. She said this was a popular place of worship for some of Japanese Buddhists in the community. Although her family did not practice Buddhism, she recalls the shrine having a special New Year's Eve tradition. She also explained that the current-day Makawao Hongwanji was a Japanese School managed by the Japanese School Committee prior to WWII. At the onset of the war, the Japanese teachers and principal were taken away to internment camps and the Army took over the location and built barracks there. After the war, Mrs. Foo Sum's father worked as a Japanese School supporter to get the property back into this use, but the Pā'ia Hongwanji took it over and created the existing Hongwanji (Mrs. Foo Sum, telephone communication July 2015). Mrs. Foo Sum also recalls pineapple farms cultivated by Japanese families throughout Makawao in the 1940s.

8.1.6 Mr. Kenneth Freitas

Mr. Kenneth Freitas has worked for Haleakala Ranch for 56 years. Nicknamed "Blackie," Mr. Freitas is the fourth generation of his family who has worked for the ranch. His great-grandfather, Joseph Francis DeRego, was the ranch foreman under Louis von Tempsky. Joseph's daughter, Jane, married Louis Freitas, their grandfather and son of Antone Freitas, the first

generation of their family from Portugal (Harrisson 2013; 101). Within his time at Haleakala Ranch, Mr. Freitas performed all ranch maintenance jobs and all ranch operations, from fixing fence lines to moving, branding and ID-ing cattle. He explained, "Whatever needs to be done, you do it."

When asked about the focus area lands, Mr. Freitas explained that they were previously owned by Maui Land & Pine and used for pineapple cultivation. He said they used to move cattle through the Maluhia area, along the *mauka* boundary of the project area, near Olinda. He describes 'Alelele Stream being the stream the road crosses by Kokomo (Kokomo Road), and says that 'Alelele Stream continues further *mauka* past the (DeCoite) slaughterhouse to ponds. Mr. Freitas does not recall seeing or collecting *'ōpae* (*Atyoida bisulcata*) in streams. Mr. Freitas recalls collecting *pepeiao* (wood ear fungus, *Auricularya cornea*) from the "wet country" for use in the local dish called *hekka*. He goes on to explain that prior to the development of the big grocery stores, his family did their grocery shopping at Ah-Fooks Market (Kahului), Ooka Market (Wailuku), and Silvas Market (Makawao). He explains that 50 years ago you could do anything in Makawao.

Mr. Freitas is deeply concerned that the proposed development will be another gentleman's estate. He would rather see the land remain exclusively in farming. He fears that the entire property will eventually become housing with no farming. This fear and skepticism is based on the changes and development he has observed on Maui over the years. Mr. Freitas has witnessed Makawao get overcrowded, and described a time when there was no traffic. He explained that roads are in disrepair and added traffic will make it worse: "the roads are like cattle trails." He also asserts that housing developments in agriculture-designated areas don't pay their fair share of taxes and he finds this unfair.

8.1.7 Mr. Robert Hobdy

Mr. Robert "Bob" Hobdy has spent the better part of his career working for the State of Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife as the District Manager for Maui County. He is well versed in his knowledge of Hawaiian habitat and ecosystems, traditional Hawaiian crops, Hawaiian history and culture, and is considered an expert in Hawaiian botany.

Mr. Hobdy first referred to a Hawaiian Government Survey map made by C.J. Lyons dated 1872 (Figure 4). Mr. Hobdy explained that this map along with another (Metcalf 1847, Figure 5) were the oldest know maps of Makawao. Together, Mr. Hobdy and Ms. Medeiros studied the Lyons map, which contains many details of the area.

Mr. Hobdy first described a trail referred to as the "Bridle Path," shown on this map. This trail extended from a location through what appears to be the pasture across the street from Po'okela Church, approximately the location of the rodeo grounds and Polo field. Currently part of Ka'ono'ulu Ranch, there is a house in this pasture that might have been the approximate location of the Rev. Jonathan. S. Green home; Rev. J. S. Green was the founder of Po'okela Church and one of the first foreign landowners in Makawao. The old Bridle trail appears to have extended by Rev. Green's house and from there headed north and then turned east, crossed Hawai Stream then Wai-o-hiwi Stream, where it then connect to the "Haiku Wood Road." Today, the Haiku Wood Road is called Ka'ili'ili Road, located by the DeCoite slaughterhouse. Mr. Hobdy

explained that this road eventually turns into the modern day Awalau Road in Hā'ku. In more recent historic times, he describes a house located near Pi'iholo Hill owned by Maui Land & Pineapple.

The Bridle Path also split, headed *makai* and then turned towards Pi'iholo Hill—the path crosses through the current project area at this point. It then went down into Māliko Gulch, and then back up to Kalena Pond, a popular swimming hole for local kids from historic times into the modern era and a culturally significant location during ancient times. Other significant landscape features include a waterfall at Waiohiwi called Waiohiwi Falls, approximately one mile *mauka* from Kalena Pond. Waiohiwi and Kalena are places mentioned in legends, chants and *mo'olelo.* Mr. Hobdy states that the Bridle Path was an access trail for residents to get into the forest, or to travel to Hā'iku and Kalena Pond.

Mr. Hobdy further explained that the two feeder streams that fill Kalena Pond are Kahakapao Stream (western) and Waiohiwi Stream (eastern). These two streams extend from Makawao Forest Reserve and then join and form Kalena Pond near Pi'iholo Hill; they then exit, eventually forming Māliko Gulch, which in turn extends *makai* forming the eastern boundary of Hāmākua Poko.

Mr. Hobdy stated that the area once supported a mesic forest, which would have included *koa* trees (*Acacia koa*), *'Ōhi'a* trees (*Metrosideros polymorpha*) and *halapepe* (*Pleomele auwahiensis*). He is confident the area could support any trees that do well in mesic forest climate. The Makawao area is also considered a transitional zone, where the climate transitions from dryer to wetter forest. Mr. Hobdy speculated that there was likely traditional plant collection in gulches and referenced legends relayed by Samuel Kamakau about Kiha a Pi'ilani working a sweet potato patch in the area between the rodeo grounds and the Polo field known as Kapalaea.

8.1.8 Mr. Sam Ka'ai

Mr. Sam Ka'ai was raised in Kaupō and now lives in Pukalani. Raised in the traditional Hawaiian ways of his time (1940s), Mr. Ka'ai spent his childhood on his grandmother's 20-acre farm in Kaupō, where she grew sweet potatoes, macadamia nuts, pear guava, papaya, 15 different types of avocados and several species of sugarcane; she also raised pigs and chickens. As a child, Mr. Ka'ai was tasked with picking papaya to feed the pigs. They stored the papaya in a dry cabinet so the chickens could not get to them. He also explained that his grandmother was a friend of Ms. Cooke and she would give his grandmother cuttings of exotic plants from her travels.

Mr. Ka'ai was raised at the end of the era when small-scale family farms were commonplace on Maui, and life conformed to the farm. In those days, he explained, farming was commonplace. Families had their own gardens and most, if not all, of their produce came from their personal garden. Virtually all families also raised chickens for eating. There was no need for a big house as you were outside working all day. Houses were full of pūne'e (Hawaiian-style day bed), a few rocking chairs for the mothers with young children, and one dining table to fit upwards of 20 individuals. In his house, half of the table was usually covered by laundry. Work was natural to his parents and grandparents, but it was changing during his own generation and continues to change today.

More foods were preserved in those days as refrigeration was not in every household, and the "iceboxes" of those days had limited feasibility, particularly in areas like Kaupō. Meats were dried, smoked and jerked. Other foods were preserved by sealing with paraffin wax; Mr. Ka'ai remembers a whole crock of stew being sealed with wax for preservation. He also recalled repurposing old iceboxes for use as meat smokers, and that they smoked all meat.

Regarding Hoku Nui Maui's sustainable community proposal, Mr. Ka'ai believes that the farm will only be successful if the homeowners have a vested interest in the farm. Therefore, he believes potential homeowners should be required to "buy in" to the farm. Without this direct financial connection to the farm, he believes housing will become the focus and the proposed project will end up as a "gentlemen's estate." He goes as far as saying that everyone in this community should themselves be farming. He explains that "the farming attitude is different" and there should only be gates to keep cattle in.

The problem as he sees it is that people value money more than a true livelihood based on farming, and housing developments currently make investors more money than farms. Mr. Ka'ai stated that project proponents should keep their focus on the fact that they are in an agricultural zone and prioritize agriculture and not homes, with a "rigid obedience to bow down to Hāloa", meaning remember that man is the servant to the foods that sustain us. "Land and farming is an obedience that is ancient," Mr. Ka'ai said, and strongly recommended leaving the maximum area for farming, beginning farming operations before developing housing, and placing housing by the gulches. Mr. Ka'ai also stated that a farm requires outbuildings for processing of farmed goods as well as sheds and barns, and that farm houses have always been small since all individuals worked the farm and didn't spend much time in houses. Further, large houses are not logical in a farming society, only in a capitalist society.

He also asserted that landscape and climate should dictate what is grown. In this way, the farm will utilize only what it can support without taking resources from surrounding lands, and will "pay attention to what the land says it needs." Mr. Ka'ai suggested planting the following crops that thrive in the environment: Chinese cabbage, lettuce, un choy, won bok and bok choy. He also mentioned that a deer control need is likely and suggested harvesting deer and offering it for sale. Regarding water, Mr. Ka'ai asked, "Where will the water come from?"

8.1.9 Mr. Anders Lyons

Mr. Anders Lyons is a member of the Baldwin family, owners of Haleakala Ranch and lands surrounding the current project area. He lives at Kapalaea (alternate spelling, Kapalaia), the area of the current day Halekala Ranch headquarters on the southwestern edge of the focus area. Mr. Lyons understands the place name, Kapalaea, to mean "red earth." He explained that cattle ranching has been a tradition in the area for at least 127 years, as Haleakala Ranch recently celebrated its 125 year anniversary in 2013.

Mr. Lyons recalls a path where cattle were driven through Kapalaea, to Olinda Road and then northeast on Maluhia Road, which extended behind (*mauka*) the Oskie Rice arena; it then crossed pastures of the current project area and continued across Pi'iholo Road to the current day Pi'iholo Ranch.

Mr. Lyons is familiar with the project area and explained that it was cultivated in pineapple by parcel owners Maui Land & Pineapple. He also explained that there are small, scattered vestiges

of native Hawaiian plants near his house at Kapalaea, including endangered *wiliwili* (*Erythrina sandwicensis*), and *neneleau* (Hawaiian Sumac, *Rhus sandwicensis*). He listed other plants he has observed near Pi'iholo: *'ōhi'a* trees (*Metrosideros polymorpha), naio (Myoporum sandwicense*), native ferns, and *kolea* (*Myrsine sp.*). In addition to plants, Mr. Lyons explained that he first observed axis deer in the area in 1990, and has also observed wild pigs near his home but stated that there are more near Pi'iholo.

Kailua Stream runs by Mr. Lyons's home, and is known as the southwestern boundary of the traditional Hāmākua Poko Moku. Kailua Stream was once fed by the Waihou Springs. Mr. Lyons also recalls swimming in Pi'iholo ponds as a kid, and that his sister would ride her horse there to swim. He stated that the area around Pi'iholo Hill was referred to as "Pi'iholo," while the area *mauka* of Pi'iholo was known as "Awalau." The area further *mauka*, in Makawao Forest Reserve, was known as "Kahakapao."

8.1.10 Mr. Keali'i Reichel

Mr. Keali'i Reichel is a Kumu Hula, music composer and songwriter who has hiked up Pi'iholo Road for more than 10 years. He drew inspiration from this area for his 2014 album titled, "*Kawaiokalena,*" for which Kumu Reichel performed detailed research on the area. He explained that many chants about the area were printed in Hawaiian language newspapers, with lyrics that mention the area's 'Ulalena rain, the 'Ūki'uki'u rain. He learned that Queen Lili'uokalani and her siblings, who were trained poets, traveled around the Islands and wrote chants and songs at places that inspired them; after visiting the current focus area, they composed songs about the area.

As Kumu Reichel understands it, Kalena Pond (the name of the pond near Pi'iholo Hill) and the series of ponds around it had royal associations. He visited these ponds for the first time last year and he and his *halau* performed a chant atop Pu'u Pi'iholo. While there, he spoke with an old Hawaiian cowboy with the last name Uekoolani (possibly deceased by now) who shared a meaning of the name Pi'iholo. The cowboy gave the following translation: "*pi'i,*" to climb, (onto a woman), and "*holo,*" to leave, meaning a one-night stand. Kumu Reichel's understanding of the word is more descriptive and based on the movement of the 'Ūkiu clouds and rain. He explains "*pi'i*" to mean climbing up the land and ravines, and "*holo*" to mean moving on and down the next ravine. In this way, the 'Ukiu clouds move through the region. He further explained that "kiu" means wind, specifically a north wind. The 'Ūki'uki'u rain of Makawao is known to be a cold, sharp, stinging rain that falls in a slanted direction from a cloud pattern that usually hangs directly over Makawao. The Nā'ulu cloud is another that comes from the Kula direction. These two famous clouds (cloud Gods), Kiu and Nā'ulu, were said to meet and battle, hence the sunny/misty/rainy pocket of sky that forms between them in the region of Pukalani.

Vegetation surrounding Kalena Ponds today is mainly eucalyptus and *waiawi*. According to chants Kumu Reichel has researched, he believes vegetation around the ponds would have been *koa*, *Kukui* nut, and *'ōhia*, with an understory of *'awapuhi*, or the native Hawaiian ginger variety. One particular chant mentions 'awapuhi so thick it looks like a wave blowing in the wind. He also observed large frogs in Kalena Pond. He recalls that they were stocked as food for residents during the 1930s and 40s.There are ruins of a *heiau* nearby as well, lending additional evidence to the area's cultural, possibly royal significance. Kumu Reichel states that because there are

songs and chants written about the area, it had to be worthy of *haku mele*; meaning, this area likely held a higher significance.

Nearby and *makai*, the area known as "Hāli'imaile" is described by Kumu Reichel as meaning "Hāli'i," to spread as a blanket or to cover something, and "*maile,*" after the vine. Kumu Reichel speculated that the area was known as a place where "*maile* spread out," possibly a collection area and explained that the climate is good for *maile*. There are five or six different varieties of maile, some for medicinal and others for symbolic use. He explained there is fragrant a variety of *maile* in Makawao Forest Reserve, and another more fragrant and drought resistant variety in Kaupō, in the uplands..

He noted regional plant adaptations that occur, such as with the *palapalai* fern, which is mentioned in chants and is a *kino lau*, a body form of Laka, goddess of hula. Patches exist around Kalena Pond, but this *palapalai* is different; Kumu Reichel described it as more hairy and cold-adapted than the *palapalai* found in 'Īao Valley.

Regarding the question of whether Makawao was once its own *moku* (see Section 4.2.1 The Māhele Aina of 1848), Kumu Reichel explained that Maui had two *piko* (naval, centers): east Maui and west Maui. Kailua Gulch and Māliko Gulch form the boundaries of Hāmākua Poko Moku. He also advised to pay attention to road names as they often contain traditional area names.

He recalled a passage that described *kukui* forest from lower Māliko *mauka* as far as the eye can see. (Lyons map depicts a region *mauka* of the focus area as "Upper Limit of Kukui" as well as an area even further *mauka* called, Kuho'olehua, "Large Ohia Trees", see Figure 5). Kumu Reichel noted that pu'u, or volcanic cinder cones, are aligned down Māliko: Pu'u Kakae, Pu'u Pi'iholo, Pu'u Kauhikoa, and Pu'u o malei. He explained that high places such as pu'u were often sought out as special or ceremonial locations because of the broader vantage and higher perspective of the surrounding land.

8.1.11 Mr. Hugh Starr

Mr. Hugh Starr has lived in Olinda since the 1960s. He is a real estate broker and land consultant who has preformed extensive research on the lands of the project area for previous landowners. He currently lives in the Haleakalā Homestead Lots in Olinda. He shared his knowledge of the property and greater focus area first by explaining that based on the early Hawaiian Government Survey maps by Metcalf and Lyons (1847 and 1872), many Hawaiians lived in the area and purchased land here in the 1840s. From his research of Land Grants and historic property boundary disputes, he recalls that their properties contained farms where they grew food and raised animals.

Mr. Starr explained that a group called Pi'iholo South LLC purchased lands from Maui Land & Pineapple Company on both the northern and southern sides of Pi'iholo Road. The partners referred to the parcels as "Pi'iholo North" and "Pi'iholo South." The current project area consists of the majority of "Pi'iholo South."

Mr. Starr recalls individuals such as Geo Miner, Rev. Jonathan Green and Brewer as some of the first foreigners to own land in Makawao; some area roads are named after these individuals. He further explained that sometime around the 1890s there were changes in land ownership

where some lots were consolidated and eventually sold, and some deeds became "sterile." Mr. Starr mentioned Mr. Eddie Cooper as being the Hawaiian luna for Maui Land & Pineapple, but is unsure if he is from the same Cooper family who donated the lands on which Seabury Hall was constructed.

Mr. Starr explained that St. Joseph's church was originally a Catholic church in Keokea that was dismantled and moved to its current location in Makawao. He further explained that the land which St. Joseph's church sits on was originally donated by Haleakala Ranch manager.

Haleakalā Homesteads Lots, the old Olinda prison and Waihou Springs Reserve are all located *mauka* of the project area. Olinda prison was located at the top of Haleakalā Homesteads and now houses the Maui Forest Bird Recovery Project, and once maintained a farm and a dairy worked by inmates. Mr. Starr lived in the area while the prison was in operation and recalls being notified when prisoners escaped. He said Mr. Al Souza was the warden at the time and explained that the prison closed around 1977. Mr. Starr said there was a school up in this area as well.

The 186-acre Waihou Springs State Forest Reserve is also located in this area, and is dedicated to the protection and management of the Waihou Springs, the water source of Kailua Gulch, the southern boundary of the Hāmakuā Poko *moku*. The Territory of Hawai'i created the reserve in 1909 to protect the water source. Mr. Starr explained that damage from an earthquake in 1936 or 1938 caused a crack in the water lens and the springs dried up. Mr. Starr also explained that the invasive plant gorse (*Ulex europaeus*) became a problem in the area, which prompted the State to plant pine trees. This planting effort was undertaken to shade gorse in hopes of eradication.

Mr. Starr described Haleakala Dairy operations, stating that their farm bred and housed Holstein cattle. He said the Abreu family lived at the dairy, and Mrs. Phyllis Abreu cared for Mr. Starr's children while he and his wife worked during the day. Mr. Starr recalls eight to 10 "dairy camp" homes. The dairy cattle were moved from the dairy, near the Haleakala Ranch office, to a lot at Pi'iholo (today Pi'iholo Ranch) for breeding and raising calves. There were pastures there that extended into Waiohiwi. The dairy used Maluhia Road, just above the rodeo grounds/arena, to access the pastures at Pi'iholo.

Mr. Starr described the area of Mauna'olu as being pineapple fields and that a community dump existed nearby at Māliko. He described Hāmakuā Poko, *makai* of Mauna'olu, as once a huge town. Mr. Starr used the Māliko dump and described it as doubling as a recycle and repurpose center. On one particular day, he spotted a canvas-covered book and discovered that it contained decades of rain-gauge records from the experiment station. This book is part of his library today.

Mr. Starr stated that the St. Joseph's Feast was a huge community event and phenomenal goods were sold there: breads, soups, jams and jellies. He said Mrs. Phyllis Abreu made jams and jellies for the St. Joseph's feast each year.

8.2 Formal Interviews

Formal interviews were conducted on May 13 and June 11, 2015 using a digital recorder and by handwritten notes. Oral history interviews such as these relay detailed, first-hand information

regarding aspects of lifestyle, the environment, and landmarks which were present during the individuals life and how they have changed. Through these oral histories, we learn about cultural practices and traditions that may or may not continue in modern times. For example when interviewees speak of their family gardens, we learn that during that particular era, family gardens were commonplace and most vegetables were grow in the family garden. Information such as this becomes important because it is evidence that earlier generations practiced more subsistence gardening than modern generations.

8.2.1 Mr. Jimmy DeRego

Mr. James "Jimmy" DeRego was born September 30, 1927 at Pā'ia Hospital. He grew up on Haleakala Ranch where his father, Joseph "Joe" Francis DeRego, was a ranch foreman and managed the cowboys and cattle. Growing up, his family lived at Kapalaea in what today is the Haleakala Ranch Office. He explained that his parents came separately from Portugal and met on Maui. His family attended St. Joseph's Church and many of his family members are buried there. Mr. DeRego worked as a cowboy for Haleakala Ranch, in maintenance for Haleakalā National Park, and took a job with the Maui County Roads Department, where he worked for 30 years before retiring.

Mr. DeRego attended Makawao Elementary School, at the time located by the Makawao Post Office. He said he walked to school each day with a bag and sickle, charged with cutting grass for the family's milk cow on the way home. He recalls enjoying such radio shows with his siblings as *Foo Man Choo, The Lone Ranger* and *The Shadow*.

Mr. DeRego also recalls Christmastime, where the one special gift the children in his household received was an apple and an orange. He said he only saw "...oranges and apples and candies once a year. And my mother used to put that on the table on a little tray when Christmas and we couldn't touch that until Christmas day...and when Christmas day came we all had one apple and orange a piece and that was our present." Fruits that were more readily available included guava and mangoes.

Mr. DeRego recalls helping during cattle round-ups and cattle drives, and that the highway used to be dirt and Haleakala Highway went through Pukalani. He described 10 or 15 men driving 200 head of cattle from Kapalaea all the way down to Kahului Harbor. He described it as a long day's work. The cattle were then shipped to the mainland.

Mr. DeRego remembers that shortly after the bombing of Pearl Harbor he blacked out all the windows, but recalls looking downtown and seeing some lights. He was fourteen at the time and said that as a result of the breakout of war, he and his father, his brothers Albert, Levi, Apela and Tesag, and cowboys from Grove Ranch, went over to help the ranch manager, Manuel Pedro, move all the cattle off Kaho'olawe. Grove Ranch, he explained, was a cattle ranch located near Hāli'imaile. Mr. DeRego described moving cattle off Kaho'olawe:

> Yeah, they had a boat Mazie C and Yamanichi was the captain, he was a Japanese captain, and what ranch did was hire cowboys to go over and drive and round up the cattle. So they load the horses from here on this boat Mazie C. They hoist the horses into the hull of the boat and then when you get to Kaho'olawe they hoist them out of the boat, into the water, listen, they had a skiff, a good size skiff, the horse swim to the skiff

> they tie the horse head to the skiff, and the skiff goes to the shore and the horses come out. When the war break out, the captain, Yamanichi couldn't be the captain because he was a Japanese ... And this old ... Portuguese, Antone Freitas, he didn't know anything about driving a boat, but he was the captain. And I was on that ship that very time, but he don't drive the ship, the regular captain, the Japanese Captain driving the ship, but Antone is the captain, so this big battle ship came right up to the boat and yelled at the captain on the Mazie C, and Antone stood up on the bow "Antone P. Freitas Captain," and some signals they gave and the big battle ship took off...I was on the Mazie C. And then you get to Kaho'olawe and then the working men stayed on the island in the home that ranch foreman that lived there, we had meals there and we slept there and then round up the cattle, drive the cattle, wild cattle too and bring them right down to the corral right near the ocean...Oh gosh, they get one name of that bay [Kūheia Bay?, Pedro's Bay?]...I know it's the name of that bay because that bay, the house that was on the hill and the bay was right down below the house like this. And this guy, oh let's see what his name was, maybe later on I get it. He goes in the coral, he ropes the cow, tie him to his horse, and he jump in the water, and drag the cow in the water, once the cow in the water he easily control. So, the boat grabbed the rope, he take him to the small boat, his horse swim, the small boat, they take the rope, they bring the cow right up to the small boat, you can handle 'em very easily, they tie his neck to the skip, and he go back and get another one...One by one to the skiff, then the skiff goes to the bigger boat, they hoist 'em up into the boat. [with the crane] Well they had that, it run by the motor, they hoist 'em up into the boat and when the boat is full, that boat goes back to Kīhei and they unload 'em same thing, into the truck.

They were on Kaho'olawe about a week and the work wasn't finished. Some cowboys stayed:

> No we didn't get all, a lot of them stayed behind and they round up a lot of sheep, they brought a lot of sheep and a lot of that sheep and cattle they didn't catch 'em and stayed behind and till they died, I guess...And Pedro, that his name, Manuel Pedro, he was the foreman. And in front of his house he had a big pile of wood and I asked him, "what all this wood?" He said, "Well, in case anything happen over here with me and my wife..." and He would light it and the people in Maui could see the fire. Because it's all in this point, you know, towards Maui...Yeah, on the hill that you could see the fire and know if something wrong...Yeah, if something wrong and they would know. Mazie C, Mazie C was owned by the ranch, Grove Ranch was the name of the Ranch that owned the cattle in Kaho'olawe, Grove Ranch.

Mr. DeRego also described cattle being driven from Haleakala Ranch through Makawao Town to the slaughterhouse. He also described a dairy in Ukulele (Makawao Forest Reserve) and

said the Olinda Road used to be an old wagon road. He said that Sam Baldwin kept the dairy cows at Ukulele because the temperatures were cooler.

Mr. DeRego recalls hunting wild pigs near the stream areas, as well as goats and pheasants. He said they smoked the meats and also made sausages. He said that the ranch provided beef and his family raised chickens. They collected eggs and also had a vegetable garden where they grew onions, green onions, carrots and potatoes, to name a few. All members of the family helped tend the garden.

As he grew older, Mr. DeRego worked as a cowboy performing tasks such as fixing fences and cleaning pastures of weeds such as *kalakala* and eucalyptus. He described a typical ranch workday:

> Well it start like in the morning you would all go down to the ranch stable and then Levi, his name was Levi [Kailipalauli], ... he was the foreman of the cowboys, Levi. And he comes up and, you know, they have other working men that take the young guys like me out, we all go and work with him see, he tells we going to pull weeds today, this kind of weeds and we going to dig this or we gonna lay a line a fence or repair a fence and that is the kind of job that we do. And the cowboys have job mostly every day that is the regular cowboys. When the branding time come then everybody goes, they brand 100 to 200 calves and that is the way we worked, they worked the ranch.

Some of the ranch families included the Holomalias, the Manoas and the Kahuas. Branding took place about three or four times a year when the claves are about four- or five-months old. After the branding, the ranch provided food for everyone: salt meat, potatoes, rice, water and all the Rocky Mountain Oysters you wanted:

> That's mountain oysters, they castrate the calves. And when branding is over, that is before we eat, they get all the ashes from the wood, keawe tree, the wood, and they throw all that on top and pour some salt and we eat 'em all there. Everyone have their share of the oysters, a wonderful thing. Oh yeah, it is a real delicacy. That is what we call mountain oysters...

For a time, as a youngster, Mr. DeRego worked part-time at Haleakalā National Park. Mr. DeRego knew how to handle the horses and pack mules, and he performed maintenance work with ranger Jimmy Lindsey. Together they maintained all the hiking trails in the crater: Sliding Sands, Halema'u, Paliku and Kaupō Gap. They stocked the cabins with firewood and other gear. He told a story of two mules going off the Halema'u trail because someone had loaded the wood improperly on them. He also hunted goats and pigs in the crater and explained that the goats ate the bark on the *mamane* trees, killing them.

Mr. DeRego later described Makawao Town as it was when he was a child:

> Well Makawao town, was just, you see all the old buildings, the old buildings get more hundred years old. I remember Komoda's bakery, Komodas been there for close to 100 years and they make the best pastries

> there is on Maui. They had pies, French apple pies. Yeah, the whole town is the same old town. Now it is all open up, every little old building has a shop in it, you know. ...Used to be all Japanese there...Even the barber shop used to be, I remember even the barber shop there, I told this lady, you know this building get 100 years or more. You know what holding them up? Termites are holding hands and keeping the building up. If those termites let loose, everything fall... its nice little town. Right now is lively. Well, I know Komodas Bakery and Matsui Store, and Club Rodeo and Sal Molina owned building right in the corner by the stop sign above, across from Polly's...Salvado Molina, the Molina family was famous, they used to have an orchestra, the Molina Orchestra. They played good dancing music. Sal Molina played and Joe Molina, and Johnny Molina ... every time had a dance they were playing. They had another orchestra, but they were pretty good, the Molina boys.

Regarding the lands around St. Joseph's Church, Mr. DeRego said his father lived across Pi'iholo Road from the Church:

> Well, my father lived, my grandparents, right across from the graveyard...You go over to the graveyard, the church, then you go up that road...[the northeast corner of Pi'iholo Road and Makawao Avenue]...my grandfather bought that place. That's when they lived in that place, had an old house...That used to be a pineapple, I don't know if it still pineapple still own 'em or whatever...Now it's across font the church now, a county garage is below the church, this is across the church. That is where my grandparents used to live.

Mr. DeRego also shared that his father used to own land below 'Alelele Pond, and that his father had cattle there. They swam in the pond as children. He described his family as "mountain men" and said they didn't care for the beach and did not go down country often. He explained that people didn't have vehicles like they do now and traveling distances was not as regular.

8.2.2 Mr. Doug McClure

(This interview was conducted on May 13, 2015 by Colleen Medeiros, using handwritten notes only.)

Mr. Doug McClure began his career on Maui with Baldwin Packers, a pineapple canning company. In 1962, Baldwin Packers merged with Maui Pineapple Company, and in 1964, Mr. McClure managed their Honolua Plantation lands in West Maui. In 1969, Maui Land & Pineapple Company (ML&P) was created and Mr. McClure transferred to Hāli'imaile where he became manager of all ML&P operations. For a time, he lived with his family along Baldwin Avenue boarding Māliko Gulch. Today, in his retirement, Mr. McClure is very involved with the Maui Invasive Species Committee as well as other invasive species programs. He volunteers with different groups helping sprays such weeds as tumbleweed and gorse.

Originally from California, Mr. McClure attended Fresno State College and earned a degree in agriculture. After securing his job with ML&P, the company sent him to Stanford University to attend a yearlong business course. Mr. McClure explained that ML&P took good care of him

and his family; in return, Mr. Colin Cameron, ML&P CEO at this time, expected a great deal of work and commitment from him.

Mr. McClure explained that the lands of the current project area were cultivated in pineapple from 1914 to 2008, when ML&P ended its pineapple operations. Throughout its 94 years, ML&P had 7000 acres of pineapple on Maui, most of which was canned and shipped worldwide, mainly to the United States. He shared some details of the land regarding soil, rainfall and place names, and explained that the gulch along the southern boundary of the property was referred to as "Makawao Gulch." He said water flow here was intermittent stream, and described water diversions made in the fields that channeled water into this gulch since these fields were generally considered too wet for pineapple. Pineapples are native to South America and the Makawao fields of the current project area were not irrigated since rainfall was more than enough. Mr. McClure explained that overly wet growing conditions cause pineapple to taste sour and explained that the Hāli'imaile climate was better for growing pineapple than Makawao. McClure suggested 'ōhelo berries and tea plants (for drinking tea) as suitable and profitable crops for the area climate.

Mr. McClure described a settling pond directly behind St. Joseph's Church, approximately where the Hoku Nui baseyard is now. On the *mauka* end and adjacent to the Hoku Nui property, there was an experiment station which is now the offices of the Maui Invasive Species Committee. Mr. McClure recalls that weeds within the Hoku Nui property when he managed it for ML&P included sour grass and *kukai pua* (grass). He explained that oil machines with chemicals such as Karmex were sprayed on the weeds. The finger of the gulch that extends into the project area and then tapers (Huluhululi'ili'i) was in ML&P field #258. Mr. McClure recalls *waiawi*, Christmas berry and guava in the gulches of the project area and overall focus area.

Mr. McClure and Mr. Doug Schenk developed the 10 million-gallon Ka'ili'ili reservoir now located on Pi'iholo Ranch; this reservoir was used to irrigate Hāli'imaile fields, piped from just below field #275.

Mr. McClure remembers when Axis deer were first released in Ōma'opio. In the late 1960s, Mr. Oskie Rice brought six deer from Lāna'i or Moloka'i. Mr. Meyer Ueoka, of the Department of Land and Natural Resources, brought more deer and released them at Red Hill. Mr. McClure said that since this time he has fed his family on venison. He stated that deer used to come into the pineapple fields when it was dry and there was no other grass. He said there are many deer in focus area as well as pigs, and that both can be found all the way down to the coast now.

Mr. McClure described the ponds around Pu'u Pi'iholo, and referred to them as Pi'iholo pools. He couldn't recall seeing any native animal species in the ponds but remembers red swordtail fish. He also remembers frogs in Māliko Gulch and in Pi'iholo pond. Mr. McClure recalls Māliko stream flowing intermittently as it does today. He explained that Mrs. Haku Baldwin had a horseracing track up by the Haleakala Dairy. He said Benji Rollins was her horse trainer and his son, also Benji, was a back-up jockey to Clarence "Brother" Sakamoto who raced at Kahului Race Track.

Mr. McClure also managed "Corn Camp," a Japanese Camp that was located in the area of the current day Makawao Fire Station and Wai Ulu Farm, which was once a 200-acre corn

plantation. Additionally, onion, white rose potatoes and red rose potatoes were grown here to supply the west coast during the Gold Rush, before his time.

Mr. Dicky Tam Sing owned the property *makai* of Corn Camp while most of Pukalani was owned by Libby Fruit Company. Mr. Tam Sing sold to Mr. Frank Munoz with a *hui,* or group, of partners that included Mr. Elmer Carvalho, Mr. Pablo Caldito, and Mr. Martin Luna, and who together developed Pukalani into a residential neighborhood, golf course and shopping center. Hāli'imaile had a dispensary, nurses and doctors for the camp there, which still remains but is used by the chef Beverly Gannon for her catering business. It's the large white house-type structure located next to the old General Store, today Bev Gannon's Hāli'imaile General Store Restaurant. Brain surgery was performed at this dispensary by Dr. Al Burden. Another Dr. there was Dr. Feltzer. McClure owns the saw that Dr. Burden used to perform the surgery.

Mr. McClure described that in 1917, draft horses were used by ML&P to pull plows; the same occurred with HC&S. McClure has some old draft horseshoes. The blacksmith at the forge in Hāli'imaile was named Inokuma (another store with same name in Hāli'imaile); prior to Inokuma, Henry Brown was the original blacksmith. There was also a [blacksmith] shop behind the old office, and they brought the horses there for horseshoeing. There were railroad tracks there as well. The train hauled pineapple from Hāmākua Poko to Haserot Haiku Cannery, to old Maui High, across Māliko, below Baldwin Estate, and finally to port at Kahului.

Mr. McClure explained that at in the 1960s, plantation camps worked well and everybody walked to work. In the 1960s, he said ML&P sold plantation employee housing to the employees for $2,400.00 for house and lot. He said ML&P wanted to get out of the housing business because after unions came in, managing the housing became too great a financial burden. Workers under the union paid $2.00/month for their housing.

Mr. McClure attended the St. Joseph's Feast every year for as long as he can remember and said it was a major community event. At the feast, sheep, cattle, goats and pigs were auctioned to raise money for the Church. There were games for entertainment and Portuguese soup for sale.

Section 9 Traditional Cultural Practices

The following paragraphs detail traditional cultural practices found to have existed in the current project area and the greater focus area. The presence of these cultural practices were determined by way of the community consultation process, namely speaking with community members, *kūpuna* and cultural practitioners, as well as researching historical references and records, analyzing historic maps, and examining archaeological findings for this region.

For the purposes of this study, traditional cultural practices include traditional trails, pathways, *mauka-makai* access routes or any other such routes in the proposed project area and/or overall focus area; collection areas or the potential for collection areas, for plants used in traditional ceremonies, *hula*, *lā'au lapa'au* (medicinal plant uses), etc., within or surrounding the project area; historic sites, archaeological sites and burial sites located within or surrounding the project area; traditional agricultural practices; and cultural associations of the focus area, such as legends and traditional practices. The traditional cultural practices identified below include those activities that include both ongoing cultural practices as well as those which took place in the past. and while no longer practiced today, may be considered for revitalization.

9.1 State Recorded Historic Properties in the Focus Area

Historic properties on Maui are structures, objects, buildings, districts, areas, or sites that are over 50 years old and provide evidence of past/traditional land use practices, events in history, and cultural practices. When located, these historic properties go through a review process to determine their significance to Hawai'i's history, architecture, archaeology and culture (Department of Land and Natural Resources 1998). The State Historic Preservation Division is the governing body that oversees the historic properties review process. If found to be significant, the historic properties are recorded and assigned a State Inventory of Historic Properties (SIHP) number and filed in the State Inventory of Historic Properties.

The following historic properties are located both within the project area, and on relatively nearby lands surrounding the project area. Collectively, the sites on and around the project area demonstrate, through interpretive analysis, the various practices which took place on the property. These sites include a rock retaining wall and associated soil terrace, an isolated find consisting of a polished basalt adz fragment, a single human burial, two Portuguese ovens, a historic outhouse, a cistern, an unidentified small chamber, and a cattle-weighing scale. This assemblage of historic sites is representative of the time period spanning possibly as far back as pre-contact times (pre-1778), based on the presence of the basalt adz, through the time of Portuguese arrival and settlement (1878) (see Section 4.1.3 Portuguese Immigration), into the era of Grove Ranch, specifically their cattle operations. These findings provide evidence of the activities that have taken place on these lands.

9.1.1 Historic Properties within the Project Area

There are two recorded historic properties located within the project area boundaries. As currently designed, the proposed farm and housing development do not impact these sites.

9.1.1.1 Rock Retaining Wall/soil terrace-SIHP 50-50-06 6273

SIHP 50-50-06-6273, is a large basalt retaining wall with an associated soil terrace. This site was located in the gulch on the southern boundary of the project area, known as Ku'aihulumoa.

9.1.1.2 Burial Site- SIHP-50-50-06-5501

Burial SIHP 50-50-06-5501 is located in southeastern corner of the current project area. This human burial was discovered inadvertently on December 16, 2003 by Maui Land & Pineapple Company employees while excavating a water line adjacent to Pi'iholo Road. Maui Island archaeologist at the time, Dr. Melissa Kirkendall along with the Maui County medical Examiner at the time, Dr. Manukian, determined the burial to be historic (older than 50 years) and of Asian ethnicity. The landowner at the time, Maui Land & Pineapple Company, commissioned Archaeological Services Hawaii to perform additional testing in the area and draft a preservation plan. The burial is described as being in a flexed position. Reinternment of burial was in a neighboring location measuring 2ft x 2ft x 1ft depth. The remains were bundled, covered with six inches of fill, capped with concrete and inscribed with the burial site number. A large upright stone was then placed over the concrete cap. This is how the burial exists today. A burial preservation plan is currently being completed (see Figure 10). The burial will have a designated preservation buffer zone that agricultural and/or construction activities will not be permitted to encroach upon.

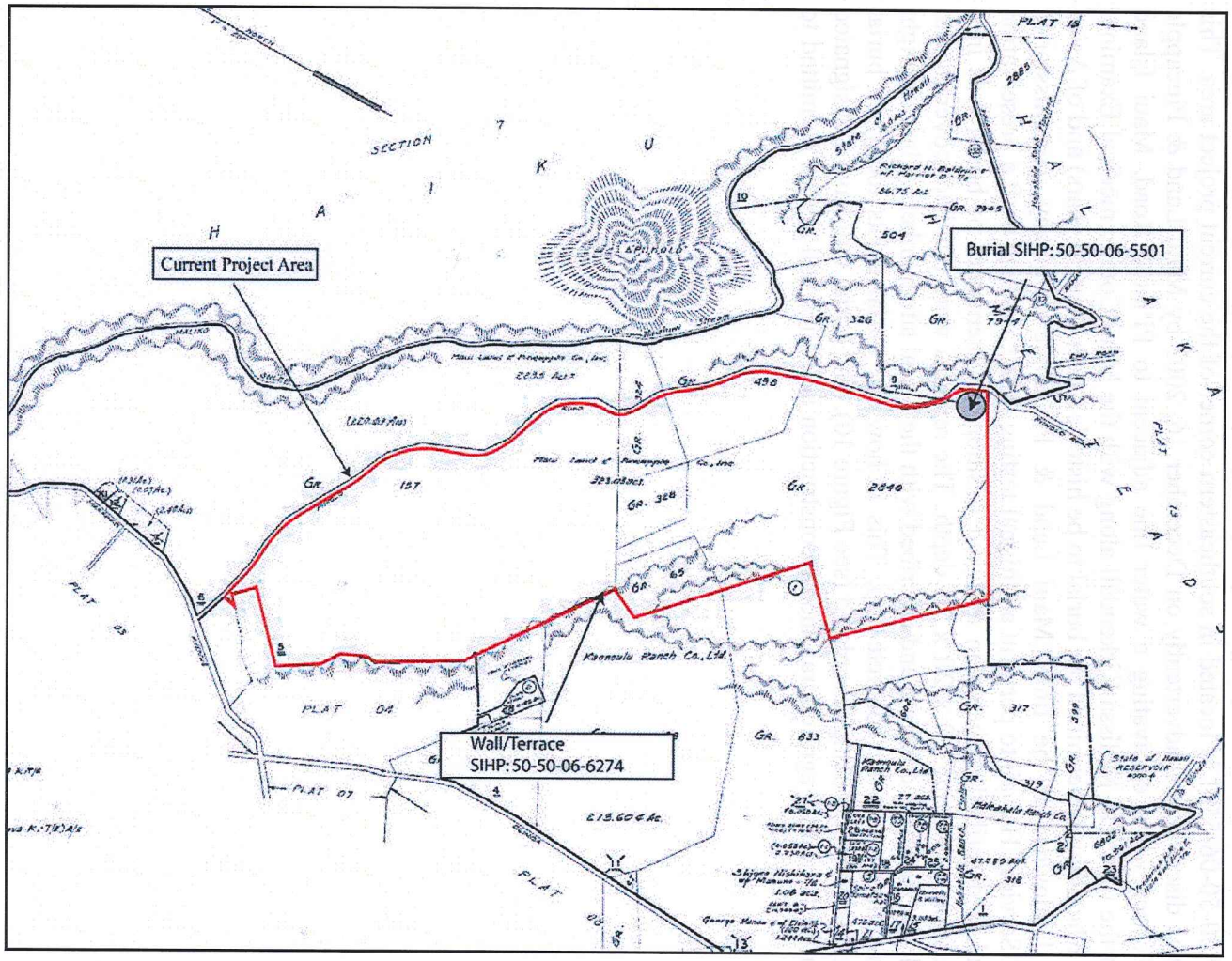

Figure 10. TMK map showing recorded historic properties and burial in relation to project boundary.

9.1.2 Historic Properties in Focus Area (outside of project area)

9.1.2.1 Portuguese Ovens

Two Portuguese ovens were located outside the current project area, yet within the greater focus area. They include SIHP 50-50-06-5554, a Portuguese oven located *makai* of the current project area on former Grove Ranch lands. This oven was recommended for removal and preservation at the Sugar Museum. The second Portuguese oven, SIHP 50-50-06-5675, was located in the region of Pi'iholo and was grouped under its SIHP number with a privy, a cistern, and "a hole with an associated internal chamber" (see Section 5.1.1Archaeological Studies within the focus area).

9.1.2.2 Cattle-Weighing Scale SIHP 50-50-06-5555

Most likely associated with Grove Ranch cattle ranching operations, and possibly its predecessors, a cattle-weighing scale was discovered and recorded on lands *makai* of the current project area in Hāli'imaile.

9.2 Christian Traditions

Christian traditions and Catholic practices are deeply entrenched in the Makawao community. Two Protestant churches, Po'okela Church (f. 1843) and Makawao Union Church (f. 1861), and one Catholic Church, St. Joseph's Church (f. 1851), are located in Pā'ia and Makawao (see Section 4.2.3 Christian Religious Centers in Makawao). The formation of these churches not only played a critical role in the conversion of the Hawaiian population of Makawao to Christianity, but individuals associated with the churches, such as Rev. Jonathan S. Green, also played a significant role in the community. For example, Rev. Green acted as the land agent during the pre-*māhele* sale of Makawao lands. Both the conversion of Hawaiians to Christianity and the end of the traditional Hawaiian land tenure system reshaped Hawaiian religious concepts and impacted Makawao and the project area lands (see Section 4.2.1 The Māhele Aina of 1848).

9.2.1 Po'okela Independent Protestant Church

The Po'okela Independent Protestant Church, also known as the Po'okela Church, brought Christianity to the heart of Makawao and provided a spiritual sanctuary for native Hawaiian Christians who had converted to the Protestant faith. This church was an important part of the social and economic foundation for the people living in the Hāmākua Loa, Hāmākua Poko and Kula Districts of Maui and was an important spiritual resource during times of economic upheaval, ravages of disease, and changes to the government of the Hawaiian Kingdom, within the context of the early historic plantation period, from 1850 to 1900 (see Section 4.2.1 The Māhele Aina of 1848 and Section 4.2.3.1 The Po'okela Independent Protestant Church).

Both Mrs. Elaine Foo Sum and Mrs. Lois Ferrington, current members of the Church, shared their knowledge of the history of Po'okela Church and Makawao Town (see Section 4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao, and Section 8.1.5 Mrs. Elaine Kazue Kajihara Foo Sum). The church's history is diverse, and in 1940 had only one active member, Mrs. Minerva Kalama. In a time when there were no active services, "Aunty Kalama" continued to show up and hold Sunday school for the children (see Section 4.3.1 Po'okela Independent Protestant Church). After years of working to revitalize it, the church membership

grew to its current diverse ethnic demographic of Hawaiians, Japanese, Portuguese and all ethnic groups in between. Several members of the Tavares family are buried in the Po'okela cemetery as is the Chinese entrepreneur, T. Akana or Akanali'ili'i (see Section 4.2.8.2 East Maui Plantation Company (Piiholo Sugar Plantation) and East Maui Stock Company (Ranch) merges with Haleakala Ranch Company).

In the 1830s-1850s, Protestant congregational churches, including the Po'okela Church, provided educational opportunities for Native Hawaiian children and vocational training for Native Hawaiian young adults. At present (August 2015), the Po'okela Independent Church conducts a pre-school, a Sunday school, and Sunday services, and continues as a place of cultural significance for all strata of Hawaiian society. The Po'okela Independent Church remains an important element of the cultural heritage of the Hawaiian people, and all of the people of Hawai'i in the Makawao *ahupua'a* and beyond.

9.2.2 Makawao Union Church

The Makawao Union Church has been providing Christian church services since 1861. Known as the "foreign" church (meaning non-Hawaiian), which conducted services in English, the Makawao Union Church was built on the foundation of the Paliuli Sugar Mill and dedicated to the memory of Henry Perrine Baldwin, the owner of the Mill and future proprietor of Alexander & Baldwin. It is also associated with Rev. Jonathan S. Green, founder of Po'okela Church, who served this church for a time while he lived in Makawao. The Makawao Union Church further represents the tradition and practice of Christianity within the Pā'ia and Makawao communities (see Section 4.2.3.2 The first "new" Makawao Union Church, 1889).

9.2.3 St. Joseph's Catholic Church

After the Kingdom of Hawai'i ended its formal banishment of Catholics with the Edict of Toleration, enacted in 1839, Catholicism was permitted as a religion in the Islands (see Section 4.2.3 Christian Religious Centers in Makawao). The Catholic mission was established in Makawao (see Section 4.2.3.3 The Catholic Mission at Makawao—St. Joseph's Church).

The Portuguese arrival in the region infused the Catholic Church in Makawao with a devoted following, as these families retained a deeply rooted tradition of the Catholic faith, the principal religion in their homelands of the Azores and Madeira Islands. The Catholic mission in Makawao began to thrive and continues to be a spiritual as well as a Portuguese cultural center, for many Catholic families. The Portuguese cultural influences at this church truly define it.

The annual St. Joseph's Feast embodies a long-standing traditional community event that incorporates many elements of Portuguese culture. First organized in 1905, the St. Joseph's Feast originated to raise funds to build the existing church. This fundraising event was, and continues to be, one of the Church's biggest events of the year. In earlier years, Mr. DeRego said families would donate livestock, goats, pigs and so forth for auction. Today, the Feast is known for its Portuguese homemade goods: sweet bread, jams, jellies, malasadas and Portuguese bean soup. Individuals consulted for this study describe helping run the event and attending it year after year (Mr. Billy Abreu, Mr. Alan DeCoite, Mr. Herman Louis DeCoite, Mr. Hugh Starr, Mr. Jimmy DeRego, and Mr. Doug McClure).

Five of the individuals interviewed were second-, fourth- and fifth-generation Portuguese; Mr. DeRego, Mr. Abreu, Mr. Alan DeCoite, Mr. Herman Louis DeCoite and Mr. Freitas. Three of the individuals interviewed mentioned that they attended St. Joseph's school as children and were members of the Church, as were/are their parents, grandparents, and great-grandparents (see Section 8.1.1 Mr. Billy Abreu, Section 8.1.2 Mr. Alan DeCoite, Section 8.1.3 Mr. Herman Louis DeCoite, and Section 8.1.6 Mr. Kenneth Freitas). The Catholic faith remains a living tradition among many residents of the Makawao area. As such it constitutes one of the most important ongoing cultural practices in the area.

9.3 Agricultural Practices of Makawao and Hāli'imaile

The lands of Makawao and Hāli'imaile are well known for their dryland agricultural uses and productivity. Agricultural practices have taken place in these *ahupua'a* and specifically on the lands of the current project area, from traditional times into the modern era virtually uninterrupted. *'Uala* and dry-land *kalo* crops were often planted in *mo'o*, or long, narrow planting plots. Although not exclusive to dryland crops, *mo'o* were often given names by those who cultivated them (E. S. C. Handy, et al. 1991:50). Due to its dryer climate and distance from coastal resources and elevation, pre-contact settlement occurred later than the coastal areas and watered stream valleys, perhaps around A.D. 1620.

9.3.1 Traditional Hawaiian Agriculture

Based on the traditional stories of the area, historic references, archaeological evidence, and individuals' knowledge of the area, Makawao *ahupua'a* was known to be suited for dryland agricultural crops. Dryland crops such as *'uala* and dryland *kalo*, or taro, varieties are documented by way of traditional stories, such as that of Kiha-a-Pi'ilani who, while in hiding after a fight with his brother, lived in Kapalaea and cleared a large patch which he planted with *'uala*. Additional references by Kamakau, Rev. Green, Handy and Handy and others all document weather and soils well suited for the growing of *'uala*, banana and dryland *kalo* and note these crops being cultivated by native Hawaiian population.

The main area documented to have had *lo'i kalo*, or pond-field cultivation, were the seaward reaches of Māliko Gulch where the gulch bottom widens and flattens out. This topography, coupled with the steady stream flow, made *lo'i kalo* cultivation possible. Hawaiians also cultivated sugarcane here; references to native sugarcane patches are provided in this study. Although early Polynesian settlers brought several varieties of sugarcane with them from southern Polynesia, and were therefore cultivating sugarcane prior to western contact, it is not clear what varieties of cane Hawaiians were growing when they were recorded in the accounts cited for this study (see Sections **Error! Reference source not found. Error! Reference source not found.** and 4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao).

9.3.2 Historic Era Agriculture

Newcomers to the Islands brought different crop plants with them, some of which literally shifted the entire economy of the island chain, setting the stage for the modern Hawaiian economy. The lands of the current project area were known for sugarcane cultivation beginning as early as the late 1830s. Sugarcane cultivation likely began in the Hāmākua Poko *moku* during traditional times, prior to the arrival of westerners. Hawaiians were likely growing sugarcane in

the traditional manner when foreigners arrived in Makawao as they brought several varieties with them during the initial settlement of the islands. Critical developments in the sugar industry began between 1838 and 1850. During this timeframe, six sugar plantations were established in Makawao and the surrounding regions with over 700 acres within this area under sugarcane cultivation. Of these, approximately 200 of those were owned and cultivated by Hawaiians (see Sections 4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao and 4.2.5 Maui Sugar Plantations). The lands of the project area were part of the first government lease to Edwin Miner and William McLane who started their own sugar plantation in 1838. Their sugar mill was located at the site of St. Joseph's Church (see Section 4.2.5.1 Miner & McLane Plantation, Makawao (Current Project Area)).

Additionally, Rev. Green tried to established wheat cultivation in Makawao in an effort to foster productivity and industry in the residents there. Rev. Green planted one acre of his own lands (adjacent to the current project area) in wheat, harvesting 27 bushels. This effort failed due to the excessive labor involved with harvesting. Additionally, Hawaiians themselves did not favor eating it (see Section 4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao).

Other crops grown in Makawao included red potatoes, white potatoes, and corn. Corn was grown at the Makawao Corn Mill Company and at Corn Mill Camp (see Sections 4.2.7 Makawao Corn and 8.2.2 Mr. Doug McClure).

Pineapple cultivation began with Haiku Fruit & Packing Company, and then moved into Makawao when the Grove Ranch Plantation began their operations. Grove Ranch lands in Hāli'imaile and Makawao became consolidated into Maui Pineapple Company lands and converted to pineapple. The lands of the project area were part of these landholdings and were in pineapple cultivation from 1914 to 2008. Smaller farm plots of pineapple were cultivated by Japanese farmers (see Sections 4.3.3 Pineapple Cultivation in Makawao, 8.1.5 Mrs. Elaine Kazue Kajihara Foo Sum and 8.2.2 Mr. Doug McClure).

9.4 Traditional Marine Resources

With ocean resources for food procurement paramount to the livelihood of early Polynesian settlers, coastal regions with access to watered stream valleys were the first areas settled. Archaeological evidence implies that this is true for Hāmākua Poko, where indeed, the coastal regions of Pā'ia and Kū'au had a far larger population. A pre-contact fishing village was located here, with the coastal sites settled as early as A.D. 1420. This section of the coast was known for *limu* (seaweed) collection and *he'e* (octopus) spearing, with locations such as Kapukaulua (in Pā'ia) implying known fishing holes for *ulua* (*Carangidae sp.*).

It was said that the fisheries of Hāmākua Poko supplied the fisheries of Wailuku through the currents and winds that cause a westward migration. There is no doubt that the connection between the coastal villages of Hāmākua Poko and the upland region of Makawao may have been one based on trade, whereby the inland population traveled to and along the shoreline where they exchanged dryland crops and other upland resources for fish.

9.5 Forest Resources

Makawao, as its name implies, is the "forest beginning." It is located in a transitional climate zone between the dryer mid-elevation and extends *mauka* into the wetter, more heavily forested regions of the current day Makawao Forest Reserve and the Waihou Springs Reserve. Based on historic references, historic maps and community consultation, traditional Hawaiian practices requiring forest resources took place in the focus area.

In some of the oldest descriptions of the region, Makawao is described as a place of higher elevations and cool temperatures, cut by gulches and ravines, and bridged by plateau lands (see Section 4.2.5 *Mele* of Makawao (Songs and Chants) and 4.2.2 Historic Accounts of Hāmākua Poko, Hāli'imaile and Makawao). As Mr. Bob Hobdy described, Makawao would have once supported mesic forest species such as *koa* (*Acacia koa*), *'ōhi'a* (*Metrosideros polymorpha*), *'iliahi* (sandalwood, *Santalum sp.*) and *halapepe* (*Pleomele auwahiensis*). Mr. Hobdy states that the lands of this transition zone could support many varieties of trees and shrubs and that native plants found in the gulches were likely collected for traditional purposes. He speculates that there was likely traditional plant collection in gulches (Section 8.1.7 Mr. Robert Hobdy). *Kukui* (*Aleurites moluccana*) forests were also known to have existed here, evidenced by historic maps, community consultation, historic references and LG boundary descriptions. *Koa* forests and *'ōhi'a* forests are notated on the 1872 Lyons map (Figure 4); one particular *'ōhi'a* grove on the Lyons map is named Kuhoolehua. On the same map there is a notation "upper limit of kukui," illustrating the edge of the *kukui* forest as being less than one-mile *mauka* of the current project area.

Traditional Hawaiian uses of the above mentioned woods vary. A historic 1844 reference by Rev. Green describes the existence of temporary housing of canoe builders located in the higher elevations *mauka* of the project area. Indeed, *koa* trees were the preferred wood for canoe building. Canoes were made to last a lifetime, and many ceremonies were conducted as part of the canoe making process. There was a class of canoe builders led by a *kahuna kālai wa'a*, a person trained in the chants and rites of canoe building (Abbott 1992; 80 and Buck 1957; 268). *Koa* was used for *'umeke lā'au* or bowls and containers to store or carry any number of items, from food to feathers. *Koa* was not used as a *poi* container as it transferred a bitter taste to the *poi*. *Koa* was also used to make surfboards (Abbott 1992; 87-88, 129 and Buck 1957; 384-385).

'Ōhi'a, along with *naio* (*Myoporum sandwicense*, bastard sandalwood), was also said to have grown in the focus area (see Section 8.1.9 Mr. Anders Lyons) and were used in house construction. Generally growing with straight trunks and to moderate sizes, these woods provided materials for posts and beams. *'Ōhi'a* was also used for decking, spreaders and seating in canoes, and sometimes gunwales. Believed to be the *kinolau* (a physical manifestation) of the gods Kāne and Kū (principal gods of procreation and war respectively), large carved images of these gods were made from *'ōhi'a*. Specific to *luakini heiau*, *'ōhi'a* wood was used for the images, oracle tower and houses within the *heiau*. Additionally, the young, red leaves of the *'ōhi'a*, called *liko lehua*, were used in traditional lei making (Abbott 1992; 68, 81, 113-114, 126 and Buck 1957; 87, 467, 519).

While *koa*, *'ōhi'a* and *naio* are tree species endemic to the Hawaiian Islands, *kukui* is believed to have been introduced by early Polynesian settlers. Many references to *kukui* in the focus area

have been made (see Sections 4.2 *Traditional and Historical* , 4.2.5 *Mele* of Makawao (Songs and Chants), 4.2 *Mid-To-Late 1800s*, 5.2 *Archaeological Background Summary and Predictive Model*, and 8.1 *Informal Interviews*). Uses of the *kukui* tree were diverse and ranged from medicinal to household use, as lamps and oils. Different parts of the plant were made into pigments and paints for canoes and *kapa* design (Abbott 1992; 3,5,81, 54-55). Charcoal from the *kukui* nut and juice from the outer covering of the fruit were used to make tattooing ink (Abbott 1992; 128). Lei were made from *kukui* seeds, in *lei hua* or seed *lei* (Abbott 1992; 125).

In the boundary description for LG 2840, which makes up more than one-third of the project area (110.54 acres), the area is referred to as "Papalanui Ahupua'a." Because Hawaiian place names often literally describe the area, a discussion of the place name Papalanui may shed light on further traditions and activities. One translation of the word "*Papala*" refers to a native species of shrubs and small trees (*Charpentiera*) belonging to the amaranth family. The word "*nui*" is used to mean large, grand or big. Possibly, this area contained a large grove of *papala*. Further research finds another plant called *pāpala kēpau* (*Pisonia* sp.), whose seeds produce a sticky substance used by Hawaiian bird catchers (*kia manu*) to capture birds for harvesting ornamental feathers (Abbott1992; 106). This particular translation is interesting in that there are two gulches within and adjacent to the project area whose names may reference feathers; Ku'aihulumoa and Huluhululi'ili'i (see Table 1). Research suggests (Lyons 1872) that the forest extended further into the project area in traditional times. These place names might imply that the project area was a place known for birds and/or possibly feather collection. Another definition of the word *papala* is to ripen, mellow or yellow. This translation could tie into other place names in the region such as 'Ulalena (yellowish-red rain of Ha'ikū) and Kalena (pond at base of Pi'iholo), as they all suggest a yellowing color.

Other endemic and Polynesian-introduced plants found in the focus area and mentioned throughout the consultation process include *wiliwili* (*Erythrina sandwicensis*), *pepeiao* (wood ear fungus, *Auricularya cornea*), *'ape* (*Alocasia macrorrhizat*), *neneleau* (Hawaiian Sumac, *Rhus sandwicensis*), *kolea* (*Myrsine sp.*), and *palapalai* (fern, *Microlepia strigosa*). Kumu Keali'i Reichel explained that *palapalai* are mentioned in chants and that he has observed patches growing around Kalena Pond. He explained that *palapalai* is a *kinolau* of Laka, the goddess of hula. Regarding Hāli'imaile, again translating this place name, it would make sense that this might have been a place where *maile* (*Alyxia stellata*) grew. As described by Kumu Reichel "*hali'i,*" means to spread, and "*maile,*" refers to the vine; therefore, Hāli'imaile may have been a place where the *maile* vine spread out (see Section 8.1.10 Mr. Keali'i Reichel).

Typically, the *hala* tree (*Pandanus tectorius*) is associated with coastal lands, and lower elevations, yet one *hala* tree was noted in the boundary description for LG 58 to Omaile. It was described as being located on "McLane and Miners old land" and referred to as "*lauhala,*" generally a reference to *hala* leaves. Traditional uses of *hala* include weaving, in the manufacturing of mats and other textiles (Abbott 1992; 72-73). The term *lauhala* used here, coupled with the fact that the tree was located in Makawao, might imply this tree was intentionally brought to Makawao and planted for the purpose of making goods from the leaves.

9.6 Freshwater Resources

The lands of the focus area have an abundance of freshwater resources. Hawaiians relied on fresh, flowing water therefore, freshwater sources were well cared for and managed. Freshwater food resources such as *hīhīwai* (*Narita granosa*), *'ōpae* (*Atyoida bisulcata*) and *'o'opu* (*Eleotridae, Gobiidae, sp.*) supplemented the traditional Hawaiian diet.

Two watersheds are located near the project area: Makawao Forest Reserve and Waihou Spring State Forest Reserve. The Waiohiwi and Kahakapao Streams originate in the Makawao Forest Reserve and flow *makai* (seaward) where they join to form Kalena Pond at the east side of Pu'u Pi'iholo. As they drain from Kalena Pond, they become one stream known by several different names, including 'Alelele. This same stream continues seaward where it then becomes Māliko Gulch. The Waihou Springs (now damaged and waters diverted) are the source of Kailua Gulch. Māliko Gulch and Kailua Gulch form the northeastern and southern boundaries, respectively, of the traditional Hāmākua Poko *moku.* Seeps of fresh water have also been observed in Ku'aihulumoa Gulch.

Through the community consultation process, one individual, Mr. Herman Louis DeCoite, recalled observing *'ōpae* in the upper ponds at Pi'iholo. Several individuals consulted have observed introduced species of fish, frogs and crawfish living in Kalena Pond and 'Alelele Pond, including red swordtails, goldfish and green frogs. It is unclear exactly how or why these species came to live here, but individuals interviewed recalled these species being in the ponds from the time they were children. Some of them said that they would catch goldfish to put in their livestock troughs to help control algae (see Section 8 Summaries of Community Member Interviews, Mr. Herman Louis DeCoite, Mr. Keali'i Reichel, Mr. Doug McClure).

Several individuals consulted recalled swimming in these ponds as youngsters for recreation and when the weather was hot. They accessed Kalena Pond from a trail off Pi'iholo Road and 'Alelele, from the bridge off Makawao Avenue, or, as Mr. Abreu stated, from his grandmother's yard. Mr. Herman Louis DeCoite and Mr. DeRego recalled the names given to the ponds: Kalena Pond, Tavage (Tavares) Pond, 'Alelele Pond, Temple Pond, 1st. Pond, 2nd Pond, Devil Pond, and Honeymoon Pond. Mr. DeRego said that someone threw barbed wire into Devil Pond and that's how it got its name. These ponds were in an alignment and a 300-foot waterfall, Waiohiwi Falls, spilled into a small pond. Some individuals consulted noticed that Māliko Stream does not run as consistently as it once did. Native water birds have also been observed on these ponds; Mr. Patrick Fisher has observed *Koloa maoli* (endangered native Hawaiian duck, *Anas wyvilliana*) and *A'eo* (Hawaiian stilt, *Himantopus Knudseni*).

9.7 Historic and Contemporary Hunting Practices

Bird and game hunting currently takes place in the focus area. Mr. Patrick Fisher and others interviewed for this study explained that axis deer (*Axis axis*), pigs (European boar, *Sus scrofa*), and Chinese ring-neck pheasant (*Kolohala, Phasianus colchicus*) live in the area and are hunted for sport and subsistance. The hunting of these animals has become an important traditional practice in the focus area, and several individuals consulted for this study noted that they have hunted on these lands for generations.

Mr. McClure and Mr. Fisher are just two of the many Maui families that continue to hunt deer and pigs as their main meat source. Beyond the families who hunt deer and pig regularly, there is a growing trend in eating local, wild-caught meats that have not been treated with antibiotics and hormones.

9.8 Cattle Ranching and the Paniolo Tradition

Few today will argue that the cattle ranching tradition and associated Paniolo culture, defines Makawao. The first recorded formal lease agreement which included access and water rights for livestock, was in 1838 to William McLane and Edwin Miner (4.2.5.1 Miner & McLane Plantation, Makawao (Current Project Area)). With their roots established in the sugar plantation business, Haleakala Ranch was created and successfully grew to its current size at nearly 29,000 acres. Today, 127 years from the date of its incorporation in 1888, Haleakala Ranch continues to be owned by members of the founding Baldwin family. From its earliest inception, Haleakala Ranch has played a critical role in the economy of Maui and estliblished the ranching lifestyle in Makawao (see Section **Error! Reference source not found. Error! Reference source not found.**).

9.8.1 Paniolo "Hawaiian Cowboy"

Along with ranching operations came the need for cowboys to manage the cattle herds, thus, the Hawaiian cowboy, or the Paniolo, came to Makawao. The term "Paniolo" is said to be a Hawaiian transliteration of the word "Español" (Harrisson 2013; 66). The traditions of cattle ranching were initiated with the introduction of cattle by Capt. George Vancouver who gifted Kamehameha I with the first bull and cow in the islands delivered in February 1793. With the cattle, the need for individuals who knew how to handle them emerged. In 1832, as a result of a booming cattle population and the need to manage them, three Mexican *vaqueros* from Califorina, were brought to Waimea, Hawai'i where they began their work of capturing wild cattle. Their names were Kossuth, Lozuida and Ramon and with them they brought the tools of their trade; intricately decorated leather saddles, spurs, hand forged bits, and handmade lariat's and ropes (Henke 1929:21). These three individuals would eventually teach interested Hawaiians their trade. From these early beginnings, the Paniolo tradition evolved into the unique Hawaiian form seen in Makawao today.

Paniolo saddle making, taught by the early *vaqueros*, originated from the Spanish *conquistadores* who first introduced cows and horses to the New World. Centuries later the descendants of these Spaniards settled in Mexico where they raised cattle and horses and eventually moved their operations into southern Califorina (Martin 1987: 27, in *Nā Paniolo o Hawai'i*) Over the course of this CIA study it was learned that the tradition of leather work; saddle making and rawhide work continues in Makawao today, where leather craftsman such as Mr. Henry Silva and Ms. Gretchen Cardosa continue the craft. (Personal communication Robin Jensen and Gretchen Cardosa 2014, 2015).

Long standing traditions related to Makawao's ranching and Paniolo culture include the annual 4th of July Makawao Rodeo and the 4th of July Makawao Parade. Prior to the formal Makawao Rodeo and Parade established in 1956, the Haleakala Ranch, celebrated its own traditions which included cattle drives, brandings, rodeo, horseracing and Polo (Harrisson 2013; 127-136). Of the individuals interviewed for this CIA study, five were cattle men and Paniolo;

Mr. Billy Abreu, Mr. DeRego, Mr. Herman Louis DeCoite, Mr. Alan DeCoite, Mr. Kenneth Freitas. Three of these five, grew up at Haleakala Ranch with generations of family members employed by the ranch. Cattle ranching and activities associated with it have created generational and deeply established traditions in Makawao.

9.8.2 Polo and "Cowboy Polo"

It can be said that the game of polo was established on Maui by Louis von Tempsky, Haleakala Ranch's second manager (Harrisson 2013; 28). The first formal polo game played in Makawao was at the site of the current Makawao Hongwanji in 1887 on a field owned by George Miner. Not long after this first game, more games were played at a field on H.P. Baldwin and Samuel Alexander's Grove Ranch, located at Mauna'olu (ibid; 127).

Maui's polo team through the years consisted of various members of the Baldwin, Rice, and von Tempsky families, as well as several others. The game was paused for a time at the onset of World War II then revived in the 1950's, after the war, by Manduke Baldwin and his wife Harriet "Haku" Baldwin (Harrisson 2013; 128-132). From this time ranch cowboys began to get involved as did cowboys from the nearby ranches of Ka'ono'ulu and 'Ulupalakua. This tradition grew to what we know today as "Cowboy Polo".

Individuals interviewed for this study recall their involvement in the game and individuals such as Mr. Herman Louis DeCoite have made a successful career playing polo. Mr. H.L. DeCoite learned to play polo in the 1970's at the Eddie Tam Park, which used to be a horse racing track and field. He explained that Peter Baldwin taught him the game. Throughout the years Mr. H.L. DeCoite has received numerous competition achievements, including championships at California's Governors Cup and Pacific Coast Open. Mr. Allan DeCoite also described spending some time playing polo as well. Today, polo continues to be played throughout the summer and fall at the Manduke Baldwin Polo Field and the Oskie Rice Polo Field respectively.

9.9 Historic Access Trails

Prior to the paved roadways and automobiles of the modern era, people got around, on-foot, on horseback and with horse and buggy. *Mauka-makai* access trails were critical for pre-contact Hawaiians as they generally traversed lands throughout their *ahupua'a* to collect resources from the different growing zones. Makawao, being a land-locked *ahupua'a*, was no different and research suggests that pre-contact Hawaiians living here, traveled *makai* to barter their dryland crops for coastal goods which they did not have easy access to. As foreigners moved into the islands and horses became utilized for travel, additional access ways were developed and greater distances were traveled. Two historic access trails and one cattle trail exist within the project focus area, in some places these trails cross the project area. These include the "Haiku Wood Road" and the "Bridle Path". The cattle trail runs from the Haleakala Dairy to pastures at Pi'iholo proceeding along the *mauka* boundary of the project area.

9.9.1 The "Haiku Wood Road"

The historic Haiku Wood Road (Figure 11, Figure 12) is now known as Ka'ili'ili Road. This road runs east off Makawao Avenue and is the access road for the DeCoite Slaughter house. The road then continues onto Pi'iholo Ranch lands where today its access ends. But, the historic trial,

although overgrown in sections, continues to Hā'iku where it connects with Awalau Road (figure Lyons, Sections **Error! Reference source not found. Error! Reference source not found.**, and **Error! Reference source not found. Error! Reference source not found.**). Mr. A. DeCoite explained that a man named 'Hubbard' lived up this road and owned and operated a saw mill, likely for milling logs harvested from the forest. Mr. Hobdy states the Haiku Wood Road was a way that people in Makawao traveled to Hā'iku.

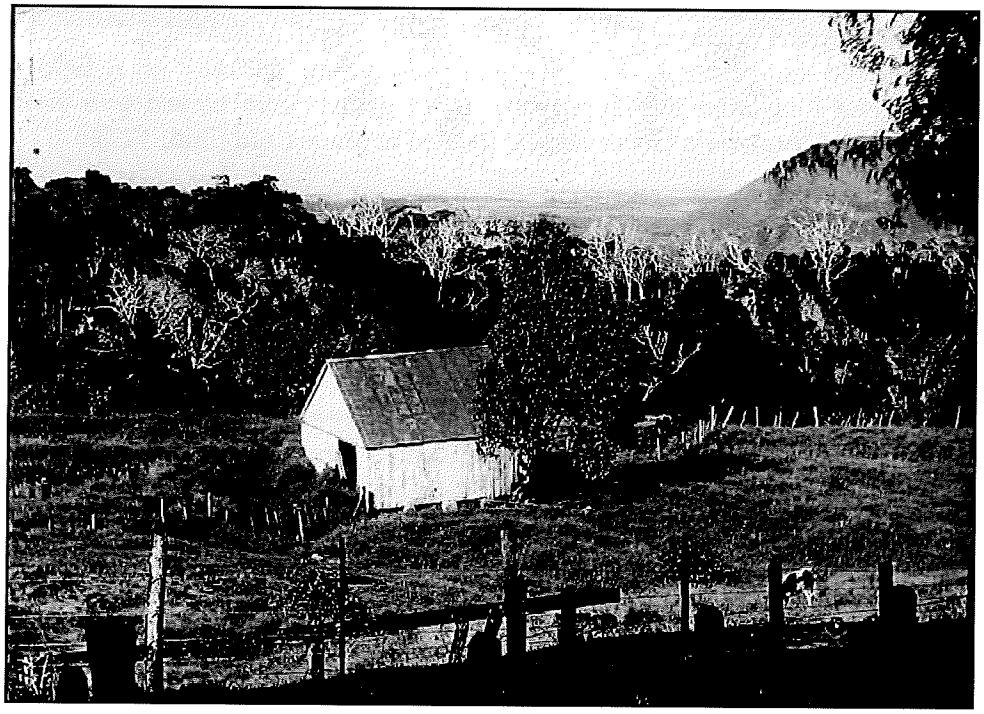

Figure 11. Photograph of a portion of Ka'ili'ili, a plantation village located east of Pu'u Pi'iholo. The cutting of the forest as fuel for plantation villages allowed for lands in the region to be used for pasture (Robert Hill private collection).

9.9.2 The "Bridle Path"

The Bridle Path, also depicted on Lyons map (1872), had several start/end points. One beginning point appears to be located at Rev. Green's residence, LG 68, adjacent to the current project area, which is today a part of Ka'ono'ulu Ranch lands. From this location it extends *mauka*, then turns east-northeast, where it traverses the project area. Within the project area it splits into two with one trail turning north where it continues to Kalena Pond, and one trail continuing *mauka* then east, where it crosses some small gulches, Waiohiwi Stream and connects with the Haiku Wood Road.

At the split in the trail going in the southwestern direction, the trail continues and splits in this direction with one trail heading south and ending in a gulch which appears to be a *mauka* extent of Ku'aihulumoa Gulch. The other branch continues south west and appears to connect to the historic Haleakala Road located in the vicinity of the area known as Maluhia (see Section 8 Summaries of Community Member Interviews)Section 8 . Mr. Hobdy states that these trails were used by the community to provide access to and from this part of Makawao.

9.9.3 Cattle Trail

Several individuals interviewed for this study described the moving of dairy cattle from the Haleakala Dairy site, off Kealaloa Road to pastures at Pi'iholo (**Error! Reference source not found.**, **Error! Reference source not found.**, Mr. Kenneth Freitas, **Error! Reference source not found.**, **Error! Reference source not found.**,**Error! Reference source not found.**). The cattle were driven down Kealaloa Road (towards Seabury), turned right up Meha Road, then left onto Hanamu Road, then right onto Olinda Road and left on Maluhia Road. Maluhia Road is a small road, just *mauka* of the rodeo arena. There are Ka'ono'ulu Ranch employee housing along this road and today it dead ends at one of the houses/yards. At one time, it continued through the pastures and the *mauka* boundary of the project area, crossed Pi'iholo Road and Waiohiwi Stream into additional pastures at the present day Pi'iholo Ranch. It was explained that some form of an easement exists along this route on the *mauka* boundary of the project area (Figure 13).

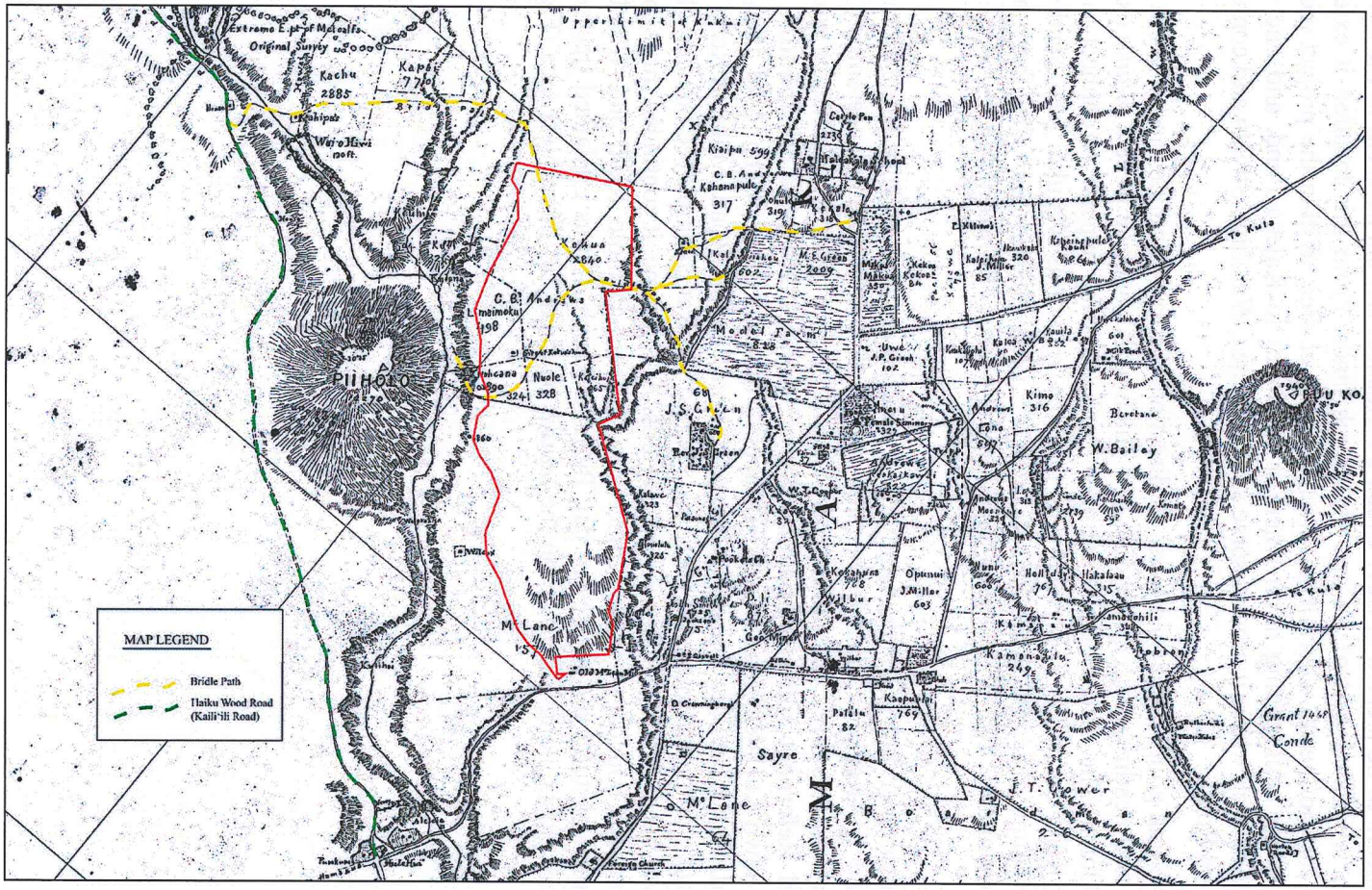

Figure 12. 1872 Hawaiian Government Survey map of Makawao by C. J. Lyons showing project area in red in relation to historic trails; Haiku Wood Road and the Bridle Path.

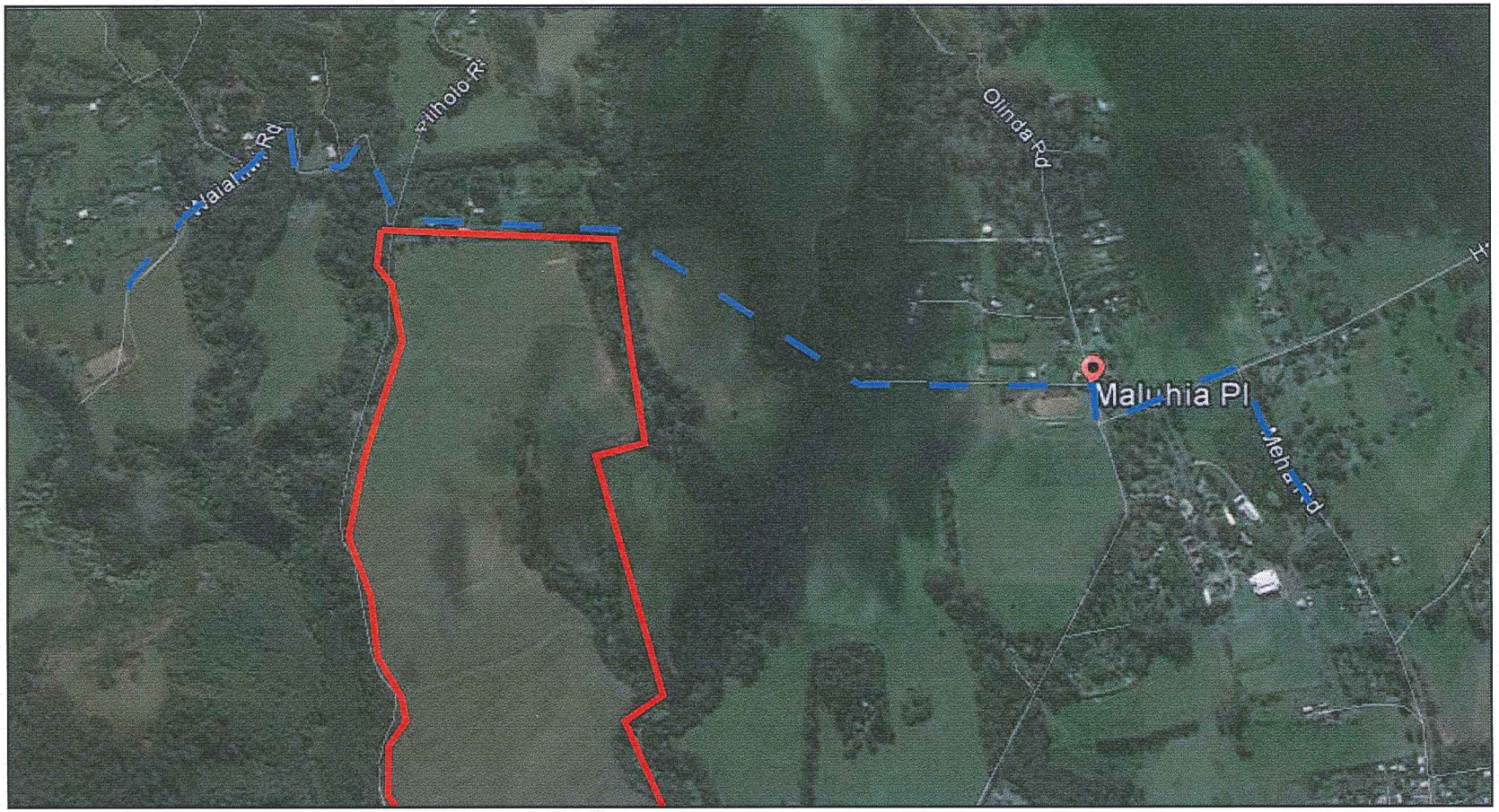

Figure 13. Google Earth satellite image 2015 showing property boundary in red and cattle trail in blue (cattle trail is an estimation based on verbal descriptions from community members, project boundary location is an approximation).

9.10 Traditional Viewshed and Cultural Landscape

The landscape and landmarks on the landscape were a critical part of traditional Hawaiian lifeways. Early Hawaiian settlers were subsistence farmers and fishermen, dependant on the landscape for survival. They attained all their goods from the land and ocean; food, water, tools, clothing, shelter, and ocean vessels. Interwoven in this dependence on the environment/landscape was the importance of what they saw visually; Pu'u (hills), gulches, streams, rocky outcrops, large boulders, small boulders any and all points on the landscape could be significant for any purpose ranging from travel (wayfinding) to ceremony. In this way, the landscape and the associated viewshed is considered a significant cultural resource.

The lands of the focus area and project area contain culturally significant elements in the viewshed that span generations and continue into modern times. The views *mauka*, *makai*, and the view of Pi'iholo Hill and from atop Pi'iholo Hill into Hā'iku, are all significant. Evidence of their significance are relayed in songs and chants and stories of the area (see Section **Error! Reference source not found. Error! Reference source not found.**, and Section **Error! Reference source not found. Error! Reference source not found.**). As Mr. Reichel described, features of the land such as the alignment of the *pu'u* which roughly follow Māliko Gulch; Pu'u Kakae, Pu'u Pi'iholo, Pu'u Kauhikoa, Pu'u o malei, are significant. Not only are these places mentioned in song, they are locations of places of worship such as Kauhihale Heiau atop Pu'u o malei. Mr. Reichel explains that high places, such as *pu'u*, were often sought out as special or ceremonial locations, where one might have a broader vantage point and a higher perspective both, literally and spiritually.

The viewshed has changed over the years with the harvesting of forest trees, and with the development of plantations and ranches. Early documents illustrate a population living in the lands of the focus area and project area, therefore there was likely traditional Hawaiian housing coupled with sporadic homes of foreigners such as William McLane, along with sugar mills. Shortly after that time, as the sugar plantations were consolidated and the native homes were cleared for planting fields, therefore, there has been no visible housing on the lands of the project area for over one hundred years. Current generations have experienced this area as agricultural fields and livestock pastures (see Section 8.1 *Informal Interviews* and **Error! Reference source not found. Error! Reference source not found.**).

Changes in the landscape and associated changes in the viewshed have impacts on the culture, whether it is the Hawaiian culture, the Portuguese culture, or the Paniolo culture. And once the landscape is altered and a viewshed is changed, future generations will not experience them as they once were. Eventually, over generations, elements of the landscape are lost and the relationship of the people to that landscape and viewshed changes.

9.11 Community Concerns

Individuals consulted for this study expressed concerns regarding water consumption for this project. Specifically, they expressed concern about both water availability and the impact a farming operation and housing development would have on the availability of water in the focus area (Table 7). Added traffic congestion was another concern voiced by community members. With the addition of housing, it is believed that the traffic will worsen in Makawao Town.

Additional concerns were expressed regarding the perception that the proposed project will be a "gentleman's estate", where no agricultural practices will take place. Because Maui has seen several housing developments built on agricultural lands that are not actively involved in agriculture, individuals expressed apprehension and disbelief that the proposed project would, in reality, include a working farm (see Sections 8.1.6 Mr. Kenneth Freitas and 8.1.8 Mr. Sam Ka'ai).

Section 10 Summary and Recommendations

In summary, this study found that pre-contact Hawaiian settlement took place in the lands of Makawao Ahupua'a around the year A. D. 1620. Until this time, as early as A. D. 1420, the population is believed to have been concentrated along the coastal reaches of Hāmakuā Poko Moku, in Kū'au and Pā'ia, and in the broad sections of Māliko Gulch and Kailua Gulch, where ocean resources and freshwater resources were easily accessible and abundant. This gap in settlement between the coastal region and the upland region may be defined simply by Makawao's distance from coastal resources which earlier Hawaiian settlers relied on. Hawaiians likely made occasional treks *mauka* for the collection of forest resources such as *koa* and *'ōhi'a* for canoe building and house construction materials, then over time Hawaiians began to settle here. References to chiefly presence in places such as Hāli'imaile and Kapalaea illustrate that by the time of these chiefs Hawaiians had settled the area. They cleared farming plots and began the cultivation of dryland crops such as *'uala* (sweet potato) and dryland *kalo*. Traditional Hawaiian ceremonies associated with both forest resource collection and dryland agriculture, without a doubt, took place here. Makawao's rich agricultural soils coupled with adequate rainfall and the freshwater resources of the Waiohiwi, Kahakapao, Māliko and Kailua Streams would have provided those living here with enough food and water, only finding the need to travel down to the coast to barter for fish and other ocean resources as desired.

The cool climate, majestic views, fertile soils, and forest resources also made Makawao a popular location with early foreign settlers, both whaling men and missionaries. Early foreign members of this community, instrumental in the region's development and land use through history, include Edwin Miner, William McLane, and Rev. Jonathan S. Green. With later members of the community consisting of children of the missionary families; Lorrin Thurston, Samuel Alexander and Henry Perrine Baldwin, to name a few. During this time, the early 1800s-1840s, Makawao is described as being dotted by farms of native Hawaiians who were growing bananas, *'uala*, dryland *kalo* and sugar cane. Houses and workshops of canoe builders remained in existence in the higher elevations during this time. The above mentioned foreign settlers further developed the area's sugar plantations, and by 1849 approximately 700 acres in Makawao were planted in sugarcane, with 200 of those acres settled and operated by Hawaiians. Yet, our understanding is that much of the land of Makawao was government lands, and may never have been worked by native Hawaiians as traditional *kuleana* lands. These details illustrate a period in Hawaiian history where Hawaiians and foreigners were in the midst of blending cultures, religions, and agricultural practices.

The abovementioned individuals play a critical role in the land use patterns, specifically of the project area. McLane and Miner obtained the first government lease of lands (which include the lands of the current project area) for use as a sugar plantation, with possibly the first formal rights to water and access to the coast for raising and shipment of livestock. Rev. Green was instrumental in Makawao's history as he worked as a dedicated missionary who spread Christianity through the establishment of Po'okela Church, while also encouraging the Hawaiian population to become more industrious by farming and planting western crops such as wheat and corn. The influence of American Protestant missionaries coupled with the creation of industries based on world economic markets rather than subsistence fishing and farming, led to the Organic

Act of 1848, also known as the Māhele'Āina. This new landownership concept was brought to Makawao earlier than any other region in Hawaii (with the exception of Mānoa, O'ahu) when in 1845 lands were offered for sale in an experimental land sale. In addition to his other roles in the community, Rev. Green became the land agent for the sale of Makawao lands. Based on the Hawaiian Government Survey maps of these sales, those who purchased lands in Makawao were predominantly Hawaiian. The transitions from traditional Hawaiian spiritual beliefs and a subsistence-based land tenure system, to Christians in the mold established and set out by American Congregationalist missionaries, set the groundwork for significant transitions in the cultural practices of this area. Few other western introduced concepts changed the face of the landscape more than the concept of private land ownership throughout Maui and the island chain.

From the time of the Māhele forward we see fewer and fewer Native Hawaiian tenants and it appears that as the sugar plantations expanded operations, the properties originally purchased by Hawaiians were bought or otherwise acquired by the sugar companies. As history progressed, and the small sugar plantations grew, so did the demand for labor. Chinese, Japanese and Portuguese contract laborers made their way to Makawao. With their arrival came their cultural traditions and spiritual practices. They establish Christian, Buddhist and Catholic religious centers in Makawao and eventually purchased land and established businesses. The sugar companies then diversified with cattle ranching operations and dairy operations.

Eventually, the majority of these early sugar companies and cattle ranches consolidated with two companies, Haleakala Ranch Company and Maui Pineapple Company, dominating the fee ownership of Makawao. While some of the early migrant laborers continued in agricultural farming, others became the cowboys, merchants, and shop owners of Makawao. Cross cultural marriages of Hawaiian, Chinese, Japanese, Portuguese and missionary populations has always been common, and continues to this day. The cattle ranching industry and the agricultural industries became the predominant drivers of the economy and established the rural, pastoral, agricultural, and ranching community that makes up contemporary Makawao town. Most recently (within the past ten years) Maui experienced the end of the large-scale pineapple industry, when Maui Pineapple Company ceased their operations in 2008 and virtually all their pineapple lands were put up for sale. Today, we see tourism as a major driver of Hawaii's economy, and to accommodate the shift, Makawao caters to this growing visitor industry.

This is the history of the lands of the project area. This land has predominantly been in agriculture since Hawaiians settled here prior to the arrival of Capt. Cook. These lands have been forested lands, traditional Hawaiian agricultural lands, sugarcane plantations, cattle pastures and pineapple fields. Hawaiians and foreigners alike have lived on the lands of the project area, although current generations have never seen housing on these lands. The following are recommendations related to the proposed project impacts to traditional cultural practices.

Recommendations

- To maintain the quality of nearby freshwater resources, it is recommended that best management practiced are utilized during all phases of project development to keep all streams and gulches free from construction and agricultural debris and run-off as these sediments may interfere with and contaminate nearby fresh water resources as well as

coastal ocean resources by way of siltation and the addition of an imbalance of nutrients into waterways.

- Burial SIHP 50-50-06-5501 is located in southeastern corner of the current project area. Upon further consultation with SHPD (see Appendix C) it has been determined that a Burial Preservation Plan for this site must be completed and formalized.
- It is recommended that activities associated with the proposed development do no adversely impact the neighboring St. Joseph's Church and their continued religious practices.
- Current development plans show 42 housing units (main houses and cottages) clustered on 20 acres adjacent to Pi'iholo Road. The proposal for housing in a location where current generation have never seen housing will alter the viewshed and elements of the viewshed including cultural and traditional landmarks. It is recommended that considerations to the viewshed be made that retain elements in alignment with the lands traditional forested, agricultural and pastoral character. To minimize the impacts of viewable housing, strategic planting of indigenous and endemic tree and shrub species such as *koa*, *'ōhi'a*, *'iliahi*, *halapepe*, *etc.*, to maintain and preserve traditional viewshed corridors is further recommended.
- The project area contains a historic access trail, the Bridle Path, which was said to have been important in the movement of people who lived in Makawao, to access neighboring regions including Hā'iku and Haleakalā Crater. Consideration should be given to re-establishing this historically significant feature of the property. Consultation with the State agency Na Ala Hele is recommended for further guidance regarding historic access trials.
- Traditional Hawaiian plant collection and harvesting of forest resources likely took place within and around the project area. It is recommended that plant communities known to have grown here historically be reestablished and that cultural practitioners (artists, traditional healers, *hula* practitioners, etc.) be allowed to gather such items. Consultation with these practitioners and local botanists will help to establish both the most desired species and the most appropriate plant species for reestablishment.
- Due to the community concerns expressed about the impacts of the proposed project on water resources, particularly the availability of water to support this project, it is recommended that the project principals, in conjunction with a recognized hydrological expert, address these concerns with the public.
- Based on community concerns and suggestions, it is recommended that farming operations are established prior to the development of housing.

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Appendix A Office of Environmental Quality Control, Guidelines for Assessing Cultural Impacts

Guide to the Implimentation and Practice of the Hawaii Environmental Policy Act (2012 Edition, Exhibit 1-1)

Guidelines for Assessing Cultural Impacts

Adopted by the Environmental Council, State of Hawaii November 19, 1997

1. INTRODUCTION

It is the policy of the State of Hawaii under Chapter 343, HRS, to alert decision makers, through the environmental assessment process, about significant environmental effects which may result from the implementation of certain actions. An environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making.

Articles IX and XII of the State Constitution, other state laws, and the courts of the state require government agencies to promote and preserve cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups. Chapter 343 also requires environmental assessment of cultural resources, in determining the significance of a proposed project.

The Environmental Council encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area. The Council provides the following methodology and content protocol as guidance for any assessment of a project that may significantly affect cultural resources.

2. CULTURAL IMPACT ASSESSMENT METHODOLOGY

Cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements. A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups.

Such information may be obtained through scoping, community meetings, ethnographic interviews and oral histories. Information provided by knowledgeable informants, including traditional cultural practitioners, can be applied to the analysis of cultural impacts in conjunction with information concerning cultural practices and features obtained through consultation and from documentary research.

In scoping the cultural portion of an environmental assessment, the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment. Thus, for example, a proposed action that

may not physically alter gathering practices, but may affect access to gathering areas would be included in the assessment. An ahupua'a is usually the appropriate geographical unit to begin an assessment of cultural impacts of a proposed action, particularly if it includes all of the types of cultural practices associated with the project area. In some cases, cultural practices are likely to extend beyond the ahupua'a and the geographical extent of the study area should take into account those cultural practices.

The historical period studied in a cultural impact assessment should commence with the initial presence in the area of the particular group whose cultural practices and features are being assessed. The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs.

The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

The Environmental Council recommends that preparers of assessments analyzing cultural impacts adopt the following protocol:

1. identify and consult with individuals and organizations with expertise concerning the types of cultural resources, practices and beliefs found within the broad geographical area, e.g., district or ahupua`a;

2. identify and consult with individuals and organizations with knowledge of the area potentially affected by the proposed action;

3. receive information from or conduct ethnographic interviews and oral histories with persons having knowledge of the potentially affected area;

4. conduct ethnographic, historical, anthropological, sociological, and other culturally related documentary research;

5. identify and describe the cultural resources, practices and beliefs located within the potentially affected area; and

6. assess the impact of the proposed action, alternatives to the proposed action, and mitigation measures, on the cultural resources, practices and beliefs identified. Interviews and oral histories with knowledgeable individuals may be recorded, if consent is given, and field visits by preparers accompanied by informants are encouraged. Persons interviewed should be afforded an opportunity to review the record of the interview, and consent to publish the record should be obtained whenever possible. For example, the precise location of human burials are likely to be withheld from a cultural impact assessment, but it is important that the document identify the impact a project would have on the burials. At times an informant may provide information only on the condition that it remain in confidence. The wishes of the informant should be respected.

Primary source materials reviewed and analyzed may include, as appropriate: Mahele, land court, census and tax records, including testimonies; vital statistics records; family histories and genealogies; previously published or recorded ethnographic interviews and oral histories; community studies, old maps and photographs; and other archival documents, including correspondence, newspaper or almanac articles, and visitor journals. Secondary source materials such as historical, sociological, and anthropological texts, manuscripts, and similar materials, published and unpublished, should also be consulted. Other materials which should be examined include prior land use proposals, decisions, and rulings which pertain to the study area.

3. CULTURAL IMPACT ASSESSMENT CONTENTS

In addition to the content requirements for environmental assessments and environmental impact statements, which are set out in HAR §§ 11-200-10 and 16 through 18, the portion of the assessment concerning cultural impacts should address, but not necessarily be limited to, the following matters:

1. A discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

2. A description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

3. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

4. Biographical information concerning the individuals and organizations consulted, their particular expertise, and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed, their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

5. A discussion concerning historical and cultural source materials consulted, the institutions and repositories searched, and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the authors, any opposing views, and any other relevant constraints, limitations or biases.

6. A discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

7. A discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area, affected directly or indirectly by the proposed project.

8. An explanation of confidential information that has been withheld from public disclosure in the assessment.

9. A discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

10. An analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

11. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

The inclusion of this information will help make environmental assessments and environmental impact statements complete and meet the requirements of Chapter 343, HRS. If you have any questions, please call 586-4185.

Appendix B Community Consultation Letter

Kua`āina Consultants Maui
Cultural Land Studies

Addressee

May 4, 2015

Subject Project: Cultural Impact Assessment for Hoku Nui Maui LLC for a 258 acre property seeking 21 lot subdivision located in TMK: (2) 2-4-12-005, 039-046, Makawao Ahupua`a, (Traditional) Hāmākua Poko Moku, Maui Island.

Aloha Addressee Name,

On behalf of Hoku Nui Maui LLC., Kua'āina Consultants Maui is conducting a cultural impact assessment (CIA) for the Hoku Nui sustainable community development project. This project is located in the "upcountry" region of east Maui, in the subject TMK, consolidated in the *ahupua'a* of Makawao, and in the traditional *moku* of Hāmākua Poko (see attachment 1).

The goal of the proposed project is to create a community based on sustainability practices drawing on both modern technologies and traditional Hawaiian land management practices in alignment with the following proverb:

He ali`i ka `āina; he kauwā ke kanaka-The land is a chief; man is its servant.

~ Mary Kawena Pukui, `Ōlelo No`eau

More specifically, The Hoku Nui Maui land management group (HNM), aspires to develop an innovative sustainability project that re-establishes a relationship between people and the land. In this way, HNM seeks to create a viable agricultural operation, while integrating a sustainable housing community and implementing native Hawaiian habitat restoration. (Susty Pacific; 2015, in draft).

Of the 21 lots currently entitled, 20 lots are proposed for a clustered housing development of 20, one-acre house lots. The remaining 238 acres will be a farm lot which will remain dedicated to agriculture and native Hawaiian habitat in perpetuity. Further details of the proposed project are as follows:

- Farm operations will include approximately 120 acres of grazing pasture for cattle and chickens with 10-20 acres of rotating horticulture. Fruit and nut trees are proposed to line the access laneways, and sheep will be utilized to maintain and control understory grasses.
- Holistic land management will be facilitated by clustering the housing development and therefore maximizing the continuity of agricultural lands. The housing development will include both market value and affordable housing, and possibly farm employee housing. Housing is planned to be consolidated on 20, one-acre lots following a clustered housing concept, with each lot containing one main dwelling and one accessory dwelling.

1
(808) 283-3131 | madelrec@hotmail.com

Additionally, one main dwelling and one accessory dwelling would be located on the larger farm lot. Together, the total housing build-out would include 42 housing units.

- Areas of native Hawaiian habitat restoration may be focused near gulches.
- An agricultural commercial kitchen.
- A farm market.
- Three acres donated to a *hula hālau*.
- Infrastructure improvements are proposed to include on-site water sources via a well (existing) for potable water, and collection of rain water into ponds for irrigation use. Renewable energy systems will be developed for energy needs. The intention is to keep energy production off-grid.

Following this model of sustainability, the proposed commercial kitchen would be utilized as needed to process farm raised goods to be sold at the on- site farm market and available for sale to public. (For more information on HNM's sustainability concepts and goals visit Darren Doherty www.regrarians.org and Virginia States Polyface Farm, www.polyfacefarms.com).

This CIA is a requirement of Chapter 343, Hawaii Revised Statutes (HRS), and will be included in the environmental assessment document (EA). The requirement of the EA has been triggered by the need for offsite road improvements along Piilholo Road which are associated with the proposed development project.

The area of study for this CIA will be delineated by first understanding the area of potential effect (APE) which is identified as "The geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist". The APE for this CIA hereafter will be referred to as the "focus area". The "focus area" for this CIA will be the upland region of Hāmākua Poko Moku including Makawao Ahupua'a. The property boundaries of the proposed development will be referred to as the "project area". Research will extend into neighboring regions as deemed necessary (see Attachments 2 and 3).

The goal of the CIA is to discover and report on traditional cultural Hawaiian practices as well as the cultural practices and resources of any other ethnic group, past, present and future, and how the proposed project might impact these practices both negatively or positively.

Kua'āina Consultants Maui is requesting your *mana'o* (thoughts, suggestions) on any of the following items;

- Traditional trails, pathways, *mauka-makai* access routes or any other such routes in the proposed project area and/or overall focus area.

[808] 283-3131 | medeiroc@hotmail.com

- Collection areas for plants used in traditional ceremonies; *hula, lā'au lapa'au* (medicinal uses), etc., within or surrounding the project area.
- Knowledge of historic sites, archaeological sites and burial sites located within or surrounding the project area.
- Referrals to *kūpuna* who possess first-hand and/or generational knowledge of the focus area.
- General history and present and past land use of the focus area.
- Cultural associations of the focus area, such as legends and traditional practices.
- Any other cultural concerns the community might have related to Hawaiian or other cultural practices in the focus area.

I invite you to contact me, Colleen Medeiros B.S., at 1-808-283-3131 or by e-mail at *medeiroc@hotmail.com* if you have any information you would like to share.

Colleen Medeiros B.S.
Principal Researcher
Kua'āina Consultants Maui

Appendix C Formal Response Letters

Office of Hawaiian Affairs

PHONE (808) 594-1888 FAX (808) 594-1938

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
560 N. NIMITZ HWY., SUITE 200
HONOLULU, HAWAI'I 96817

HRD15/7471

May 22, 2015

Colleen Medeiros, B.S., Principal Researcher
Kua'āina Consultants Maui
Cultural Land Studies
44 Kau St.
Kula, Maui 96790

Re: Request for Consultation for Cultural Impact Assessment for Hoku Nui Maui LLC for a 258-acre property subdivision
Makawao Ahupua'a, Hāmākuapoko Moku, Maui Mokupuni
Tax map key (2) 2-4-012:005, 039-046

Aloha Ms. Medeiros:

The Office of Hawaiian Affairs (OHA) is in receipt of your May 5, 2015 letter requesting consultation for the cultural impact assessment to be included in the environmental assessment document, under Hawai'i Revised Statures Chapter 343.

The project proponent is Hoku Nui Maui LLC. The project entails the subdivision of 258 acres into 21 lots. Of the subdivided lots, 20 will be for a cluster housing development of 20 one-acre house lots, while the remaining one lot of 238-acres will be preserved in perpetuity for farming and native Hawaiian habitat restoration.

OHA would like to suggest that the following entities and individuals be contacted:

- Ke'eaumoku Kapu
  - keeaumokukapu@yahoo.com
- Joyclynn Costa
  - back2daaina@live.com
- Christine Tavares
  - (808) 573-8960

Colleen Medeiros
May 22, 2015
Page 2

- Gin Nary
  - (808) 242-9774
- Kyle Nakanelua
  - Please contact Ke'eaumoku Kapu
- Basil Oshiro
  - soshiro17@hawaii.rr.com
- George Kaimiola
  - george.kaimiola@halemua.org
- Gerry Harmon
  - Please contact Ballards Mortuary at (808) 871-7911
- Hinano Rodrigues
  - (808) 243-4640
- Joey Iokepa Naeole
  - (808) 281-7708
- Kekai Robinson
  - info@mauimuseum.org

We look forward to participating in the consultation process for the Archeological Inventory Survey, as well as an opportunity to review the completed draft EA.

Mahalo for the opportunity to consult. Should you have any questions, please contact Jeannin Jeremiah at 594-1790 or by email at jeanninj@oha.org.

'O wau iho nō me ka 'oia 'i'o,

Kamana'opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC:jj

C: Thelma Shimaoka, OHA Maui Community Outreach Coordinator *(via email)*

**Please address replies and similar, future correspondence to our agency:*
Dr. Kamana'opono Crabbe
Attn: OHA Compliance Enforcement
560 N. Nimitz Hwy, Ste. 200
Honolulu, HI 96817

State Historic Preservatoin Division

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
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September 17, 2015

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Log No: 2015.02881
Doc No: 1509MD22
Archaeology

Aloha Ms. Medeiros:

SUBJECT: **Revised: Chapter 6E-42 Historic Preservation Review - Consultation**
Early Consultation for a Cultural Impact Assessment for the Hoku Nui Maui LLC
Hāli'imaile and Makawao Ahupua'a, Makawao District, Island of Maui
TMK (2) 2-4-012:005, 039-046 [formerly TMK (2) 2-4-012:005 and 009]

Thank you for the opportunity to comment on the subject project, which we originally received on June 19, 2015 with a follow-up request on July 29, 2015. This proposed project entails a cultural impact assessment (CIA) for a sustainable community development project in the upcountry region of East Maui. We previously commented on this request for consultation and this letter replaces our earlier correspondence recommending an archaeological inventory survey (*Log No. 2015.02415, Doc No. 1507MD01*).

A search of our records indicates that an archaeological inventory survey (AIS) has been conducted for this project. Fieldwork was conducted following the inadvertent discovery of a human burial below the till zone during trenching for a water line in 2003; the burial was assigned State Inventory of Historic Places (SIHP) number 50-50-06-5501.

The AIS identified one new historic property, SIHP 50-50-06-6274 which was under passive preservation in 2007. The report documenting the site and the location of the burial was accepted by SHPD in 2008 (McIntosh and Cleghorn 2007; *Log No. 2008.1759, Doc No. 0805PC34*).

We have no records of a preservation plan for SIHP 6274 (located in a gulch), and await a burial plan for SIHP 5501. This project is covered under an approved archaeological monitoring plan submitted in 2008 (Kirkendall, *et al.* 2008; *Log No. 2008.1261, Doc No. 0805PC35*).

Please contact me at (808) 243-4641 or Morgan.E.Davis@hawaii.gov if you have any questions or concerns regarding this letter.

Mahalo,

Morgan E. Davis
Lead Archaeologist, Maui Section

cc: County of Maui
Department of Planning
(Planning@co.maui.hi.us)

County of Maui
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County of Maui
Cultural Resources Commission
(Annalise.Kehler@co.maui.hi.us)

Hinano Rodrigues, SHPD History & Culture Branch Chief

Appendix D Formal Interview Transcriptions

Kua`āina Consultants Maui
Cultural Land Studies

Permission Form

Aloha and thank you for participating in and sharing your knowledge and family history.

Kua'āina Consultants Maui is requesting your written permission to utilize information you have shared for the project:

Cultural Impact Assessment for Hoku Nui Maui LLC for a 258 acre property seeking 21 lot subdivision located in TMK: (2) 2-4-12-005, 039-046, Makawao Ahupua`a, (Traditional) Hāmākua Poko Moku, Maui Island.

In an effort to maintain clarity, information you have shared may be made available to the public and for use for other educational purposes. Please understand that you are free to share in any way you feel comfortable. If you wish to remain anonymous, please specify below.

Signing this authorization form gives Kua'āina Consultants Maui permission to use the information you have shared to help assess traditional and cultural practices of the above mentioned project area for the above mentioned project. Signing this permission form also verifies that you have had the opportunity to review your transcription and make edits as you see fit.

Again, thank you for taking the time to share with me.

Mahalo,
Colleen Medeiros
Principal Researcher
Kua`āina Consultants Maui

James De Rego
Mr. James DeRego

7-13-15
Date

[808] 283-3131 | medeirac@hotmail.com

Jimmy DeRego Interview, June 11, 2015

Interviewed by Colleen Medeiros of Kua'āina Consulting Maui, Transcribed by Stephanie Brown June 26, 2015.

(Jimmy DeRego: JD, Colleen Medeiros: CM)

JD: Oh myself I'm James DeRego, Jimmy, oh brother, yeah, alright, but you don't want the story of all my history, you want Makawao town because you are going to do some work there.
CM: Well, yes, but it is an oral history, so, so
JD: What I tell you, I going to make one good tape. Get a good tape and make my story.
CM: OK.
JD: And I will give it to you, you publish 'em.
CM: OK
JD: You put 'em into a book. But right now you should tell, do what you want me to do.
CM: Well how about we start with, you said you are James DeRego. When was your birthday?
JD: September 30, '27
CM: And where were you born?
JD: Well, those days was Pā'ia . Pā'ia hospital,
CM: OK
JD: down the old Pā'ia hospital and I lived in Haleakala Ranch. My parents came from Portugal. My father met my mother here.
CM: Where in Portugal?
JD: I don't know.
CM: Is this them?
JD: There is a picture. That is my grandparents. My father is there. I don't know who he is, this is my grandfather and grandmother. My father is one of those young ones in here. It could be him. See, I came from 12 in the family and now I have only one more sister left. Just her and I, two. She is 96. So she could tell me who this is and who is. But I know this is my grandma and grandpa. This is my Auntie, I think this is one of my Auntie, another, another Auntie, the whole family. That is a whole bunch that came from Portugal.
CM: Wow. So you are the second generation.
JD: Oh, yeah, whatever.
CM: Yeah, so when you are living in Haleakala Ranch, how old were you then?
JD: Well, I was born and raised there. I went to school, Makawao School which I walked to school every day.
CM: And where was Makawao School located?
JD: In Makawao town.
CM: Same place as now?
JD: Yes, it is still there.
CM: OK.
JD: It's around, let me, see. No, I think that school is down, is right where the post office is, used to be. That new school is down below. Yeah, I think that was the old school over there where the post office is. So we used to walk from Haleakala Ranch and my dad gave me a sickle and a bag. Every day before I come home, cut a little bag of grass to feed the cows. We had a milking cow.

CM: Your own family.
JD: My own family, yeah.
CM: So how long were you in Pā'ia as a child?
JD: Well I was born as a child. I lived at the Ranch.
CM: Oh, so you were just born down there. You didn't live there. That is where the hospital was.
JD: Yeah, we lived in Haleakala Ranch with my parents. My father was the foreman of the Ranch.
CD: Ok, What was his name?
JD: Joe Francis.
CM: Joe Francis
JD: DeRego
CM: DeRego
JD: So he is one of that over there. I don't know.
CM: He was a foreman, so he managed the cowboys?
JD: Yeah, managed the cattle for the ranch and de took care of the cowboys. And as I grew up, I'm telling you is not when I was born, when I was maybe 12, 13, 14 years old that I remember all of these things now. Like at Christmas time, you know, the old people, only when you could see mango, I mean, oranges and apples and candies is once a year. And my mother used to put that on the table on a little tray when Christmas and we couldn't touch that until Christmas day. That's the only way you could see apples and oranges. And when Christmas day came we all had one apple and orange a piece and that was our present.
CM: So, you didn't have much fruit, or, you didn't have apples and oranges the rest of the year? That wasn't…
JD: Well you know, yeah, it was hard to get. People were poor, you know, the ranch was small wages and we had 12 in the family and quite a gang, you know. We all used to listen, we had a radio and they had *Foo Man Chu*, *Shadow Knows* and we all used to eat by the radio and listen on Sundays. And then they had, what was the famous cowboy? Oh gosh, Tanto?
CM: The Lone Ranger?
JD: The Lone Ranger, we used to hear all that. How the Tanto his big voice. I used to remember that box radio. I wish I had one today, it's an antique. But anyway, that was our life in those days that I can remember.
CM: What kind of fruit did you have?
JD: Well, we had other type of fruit that we raised around but not apples and oranges.
CM: What did you raise?
JD: Well you know, we had guavas, we had mangoes, and different other fruit around. I can't remember all. So, that was the big thing about waiting for Christmas is getting the things that you never had throughout the year.
CM: Did you get presents or were those fruits your present?
JD: No, that was it brother, there was no present. A sickle and go cut grass for that cow that was the present. So anyway, that was the start of the ranch and as I grew older I remember more things. Every year the ranch used to round up a big bunch of cows, I mean cattle. They used to ship 'em to the mainland. And I was riding horse at the time and the ranch used to drive them all down the highway, down there, this used to be a dirt highway.
CM: So the one through Pukalani now?

JD: Right down from Haleakala Ranch right down to Kahului Warf. Used to drive two hundred head of cattle going down.
CM: Two hundred head?
JD: Load 'em on the boat. Well in those days, I think a bunch I think. And send 'em to the mainland. I remember doing that.
CM: How long would that take?
JD: Oh, it would take quite a while. I think would take all day and all night, or something like that. Because it is all slow downhill, there's no traffic those days. Very little cars and wagons mostly.
CM: But it wasn't an overnight thing? Did the cattle have to rest? Did you guys like stop and sleep?
JD: No, no
CM: You could do it in one trip.
JD: Yeah, one day or a day and a half, I can't remember exactly how long.
CM: And then were you working for the ranch at that time?
JD: No, I just get a long since my father was a foreman I go along with them, just learning the trade if you call it.
CM: Yeah, How many cowboys helped?
JD: The ranch had quite a few, they had about 12 or 15 men.
CM: Would they all participate in that?
JD: Yeah, yeah they were some big Hawaiians, big strong Hawaiians. I even know their names.
CM: What are their names?
JD: I had, well, I had two half-brothers too. I had a brother David Holomalia and Apela. Apela, I will show you his picture. That is my favorite half-brother. This is my half-brother, David Holomalia.
CM: Holomalia?
JD: Holomalia, is Hawaiian.
CM: Huh, and so these guys were with you too?
JD: Yeah, yeah, he works for the ranch. And this is my picture of my sister, Angus the one is 90-something. And this is my sister, oh god, my brother Albert he was very sick at that time we took that picture. And this is Margaret, and this is me, and my sister Jessie. I got this picture…but there were 12 of us in the family so there is 2, 4, 5 here.
CM: Wow.
JD: So Anyway,
CM: So was this a half-brother on your Mother's or Father's side?
JD: Ah well, half-brother, DeRego, yeah,
CM: Your Dad.
JD: Yeah, Dad.
CM: So who was his Mom?
JD: His mother was Holomalia. She was Hawaiian, she was half Hawaiian/Portuguese. So anyway, the ranch that is how it started and then as time went by, the war broke out, they bombed Pearl Harbor, Japan bombed Pearl Harbor and I just can remember we shutting all our windows with paper and blanket (10:30 min) and still that night we used to live on the hill we could see all down here, we could see all lights shining, you know.
CM: Cuz it was a blackout, right?

JD: Black out, everything was supposed to be dark. We don't know, aliens or whatever, who was doing it, but anyways, we used to be all scared. And we didn't here no bombing or anything in Honolulu, is quite a ways from here. But that is how the story went through and that is how I was telling you about Kaho`olawe when the ranch had to move all the cattle out. Manuel Pedro used to live there, right on the hill in Kaho`olawe and his wife used to live with him and I think they had three daughters and one of the daughters who was born in Kaho`olawe. She is the only citizen of Kaho`olawe actually. And he was, I think, Hawaiian, he had Oriental, Chinese blood or something mixed in. Beautiful daughters and so that's how they started that the ranch had to take the cattle out.
CM: And you worked, at the
JD: No, I was like I say, I was only 14 years old.
CM: And what were you doing over there?
JD: I just went along for the ride. My brother Albert went. Levy Hoomalia (12:07) Apela, Tesag, Tesag is another cousin for me, he is a crazy guy, and he went. And a lot of ranch, Grove ranch actually pulled the cattle, they had their men go.
CM: And were was grove ranch located?
JD: Well just before you get to Hāli'imaile Rd, if you are familiar. You know, you go straight down before you turn to go to Hāli'imaile, you go up the hill. Grove Ranch was right up in there. They had a stable and everything there. So they had to move the cattle from…hey, I am going to finish my story, I better finish stuff already. So, I going wait for you. What I was going to say, is you came her for asking me questions, and I am talking too much.
CM: No, you're not talking too
JD: You're not gonna use this for what you gonna do.
CM: Well, actually I am, this is what I would do, I would say your name, where you are from, where you were born.
JD: Billy going tell you the same thing, Billy live in Kokomo his whole life. I give you one history of before Billy. Billy is only about in his 50s or 40s.
CM: Well, stories like herding the cattle down from the ranch that is important.
JD: Yeah, like how they used to get the cattle to the slaughterhouse.
CM: That is important. Knowing…
JD: Yeah how did they used to get the cattle to the slaughterhouse from the ranch?
CM: I don't know how.
JD: Yeah, drive 'em down the road again.
CM: Which road? Same road?
JD: Well, from Haleakala Ranch, come down the road right in through Makawao town to get into the slaughterhouse.
CM: Right down Makawao Avenue?
JD: That's right. Right through Makawao town, right below used to be the slaughter house you had to go in.
CM: And so you'd help out with that too?
JD: No I didn't, but I know about it. Had like I know about the dairy. Nobody knows about the dairy.
CM: So tell me about that dairy, cuz I never…
JD: Oh, that dairy.
CM: You are talking about the one in…

JD: Ukulele, that was up the mountain, half way to the top. Why they did the dairy up there, well, actually the dairy, they brought 'em down here Haleakala Ranch, right up here. Sam Baldwin he was the manager of Haleakala Ranch and he had the dairy. They took the dairy, the cows up there and they made the dairy up there because of the nice cold breeze and air. At night the milk is cold and so they can bring them up in tanks. But that is where the milk used to be.
CM: So how did you get up there?
JD: With their wagons, they pull it up with the tank and wagon. But that is why the road is crooked. Why that road is going this way, going up Olinda?
CM: To avoid the gulches?
JD: Because it is steep, they cannot go up steep so they made the road windy road so the wagon can go.
CM: So Olinda Road today follows the old road?
JD: The old road is the only road that I know.
CM: And when you say "Ukulele" that is the area over there?
JD: That is where the dairy way, Ukulele.
CM: Do you know how, that is just the name of the area?
JD: Ukulele. Haleakala Ohua? (16:02) that's Ukulele, Just like Kokomo is the name of the place, Kokomo is Kokomo.
CM: Because I have only heard it maybe once or twice referred to.
JD: Actually my wife and I used to ride horses up there.
CM: Ahh, that is nice.
JD: Yeah, a beautiful place. We ride from Olinda right go up there, have lunch and come back. That is how I know the dairy is up there.
CM: Oh, and so when you guys lived at Haleakala Ranch, what did you guys do as kids?
JD: When I grew older we worked for the ranch. We used to drive cattle like cowboys on horseback and branding, branding the calves and we roped, go in the pen and rope. The foreman was a short little guy, maybe a little shorter than me. His name was, oh my god, let's see if I can think of it, anyway, he was the foreman.
CM: It wasn't Harold was it?
JD: No Harold came a ways after. Harold Amoral was the last foreman they had up there. Oh shucks, let me think about this, his name, Apela, he was my half-brother. Anyways, a small short Hawaiian was a foreman. The main foreman, my father was head foreman, he took care of the cowboys, he used to come up in the morning, all us young kids working, you know, and he say "aw, Jimmy cowboy, catch horse." He used to tell me like that, catch horse. He gave me more breaks because I was pretty good on a horse. Yeah, I never forget that. And we do other jobs like going out clean pastures, fix fences,
CM: When you say clean pastures, what are you cleaning?
JD: Oh poison, different bad weeds, the bad weeds *kalakala* 18:18
CM: Kalakala is a weed?
JD: Kalakala is like a plant and get a lot of thorns. You guy up Olinda, Billy's place get plenty.
CM: Does it have a flower?
JD: Yeah I think it is a yellow flower.
CM: Oh, kind of like a poppy?
JD: not too sure.

CM: I think I know what one you are talking about.
JD: Different kind of bad weeds, we that we used to dig 'em out.
CM: Do you remember the name of the others?
JD: Well there was a lot of eucalyptus seed that grow, we used to pull them out too.
CM: Oh, Ok.
JD: And, this has been quite a while back, I kind of forget a few things, you know.
CM: Do you remember what was growing in the gulches?
JD: Pamakani 19:15 was another plant that is a pest.
CM: Pamakani?
JD: That for sure was growing in the gulches.
CM: What is that?
JD: It's a plant.
CM: What does it look like?
JD: Well, it is a wild plant get small little white flowers. Still have some growing around some place.
CM: Do you remember animals that lived in the streams? What did you see in the streams?
JD: Well they had wild pigs. They still have wild pigs today. In the, up in the ranch land up in the crater, the ranch land go all the way up Punini'au Hill, it's the hill that you can see from here.
CM: Punini'au?
JD: Punini'au hill. Get a lot of goats, and wild pigs, and that's about, oh and pheasants.
CM: Did you guys ever collect like ` out of the streams or anything like that?
JD: No,
CM: You didn't eat that kind of stuff?
JD: No, we didn't do that. We did hunting there.
CM: Hunting, and you hunted all those things you just mentioned?
JD: Yeah, pigs and goats.
CM: And then you would bring them home and your Mom would…
JD: Oh well, we like to smoke 'em, made jerky, better than venison.
CM: The pork, or all of them?
JD: Well the pork yeah what the old people used to do, make sausage, what they call them, Portuguese sausage. We make now, we get, In my freezer, I get. My sons make…
CM: So how do you guys make it?
JD: Well, we buy the port butts, now that you have a lot of deer running around all over the place. So we use pork and deer, we grind 'em, we mix 'em up, we season 'em, put 'em through the casing.
CM: How do you season it?
JD: Well my son get the old recipe from the old people, vinegar, add a little bit of this and salt and all…come out pretty good.
CM: Do your sons hunt?
JD: Oh yeah, both of them hunt. I get two of 'em here. One down here, Jeffrey, he is a horse shoer. He shoes horse, he good friend with Billy, in fact he has some cattle. Billy work together. In fact he helps Billy all the drive and brand. But yeah, that is food we used to do.
CM: Did you know your Grandmother?

JD: No, My grandmother guys came when, [we we're born] my father is in there too. I never met them. I am sure glad to get this picture. I don't know how I got it. In fact my sister Agnes gave it to me. I don't know how I got it.
CM: Did your mother cook in a traditional way?
JD: Yeah, well, Portuguese soup and you know, just the regular, we used to eat a lot of soup. Portuguese make good bean soup, cabbage and the whole works. Roast meat, the ranch used to give us meat every week. Each guy had so much meat every week. And we raised chickens and we had eggs, and we raised a garden, we had vegetables.
CM: Do you remember what you grew in the garden?
JD: Just like mostly, onions, green onions, and carrots and potatoes.
CM: And was that your Mom's? Who took care of the garden?
JD: Yeah, the whole gang, we used to go in and work in the garden.
CM: You too?
JD: Me too. Like I said, sickle and one bag of grass for the cow. It was the same thing. I never forget that.
CM: Well you were talking about the branding and helping out with the branding at the ranch. Can you just tell me about what that was like? Like a day, what was your job and how did it start?
JD: Well it start like in the morning you would all go down to the ranch stable and then Levi, his name was Levi, that is the small man he was the foreman of the cowboys, Levi. And he comes up and, you know, they have other working men that take the young guys like me out, we all go and work with him see, he tells we going to pull weeds today, this kind of weeds and we going to dig this or we gonna lay a line a fence or repair a fence and that is the kind of job that we do. And the cowboys have job mostly every day that is the regular cowboys. When the branding time come then everybody goes, they brand 1-200 calves and that is the way we worked, they worked the ranch.
CM: So is there like a cook out or anything after?
JD: Yeah, they have salt meat, potatoes, and water.
CM: Was it good?
JD: The salt meat and Irish potatoes, boil and if you wanted rice you could have rice and water.
CM: And the ranch provided that?
JD: The ranch provided that in the branding.
CM: Did it like, turn into a like party after?
JD: Yeah, and eat all the mountain oysters you want.
CM: Mountain…
JD: Mountain oysters, Oh yeah, that is the best thing.
CM: Mountain what?
JD: Mountain oysters, see they castrate the calves.
CM: Mountain oysters.
JD: That's mountain oysters, they castrate the calves. And when branding is over, that is before we eat, they get all the ashes from the wood, keawe tree, the wood, and they throw all that on top and pour some salt and we eat 'em all there. Everyone have their share of the oysters, a wonderful thing. Oh yeah, it is a real delicacy. That is what we call mountain oysters, ok my dear.
CM: I have never had that.

JD: OK.
CM: But if I ever get a chance, I will.
JD: Oh, you better try it. I think I have some in my ice box, in my freezer. I never cook 'em yet.
CM: Really, from what? The last…
JD: From my son, he raise cattle too and so when he brand. He gave me the mountain oysters. They don't want to eat 'em but I eat 'em. They don't know what they missing. Yeah, I think a couple of them, six of them over there waiting for when we barbeque, I throw 'em on the fire. So anyway, that is what we do and they feed you for the day.
CM: And then, I mean did it turn into a party with drinking.
JD: The boys talk there and when the branding over the working men all eat, sit down, and they talk story.
CM: Singing, playing?
JD: No, no, no more those things, that's only in the movies.
CM: So how often did the branding happen?
JD: Well, it depends how much cattle you raise on the ranch. Depends how much cows.
CM: Kind of as needed?
JD: Well yeah, once a year they do the branding, depends, what is, all the pastures have different calves born different place so you get branding maybe three four times a year. Because it isn't just one pasture they get, they get 4-5000 heads of cattle. So the pastures are all branded cows are all in a separate pastures.
CM: How old are they when they get branded?
JD: Oh they are about 4 or 5 months, some a little older.
CM: But generally that is when they like to brand them?
JD: That is the right time to brand them, yeah. When they are small because you know, branding is a little bit rough on the animal too you know, the fire, you cut the ears.
CM: So you notch the ears at the same time?
JD: The ranch had an easier, ear muff, you just, straight down, one side. Some people make 'em differently. Different this one ear, so they can recognize their cattle, you know, if it is in a different pasture with different cattle.
CM: Did you, just kind of changing the subject a little bit, did you attend St. Joseph Church?
JD: Pardon me?
CM: Did your family attend St. Joseph's Church?
JD: Oh yeah, in fact, they all buried there.
CM: The whole family…
JD: Father, Mother, brother, sister, they all there.
CM: Wow, but you went to Makawao School you said.
JD: That's it. No more other college or high school, nothing.
CM: No high school?
JD: No way.
CM: So did you become a cowboy?
JD: Yeah, I became a cowboy for a while working the ranch and then gosh, I don't know, so as I grow older and then, you know, mostly work in the ranch and then when I got older I got married I worked for the county. I Worked 30 years for Maui County.
CM: In what department?

JD: The road department.
CM: The roads…
JD: I retired from the county.
CM: You mentioned that you worked up at Haleakala National Park?
JD: That was again when I was a younger boy, you know, that wasn't a steady job. There was more part-time hiring...
CM: What did you do up there?
JD: Well, we do a lot of maintenance work. Since I could handle horses and pack mules regular, they had this ranger there, his name was Jimmy Lindsey. His lived, home was up Olinda someplace. He was a ranger up there and him and I was good friends. And you see there's trails that we maintained going into the crater.
CM: From Olinda?
JD: No, you start from the observatory and you go down sliding sand trail down into the crater. We maintained all the trails all the way to the cabins and all the way to Paliku. Paliku is the last cabin down in Kaupō Gap. And we maintained the roads right from the ranger station up to Halemau trail down the crater. So that is a winding trail going down like that, all the way down. And so those days, well they build the, who build the cabins? Oh, I forget who did the cabins, I know 'em. When I worked for the ranch the cabins was there, I mean the National Park. And when we take wood in, every so often, a lot of tourist go in we go in work, we sleep in the crater and work in the crater out back and forth so take wood and then Jimmy Lindsey used to take me with him and we would take about six mules loaded with wood. So as time go by, different rangers come in, you know. And this guy Ranger, I forget his name, I can't, anyway, he was a short little guy, cocky little guy, he know everything about hauling up wood. He did it in the mainland so he took over the hauling wood in the crater. When you load wood, the mainland style is they put 'em up like this, on top the pack mule. We put 'em up like this, against the mule like this…
CM: On the side…
JD: The crater, Halemau trail you going over little cliffs on top, over the trail.
CM: You don't want them to pitch.
JD: So he went and lead and knocked down a couple of mules because of the pack is built up...
CM: Knocked down a couple of mules.
JD: Yeah down.
CM: Like down the cliff?
JD: Down, so that is the way that I know and Jimmy Lindsey was the top man, he never could be a supervisor or anything, he just was like a foreman because he never to go to different National Parks on the mainland, you have to go travel to get promotions, but he was a good ranger.
CM: Did you ever drive cattle through the crater with the ranch?
JD: No, no that was before me, I think.
CM: Have you heard about that?
JD: I heard they raised cattle in the crater. I don't know if nobody can tell you that is living today. I only know a lot of goats in the crater, we did a lot of hunting in there and wild pig.
CM: So you were allowed to hunt in there?
JD: Yeah, we can. They eat the good trees, the Mamane trees, Mamane is a nice tree, if you know what Mamane tree looks like. So, they can tell where the goats, they cannot climb the

tree but all underneath is all chewed up, they stand up on their hind legs and reach up as high as they can go.
CM: Se they eat it up as high as they can reach. So, did the trees die from that?
JD: If they eat the bark, yeah they dies. Yeah, so that is the story about the National Park. Like I said, I still praise Jimmy Lindsey for what he did for us.
CM: Good, so when you were a kid, or younger, what was Makawao town like?
JD: Well Makawao town, was just, you see all the old buildings, the old buildings get more hundred years old. I remember Komodas bakery, Komodas been there for close to 100 years and they make the best pastries there is on Maui. They had pies, French apple pies.
CM: Is that your favorite?
JD: Yeah, the whole town is the same old town. Now it is all open up, every little old building has a shop in it, you know. So there other day I was talking to one of the owners, they rent it from some old Japanese, guarantee, gotta be.
CM: Why cuz what, all the Japanese…
JD: Used to be all Japanese there.
CM: Shop owners.
JD: Even The barber shop used to be, I remember even the barber shop there, I told this lady, you know this building get 100 years or more. You know what holding them up? Termites are holding hands and keeping the building up. If those termites let loose, everything fall. She look at me she go, oh yeah, I tell you, yeah. You hear that? (dogs howling), it's all pig dogs back there, hunting dogs and down here too, there is cattle down there. See, they holler like that with the sirens. It bothers their ears, or something. They don't like the sirens. Ok, so that's about Makawao town. I can't tell you much the town is a town its nice little town. Right now is lively.
CM: Well tell me the names of the shops that you remember.
JD: Well, I know Komodas Bakery and Matsui Store, and Club Rodeo and Salv Molino owned building right in the corner by the stop sign above, across from Pollis'.
CM: Who owned it?
JD: 37:00 Salv Molina, Salvido Molina, the Molina family was famous, they used to have an orchestra, the Molina Orchestra. They played good dancing music. Salv Molina played and Joe Molina, and Johnny Molina and the whole broad brothers.
CM: All around Maui, or….
JD: Oh yeah, every time had a dance they were playing. They had another orchestra, but they were pretty good, the Molina boys.
CM: So where were the dances up here?
JD: Mostly jeans you know,
CM: Like High school, like community dances?
JD: Yeah, High School dances
CM: Did you go to those?
JD: and Hawaiian dances. Well no, I didn't. I used to go with my brother-in-law, he played the bass. He was a Molina. I used to go with him, do a little dancing, and [dancing] around, chopping around like an old, stupid. But I cannot tell you much about Makawao town, but the only thing like I said, Matsui store…
CM: Well what do you remember about above St. Joseph's Church that land? What was it when you…

JD: Well, my father lived, that bunch there, my grandparents, right across from the graveyard.
CM: Across Makawao Avenue?
JD: No, no, no. You go over to the graveyard, the church, then you go up that road, the road that go up over there. That side, the left side of the road that was my grandfather bought that place. That's when they lived in that place, had an old house.
CM: Is there any house there now?
JD: No,
CM: There was a house.
JD: That used to be a pineapple, I don't know if it still pineapple still own 'em or whatever.
CM: They sold.
JD: Now it's across font the church now, a county garage is below the church, this is across the church. That is where my grandparents used to live. I know that. But as far as above the church and all that, I don't know I mean you know, who own that land. The one they want to subdivide now I think was Maui Pine, used to have pineapple there.
CM: Yup. So when your grandparents lived there, that is where your Dad lived.
JD: Yeah, with him there.
CM: But that was no longer there when you were born.
JD: No, no. That is the story that I hear. From them, you know and they tell where it was, you know. I never knew my grandparents. I never see them.
CM: You know where Billy helps with the town property, right at the low point past the bridge? The town property?
JD: Where the slaughterhouse is?
CM: No before that, right passed Polli's, there is Balthazar Bridge…
JD: Well if you pass Polli's you going to go to that place where the slaughter house is right there in the turn, Polli's is here, you mean up that road, Polli's?
CM: No, not up that road.
JD: Club Rodeo was here, Polli's across and below Polli's right in that hollow there, that's where the dairy was, inside.
CM: Oh, do you know the names of some of the streams over there, do you remember?
JD: The streams, I know is A'le'lele Gulch.
CM: Now which one is that?
JD: That's passed going to Kokomo. You pass the graveyard you keep going down, go till you make that one turn over the bridge then you go up the hill that's called A'la'lele.
CM: A'la'lele
JD: Yeah, my Dad used to own that property before, below the pond. Down there had a big pond, because big water come down there.
CM: Below the, below…
JD: The bridge…
CM: Below the bridge
JD: A'la'lele bridge.
CM: was a big pond.
JD: Yeah, my Dad owned that property, we never lived there. He had raised some cattle there.
CM: Did the pond have a name?
JD: What they called A'la'lele pond.
CM: And were there any…did you guys fish? Was there anything?

JD: No, no, you know, there was just a pond there.
CM: Did you swim in it?
JD: Yeah, swim it, that's all we never fished in it.
CM: Did all the kids, did everyone kind of swim in it?
JD: Well, whoever go down there they used to swim. The old people used to live there, a lot of homes. The homes are still there, some old homes.
CM: Is the pond still there?
JD: But that's, yeah the pond still there, the bridge is there, the whole bridge.
CM: Was is always full, was it ever dry?
JD: Well I tell you cannot see if from the road. You either gotta stop on the turn going down to the bridge and look down to see the pond. The pond is right below the bridge down. Yeah, that is all I can tell you that is in Kokomo. But Makawao, much, I don't know, I mean, just the stores that I remember, and all the Japanese stores I don't know their names. Had Kitadas, had a little restaurant there. Kitadas store is the one right across from the Theatre. Had a Makawao theatre there.
CM: Did you go to the movies there?
JD: Go to the movies there.
CM: Did you spend much time in Makawao town?
JD: Well, just as you grow, eh, used to go in the bar. Club Rodeo you know, as you get older but before that, you just go to school, we not even go to town. You see that buildings there, I don't think nobody could tell you anything about it. Whole building, and how old everyone of 'em, that's quite a few there.
CM: What about trips to the beach. Did you guys go to the beach much?
JD: No, no not much. We weren't much of swimmers, we were mountain men. I still don't like the beach. Look my hand, all bruised.
CM: Is that from the beach?
JD: Ah no, I got that damn thing, yesterday, day before yesterday. I was fooling around and stuck my hand between the pipe and the gate went close and bruised me all…
CM: So the people that you kind of, your community, did they, did people go down to the beach much in this time or not really, was it more of the ranching?
JD: In those days, no, those days people, you know not anybody could have a little car, we had a car way afterwards, a little Dodge or something, but you know, county people don't go to the beach as much as the people that live on the beach.
CM: How about the Hawaiian families that you knew, did they have, did you notice, did they have family down country or anything like that? You don't know
JD: I don't know. Most of them that I know, they were born on Ranch I am sure, like the Holomalias, Johnny Kahua, and his family. All that I know that lived on the ranch and they were big strong Hawaiians, and they never lived too long. For some reason, they all died young people, you know. George Manoa, a good friend of mine, used to live right above us and.
CM: Right There at…
JD: At Haleakala Ranch
CM: Did you, what was the area called? Was there any name?
JD: No, no just Haleakala Ranch. The ranch gave homes to the workers and that used to be all full of homes in there. Today all they only get two of them left, they break everything down. But, ah, and they had the Freitas family were family to us, and that lived up there on the ranch.

We was friends and they still have a grandson still working up there. Blackie, they call him Blackie. Herald Monroe, worked up there. Herald Monroe is family to my mother, came from Portugal too.
CM: Who was your mother?
JD: She was Fivala?????46:45 Family.
CM: What was her first name?
JD: Antonina.
CM: Do you know what?
JD: Derego, now Derego, Antonina Fivela. And she was a wonderful woman, a big woman. My father was a short little man, little bit taller than me, maybe smaller, I don't know.
CM: So your Mother came…
JD: Didn't come with him, on the same ship, on a different ship.
CM: They came later?
JD: Yeah, I think it San Miguel, I don't know what part of Portugal.
CM: I have this book.
JD: I don't know. I have Portuguese/Hawaiian, I don't know.
CM: Do you remember your grandparent's last name? Would have been…
JD: Gotta be DeRego, my father is DeRego, my grandfather, I don't know my Grandmother, You know who can tell you? I give you one guy's name- Gilly Cambra 47:55 He go to Portugal, he told me about my DeRego family in Portugal.
CM: He did?
JD: Yeah, you go see Gilly Cambra.
CM: I actually met him before because he has big saw mill.
JD: He lives right up in the hills, you never miss his house.
CM: He has a big saw mill, right?
JD: Yeah, in front of his house is a bunch of logs that he never used. Still piled up there, Gilly Cambra.
CM: Does he still run that saw mill?
JD: I don't think so.
CM: I wonder if he still has it.
JD: I don't know.
CM: So he goes back and forth?
JD: Yeah, he went, yeah, yeah he learned a lot of Portuguese history, he could tell you but me, I don't know. I only know what I, you know, yeah so, Kaho'olawe is um, yeah, I almost give you my whole history already.
CM: Oh good.
JD: If you don't sell this book, I remember,
CM: I'm not going to sell it.
JD: you give me half the money if you sell this book. So my wife.
CM: It's on the record now.
JD: My computer there not working.
CM: So tell me a little more about Kaho'olawe then. You were there one time to help take the cattle off?
JD: Yeah, they had a boat Mazie C 49:06 and Yamanichi was the captain, he was a Japanese captain, and what ranch did was hire cowboys to go over and drive and round up the cattle. So

they load the horses from here on this boat Mazie See. They hoist the horses into the hull of the boat and then when you get to Kaho'olawe they hoist them out of the boat, into the water, listen, they had a skip, a good size skip, the horse swim to the skip, they tie the horse head to the skip, and the skip goes to the shore and the horses come out. When the war break out, the captain, Yamanichi couldn't be the captain because he was a Japanese Alien. And this old drunken Portuguese, Anton Freitas, he didn't know anything about driving a boat, but he was the captain. And I was on that ship that very time, but he don't drive the ship, the regular captain, the Japanese Captain driving the ship, but Anton is the captain, so this big battle ship came right up to the boat and yelled at the captain on the Mazie Sea, and Anton stood up on the bow "Anton P. Freitas Captain," and some signals they gave and the big battle ship took off.
CM: You were there?
JD: I was on the Mazie Sea. And then you get to Kaho'olawe and then the working men stayed on the island in the home that ranch foreman that lived there, we had meals there and we slept there and then round up the cattle, drive the cattle, wild cattle too and bring them right down to the coral right near the ocean.
CM: Do you know what part of the island that was?
JD: Kaho'olawe, this part of the island.
CM: Kuheia?
JD: Oh gosh, they get one name of that bay.
CM: Was it Kuheia Bay?
JD: Gosh, I don't know. I know it's the name of that bay because that bay, the house that was on the hill and the bay was right down below the house like this. And this guy, oh let's see what his name was, maybe later on I get it. He goes in the coral, he ropes the cow, tie him to his horse, and he jump in the water, and drag the cow in the water, once the cow in the water he easily control. So, the boat grabbed the rope, he take him to the small boat, his horse swim, the small boat, they take the rope, they bring the cow right up to the small boat, you can handle 'em very easily, they tie his neck to the skip, and he go back and get another one.
CM: So one by one…
JD: One by one to the skip, then the skip goes to the bigger boat, they hoist 'em up into the boat.
CM: With the crane?
JD: Well they had that, it run by the motor, they hoist 'em up into the boat and when the boat is full, that boat goes back to Kihei and they unload 'em same thing, into the truck.
CM: And how long were you on Kaho'olawe?
JD: About a week.
CM: About a week, and did you guys get them all off?
JD: No we didn't get all, a lot of them stayed behind and they round up a lot of sheep, they brought a lot of sheep and a lot of that sheep and cattle they didn't catch 'em and stayed behind and till they died, I guess. But that is the story about Kaho'olawe
CM: Wow, that's neat.
JD: And Pedro, that his name, Manuel Pedro He was the foreman. And in front of his house he had a big pile of wood and I asked him, "what all this wood?" He said, "Well, in case anything happen over here with me and my wife…" and He would light it and the people in Maui could see the fire. Because it's all in this point, you know, towards Maui.
CM: Facing.

JD: Yeah, on the hill that you could see the fire and know if something wrong.
CM: Like his beacon?
JD: Yeah, if something wrong and they would know. Mazie Sea, Mazie Sea was owned by the ranch, Grove Ranch was the name of the Ranch that owned the cattle in Kaho'olawe, Grove Ranch.
CM: Grove, yeah.
JD: That is about the end of my book,
CM: OK
JD: but, you know, who is smart can work on that, they can drag 'em and fill in other stuff. But, that is what get in my little tape.
CM: I will go ahead and stop this.

Appendix E Makawao Land Grants

Land Grant: 00058 to Omaile

Grant Number(LG)	00058	Source Book:	**1**
Grantee:	Omaile	Acreage::	2.89 Acs
Ahupua`a	**Olinda**	Year	**1847**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	

Helu 58, Omaile, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, p. 119 [LG Reel 1, 0140]

Helu 58
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Omaile i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma, Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ka pahu ma ke kihi Hikina o ka aina hou o McLane, a e holo ana i ka
Hema 44° 30' Hikina 12 Kaulahao 6 7/12 kapuai a hiki i ka Lauhala ma ka aina kahiko o McLane a me Miner, mailaila aku i ka
Hema 55° 15' Komohana 6 Kaulahao 58 kapuai a hiki i ka laau koa, mailaila aku i ka
Akau 49° 30' Komohana 12 Kaulahao 23 kapuai e iho ana i huai pali a hiki i ka pahu ma ke kihi Komohana o keia aina, mailaila aku i ka
Akau 51° Hikina 8 Kaulahao 20 kapuai a hiki i kahi e hoomaka'i ke ana ana.

A maloko o ia Apana 9 73/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala Ewalu me na keneta 73.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Omaile, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 17 o Novemaba, 1847.

Received of Omaile, through the Reverend J.S. Green, the sum of $8.73, for the above Land Treasury Office 17 November 1847
Minister of Finance, G.P. Judd

[Land Patent Grant No. 58, Omaile, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 9.73 Acre, 1847]

00058 - No maps found.

Translation K. Robinson 2015

Helu 58, Omaile, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, p. 119 [LG Reel 1, 0140]

No. 58

Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Omaile, his faithfully and loyally disposed subject, all that certain piece of land situated at Makawao on the Island of Maui, and boundaries described as follows:

Commencing at the tank at the Eastern corner of McLane's new land and traveling South 44□ 30' East 12 Chains 6 7/12 feet until the Lauhala on McLane and Miner's old land, from there

South 55 degrees 15' West 6 Chains 58 feet until the Koa tree, from there

North 49 degrees 30' West 12 Chains 23 feet descending down into the open cliff until the tank at the West corner of this land, from there

North 51 degrees East 8 chains 20 feet until the place of commencement.

Contained within this lot parcel 9.73 acres, more or less. Purchase costs is as follows: Eight dollars and seventy-three cents have been placed into the Royal Exchequer. However, all mine minerals and mine metals are reserved for the Government.

Unto Omaile, the above-granted land, forever, in Fee Simple, his heirs and assigns, subject to the taxes imposed by the Legislative Council upon all similar lands in Fee Simple, from time to time.

And in witness whereof, I have hereunto affixed my name and the Great Seal of the Hawaiian Islands, in Honolulu on the 17th day of November, 1847.

Received of Omaile, through the Rev. J.S. Green the sum of $8.73, for the above Land Treasury Office 17 November 1847. Minister of Finance, G. P. Judd.

Land Grant: 00065 to Kaleihopu

Grant Number (LG) 00065
Source Book: 1
Grantee: Kaleihopu
Acreage: 8.62 Acres
Ahupua`a:
Year: 1847
District: Hamakuapoko, Makawao
Cancelled: False
Island: Maui TMK: 2-2-4-12

Helu 65, Kaleihopu, Makawao Ahupuaa, District of Hamakualoa 1(Makawao), Island of Maui, Vol. 1, p. 133 [LG Reel 1, 00154]

1 "Hamakuapoko" discrepancy with "Hamakualoa" throughout.

Helu 65

Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kaleihopu i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ka pahu ma ke kihi Hema o keia aina a me ke kihi Hikina o ka aina o J.S. Green maluna o ka Akau o huai-pali o ke awawa Huluhululiilii, a e holo ana i ka Akau 21□ 30' Hikina 8 ½ Kaulahao e oki ana i ke awawa a hiki i ka pahu ma ke kihi Hikina o keia aina, mailaila aku i ka Akau 63□ Komohana 12 Kaulahao 39 7/12 kapuai ma kapa Alanui Kaa a hiki i ka pahu ma ke kihi Akau o keia aina ma ka aina kahiko o McLane a me Miner, mailaila aku i ka Hema 42□ 30' Komohana 1 Kaulahao 48 2/12 kapuai a hiki i ka pahu ma kae pali ma ke kihi Hema o ka aina kahiko o McLane a me Miner, mailaila aku i ka Hema 19□ Komohana 5 Kaulahao 20 kapuai e iho ana i ka pali a hiki i ka laau Kukui nui, kihi Komohana o keia aina e pili ana i ka aina o J.S. Green, mailaila aku e pili ana iluna a e pili ana i ka Akau huai-pali o ke awawa o Huluhululiilii a hiki i kahi e hoomaka`i ke ana ana.

A maloko o ia Apana 8 62/100 eka a oi iki aku, emi iki mai paha. Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i Ehiku Dala me elima hapawalu. Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kaleihopu, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau lik ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea`i ua kau wau i ko`u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 15 o December, 1847.

Received of Kaleihopu, through the Rev. J. S. Green the sum of $7.62, for the above Land Treasury Office December 21st,1847 for the Minister of Finance, William Jarrett

[Land Patent Grant No. 65, Kaleihopu, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 8.62 Acre, 1847] 00065 - No maps found.

[Received from Waihona `Aina online June 11, 2015]

Translation:

Helu 65, Kaleihopu, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, p. 133 [LG Reel 1, 00154]

No. 65

Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Kaleihopu, his faithfully and loyally disposed subject, all that certain piece of land situated at Makawao on the Island of Maui, and boundaries described as follows:

Commencing at the stake at the South corner of this land and the East corner of J.S. Green's land above the North (right-side) *huai-pali2* of Huluhululiilii Gulch, and running to N. 21□ 30' E. 8 1/2 Chains stopping at the gulch until the stake at the East corner of this land, thence to N. 63□ W. 12 Chains 39 7/12 feet along the boundary of Kaa Street *(Alanui Kaa)* until the stake at the North corner of this land of the old lands of McLane and Miner, thence S. 42□ 30' W. 1 Chain 48 2/12 feet until the stake at the cliff bank of the South corner of the old lands of McLane and Miner, thence S. 19□ W. 5 Chains 20 feet descending down the cliff until the large *Kukui* tree, West corner of this land adjacent to J.S. Green's land, thence close above and along the North (right-side) *huai-pali* of Huluhululiilii Gulch until the place of this survey's beginning.

2 *huai-pali,* no reference to this terminology can be found for translation so I have left it untranslated. My guess would be *hua`i* meaning *uncovered or unearthed* and *pali* meaning *sheer drop* and probably a description of a portion of the gulch as opposed to a place called *huai-pali.*

Contained within this lot parcel 8.62 acres, more or less. Purchase costs is as follows: Seven dollars and sixty-two cents have been placed into the Royal Exchequer. However, all mine minerals and mine metals are reserved for the Government.

Unto Kaleihopu, the above-granted land, forever, in Fee Simple, his heirs and assigns, subject to the taxes imposed by the Legislative Council upon all similar lands in Fee Simple, from time to time.

And in witness whereof, I have hereunto affixed my name and the Great Seal of the Hawaiian Islands, in Honolulu on the 15th of December, 1847.

Received of Kaleihopu, through the Rev. J.S. Green the sum of $7.62, for the above Land Treasury Office December 21, 1847, For the Minister of Finance, William Jarrett

[Land Patent Grant No. 65, Kaleihopu, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 8.62 Acre, 1847; Waihona Aina Website; K. Robinson translation, 6/2015]

2 *huai-pali,* no reference to this terminology can be found for translation so I have left it untranslated. My guess would be *hua`i* meaning *uncovered or unearthed* and *pali* meaning *sheer drop* and probably a description of a portion of the gulch as opposed to a place called *huai-pali.*

Land Grant: 00068 to Jonathan S. Green

Grant Number(LG) 00068		Source Book: **1**	
Grantee:	Green, J.S.	Acreage::	87.07 Acs
Ahupua`a	**Makawao**	Year	**1847**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

No. 68, Green, Reverend J.S., Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, pps. 138-139 [LG Reel 1, 00160-00161]

Helu 68
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia J.S. Green i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ka pahu ma ka huina Hema Komohana o keia aina, e pili pu ana me ko Keawe a me Kaimu aina, a e holo ana i ka
Hema 61° Hikina 16 Kaulahao e pili ana i ko Kaimu a me ka aina Kumu ao mahiai a hiki i ka pahu ma ke alanui ma ke kihi Hema o keia aina, mailaila aku i ka
Akau 57° 15' Hikina 17 1/2 Kaulahao e pili ana i ua aina Kumu ao la, a hiki i ka pahu a me na pohaku ma ka lima Akau, a e pili ana i kekahi awawa, mailaila aku i ka
Akau 47° Hikina 17 Kaulahao 6 7/12 kapuai a hala mai ke awawa, a e pili ana i ka aina Kumuao, a hiki i ka pahu ma ke kihi Hema o ko Kaleihopu aina ma ka Akau o ka huai-pali o ke awawa o Huluhululiilii, Alaila e holo ana e pili i ko Kaleihopu aina a hiki i ka laau kukui ma ke kihi Komohana o kona, e kokoke ana i na awawa, mailaila aku i ka
Akau 19° Hikina 5 Kaulahao 19 10/12 kapuai e pili ana i kekahi pali a hiki i ka pahu ma ke kihi Hema o ko McLane aina, mailaila aku i ka
Akau 65° Komohana 9 Kaulahao 19 10/12 kapuai e pili ana i huai-pali a hiki i ka pahu ma ke kihi Akau o keia, a ma ke kihi Hikina o ko Kalawe, mailaila aku i ka
Hema 52° Komohana 14 Kaulahao 26 4/12 kapuai a hala mai ke awawa o Manawainui, e pili ana i ko Kalawe a hiki i ka pahu, mailaila aku i ka
Hema 51° Komohana 18 1/2 Kaulahao e pili ana i ko Kalawe aina, a me ka aina Hale Pule a hiki i ka pahu ma ka palena Hikina o ko Keawe aina, mailaila aku i ka

Hema 6° Hikina 10 Kaulahao 4 kapuai e pili ana i ko Keawe aina a hiki i kahi e hoomaka'i ke ana ana.

A maloko o ia Apana 87 7/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he Kanawalukumamahiku.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No J.S. Green, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 22 o December, 1847.

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 68, Green, Reverend J.S., Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 87.7 Acre, 1847]

Translation:

No. 68
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto the Reverend J.S. Green his faithful and loyally disposed subject for the consideration of Eighty Seven Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao, in the Island of Maui, and described as follows:

Commencing at Stake at South West angle of this land, joining lands owned by Keawe and Kaimu, and running
South 61° East 16 Chains along Kaimu's and Model Farm to stake at road at South corner of this land, thence
North 57° 15' East 17 Chains along Model Farm to stake and stones at slight angle on right side and near Gulch, thence
North 47° East 17 Chains 6 7/12 feet across Gulch and along Model Farm to stake at mauka East corner of this & South corner of Kaleihoopu's land on right huai-pali of Huluhululiilii Gulch then following along Kaleihopu's land to Kukui tree at his West corner near intersection of Gulches, thence
North 19° East 5 Chains 19 10/12 feet along up pali to stake on left upper edge at South corner of MLane's plantation, thence
North 65° 30' West 9 Chains 19 10/12 feet along huai-pali to stake at North corner of this land and East corner of Kalawe's, thence

South 52° West 14 Chains 26 4/12 feet across Manawainui Gulch and along Kalawe's to stake slight angle, thence
South 51° West 18 1/2 Chains along Kalawe's and Church land to stake at Keawe's East boundary, thence
South 6° East 10 Chains 4 feet along Keawe's to place of commencement.

Containing 87 7/100 Acres,more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Reverend J.S. Green, his Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 22nd day of December 1847.

(Sign) Kamehameha
(Sign) Keoni Ana

The above land settled for by Reverend Green's Bill for Surveying Lands
Treasury Office Febuary 5th 1848
For the Minister of Finance, William Jarrett

Land Grant: 00079 to Kalawe

Grant Number(LG)	00079	Source Book:	**1**
Grantee:	Kalawe	Acreage::	11.1 Acs
Ahupua`a	**Makawao**	Year	**1848**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-11**

No. 79, Kalawe, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, pps. 160-161 [LG Reel 1, 00182-00183]

Royal Patent [79]

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto [left blank], his faithful and loyally disposed subject for the consideration of [left blank], paid into the Royal Exchequer, all that certain piece of Land situated at [left blank]in the Island ofand described as follows:

Containing [left blank] Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said ,Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this [left blank] day of 18[left blank]

Received of Kalawe through the Reverend M Green the sum of $11, for the land for Patent No. 79
Treasury Office Febuary 9th 1848
For the Minister of Finance, William Jarrett

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Helu 79
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kalawe i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ka pahu ma ke kihi Akau o keia aina a ma ke kihi Komohana o ka aina o Paele ma ke alanui, a e holo ana i ka
Hema 34° 45' Komohana 4 Kaulahao 29 kapuai e moe ana i ke Alanui, a hiki i ka pahu ma ke kihi Komohana o keia aina, alaila i ka
Hema 54 1/4° Hikina 25 Kaulahaoe pili ana i ka aina o Kalaihopu, a hiki i ka pahu ma ke kihi Hema o keia aina, alaila i ka
Akau 37° Hikina 4 Kaulahao 29 kapuai a hiki i ka pahu ma ke kihi Hikina o keia aina maluna iho, alaila i ka
Akau 54 1/4° Komohana 25 Kaulahao e pili ana i ka aina o Paele a hiki i kona wahi e hoomakaia'i.

A maloko o ia Apana 11 1/10 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he Umikumamakahi.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kalawe, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la Eono o Maraki, 1848.

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 79, Kalawe, Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 11.01 Acre, 1848]

00079 - No maps found.

Land Grant: 00157 to William A. McLane

Grant Number(LG) 00157		Source Book: **1**	
Grantee:	McLane, William A.	Acreage::	370 Acs
Ahupua`a		Year	**1849**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-03, -12**

No. 157, McLane, William A., Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, Vol. 1, pps. 320-321 [LG Reel 1, 00367-00369.tif]

No. 157
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto William A. McLane, his faithful and loyally disposed subject for the consideration of Seven Hundred & Forty Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui and described as follows:

Commencing at rock marked + on East side of Punaokeawe ravine at the West corner of this land, and running
South 65° East 22 4/10 chains to North corner o Maile (Mrs. McLane) lot, thence running mauka along lands owned by Maile, John Smith, Honolulu, Kalawe & J.S. Green to stake at makai angle of Kaleihopu's land & mauka South corner of this, then along makai side of Kaleihopu's, Nuole, & Naheana's land to stream again in Māliko gulch at foot of Puu Piiholo, then along stream down Māliko gulch to end of first line

Containing Three Hundred & Seventy Acres, more or less, excepting and reserving to the

Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said William A. McLane his Hawaiian, Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 20 day of October, 1849

Received of William A. McLane the sum of $720.00 for land as per Patent No. 157
Treasury Office, October 22, 1849
For the Minister of Finance, William Jarrett

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Helu 157
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia William A. McLane i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka pohaku i hoailonaia + ma ka aoao Hikina o ke awawa o Punaokeawe, ke kihi Komohana o keia aina, a e holo
Akau 19° Hikina 46 7/10 Kaulahao ma ka aoao makai o keia ainaa hiki i ka laau Kukui maloko o ke awawa o Māliko, alaila haalele a hoi hou ma kahi i hoomaka'i, e holo
Hema 65° Hikina 22 7/10 Kaulahao a hiki i ke kihi Akau o ka aina no Maile (wahine o Wiliama), alaila e holo mauka ma na aina o Maile, John Smith, Honolulu, Kalawe & J.D. Green a hiki i ka pahu ma ke kihi makai o ka aina o Kaleihopu, ke kihi Hema mauka o keia, alaila ma ka palena makai o na aina o Kaleihopu, Nuole a me Naheana a hiki i ke kahawai o Māliko, malalo iho o ka Puupiiholo, alaila iho ma ke kahawai o Māliko a hiki i ka hope o ka palena mua kahi haalele ia a puni ae keia aina

A maloko o ia Apana 370 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala $740.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No William A. McLane, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a me ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 20 o Okakoba, 1849

[Land Patent Grant No. 157, McLane, William A., Makawao Ahupuaa, District of Hamakualoa (Makawao), Island of Maui, 370 Acres, 1849]

Land Grant: 00324 to Naheana

Grant Number(LG) 00324		Source Book: **2**	
Grantee:	Naheana	Acreage::	2.69 Acs
Ahupua`a	**Olinda**	Year	**1850**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

No. 324, Naheana, Makawao Ahupuaa, District of Makawao, Island of Maui, Vol. 2, pps. 282-283 [LG Reel 1, 00844-00845.tif]

No. 324
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Naheana, his faithful and loyally disposed subject for the consideration of Eleven 35/100 Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui and described as follows:

Commencing at stake by old ditch at North corner of Nuole's land and running
South 54° 30' East 10 Chains 26 4/12 feet along Nuole's to stake at South corner of this land, thence
North 35° 30' East 13 Chains 42 3/12 feet along makai side of Limuaimokus land down pali to bottom of deep gulch separating Makawao nei from Haiku at East corner of this, thence
North 38° West 6 Chains 23 9/12 feet along bottom of gulch to Kukui tree at North corner of this & East corner of Mc Lane's land, thence
South 56° 30' West 6 1/2 Chains up Pali to stake at upper edge, thence
South 46° 45' West 9 Chains to place of commencement.

Containing Twelve 35/100 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Naheana his Hawaiian Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian

Islands to be affixed, at Honolulu, this 2 day of July, 1850.

Received of Naheana through Rev. J. S. Green the sum of Eleven 35/100 Dollars as per Patent No. 324.
Minister of Finance, G. P. Judd, as for [?]

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Helu 324
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Naheana i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka pahu ma ka auwai kahiko ma ke kihi Akau o ka aina o Nuole a e holo ana Hema 54° 30' Hikina 10 Kaulahao 26 4/12 kapuai ma ko Nuole a hiki i ka pahu ma ke kihi Hema o keia aina, alaila
Akau 35° 30' Hikina 13 Kaulahao 42 3/12 kapuai ma ka aoao makai o ka aina o Limaimoku [sic] iho ilalo o ka pali a hiki i waena konu o ka awawa hohonu e hookaawale ana ia Makawao a me Haiku ma ke hiki Hikina o keia, alaila
Akau 38° Komohana 6 Kaulahao 23 9/12 kapuai mawaena konu o ke awawa a hiki i kalaau kukui ma ke kihi Akau o keia a hiki i ke kihi Hikina o ka aina o Mc Lane ma, alaila
Hema 56° 30' Komohana 6 « Kaulahao pii i ka pali a hiki i ka pahu ma kae lihi pali, alaila
Hema 46° 45' Komohana 9 Kaulahao a hiki i hoomaka ai.

A maloko o ia Apana 12 35/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he $11.35.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Naheana, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 2 o Julai, 1850

Kamehameha
Keoni Ana

[Land Patent Grant No. 324, Naheana, Makawao Ahupuaa, District of Makawao, Island of Maui, 12.35 Acres, 1850]

Land Grant: 00325 to Honolulu

Grant Number(LG) 00325		Source Book: **2**	
Grantee:	Honolulu	Acreage::	11.19 Acs
Ahupua`a	**Makawao**	Year	**1850**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	

No. 325, Honolulu, Makawao, Ahupuaa, District of Makawao, Island of Maui, Vol. 2, pps. 284-285 [LG Reel 1, 00846-00847.tif]

No. 325
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Honolulu, his faithful and loyally disposed subject for the consideration of Ten 12/100 Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui and described as follows:

Commencing at flared Okoko [sic] tree at East corner of this of left huai Pali joining Mc Lane and Kalawe's and running
North 46° West 9 Chains 29 8/12 feet along huai Pali to stake by Akoko tree at North corner of this and East corner of Kahuna's land, thence
South 59° West 8 Chains 18 1/2 feet acrofs [sic] gulch to Koa stump on right huai Pali, thence
North 64° 45' West 2 Chains 46 2/12 feet along Kahuna's to stake angle, thence
South 31° 30' West 3 Chains 15 10/12 feet along Kahuna's to stake at West corner of this just mauka of clump of Koa trees, thence
North 57° 45' East 11 Chains 59 5/12 feet along church land to stake at South corner of this, thence
North 36° East 4 Chains along Kalawe's to marked Koa tree on right huai Pali, thence
North 60° 30' East 5 Chains 58 feet acrofs [sic] Manaiwai nui Gulch to place of commencement.

Containing Eleven 19/100 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Honolulu his Hawaiian Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian

Islands to be affixed, at Honolulu, this 2 day of July, 1850.

Received of Honolulu Rev. J. S. Green the sum of Ten 12/100 Dollars for above described land. Minister of Finance, G. P. Judd as for [?]

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Helu 325
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Honolulu i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka laau Akoko i hoailonaia ma ke kihi Hikina o keia me ka lihi kae pali lima Hema e pili ana me ko Mc Lane ma a me ko Kalawe a e holo ana
Akau 46° Komohana 9 Kaulahao 29 8/12 kapuai ma ka lihi kae pali a hiki i ka pahu kokoke i ka laau Akoko ma ke kihi Akau o keia a me ka [sic] kihi Hikina o ko Kahuna, alaila
Hema 59° Komohana 8 Kaulahao 18 1/2 kapuai moku ana ke awawa a hiki i ka laau koa ma ka lihi kae pali lima Akau, alaila
Akau 64° 45' Komohana 2 Kaulahao 46 2/12 kapuai ma ko Kahuna a hiki i ka pahu, keekee, alaila
Hema 31° 30' Komohana 3 Kaulahao 15 10/12 kapuai ma ko Kahuna a hiki i ka pahu ma ke kihi Komohana o keia mauka iki o kekahi ulu laau koa, alaila
Hema 57° 45' Hikina 11 Kaulahao 59 5/12 kapuai ma ka aina Ekelesia a hiki i ka pahu ma ke kihi Hema o keia, alaila
Akau 36° Hikina 4 Kaulahao ma ko Kalawe a hiki i ka laau koa i hoailonaia ma ke [sic] lihi kae pali lima akau, alaila
Akau 60° 30' Hikina 5 Kaulahao 58 kapuai moku ana ka auau o Manawainui a hiki i kahi i hoomaka ai.

A maloko o ia Apana 11 19/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he $10.12.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Honolulu, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 2 o Julai, 1850

Kamehameha

Keoni Ana

[Land Patent Grant No. 325, Honolulu, Makawao Ahupuaa, District of Makawao, Island of Maui, 11.19 Acres, 1850]

00325 - No maps found.

Land Grant: 00326 to Kuli

Grant Number(LG) 00326		Source Book: **2**	
Grantee:	Kuli	Acreage::	13 Acs
Ahupua`a	**Makawao**	Year	**1850**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

No. 326, Kuli, Makawao Ahupuaa, District of Makawao, Island of Maui, Vol. 2, pps. 286-287 [LG Reel 1, 00848-00848.tif]

No. 326
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Kuli, his faithful and loyally disposed subject for the consideration of Thirteen Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui and described as follows:

Commencing at small Koa tree on top of bank at bend of Gulch joining Limaimoku's land and running
South 74° 30' West 4 Chains 17 10/12 feet along Limaimoku's to stake at West corner of this land, thence
South 24° East 7 Chains 37 feet along Koena to Naholowaa's lands to stake at South corner of this, thence
North 51° East 17 1/4 Chains along mauka side this to stake at East corner, thence
North 47° West 12 Chains down Pali to Kukui tree on mauka foot of Piiholo hill at Haiku the North corner this land, thence
South 27° West 8 1/[left blank] Chains along bottom of Gulch to Limaimoku's land, thence
South 46° East 6 1/2 Chains up Gulch to East corner of Limaimoku's land, thence due
West 2 Chains up Pali to place of commencement.

Containing 13 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Kuli his Hawaiian Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 2 day of July, 1850.

Received of Kuli through Rev. J. S. Green the sum of Thirteen Dollars as per Patent No. 326. Minister of Finance, G. P. Judd, as for [?]

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Helu 326
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kuli i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka laau koa liilii maluna o ke kapa ma kahi uakee o ke awawa e pili ana me ka aina o Limaimoku, a e holo ana
Hema 74° 30' Komohana 4 Kaulahao 17 10/12 kapuai ma ko Limaimoku a hiki i ka pahu ma ke kihi Komohana o keia, alaila
Hema 24° Hikina 7 Kaulahao 37 kapuai ma ko Koena me Naholowaa a hiki i ka pahu ma ke kihi Hema o keia, alaila
Akau 51° Hikina 17 1/4 Kaulahao ma ka aoao mauka o keia a hiki i ka pahu ma ke kihi Hikina, alaila
Akau 47° Komohana 12 Kaulahao iho ma ka pali a hiki i ka laau Kukui ma ke kumu mauka o ka puu o Piiholo ma Haiku ke kihi akau o keia, alaila
Hema 27° Komohana 8 1/10 Kaulahao iwaena Komohana o ke awawa a hiki i ko Limaimoku, alaila
Hema 46° Hikina 6 1/2 Kaulahao pii ma ke awawa a hiki i ke kihi Hikina o ko Limaimoku, alaila Komohana 2 Kaulahao pii ma ka pali a hiki i kahi i hoomaka'i.

A maloko o ia Apana 13 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he $13.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kuli, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 2 o Julai, 1850

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 326, Kuli, Makawao Ahupuaa, District of Makawao, Island of Maui, 13 Acres, 1850]

00326 - No maps found.

Land Grant: 00328 to Nuole

Grant Number(LG) 00328		Source Book: **2**	
Grantee:	Nuole	Acreage::	2.88 Acs
Ahupua`a	**Olinda**	Year	**1850**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

Miscellaneous

No. 328, Nuole, Makawao, Ahupuaa, District of Makawao, Island of Maui, Vol. 2, pps. 290-291 [LG Reel 1, 00852-00853.tif]

No. 328
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Nuole, his faithful and loyally disposed subject for the consideration of Eight Dollars, paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui and described as follows:

Commencing at stake at West corner of this land near gate in mauka fence of Mc Lane & Miner's Lease and running
North 60 1/2° East 4 Chains 36 4/12 feet along Mc Lane's to angle, thence
North 44° East 5 Chains 6 7/12 feet along Mc Lane's to stake by old ditch at North corner of this land, thence
South 54° 30' East 10 Chains 26 4/12 feet along Naheana's to stake at East corner of this and South corner of Nahena's [sic] land, thence
South 49° 30' West 9 Chains along mauka boundary of this to stake at South corner, thence
North 58° West 10 Chains 52 8/12 feet along space left for road to place of commencement.

Containing Eight 9/10 Acres, more or less, excepting and reserving to the Hawaiian Government,

all mineral or metallic Mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Nuole his Hawaiian Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 2 day of July, 1850.

Received of Nuole through Rev. J. S. Green the sum of Eight Dollars for land as per Patent No. 328.
Minister of Finance, G. P. Judd, as for [?]

[page 291]

Helu 328
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Nuole i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka pahu ma ke kihi Komohana o keia aina kokoke i ka puka ma ka pa mauka o ka aina hoolimalima o Mc Lane a me Miner a e holo ana
Akau 60 1/2° Hikina 4 Kaulahao 36 4/12 kapuai ma ko Mc Lane ma a hiki i ke kihi, alaila
Akau 44° Hikina 5 Kaulahao 6 7/12 kapuai ma ko Mc Lane a hiki i ka pahu ma ka auwai kahiko ma ke kihi Akau o keia aina, alaila
Hema 54° 30' Hikina 10 Kaulahao 26 4/12 kapuai ma ko Naheana a hiki i ka pahu ma ke kihi Hikina o keia a ma ke kihi Hema o ka aina o Naheana, alaila
Hema 49° 30' Komohana 9 Kaulahao ma ka palena mauka o keia a hiki i ka pahu ma ke kihi Hema, alaila
Akau 58° Komohana 10 Kaulahao 52 8/12 kapuai ma ke lihi Hikina o ke alanui i hookawale ia a hiki i kahi i hoomaka'i.

A maloko o ia Apana 8 9/10 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he $8.00.Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Nuole ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i

keia la 2 o Julai, 1850

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 328, Nuole, Makawao Ahupuaa, District of Makawao, Island of Maui, 8.9 Acres, 1850]

Land Grant: 00498 to Kalimaimoku

Grant Number(LG) 00498		Source Book: **3**	
Grantee:	Kalimaimoku	Acreage::	23.35 Acs
Ahupua`a		Year	**1851**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

No. 498, Kalimaimoku, Makawao, Ahupuaa, District of Kula, Island of Maui, Vol. 3, p. 221
[LG Reel 1, 01370-01371.tif]

Helu 498
Palapala Sila Nui

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kalimaimoku i kona wahi kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka pahu ma ke kihi Komohana o keia, e pili ana me na aina o Nuole a me Naheana, a e holo
Hema 52° Hikina 13 1/2 Kaulahao a hiki i ke kihi Hema o keia, alaila
Akau 74 1/2° Hikina 11 1/4 Kaulahao ma ko Kuli aina a hiki i wahi Laau Koa ma ka huai pali, alaila Hikina 2 Kaulahao ma ka pali a hiki i ke kihi Hikina o keia ma kahi anakee o ka auwai, alaila
Akau 46° Komohana 24 Kaulahao maloko o ke Awawa iwaena o Makawao a me Haiku a hiki i ke kihi Hikina o ko Naheana aina, alaila
Hema 35° 30' Komohana 13 Kaulahao 42 3/12 kapuai ma ko Naheana a hiki i kahi i hoomaka'i.

a maloko o ia Apana 23 35/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he Iwakaluakumamalua me Ekolu Hapawalu. Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kalimaimoku, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka Sila Nui o ko Hawaii Pae Aina ma Honolulu i keia la 16 o Januari, 1851.

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Insert]

Treasury Office, [left blank] of [left blank] 185 [left blank]
Received of Kalimaimoku thro G. Green the sum of Twenty Two 37/100 Dollars for land as per Patent No. 498 and four Three dollars, the fees of patenting.
As for Ap. For Minister of Finance, G. P. Judd

[End of Insert]

[Land Patent Grant No. 498, Kalimaimoku, Makawao, Ahupuaa, District of Kula, Island of Maui, 23.35 Acres, 1851]

00498 - No maps found.

No. 498, Kalimaimoku, Makawao Ahupuaa, District of Kula, Island of Maui, Vol. 3, p. 221 [LG Reel 1, 01370-01371.tif]

No. 498

Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Kalimaimoku, his faithfully and loyally disposed subject, all that certain piece of land situated at Makawao on the Island of Maui, and boundaries described as follows:

Commencing at the tank at the Western corner of this area, adjacent to Nuole and Naheana's lands, and traveling

South 52□ East 13 1/2 Chains up until the Southern edge of this area, then

North 74 1/2□ East 11 1/4 Chains along Kuli's land up to the Koa tree area on the edge of the cliff, then

East 2 Chains on the cliffs until the Eastern boundary of this area at the bend of the water ditch, then

North 46□ West 24 Chains inside the gulch between Makawao and Haiku until the Eastern boundary of Naheana's lands, then

South 35□ 30' West 13 Chains 42 3/12 feet at Naheana's until the place of commencement.

Contained within this lot parcel 23 35/100 acres, more or less. Purchase costs is as follows: Twenty-two dollars and thirty-seven cents have been placed into the Royal Exchequer. However, all mine minerals and mine metals are reserved for the Government.

Unto Kalimaimoku, the above-granted land, forever, in Fee Simple, his heirs and assigns, subject to the taxes imposed by the Legislative Council upon all similar lands in Fee Simple, from time to time.

And in witness whereof, I have hereunto affixed my name and the Great Seal of the Hawaiian Islands, in Honolulu on the 16th day of January, 1851.

(Signature) Kamehameha

(Signature) Keoni Ana (John Young)

[Insert]

Treasury Office, [left blank] of [left blank] 185 [left blank]

Received of Kalimaimoku, through G. Green the sum of Twenty-two 37/100 Dollars for land as per Patent No. 498 and four Three dollars, the fees of patenting.

As for Ap. For Minister of Finance, G. P. Judd.

[End of Insert]

[Land Patent Grant No. 498, Kalimaimoku, Makawao Ahupuaa, District of Kula, Island of Maui, 23.35 Acres, 1851; Waihona Aina Website; K. Robinson translation, 7/2015]

Land Grant: 00504 to Kekino

Grant Number(LG) 00504		Source Book: **3**	
Grantee:	Kekino	Acreage::	24 Acs
Ahupua`a		Year	**1851**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-12**

No. 504, Kekino, Makawao, Ahupuaa, District of Kula, Island of Maui, Vol. 3, p. 233 [LG Reel 1, 01385- 01386.tif]

Helu 504
Palapala Sila Nui

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona

lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kekino i kona wahi kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ma ka pahu ma ke kihi Hema o keia a ma ke kihi Hikina o ka aina o Kuli ma ka aoao lima Akau o ke Awawa o Kealakeakua a holo ana
Akau 29° 30' Hikina 5 Kaulahao 42 3/12 kapuai e moku ana i ke Awawa a hiki i ka pahu ma ke Alanui, alaila
Akau 66° 30' Hikina 5 Kaulahao 52 8/12 kapuai ma ko Kahae a hiki i ka pahu ma ke kihi Hikina o keia, alaila
Akau 34° Komohana 19 Kaulahao 6 7/12 kapuai ma ko Kamapuaa a hiki i ka pahu maluna o ka pali o ke Awawa hohonu, alaila
Akau 42° 30' Komohana 10 Kaulahao 52 8/12 kapuai iho ilalo ma ka pali a hiki i ke kihi Akau o keia a me ke kihi Komohana o ko Kamapuaa, alaila
Hema 27° Komohana 10 1/2 Kaulahao mawaena konu o ke awawa hohonu iwaena o Makawao a me Haiku a hiki i ka Laau Kukui ma ke Komohana o keia, alaila
Hema 47° Hikina 12 Kaulahao 39 1/12 kapuai ma ko Kuli pii i ka pali a hiki i ka pahu ma ka lihi kae pali, alaila
Hema 38° 45' Hikina 4 Kaulahao 8 7/12 kapuai kihi, alaila
Hema 3° Komohana 3 Kaulahao a hiki i ka pahu maluna o ka pali iloko o Piihonu, alaila
Hema 21° 30' Hikina 7 Kaulahao 21 2/12 kapuai moku ana i ke awawa o Kealakeakua a hiki i kahi i hoomaka'i.

[Insert]

Treasury Office, [left blank] of [left blank] 185 [left blank]
Received of Kekino through G. Green the sum of Twenty three Dollars for land as per Patent No. 504 and four Three dollars, the fees of patenting.
As for Ap. For Minister of Finance, G. P. Judd

[End of Insert]

a maloko o ia Apana 24 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na Dala he $23.00 Iwakaluakumamakolu. Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kekino, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka Sila Nui o ko Hawaii Pae Aina ma Honolulu i keia la 16 o Januari, 1851.

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 504, Kekino, Makawao, Ahupuaa, District of Kula, Island of Maui, 24 Acres, 1851]

00504 - No maps found.

No. 504, Kekino, Makawao, Ahupuaa, District of Kula, Island of Maui, Vol. 3, p. 233 [LG Reel 1, -1385-01386.tif]

No. 504

Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Kekino, his faithfully and loyally disposed subject, all that certain piece of land situated at Makawao on the Island of Maui, and boundaries described as follows:

Commencing at the tank on the Southern corner of this land and the Eastern corner of Kuli's land on the right-hand side of Kealakeakua Gulch and continuing

North 29 [degrees] 30' East 5 Chains 42 3/12 feet cutting through the gulch until the tank on the raod, then

North 66 [degrees] 30' East 5 Chains 52 8/12 feet along Kahae's land until the tank on the Eastern corner of this area, then

North 34 [degrees] West 19 Chains 6 7/12 feet along Kamapuaa's land until the tank on top of cliffs of a deep gulch, then

North 42 [degrees] 30' West 10 Chains 52 8/12 feet down below the cliffs until the Northern corner of this area and the Western corner of Kamapuaa`s land, then

South 27 [degrees] West 10 ½ Chains in the center of the deep gulch between Makawao and Haiku until the Kukui tree on the West of this land, then

South 47 [degrees] East 12 Chains 39 1/12 feet along Kuli's property ascending the cliffs until the tank on the cliff's rim edge, then

South 38 [degrees] 45' East 4 Chains 8 7/12 angled feet, then

South 3 [degrees] West 3 Chains until the tank on top of the pali inside Piihonu, then

South 21 [degrees] 30' East 7 Chains 21 2/12 feet cutting through Kealakeakua gulch until the corner of commencement.

[Insert]

Treasury Office, [left blank] of [left blank] 185 [left blank]

Received of Kekino through G. Green the sum of Twenty-three Dollars for land as per Patent No. 504 and four Three dollars, the fees of patenting.

As for Ap. For Minister of Finance, G. P. Judd

[End of Insert]

Contained within this lot parcel 24 acres, more or less. Purchase costs is as follows: $23.00 have been placed into the Royal Exchequer. However, all mine minerals and mine metals are reserved for the Government.

Unto Kekino, the above-granted land, forever, in Fee Simple, his heirs and assigns, subject to the taxes imposed by the Legislative Council upon all similar lands in Fee Simple, from time to time.

And in witness whereof, I have hereunto affixed my name and the Great Seal of the Hawaiian Islands, in Honolulu on the 16th of January, 1851.

(Signature) Kamehameha

(Signature) Keoni Ana (John Young)

[Land Patent Grant No. 504, Kekino, Makawao Ahupuaa, District of Kula, Island of Maui, 24 Acres, 1851. 00504 - No maps found. Received from Waihona Aina Website; K. Robinson translation, 7/2015.]

Land Grant: 00833 to Jonathan S. Green

Grant Number(LG) 00833		Source Book: **5**	
Grantee:	Green, J.S. same as Grant 66	Acreage::	98.93 Acs
Ahupua`a		Year	**1852**
District:	Hamakuapoko, Makawao	Cancelled	False
Island	**Maui**	TMK	**2-2-4-08, -12**

No. 833, Green, Jonathan L., Makawao Ahupuaa, District of Hamakuapoko/Makawao, Island of Maui, Vol. 5, pps. 71-74 [LG Reel 2, 00636-00639.tif]

No. 833
Royal Patent

Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Jonathan L. Green, his faithful and loyally disposed subject for the consideration of One hundred & forty eight 37/100 dollars paid into the Royal Exchequer, all that certain piece of Land situated at Makawao in the Island of Maui, and described as follows:

Commencing at Stake at North of Kalawaiahou's land, and running
North 37° East 19 Chains 26 4/12 feet acrofs Gulch along mauka side of this to stake by road at East corner, thence

North 55° 30' West 14 Chains 26 11/12 feet to stake at East corner of J.S. Green's farm, thence
South 47° West 17 Chains 6 7/12 feet along mauka side of J.S. Green's to stake and stones slight angle, thence
South 57° 15' West 17 1/2 Chains to J.S. Green's South corner, thence
North 61° West 11 Chains 31 2/12 feet along J.S. Green's to stake at Kaimu's East corner, thence
South 48° 15' West 12 Chains 56 feet along Kaimu's to his South corner, thence
South 48° 15' East 11 Chains 36 4/12 feet along Aneru's to his East corner, thence
South 32° West 3 Chains 45 feet along mauka side of Aneru's land to North corner of Uwe's, thence
South 50° 30' East 11 Chains 6 7/12 feet along Uwe's land to his East corner, thence
South 46° 30' East 4 Chains 19 10/12 feet along Makua's to stake at West corner of Kekalo's land, thence
North 57° East 18 Chains 47 1/2 feet along makai side of Kekalo's to his North corner, thence
North 45° East 16 1/2 Chains along makai side of Kalawaiahou's to place of commencement

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Containing 98 93/100 Acres, more or less, excepting and reserving to the Hawaiian Government, all mineral or metallic mines of every description.

To have and to hold the above granted Land in Fee Simple, unto the said Jonathan L. Green, his Heirs and Assigns forever, subject to the taxes to be from time to time imposed by the Legislative Council equally, upon all landed Property held in Fee Simple.

In Witness whereof, I have hereunto set my Hand, and caused the Great Seal of the Hawaiian Islands to be affixed, at Honolulu, this 19th day of July, 1852

(Signed) Kamehameha
(Signed) Keoni Ana

[page 73]

See Gr. 66

Helu 833
Palapala Sila Nui

Ma keia palapala sila nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho; a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Jonathan L. Green i kona wahi kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ka pahu ma k e kihi Akau o ko Kalawaiahou aina, a e holo ana i ka Akau 37° Hikina 19 Kaulahao 26 1/2 kapuai a pae aku i kela aoao o ke awawa e pili ana i ka

aoao mauka o keia, a hiki i ka pahu ma ke Alanui ma ke kihi i Hikina, mailaila aku i ka
Akau 55° 30' Komohana 14 Kaulahao 26 4/12 kapuai a hiki i ka pahu ma ke kihi Hikina o ko J.S. Green aina, mailaila aku i ka
Hema 47° Komohana 17 Kaulahao 6 7/12 kapuai e pili ana i ka aoao mauka o ko J.S. Green a hiki i ka pahu a me na pohaku, mailaila aku i ka
Hema 57° 15' Komohana 17 1/2 Kaulahao a hiki i ke kihi Hema o ko J.S. Green, mailaila aku i ka
Hema 61° Komohana 11 Kaulahao 31 2/12 kapuai e pili ana i ko J.S. Green, a hiki i ka pahu ma ke kihi Hikina o ko Kaimu aina, mailaila aku i ka
Hema 48° 15' Komohana 12 Kaulahao 56 kapuai e pili ana i ko Kaimu a hiki i kona kihi Hema, mailaila aku i ka
Hema 48° 15' Hikina 11 Kaulahao 36 4/12 kapuai e pili ana i ko Aneru a i kona kihi Hikina, mailaila aku i ka
Hema 32° Komohana 3 Kaulahao 45 kapuai e pili ana i ka aoao mauka o ko Aneru a hiki i ke kihi Akau o ko Uwe aina, mailaila aku i ka
Hema 50° 30' Hikina 11 Kaulahao 6 7/12 kapuai e pili ana i ko Uwe aina a ke kihi Hikina o kona, mailaila aku i ka
Hema 46° 30' Hikina 4 Kaulahao 19 10/12 kapuai e pili ana i ko Makua a hiki i ka pahu ma ke kihi Komohana: o ko Kekalo aina, mailaila aku i ka
Akau 57° Hikina 18 Kaulahao 47 1/2 kapuai, e pili ana

[page 74]

i ka aoao makai o ko Kekalo, a i kona kihi Akau mailaila aku i ka
Akau 45° Hikina 16 1/2 Kaulahao ma ka aoao makai o ko Kalawaiahou a hiki i kahi i hoomaka'i.

[Insert]

Treasury Office, 2nd of January 1853
Received of Jonathan L. Green the sum of One hundred forty eight 37/100 Dollars for land as per Patent No. 833 and four dollars, the fees of patenting.
G. P. Judd, For Minister of Finance

[End of Insert]

A maloko o ia Apana 98 93/100 eka a oi iki aku, emi iki mai paha.
Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i $118.87.
Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Jonathan L. Green, ua aina la i haawiia, no na mau loa aku no, ma ke ano alodio, a no ko na mau hooilina, a me ko na waihona, ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea'i ua kau wau i ko'u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 19 o Julai, 1852

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent Grant No. 833, Green, Jonathan L., Makawao Ahupuaa, District of Hamakuapoko/Makawao, Island of Maui, 98.93 Acres, 1852]

00833 - No maps found.

Land Grant: 02840 to Kekua

Grant Number (LG) 02840	Source Book: 13
Grantee: Kekua	Acreage: 110.54 Acres
Ahupua`a: Papalanui	Year: 1862
District: Hamakuapoko, Makawao	Cancelled: False

No. 2840, Kekua, Papalanui Ahupuaa, District of Hamakuapoko/Makawao, Island of Maui, Vol. 13, pps. 335-336 [LG Reel 4, 01495-01496.tif]

Helu 2840

Palapala Sila Nui

Ma keia Palapala Sila Nui ke hoike aku nei o Kamehameha IV., ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope alii, ua haawi lilo loa aku oia ma ko ano alodio ia Kekua i kona kanaka i manao pono ia ia i kela apana aina a pau e waiho la ma Papalanui Makawao ma ka Mokupuni o Maui, a penei hoi ka waiho ana o na Mokuna.

E hoomaka ana i ke ana ma ke Kihi Kahi i hui ko Limaaimoku Naheana ame Nuole ma ka pohakuloihi Hoailonaia X kihi Akau makai o Keia, A holo

Hema 50 [degrees] Hikina 13 1/2 Kaulahao

Akau 79 [degrees] Hikina 7 1/4 Kaulahao ma ko Limaainamoku

Hema 30 [degrees] Hikina 22 Kaulahao ma ko Kulia ame Aupuni

Hema 50 [degrees] Komohana 35 1/2 Kaulahao ma ka aina Hanai bipi a hiki i ka lihi Akau o ke Awawa alua, Alaila

Akau 40 [degrees] Komohana 9 1/2 Kaulahao ma ko Kahunapule

Akau 43 [degrees] 30' Hikina 13[?] Kaulahao

Akau 50 [degrees] Komohana 14 Kaulahao ma ko Mr. Green

Akau 36 [degrees] Hikina 8 4/10 Kaulahao ma ko Kalaihopu,

Akau 55 [degrees] Hikina 11 Kaulahao ma ko Nuole Naheana a hiki i ke Kihi hoomakai.

100 54/100 Eka.

Koe nae ke Kuleana o Kanaka a maloko o ia Apana 100 54/100 eka a oi iki aku, emi iki mai paha. Eia ke kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i na dala $110.50

Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Kekua, ua aina la i haawiia, no [left blank] mau loa aku no, ma ke ano alodio, a me ko [left blank] mau hooilina, a me ko [left blank] waihona, ua pili nae ka auhau a ka Poe Ahaolelo e ka like ai ma na aina alodio a pau i kela manawa i keia manawa.

A i mea e ikea`i, ua kau wau i ko`u inoa, a me ka sila nui o ko Hawaii Pae Aina ma Honolulu i keia la 3 o January, 1862.

Kamehameha

Na ka Moi & Kuhina Nui

Kaahumanu

L. Kamehameha

[Land Patent Grant No. 2840, Kekua, Papalanui Ahupuaa, District of Hamakuapoko/Makawao, Island of Maui, 100.54 Acres, 1862] 02840 No maps found.

[Received from Waihona `Aina online June 11, 2015]

Land Grant: 02840

Grant Number (LG) 02840 Source Book: 13

Grantee: Kekua Acreage: 110.54 Acres

Ahupua`a: Papalanui Year: 1862

District: Hamakuapoko, Makawao Cancelled: False

Island: Maui TMK:

Miscellaneous:

No. 2840, Kekua, Papalanui Ahupuaa, District of Hamakuapoko/Makawao, Island of Maui, Vol. 13, pps. 335-336 [LG Reel 4, 01495-01496.tif]

No. 2840

Royal Patent

Kamehameha IV, By the Grace of God, King of the Hawaiian Islands, by this Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Kekua, his faithfully and loyally disposed subject, all that certain piece of land situated at Papalanui Makawao on the Island of Maui, and boundaries described as follows:

Commencing the survey at the outside corner area where Limaaimoku, Naheana and Nuole's join at a long stone marked X and North seaward of this, and continuing

South 50 degrees East 13 1/2 Chains

North 79 degrees East 7 1/4 Chains along Limaainamoku's lot

South 30 degrees East 22 Chains along Kulia's lot and government lands

South 50 degrees West 35 1/2 Chains along cattle ranch lands up until the northern edge of Alua Gulch, then

North 40 degrees West 9 1/2 Chains along Kahunapule's lot

North 43 degrees 30' East 13[?] Chains

North 50 degrees West 14 Chains along Mr. Green's land

North 36 degrees East 8 4/10 Chains along Kalaihopu's lot

North 55 degrees East 11 Chains along Nuole and Naheana's land until the place of commencement.

100 54/100 acres.

Reserving the rights of native tenants within this land parcel, 100 54/100 acres, more or less. Purchase costs is as follows: $110.50 has been placed into the Royal Exchequer.

However, all mine minerals and mine metals are reserved for the Government.

Unto Kekua, the above-granted land, for [left blank] forever, in Fee Simple, and [left blank] his heirs and [left blank] assigns, subject to the taxes imposed by the Legislative Council upon all similar lands in Fee Simple, from time to time.

And in witness whereof, I have hereunto affixed my name and the Great Seal of the Hawaiian Islands, in Honolulu on this day 3 of January, 1862.

Kamehameha

Na ka Moi & Kuhina Nui

Kaahumanu

L. Kamehameha

[Land Patent Grant No. 02840, Kekua, Papalanui Ahupuaa, District of Hamakualoa/Makawao), Island of Maui, 100.54 Acre, 1862; Waihona Aina Website; K. Robinson translation, 6/2015]

APPENDIX E.

Revised Final Archaeological Inventory Survey, June 26, 2007

Pacific Legacy

Incorporated

CULTURAL RESOURCES CONSULTANTS

REVISED FINAL

ARCHAEOLOGICAL INVENTORY SURVEY OF CA. 325 ACRES IN HALI`IMAILE AHUPUA`A, MAKAWAO DISTRICT, ISLAND OF MAUI

(TMK (2) 2-4-12: 5, 9)

Prepared By:
Pacific Legacy, Inc.

Pacific Legacy: Exploring the past, informing the present, enriching the future

REVISED FINAL

ARCHAEOLOGICAL INVENTORY SURVEY OF CA. 325 ACRES IN HALI`IMAILE AHUPUA`A, MAKAWAO DISTRICT, ISLAND OF MAUI

(TMK (2) 2-4-12: 5, 9)

Prepared by

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Prepared for

Piiholo South LLC
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June 26, 2007

ABSTRACT

Pacific Legacy, Inc. at the request of Piiholo South, LLC., conducted an archaeological inventory survey on approximately 325 acres of former pineapple and active pasture land in the *ahupua`a* of Hali`imaile, Makawao District, Island of Maui (TMK: (2) 2-4-12: 5, 9). The fieldwork was conducted over a five day period between March 7 and 15, 2007.

A previously identified burial (Site 50-50-06-5501) is located on the east side of the project area adjacent to Pi`iholo Road. This site is assessed as significant under criteria "d" and"e" and is being preserved.

A new site (50-50-06-6273) was identified in an un-named gulch on the west side of the project area. This site (a slope retaining wall and an associated soil terrace) is assessed as significant under criteria "d". The landowner would like to passively preserve this site. As a result, no subsurface testing was undertaken. However, if plans change and alterations to the site are planned, further archaeological investigation at this site should be undertaken prior to any ground altering activities.

An isolated adze fragment was recovered from the former pineapple field land. Further, a concrete slab and several unassociated waterlines were recorded during the survey. These resources are not significant. The pipelines identified are active and less than 50 years old. No further work is recommended.

Frontispiece: Overview of the project area looking *mauka* (southeast).

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1.0 INTRODUCTION

Pacific Legacy, Inc. at the request of Piiholo South, LLC., conducted an archaeological inventory survey on approximately 325 acres of former pineapple and active pasture land in Hali`imaile Ahupua`a, Makawao District, Island of Maui (TMK: (2) 2-4-12: 5, 9) (Figure 1). Fieldwork was conducted over a five day period between March 7 and 15, 2007. The survey was performed by James McIntosh, B.A. and Tanya Souza, B.A., and was under the direction of Paul L. Cleghorn, Ph.D.

The purpose of an archaeological inventory survey is to determine if archaeological and historic properties are present in the project area and, if so, so identify all such historic properties. In addition, the archaeological inventory survey must gather sufficient information to evaluate the significance of each historic property according to defined significance criteria (§13-275-6(b) and §13-276-3). The archaeological inventory survey consisted of four components:

- **Archival Research** is a review of traditional accounts, legends, early historic descriptions, and previous archaeological studies in the vicinity of the project area. This background information allows predictions to be made about the likelihood of finding archaeological and historic properties and for providing a context for those properties that are found.

- **Surface Survey** is a pedestrian survey of the project area searching for archaeological and historic properties such as walls, platforms, mounds, etc.

- **Test excavations** where warranted are generally conducted in areas where suspected subsurface deposits containing portable artifacts, midden, and features such as fire hearths and human burials are present. These subsurface deposits aid in evaluating the significance of the property.

- **Data Analysis and Report Preparation** is necessary at the conclusion of data collection. The data collected from archival research and survey are analyzed, so that the settlement and use patterns of the area can be described and the significance of the historic properties can be evaluated. The report also provides recommendations for the ultimate disposition of the historic properties identified.

1.1 PROJECT LOCATION AND ENVIRONMENT

The project area is located in the *ahupua`a* of Hali`imaile in the district of Makawao. The majority of the project area (some 245 acres) is covered in pineapple cultivation, approximately 67 acres are in pasture and the remaining ca. 15 acres are gulches. Althought the steams in the gulches were dry, they are steep and narrow indicating rapid water movement when they flow with seasonal streams.

Vegetation in the area is predominantly introduced species and includes: pineapple (*Ananas comosus*), guava (*Psidium guajava*), christmas-berry (*Schinus terebinthifolius*), eucalyptus

(*Eucalyptus sp.*), coffee (*Coffee Arabica*), coconut (*Cocos nucifera*), papaya (*Carica papaya*), *`ape* (*Alocasia macrorrhiza*), mango (*Mangifera indica*), banana (*Musa paradisiacal*), *kukui* (*Aleurites moluccana*), lantana (*lantana camara*), and various ferns and grasses.

This area of Maui receives approximately 60 inches per year (Juvik and Juvik 1998: 56). Mean annual temperatures range from a minimum of 50° to 70° (10° to 21° C) to a maximum of 80° to 95° F (27° to 35° C) (Juvik and Juvik 1998). While there are no permanent streams present within the project area, the gulches provide seasonal drainage.

Soils are comprised of: Makawao Silty clay, 7 to 15 percent slopes and Rock Land.

Makawao Series
This series consists of well-drained soils on uplands on the island of Maui. These soils developed in volcanic ash and in material weathered from basic igneous rock. They are gently sloping to moderately sloping. Elevation range from 1,200 to 2,500 feet. The annual rainfall amounts to 60 to 90 inches. The mean annual soil temperature is 69° F. Makawao soils are geographically associated with Haiku, Kailua and Olinda soils. These soils are used for pasture. Small acerages are used for pineapple, truck crops and homesites. The natural vegetation consists of bermudagrass, eucalyptus, guava, hilograss, kaimicolor, and kikuyugrass (Foote et al. 1972: 89).

Makawao Silty clay, 7 to 15 percent slopes
This soil is similar to Makawao silty clay, 3 to 7 percent slopes, except that it is moderately sloping to strongly sloping. Runoff is slow to medium, and the erosion hazard is slight to moderate. (Foote et al. 1972: 90).

Rock Land
Rock Land is made up of areas where exposed rock covers 25 to 90 percent of the surface. It occurs on all five islands. The rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt andesite. This land type is nearly level to steep. Elevations range from nearly sea level to more than 6,000 feet. The annual rainfall amounts to 15 to 60 inches (Foote et al. 1972: 119).

Rock land is used for pasture, wildlife habitat, and water supply. The natural vegetation at the lower elevations consists mainly of kiawe, klu, piligrass, Japanese tea, and koa haole. Lantana, guava, Natal redtop, and molassesgrass are dominant at the higher elevations (Foote et al. 1972: 119).

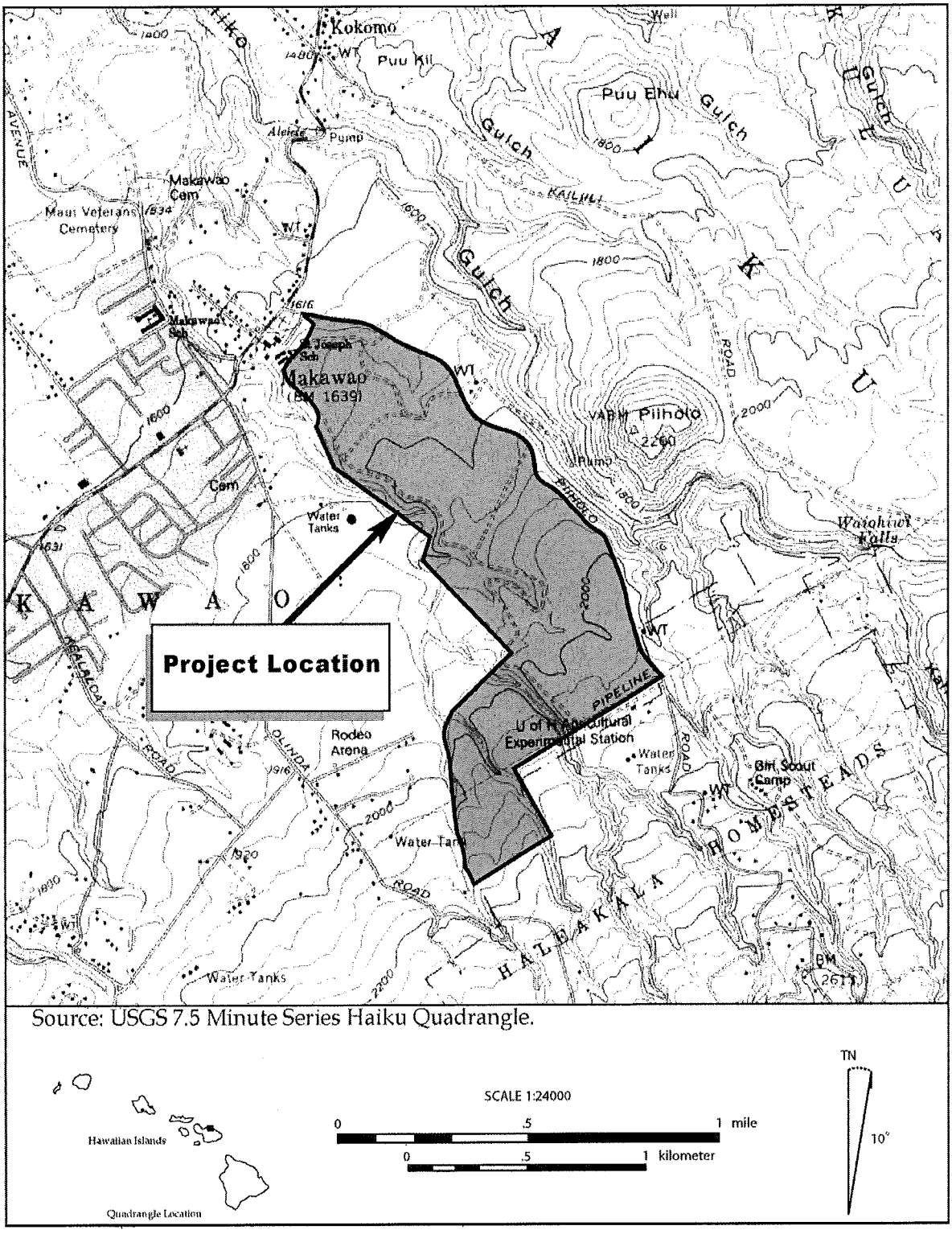

Figure 1. Project Location on USGS Map.

2.0 BACKGROUND

2.1 TRADITIONAL ACCOUNTS

The accounts of the Hali`imaile and Makawao areas are few. Traditionally, the district of Makawao was part of the Hamakuapoko district but was subsequently changed after the 1848. Four formerly recognized districts make up the present Makawao district. They are: Honoua`ula, Kula, Hāmākuapoko, and Hāmākualoa.

Makawao translates literally as forest beginning (Pukui et al. 1974: 142). Pi`iholo, the name of the road that borders the northeast side of the project area literally translates to climb run (Pukui et al. 1974: 184), and Hāli`imaile mean *maile* vines strewn (Pukui et al. 1974: 39).

"On Maui, at Makawao, was the grove named Lilikoi, a famous place to rest, noted for its fragrant and sweet nuts" (Fornander, 1915 Vol. 5: 674) in Handy and Handy (1972).

The former ruler of Maui, Kaheliki, was said to have been born at Hali`imaile in Makawao (Sterling 1998: 97).

2.2 MĀHELE AND LAND COMMISSION AWARD DOCUMENTATION

Private land ownership was introduced into Hawaii during the Great Māhele (the division of Hawaiian lands) of 1848. Crown and *ali`i* lands were awarded in 1848 and *Kuleana* titles were awarded to the general populace in 1850 (Chinen 1958). The awarded lands were called Land Commission Awards (LCAs). Over time, government lands were sold off to pay government expenses. The purchasers of these lands were awarded Grants or Royal Patent Grants (Chinen 1958).

Research conducted at the Bureau of Conveyances determined that no LCA's have been awarded for the subject property. However, a number of Land Grants were awarded (Figure 2). They are detailed below:

Grant No.	Awardee	Date	Acerage
65	Kaleihopu	December 15, 1847	8.62
157	William McLane	October 20, 1849	370.00
317	Kahanapule	July 2, 1850	21.50
319	Kealoha	July 2, 1850	12.69
324	Naheana	July 1850	12.35
325	Honolulu	July 2, 1850	11.12
328	Nicole	July 2, 1850	8.90
498	Kalimaimoku	January 16, 1851	23.35
599	Kiaipu	May 14, 1857	11.62
602	Kalamaiahou	May 14, 1857	21.18
2840	Kekua	1852	110.50

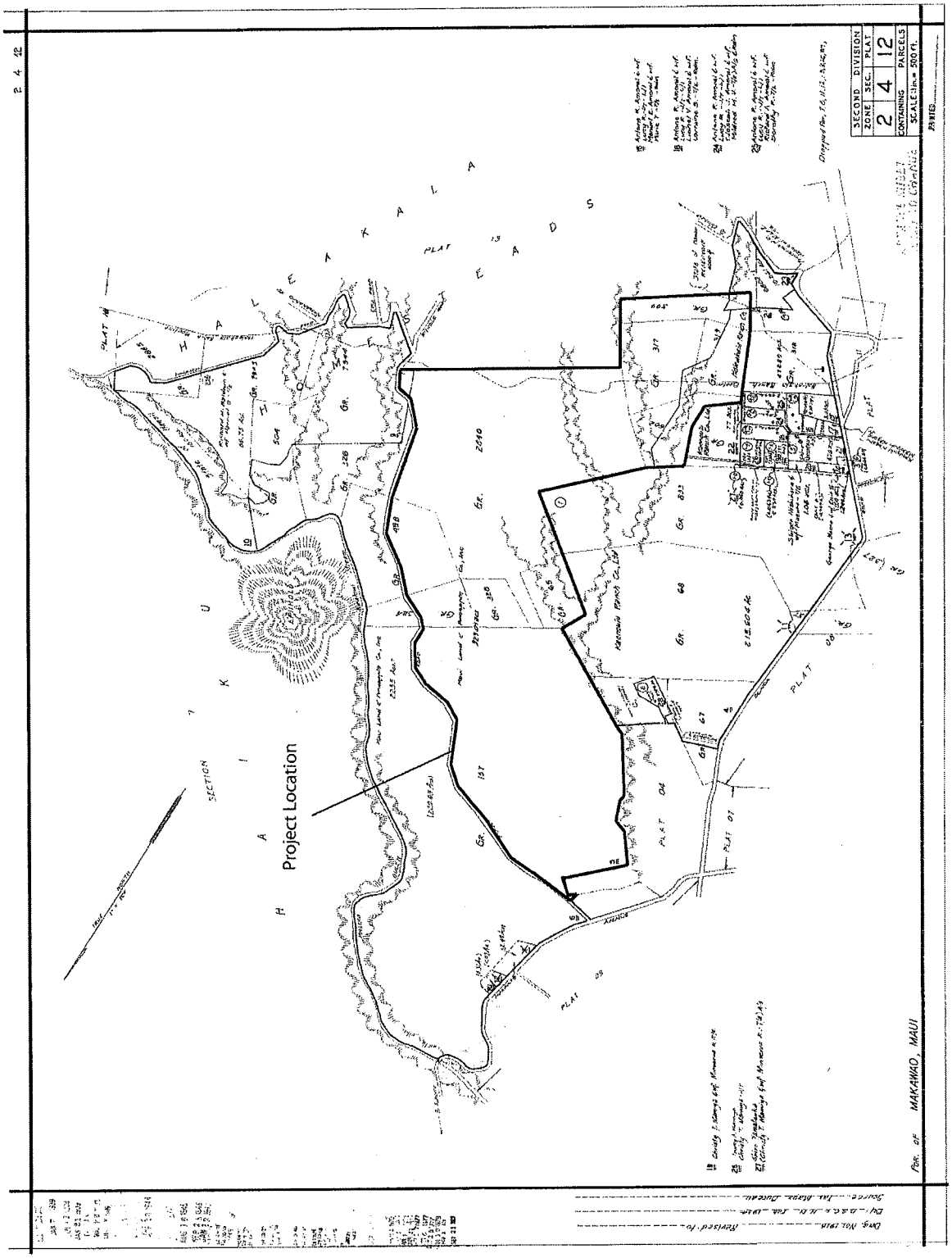

Figure 2. TMK Map depicting project area.

2.3 HISTORIC PERIOD

Pineapple cultivation began on Maui in the late 1800's when the Baldwin family first planted pineapple in Haiku as an experiment. The Baldwin family, which had acquired a sizeable amount of land by the 1990's, saw a future for the pineapple. In the early 1900s the Baldwin's (lead by H.P. Baldwin and D. Dwight Baldwin) formed Keahua Ranch Company, Ltd., which later became the Maui Pineapple Company, Ltd. in 1932. It was around this time that pineapple cultivation spread into the plateau regions of east Maui including the Hali`imaile fields.

2.4 PREVIOUS ARCHAEOLOGY

A check of the State Historic Preservation Division libraries in Wailuku, Maui and at Kapolei, O`ahu, determined that only a few archaeological investigations have been conducted in this area of upcountry Maui. A single human burial has been identified on the border of the subject property and one archaeological investigation has occurred on the property. Further, several other investigations have occurred in the vicinity of the current project area and are detailed below.

In 1985, Wendell Kam, archaeologist for the Hawaii State Parks, conducted a field inspection for the then proposed Olinda Project Haleakala Homesteads in Makawao, Maui (Kam 1985). The subject parcels (TMK 2-4-13: 4, 5 and 53) are located *mauka* of the current project area. The survey failed to identify any resources on the parcels.

In 2003, Jeffrey Pantaleo Consultants, conducted an Archaeological and Cultural Assessment for a then proposed Piiholo well in Hali`imaile *ahupua`a*, (TMK 2-4-12: por. 6) located just to the northwest of the current project area across Pi`iholo Road (Pantaleo and Tsuha 2004). A cultural assessment identified the area as having been used traditionally for seasonal exploitation involving the gathering of koa, and collecting feathers. During the archaeological survey, no cultural remains or deposits were identified. No further work was recommended.

An inadvertent burial was found on 16 December 2003 by Maui Land and Pineapple Company workers who were excavating a waterline on the edge of Pi`iholo Road (on the southeast corner of the present project area) (Kirdendall 2003; see Appendix A). The burial was identified by Dr. Melissa Kirkendall (SHPD Maui archaeologist) and Dr. Manukian (Maui County Medical Examiner) as being a human female, approximately age 30 and of Asian ethnicity. The burial was located a clay matrix and there was no evidence of a coffin. The burial was assigned State Site Number 50-50-06-5501. Subsequently, Archaeological Services Hawaii, performed archaeological investigations in the area to determine if additional burials were present. Although there is no formal report of record of this testing, we do have a letter and an incomplete Burial Preservation Plan written by Lisa Rotunno-Hazuka (Appendix B). The burial Preservation Plan indicates that the burial was in a flexed position and is that of an adult female probably of Native Hawaiian ancestry. The displaced remains were reinterred in a pit adjacent to where they were originally found. The pit reinternment measured 2 feet by 2 feet and 1 foot deep. The remains were bundled and 6 inches of fill was placed over them. The pit was then covered with fresh concrete with the site number inscribed in it. An upright boulder was then

placed over the burial. The burial preservation plan also calls for an unspecified buffer zone, a rock wall and a plaque to be placed near the wall. It does not appear that this preservation plan was ever finished or formally submitted to the State Historic Preservation Division. The archaeological testing which apparently took place in September 2005 (the letter is dated 6 June 2006 but states that the testing was conducted on 12 September 2006), consisted of the mechanical excavation of four backhoe trenches adjacent to the burial to determine if further remains are present. The trenches measured 2 meters long, 0.6 meters wide and 1.7 meters deep. No human remains or burial pits were uncovered in any of the trenches. Unfortunately, this is the only record of these excavations as no report has ever been submitted to the State Historic Preservation Division; all of these records are included in Appendix A and B of this report as a means of documenting this previous work.

In 2004, Archaeological Services Hawaii (Pantaleo 2004), conducted an archaeological inventory survey of ca. 57 acres for the Taylor-Fewell Subdivision and Grove Ranch Agricultural Subdivision No. 2 (TMK: 2-4-001: 004, 019) located approximately 1.5 miles *makai* and northwest of the current project area. The survey identified two historic sites, 50-50-06-5554, a Portuguese oven and Site 50-50-06-5555, a cattle weighing scale. The sites were assessed as significant under criteria "c" and "d". Subsurface testing was also conducted on the property which failed to identify any cultural remains. The Portuguese oven was recommended for removal to the Sugar Museum or another area for preservation. No further work was recommended.

In 2005, Scientific Consultant Services, Inc., conducted an archaeological inventory survey for 13 acres in Pi`iholo and Ha`ikū *ahupua`a* (TMK: (2) 2-4-013-075) (Pickett and Dega 2005). The project area located *mauka* of the present project area, contained a single site (Site No. 50-50-06-5675), a historic site comprised of a privy, a cistern, a Portuguese oven and "a hole with an associated internal chamber". The site was deemed significant under criterion "d". Subsurface testing was conducted with no deposits encountered. No further archaeological work was recommended for the project.

2.5 Settlement Pattern

Given the limited amount of archaeological information for this region of Maui, it is difficult to obtain a clear picture of the region's pre-contact use. However, in examining the literature for the rest of Maui and the other Hawaiian Islands (Kirch 1985), a general model of settlement can be described.

Traditionally, the Native Hawaiians settled the coastal areas that provided ample access to exploit the marine environs. The proximity to permanent streams was an obvious necessity to obtain fresh drinking water but also develop intricate *lo`i* system for *kalo* cultivation. Areas without permanent streams were used for dryland cultivation of sweet potatoes or yams. These crops were important in areas like East Maui where the climate was appropriate for these crops (Bartholomew and Bailey 1994: 124), and where the land tended to lack permanent streams (Kirch 2000). *Mauka* areas were utilized for collecting of plants and animals (i.e. collecting birds for feathers). These activities likely took place in the project area.

2.6 ARCHAEOLOGICAL PREDICTIONS

From the results of previous archaeological investigations in the area we can predict the archaeological sensitivity of the project area. Based on the relative archaeological sensitivity of each area, appropriate methods of identifying and resolving potential adverse effects to historic properties can be developed. The following predictions are offered for the project areas:

- Due to the limited disturbance, gulches have a higher potential of containing archaeological features such as stone terraces for traditional agricultural purposes, stone mounds, rock walls and stone alignments, C-shaped rock walls for temporary shelters, grinding surfaces for polishing traditional stone adzes, irrigation ditches and trail or roadway segments.

- Given the disturbances to the plateau areas from commercial agriculture and ranching, there is a low likelihood of finding traditional archaeological resources in these areas, however there is still the possibility of finding historic resources such as cattle features (walls, fences, loading ramps, roads) and irrigation features (ditches, tunnels).

3.0 METHODS

The plateau portions of the project area have been used for pasture or under pineapple cultivation for nearly 70 years. As a result, survey efforts concentrated in finding portable cultural remains that may be present on the surface or eroding out of the ground. The survey within the pineapple fields were constrained by thick grass some 3 to 6 feet high which limited ground visibility (Figure 3). Thus the survey in these plateau areas focused on exposed roads and drainage cuts.

The surface survey proceeded with the two member survey team spaced approximately 3- 15 meters apart depending on vegetation density. Transect lines within the gulches were walked in a roughly east/west direction. Digital photographs of the area were taken to record the current condition, vegetation, and use of the area.

When a cultural resource was encountered, its location was to be recorded on a site plan map and recorded using metric tapes and sighting compasses. Its location was also plotted with a Global Positioning System (GPS). Digital photographs of the resource were taken.

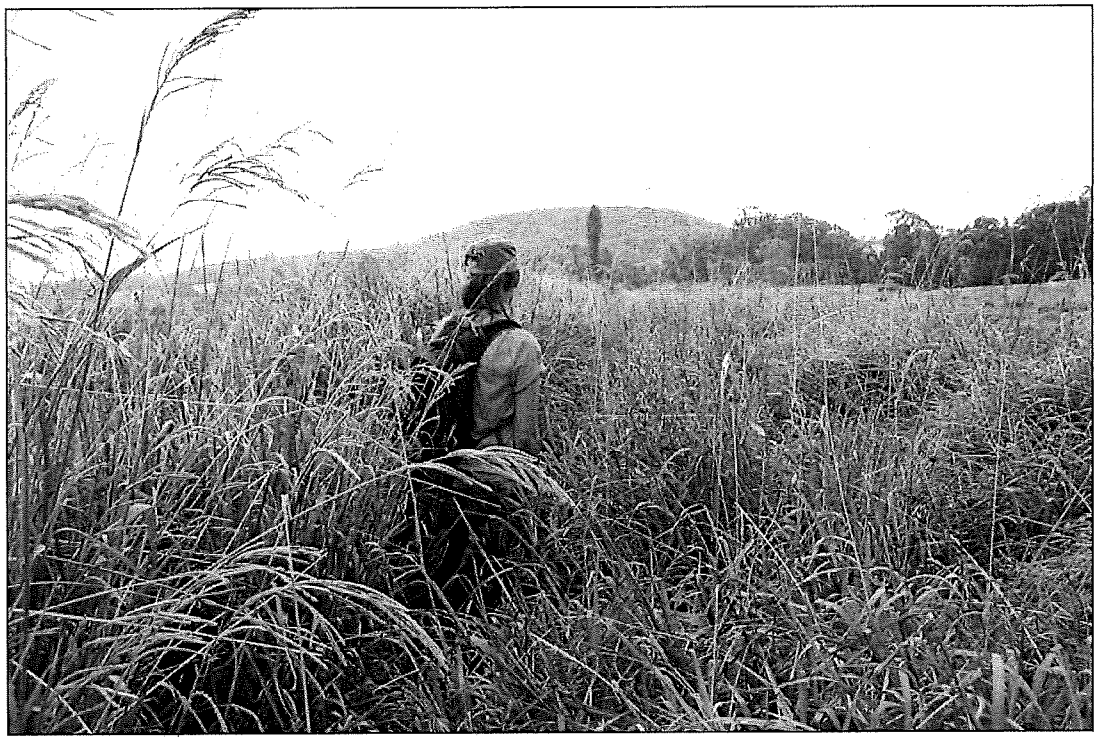

Figure 3. Dense grass in the pineapple field roadway hampered surface visibility.

4.0 RESULTS

4.1 PLATEAU AREAS

Site 50-50-06-5501
GPS Location: N20 50.569 W156 17.576
A single archaeological site was known to exist in the project area. This site is comprised of a single human burial first identified by Kirkendall (2003). The burial is located on the southeast corner of the current project area, along Piiholo Road (Figures 4 and 5). A check of the area revealed a ring of large boulders and a single upright boulder (presumably the reburial location). There is no indication that a burial is present at this location. Approximately 2 meters southeast of the upright boulder is a waterline valve which was likely the reason the burial was encountered in 2003. Also present is a yellow sign indicating a buried plastic pipeline.

Figure 4. Site 50-50-06-5501, burial area, view to south.

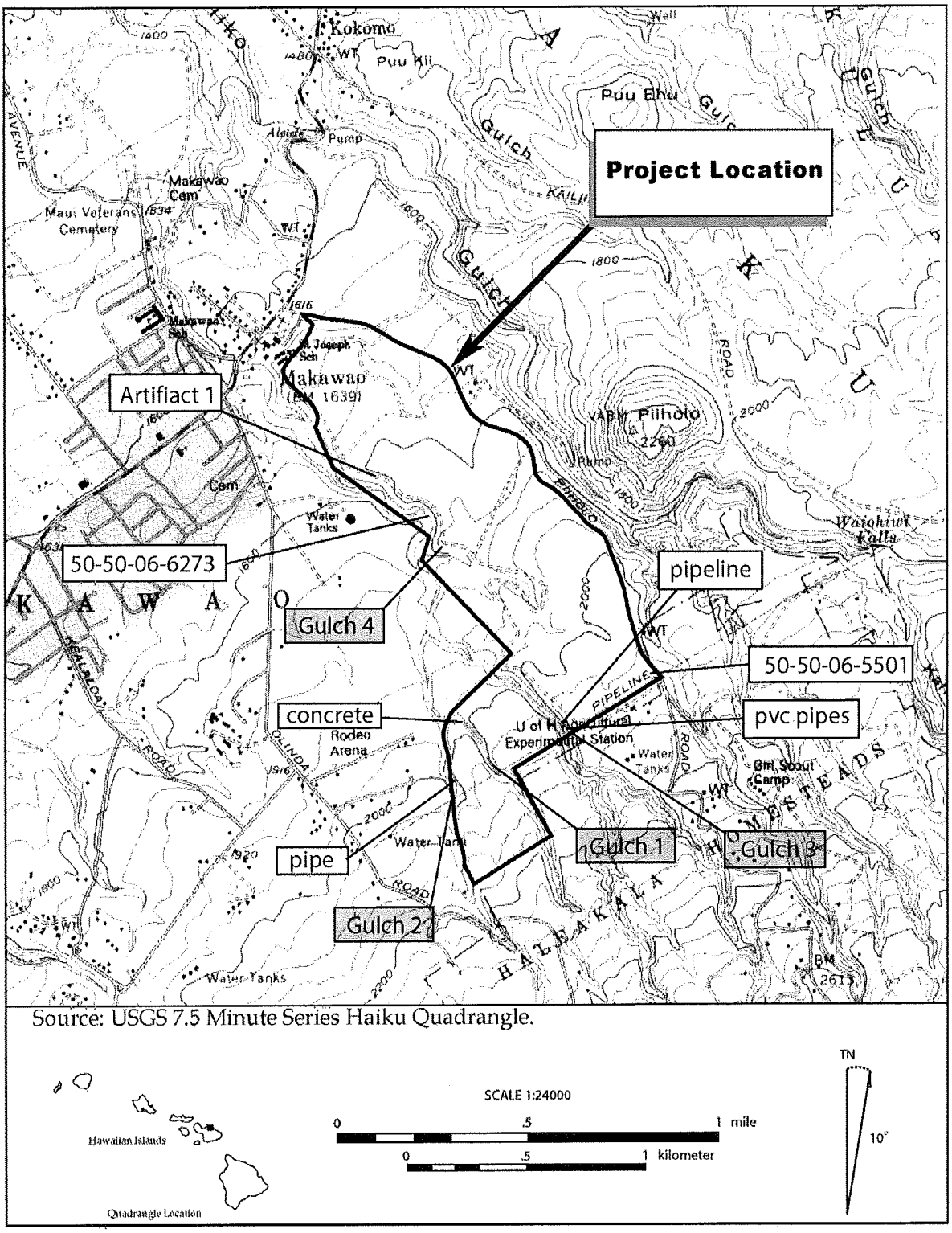

Figure 5. Archaeological resources identified during the current project.

Artifact 1

GPS Location: N20 50.989 W156 18.157

The bevel portion of a polished basalt adze fragment was recovered on the surface in the center of an eroded pineapple road located in the north central portion of parcel (Figure 5). It measures 4.23 cm long, 4.18 cm wide, 1.94 cm thick and weighs 63.4 gm. The polished fragment is broken with the tang end missing (Figure 6). No cultural deposit was observed in the area.

Figure 6. Adze fragment recovered from an eroded pineapple road.

4.2 GULCHES

Site 50-50-06-6273

GPS Location: N20 50.926 W156 18.133

The survey identified a single site (50-50-06-6273) in Gulch 4, a large basalt slope retaining wall and associated soil terrace (Figure 5, 7-10). The slope behind the wall is 20-45° slope (Figure 8). The wall measures 56 meters long, between 40 and 80 cm height and 50 to 70 cm in width. The retaining wall is constructed of stacked basalt cobbles and boulders and extends along the west side of the largest gulch in the project area. It is in fair condition showing some damage from the vegetation growth and cattle. A small segment of the wall appears to have been restacked and may indicate refuse or repairs made to the wall at a later time. A road extends into the gulch above the retaining wall from the adjacent property.

The soil terrace fronting the retaining wall measures between 6.5 m and 17.0 m deep and is approximately 50 m long. It is between 0.95 and 1.1 m above the currently dry stream bed. The terrace is located on the inside bend of the stream which helps to prevent erosion when the stream flows. Vegetation on the terrace consists of *`ape*, *kukui* and guava.

Mr. Billy Abreu, a lifelong Maui resident, says when he was young (1950-60's), a piggery operated in the area. He believes this wall is a remnant of it. Although no fence posts of fence remnants area present, there is a small portion of the wall which appears to have been restacked and may be indicative of this site being reused as a piggery (Figure 9).

Figure 7. Site 50-50-06-6273, slope retaining wall and soil terrace. View to north.

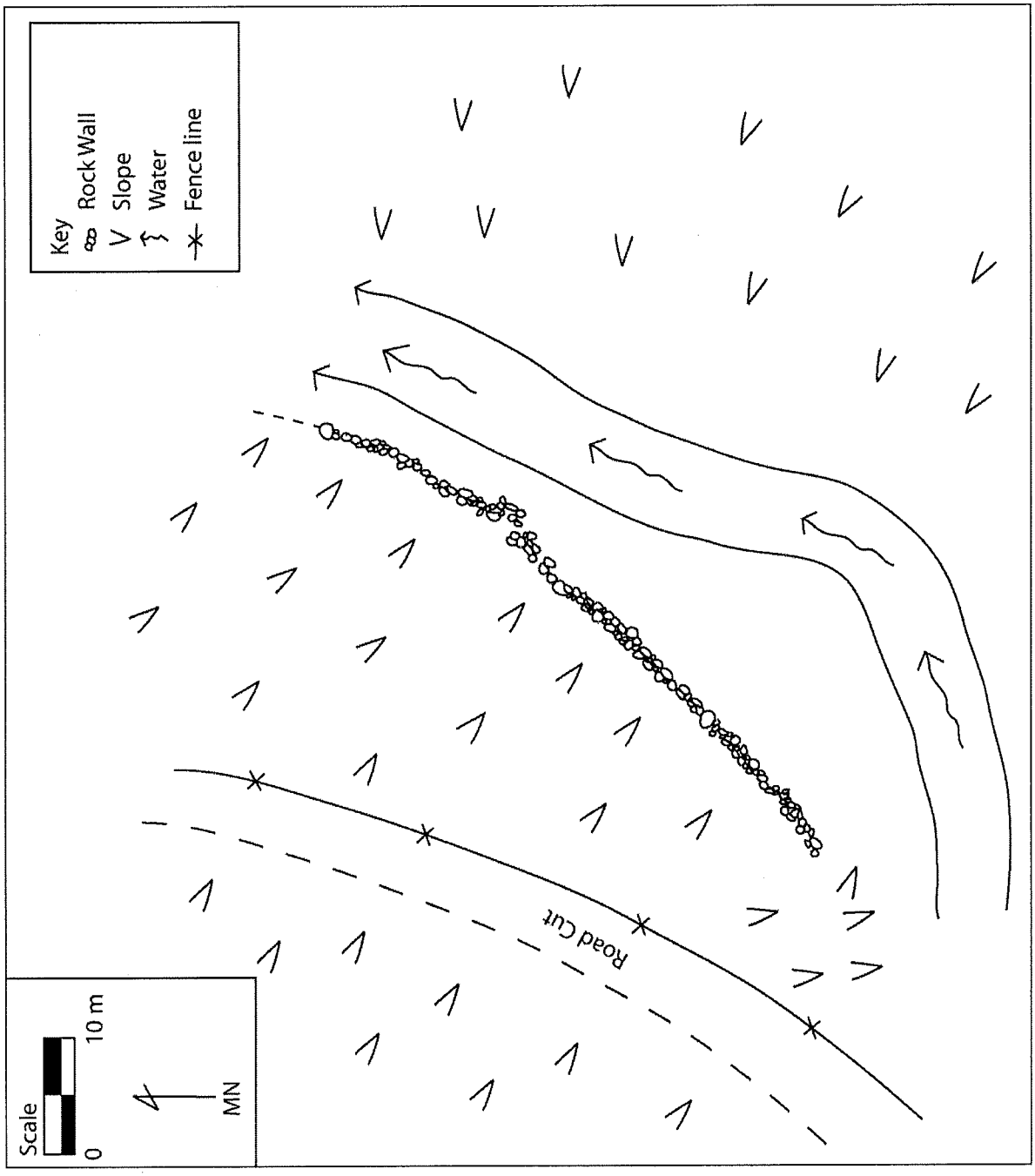

Figure 8. Site 50-50-06-6273, Retaining wall with associated terrace.

Figure 9. Close-up of retaining wall. View to west.

Figure 10. Close-up of modified retaining wall.

4.3 ADDITIONAL COMPONENTS

Several recent features were located in the course of the survey. Generally, these are recent constructions, some of which are still being used. They have not been assigned archaeological site designations, but are described below as a means of documenting current use of the area.

Gulch 1

Concrete Slab
GPS Location: N20 50.445 W156 18.008
A concrete slab was identified within Gulch 1 approximately 50 m southeast of the access road and extends across the floor of this narrow gulch (Figures 5 and 11). The slab measures 1.3 m long, 0.65 m wide and 0.10 m thick and is composed of concrete at basalt cobbles. This component serves no apparent function.

Figure 11. Concrete slab located in Gulch 1.

Pipeline
GPS Location: N/A
Approximately 100 m southeast of the concrete slab is a section of three-inch diameter galvanized pipeline which extends across the floor of the gulch. The pipeline is active and less than 50 years old. It is unknown where it starts or ends. No GPS data could be obtained at this location because of dense tree canopy.

Gulch 2

Pipe
GPS Location: N20 50.256 W156 18.069
At the head of Gulch 2, where the access road intersects with the gulch, a large corrugated pipe protrudes from the ground (Figure 12). The pipe measures 0.96 m in diameter and is covered with a metal cover. Within the pipe is a valve or bypass. Presumably this valve is for a waterline. The valve is active and less than 50 years old.

Figure 12. Corrugated pipe containing a water valve.

Gulch 3

Waterline
GPS Location: N20 50.527 W156 17.882
A rather extensive active waterline was identified about midway into Gulch 3. The pipeline is constructed of eight-inch diameter cast iron steel, which is supported by concrete footings vary in length with the longest being 1.54 m high, 0.26 m wide at the top and 0.38 m wide at the base (Figures 13 and 14). A drain valve is located on the west side of the pipeline. The pipeline is active and less than 50 years old. This may be the pipeline that shows up on both the USGS Quad and on the TMK Map.

Figure 13. Eight-inch diameter cast iron steel pipe in Gulch 3.

Figure 14. Eight-inch diameter steel pipeline extending across the floor of the gulch.

PVC Pipes
GPS Location: N20 50.421 W156 17.804
Also within Gulch 3 (Figure 5), farther *mauka* at the boundary of the project area, are two sets of six-inch black PVC pipes these pipes also appear to be active and extend down the east side of the gulch, across the floor and back up the west side. These pipes appear to have been placed very recently.

4.4 SUBSURFACE TESTING

No subsurface testing appeared to be warranted in the project area so none was conducted. Upland plateau lands generally have a low potential to contain subsurface cultural deposits because they were not normally inhabited. Any evidence of traditional agricultural activities that may have occurred here was probably obliterated by modern mechanical farming. The one probable traditional site found in Gulch 4 was not tested because the land owners are willing to preserve this archaeological site.

5.0 SIGNIFICANCE ASSESSMENT

The National Historic Preservation Act of 1966 (as amended) authorizes the Secretary of Interior to expand and maintain a National Register of Historic Places (NRHP) that contains a listing of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. A property may be listed in the NRHP if it meets criteria for evaluation defined at 36 CFR §60.4:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

(a) That are associated with the events that have made a significant contribution to the broad patterns of our history; or

(b) That are associated with the lives of persons significant in our past; or

(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) That have yielded, or may be likely to yield, information important in prehistory or history.

In addition, the State of Hawai`i has added a fifth criterion:

(e) Site has yielded cultural significance; probable religious or burials present.

Site 50-50-06-5501 has yet to be evaluated. It is our opinion that this site is significant under criteria "d" and "e" and should continue to be preserved in place.

Site 50-50-06-6273 is significant under criteria "d". The land owner has stated that no work is planned for the gulch in the area of this site. As a result, no further work is recommended for this site. If ground altering activities are planned for this gulch, archaeological testing must be undertaken prior to any alteration.

The other resources identified in this project area determined to be not significant.

6.0 DISCUSSION AND RECOMMENDATION

Pacific Legacy, Inc. at the request of Piiholo South, LLC., conducted an archaeological inventory survey on approximately 325 acres of former pineapple and active pasture land in Hali`imaile Ahupua`a, Makawao District, Island of Maui. The survey was conducted over a five day period between March 7 and 15, 2007.

The plateau portions of the project area have been used for pasture or under pineapple cultivation for nearly 100 years. The pineapple roads are overgrown with vegetation since commercial agricultural activities have been halted on the property once the land was sold by Maui Land and Pineapple Company.

Site 50-50-06-5501, a previously identified burial of a female, located in the east corner of the project area along Piihilo Road is recommended for preservation. This site appears to be significant under criteria "d" and "e" and should be protected in perpetuity. Archaeological Services Hawaii apparently undertook archaeological investigations around the site to determine if additional burials were present. There is no formal record of these excavations but we do have an incomplete burial preservation plan and letter (Appendix B) discussing the burial and testing. No additional burials or pits were found during trenching. It appears that the burial is isolated and not apart of a "cemetery." The site is presently protected with large boulders and an upright boulder marks the location of the reinterred remains.

A single new site was identified, Site 50-50-06-6273 Located in the floor of an unnamed gulch (Gulch 4). This site consists of a slope retaining wall comprised of stacked basalt cobbles and boulders. The retaining wall functions to prevent the slope from eroding onto the soil terrace below. It's probable that this site is of pre-contact origins however, the site also exhibits a recent reuse. Mr. Billy Abreu maintains that this site was a piggery in the 1950 and 60's. This site appears to be significant under criteria "d". Piiholo South, LLC has no development plans for the gulch with and would like to passively preserve the site. No archaeological testing was undertaken at this site since the land owners want to preserve the retaining wall and terrace. If these plans change, archaeological testing should be carried out at this site prior to any alterations.

A single adze fragment was recovered from the north central portion of the project area from the center of an eroded pineapple road. No cultural deposit was associated with the fragment. The origin of the adze is unknown. Its location, in an eroded road, suggests that it could have come from almost anywhere upslope or even brought in for fill to repair pineapple roads. The fragment was collected and will be transferred to the land owner.

The remaining resources, an unidentified concrete slab and several waterlines do not appear to be significant because all of them are active and less than 50 years old. The concrete slab has an unknown function and origin thus cannot be evaluated. The remaining pipelines are additional components of the waterline which apparently feeds water tanks in the Makawao area. No further work is recommended.

Development plans for this area are to subdivide the plateau lands for single family housing. There are currently no plans to develop or modify the gulches. As such, the developers are willing to passively preserve Site 50-50-06-6273. This means that there are no plans to modify this part of the project area and that the site will be left alone. Likewise, there are no plans to interpret the site. If at some point in the future there are plans for development of Gulch 4, we recommend that consultations be instigated with the State Historic Preservation Division regarding future archaeological investigations, which may include archaeological testing, radiocarbon dating etc.

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APPENDIX A

Melissa Kirkendall Letter Report
2003

Facsimile Memorandum

Melissa Kirkendall, Maui Archaeologist
State Historic Preservation Division, DLNR
130 Mahalani Street
Wailuku, Hawai'i 96793

17 December 2003

TO: Cathy Dagher
Holly McEldowney
Sara Collins
Nathan Napoka
Kai Markell
Kana'i Kapeliela

FAX: 808 692-8020

TO: Kenneth Bode, DOCARE
984-8111

FROM: Melissa Kirkendall
FAX: 808 243-5838

Total Number of Pages including cover sheet: 5

Subject: **Inadvertent Burial Find, SHIP 50-50-06-5501**
Hali'imaile Ahupua'a, Makawao District, Maui
TMK (2) 2-4-12:9

On 16 December 2003, 1:00pm, Dr. Melissa Kirkendall responded to a call from DOCARE regarding a burial identified during waterline excavation on Pi'iholo Road in Makawao. The call originated from Maui Police Department. MPD investigators were on the scene, awaiting the arrival of the coroner. Upon his arrival, Dr. Kirkendall and Dr. Manukian conferred and determined, based on skeletal evidence, that the burial was over 50 years of age, hence SHPD jurisdiction.

It was further determined by Drs. Manukian and Kirkendall that the burial represents a female of Asian ethnicity. Stature of the individual is estimated between 5' and 5'3", and she is 30+ years of age. Based on context, the burial appears to be primary disposition, although there is no evidence of a coffin. Approximately 25% of the individual was recovered from the back dirt pile and is temporarily curated at the Maui SHPD office. The right half of the mandible remains *in situ*, at a depth of approximately 60cmbs. The matrix is heavy clay.

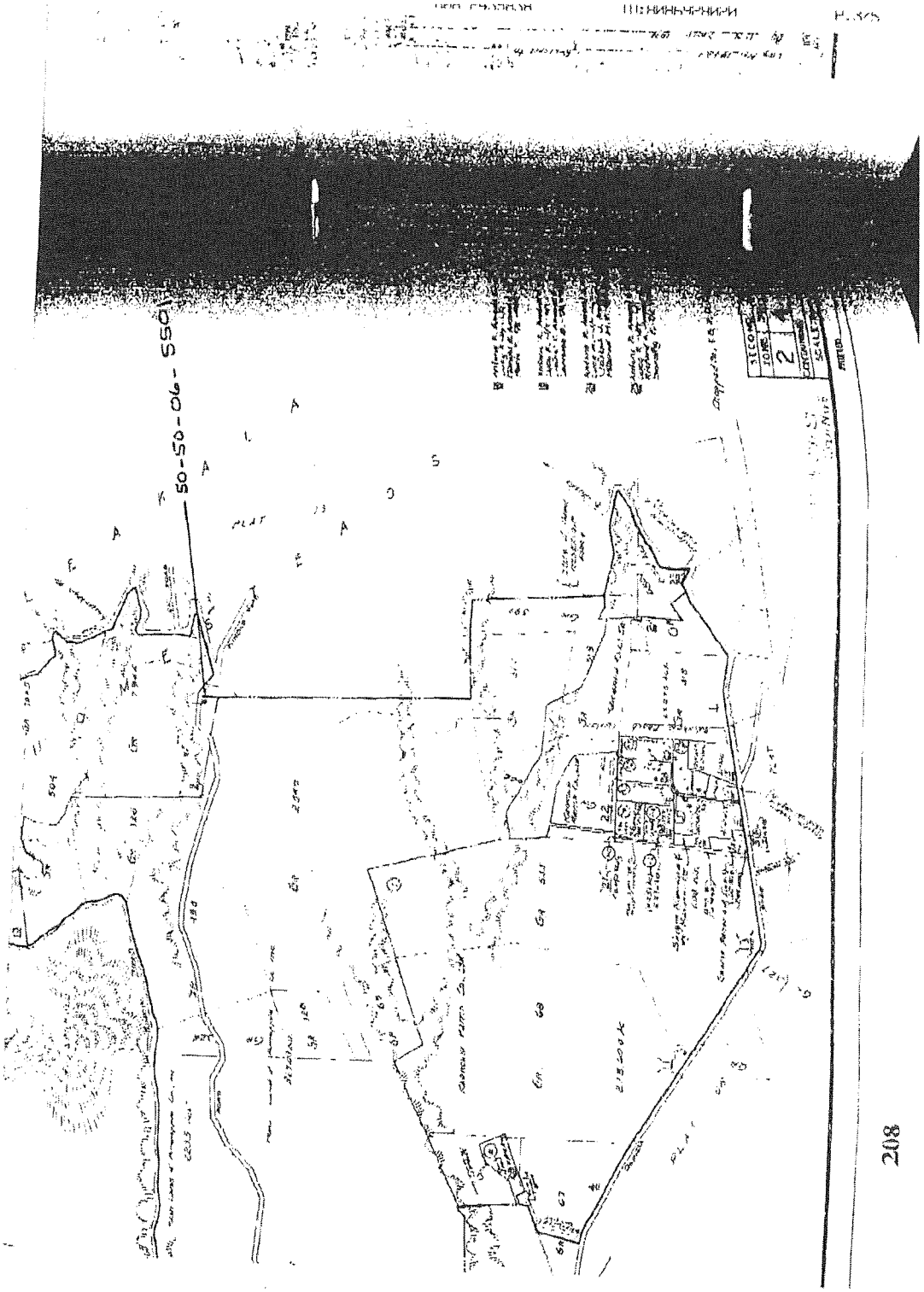
The back dirt pile was covered with a tarp provided by Dr. Kirkendall (personal property). The area from which the burial originated within the trench was covered with plywood boards provided by Maui Land and Pine, with the backhoe bucket gently covering it, to prevent animals from digging in the area.

Maui Land and Pine was informed that they will need to secure an archaeologist to discuss appropriate mitigation with SHPD, as well as to monitor the trench excavation in the area, as they complete the waterline installation. SHPD requested that Maui Land and Pine have the

consulting archaeologist contact Dr. Kirkendall prior to proceeding additional trench excavation associated with the project. In addition, they will confer with the Burial Sites Staff regarding burial treatment.

The burial is in the south west corner of TMK (2) 2-4-12:9, and on the west side of Pi`iholo Road. The majority of this parcel is on the east side of Pi`iholo Road. The southwest corner of parcel nine is the only part on the west side of Pi`iholo Road: see attached map).The parcel, as reflected on the TMK, is part of Land Grant 7944

Attachments: TMK map
Inadvertent burial form


50-50-06-5501
208

RSP Case No: SIHP 50-50-06-5501

Department of Land and Natural Resources Checklist
Inadvertent Discovery of Human Skeletal Remains
Notification to Determination

Reported by: DOCARE, MPD through SHPD — Date & Time: 12/16/03 1:00 pm
Location/Project: Piiholo Road — TMK: 2-4-12:9
Landowner/Agent: Maui Land & Pine — Island/District: Haliimaile

Upon notification of the inadvertent discovery of human skeletal remains, DLNR staff shall complete the following in accordance with §6E-43.6 HRS and §13-300-40(c) & (d):

COMPLETED:

Date/Time	Initial	
12/16/03 12:00	HK	Assure any activity ceases in the immediate area that could damage the remains or historic property and that appropriate actions are taken to protect integrity and character of site [§6E-43.6(a); §13-300-40(c)(1)]. Measures taken/verified: work on waterline shut down by MPD
12/16/03 12:00	HK	Notify appropriate SHPD archaeologist or Burial Sites Program staff Name/form of contact: M. Kirkendall notified by DOCARE/MPD
12/16/03 2:00	HK	Determine jurisdiction by assuring that medical examiner's representative and qualified archaeologist determine if skeletal remains are human and over fifty years old [§6E-43.6(1); §13-300-40(c)(2)]. Determined by/basis for determination: met w/ coroner - determined burial is Asian female, and burial over 50 years old Human/non-human: human
12/16/03 1:00	MK	Conduct a site inspection where necessary [§13 300-40(c)(3)]. If no inspection, why: ____
____	____	Gather sufficient information, including oral tradition, to document the nature of the burial context and determine appropriate treatment [§6E-43.6(c)(2)]. Seek individuals knowledgeable of families connected lineally or culturally to the discovered remains to help gather sufficient information [§13-300-40(c)(4)]. Appropriate effort: ____ Individuals to contact: ____
____	____	Complete departmental inadvertent discovery forms [§13-300-40(c)(5)]
____	____	Establish case file and assign number

BSP Case No: 2

COMPLETED:

Date/Time	Initial	
N/A		Non Hawaiian Notify burial council member(s) representing the geographic region where the human remains were discovered [§13-300-40(c)(6)] and offer council members on-site examination [§6E-43.6(c)(2)]
		Name/form of contact: _____
		Site examination scheduled: _____
		Notify Office of Hawaiian Affairs [§13-300-40(c)(6)]
		Name/form of contact: _____
		Inform the landowner or its agent of the discovery if different from person making report [§13-300-40(c)(7)]
		Name/form of contact: _____
		Number and condition of human remains discovered: _____
		Other Actions Taken/Approved: _____
		Landowner consent to voluntarily extend statutory time periods [§13-300-40(d)]
		Consent form/letter signed: _____
		Basis for extension: _____
		Time of extension: _____
		Determine whether to preserve in place or relocate the human skeletal remains [§13-300-40(c)(8)]
		Justification and criteria applied [§§13-300-36 & 37]: _____

Per 13-300-40(d), HAR.
In the event an inadvertent discovery of:

Single human skeleton: on **O`ahu** the department shall have **one working day** to complete the above
on **Neighbor Islands** the department shall have **two working days** to complete the above

Multiple human skeletons: on **O`ahu** the department shall have **two working days** to complete the above
on **Neighbor Islands** the department shall have **three working days** to complete the above

The statutory time periods may be extended with voluntary written consent of the landowner or its authorized representative.

APPENDIX B

Lisa Rotunno-Hazuka
Archaeological Services Hawaii, LLC
Burial Preservation Plan and Letter

Sep 01 05 07:35p Cynthia Warner 808-573-0051 p.1

JUL-31-2005 01:35 PM

FAX TO: RON 8910269 7/11/05
FROM: CINDY
NOT SURE IF YOU HAVE THIS IN YOUR FILE YET.

P.01

ARCHAEOLOGICAL SERVICES HAWAII, LLC
1930 A Vineyard; Wailuku HI; 96793
808-244-2012; 808-244-9592

26 July 05

FASCIMILE TRANSMISSION 242 6912

TO: Mike

FROM: Lisa

SUBJECT: Maui Land and Pineapple Burial Site

Mike, I was in the field until 5:00 yesterday. I worked on this BPP at lunch and a little last night. I still need to fill in the blanks with data from my office. Unfortunately, since I moved, some of this stuff may still be packed. Anyway, I'll get what I can today and send it to you either tonight or tomorrow. I am in the field again today and am not sure when I'll get to the office to gather data. I will get the information together this weekend though.

Thank you.

Lisa

LONG TERM MEASURES FOR HUMAN SKELETAL REMAINS OF SITE

Site _____ consists of a partial *in situ* burial of an adult female located within the corner of the project area (Figure). The burial feature is in a flexed position and the *in situ* components of consisted of the long bones, . This site appeared to be a solitary burial feature probably of Native Hawaiian ancestry. This site will be preserved in perpetuity in the corner of the project area. The preservation measures area as follows:

1. **Surface Demarcation-** The displaced human skeletal remains from from the backdirt pile of Site were reinterred adjacent to the in situ burial feature located in the corner of the parcel. A reinterment pit measuring 2.0 ft. long by 2.0 ft. wide by 1.0 was excavated by the archaeologist. An approximate 6 inch layer of fill was placed over the bundle of human skeletal remains and a layer of concrete measuring approximately 3.0 ft. long by 2.0 ft. wide by 4 inches thick was poured over the reinterment pit. The SIHP number was inscribed onto the concrete cap. An upright stone has been placed over the burial site and shall serve as a surface marker for the *in situ* burial and the reinterred remains. This burial site will be further protected by a buffer zone, landscaping, signage and a metes and bounds description of the permanent preservation area.

2. **Preservation Area/Buffer Zone-** The preservation area includes the burial site and the upright stone surrounded on four sides by a buffer zone. The buffer zone is a protective area for the burial and the rock platform. The buffer zone is a no build area in which temporary or permanent structures will not be placed or built. Subsurface utilities shall be routed outside of the buffer zone. The buffer zone shall be measured from the outer edges of the upright stone as follows: ft. on the north and west sides and ft. on the south and east sides. This buffer zone and the platform shall define the preservation area. The preservation area measures ft. long by ft. wide. The preservation area will be demarcated on the surface by a low rock wall (2 ft. high).

3. **Landscaping-**The area around the platform within the buffer zone will be planted with grass or native ground cover. No trees or deeply rooted plants shall be grown or maintained within the buffer zone.

4. **Signage-**A bronze plaque measuring 18 inches by 10 inches shall be permanently affixed to a wooden post along the rock wall. The plaque will be inscribed with the following:

Native Hawaiian Burial Site
State Site Number 50-50-
Please Respect This Area

5. **Recordation**-The preservation area shall be surveyed by a licensed surveyor and a metes and bounds description of the preservation area shall be recorded along with the Burial Preservation Plan at the State of Hawaii Bureau of Conveyance within 90 days of written acceptance of the Burial Preservation Plan by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD). The DLNR-SHPD and the Maui/Lanai Islands Burial Council (M/LIBC) shall be provided with copies of the recorded Burial Preservation Plan.

6. **Maintenance**-The platform and signage shall be maintained by the landowner. If the plaque and or platform should be damaged or fade over time, it will be replaced by the landowner.

   To ensure perpetual protection of this burial feature, periodic site inspections by SHPD may be conducted to verify that the signage, platform and all long-term preservation measures are in place and the site is adequately protected. Site inspections will be performed at mutually agreed upon times between the landowner and SHPD staff.

7. **Access**-No lineal descendent claims have been received by the SHPD for these human skeletal remains. Thus, no access to this burial site is afforded to lineal descendents at this time. Should the SHPD receive a lineal descendency claim in the future, the landowner shall be informed by SHPD of the receipt of such claim and the timetable for, and manner in which the claim will be processed. Lineal descendency claims must be formally recognized by the M/LIBC as stated in Chapter 13-300 HAR entitled "Rules of Practice and Procedure Relating to Burial Sites & Human Remains". In the event that a lineal descendency claim is recognized by the M/LIBC, access to the specific burial feature(s) shall be permitted at a reasonable dates & times mutually agreed upon by the landowner, lineal descendents and SHPD in consultation with M/LIBC.

Auku'u Land Consulting
P.O. Box 33
Makawao, HI 96768

Ph: 808 573 0081 Fx: 808 573 0090
starr@maui.net

3 pages including cover

August 24, 2005

To: Cindy Warner
VIA FAX

Re: Baldwin Remnant Lot

Aloha Cindy:

After actually looking at the tax map, the situation is different than how I had described it.

The tax map shows part of Peter's grant on the south side of Piiholo Road.

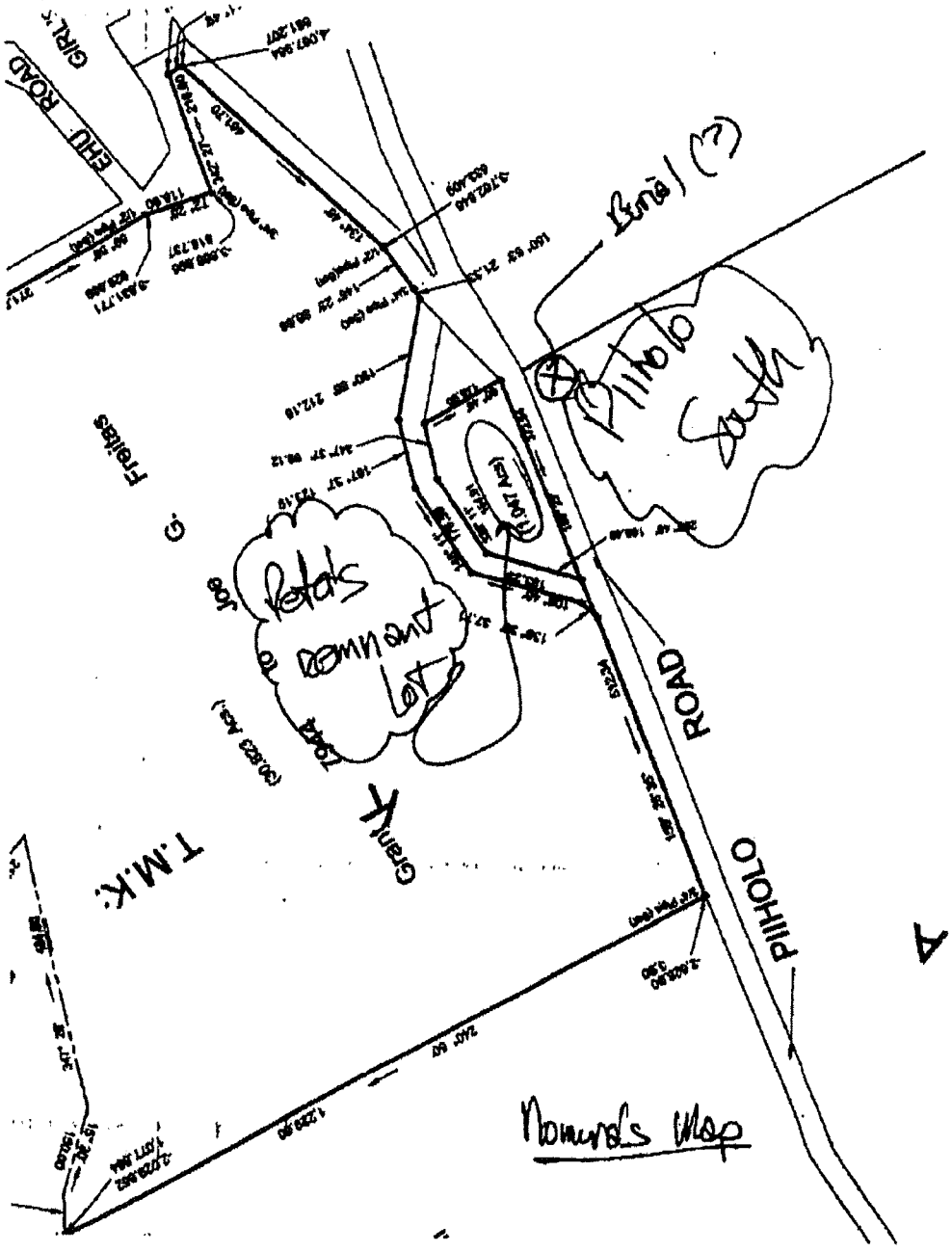
However, the actual Piiholo Road, according to Ken's survey, runs along the edge of Peter's grant...thus also along the boundary of Piiholo South.

So, the remnant land is Peter's and it's on the North side of Piiholo South and the actual Piiholo Road; it's in-between the actual Piiholo Road and the Piiholo Road right-of-way as shown on the tax map.

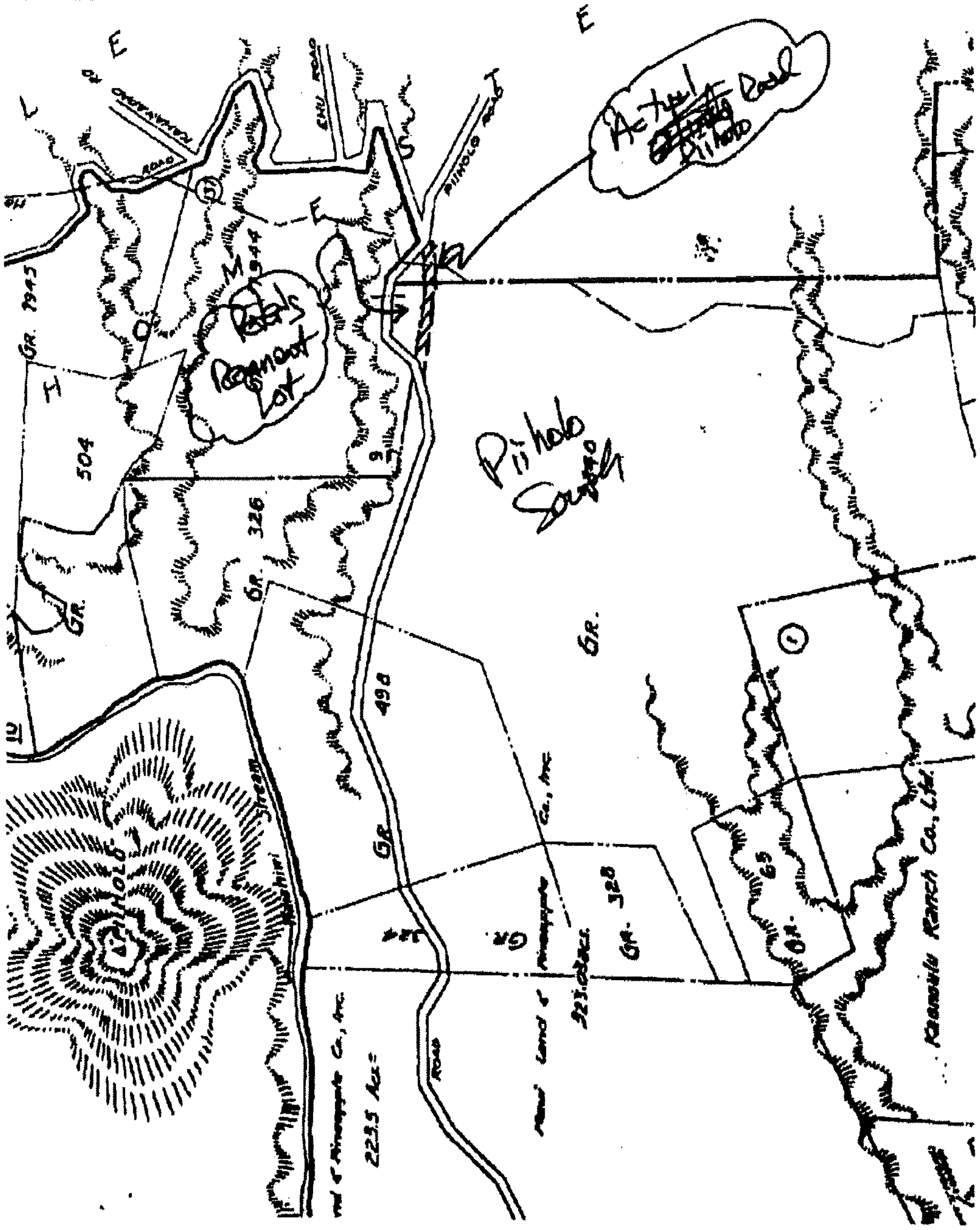
Thus the burial is on Piiholo South land.

Call me if you have questions.

Thanks, Hugh


GIRL
ROAD
T.M.K.
ROAD
PIIHOLO
Howard's Map

Sep 01 05 07:44p Cynthia Warner 808-573-0051 p.3
AUG-25-2005 07:03 AM HUGH Y STARR & CO., INC. 808 573 0090 P.03



APPENDIX E-1.

July 6, 2007 Letter from State Historic Preservation Division

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

July 6, 2007

Mr. Paul Cleghorn
Pacific Legacy
332 Uluniu Street
Kailua, Hawaii 96734

LOG NO: 2007.3126
DOC NO: 0709JP20
Archaeology

Dear Mr. Cleghorn:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
Revised Archaeological Inventory Survey of 325 Acres in Hali'imaile (File No. 2.2994)
Hali'imaile Ahupua'a, Makawao District, Island of Maui
TMK: (2) 2-4-012:005 and 009

Thank you for the opportunity to review this revised final report which our staff received on July 6, 2007 (McIntosh and Cleghorn 2007, *Archaeological Inventory Survey of ca. 325 Acres in Haliimaile Ahupuaa, Makawao District, Island of Maui [TMK (2) 2-4-12:5, 9]*...Pacific Legacy, Inc., ms. We have previously reviewed a draft report and requested some revisions (LOG NO: 2007.1357/ DOC NO: 0706MK21).

To summarize, the subject area has been utilized for commercial pineapple cultivation for the past 70 years. Previous Archaeological Inventory Surveys in the general area have documented historic properties indicative of post-Contact historic plantation and ranching activities. Documented historic properties in the immediate area include terraces, refuse pits, Portuguese ovens, cisterns, privies, and a cattle weighing scale. Several Land Grants were issued but no Land Commission Awards (LCAs) were identified within the subject parcels.

Maui Land and Pineapple conducted backhoe excavations for a water line in 2003 and inadvertently uncovered a human burial within the project area (SIHP 50-50-06-5501). Archaeological Services Hawaii, LLC. (ASH) was contracted to document the burial and to monitor the additional excavations. There were no additional historic properties identified during the duration of the emergency archaeological monitoring program. The remainder of the small trench line involved minimal excavations mostly in previously disturbed soil. The water line was re-routed around the partial *in situ* burial and we understand that the burial will be preserved in place. ASH, LLC suggested that the burial was more than likely Native Hawaiian. The current inventory survey provides a summary of events surrounding the inadvertent burial discovery. We believe that SIHP 50-50-06-5501 is significant under Criteria "D" and "E" and that it should continue to be preserved in place. We are currently awaiting a burial treatment and preservation plan for the site.

We previously recommended that the Archaeological Inventory Survey be conducted (LOG NO: 2006.4132/ DOC NO: 0702JP17). The survey has adequately covered the project area documenting one new historic property consisting of three component features (SIHP 50-50-06-6273). Feature 1 is an isolated artifact find (polished basalt adze fragment); Feature 2 is a sloped retaining wall and Feature 3 is an associated terrace. We concur that SIHP 50-50-06-6273 is significant under Criterion "D". The landowner would like to passively preserve the site. If any future proposed development plans will affect the documented site; further archaeological investigations are undoubtedly warranted. Please keep in mind that additional work at the site may lead to necessary adjustment of significance evaluation. In addition, a preservation plan may need to be prepared.

This revised Archaeological Inventory Survey has addressed the previously specified requested revisions and the report is now acceptable. Based on the fact that there was no sub surface excavations conducted during the fieldwork; combined with the documentation of an *in situ* burial on the subject parcel, we believe that full-time archaeological monitoring is warranted for any proposed ground alterations on the subject parcels. Archaeological monitoring will help mitigate potential adverse effects to any additional human burials as well as any possible sub surface cultural deposits/features. Should there be any questions or concerns, please do not hesitate to contact the SHPD at (808) 243-4641 or (808) 243-1285.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

JP

c:

Lesli Otani DPWEM, County of Maui 270-7972
Director, Dept. of Planning, 250 S. High Street, Wailuku, HI 96793
Maui Cultural Resources Commission, Dept. of Planning, 250 S. High Street, Wailuku, HI 96793
Hinano Rodrigues, Cultural Historian, SHPD
MLIBC

APPENDIX E-2.

May 21, 2008 Letter from State Historic Preservation Division

LINDA LINGLE

LAURA H. THIELEN

RUSSELL Y. TSUJI

KEN C. KAWAHARA

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

May 21, 2008

Paul L. Cleghorn, Ph.D.
Pacific Legacy, Inc.
3332 Uluniu Street
Kailua, Hawai'i 96734

LOG NO: 2008.1261
DOC NO: 0805PC35
Archaeology

Dear Dr. Cleghorn:

SUBJECT: **Chapter 6E-42 Historic Preservation Review of an Archaeological Monitoring Plan for a ca. 325 Acre (130 Hectare) Pi'iholo South, LLC. Property in Hali'imaile Final Plat Review File 2.2994**
Hali'imaile Ahupua'a, Makawao District, Island of Maui, Hawai'i
TMK: (2) 2-4-012:005, 039 – 048 (formerly TMK (2) 2-4-012: 005, 009)

Thank you for the opportunity to review this plan, which our staff received on April 8, 2008 (Kirkendall, Cleghorn and McIntosh 2008): *Archaeological Monitoring Plan for the Pi'iholo South, LLC*...Pacific Legacy, Inc.

The plan was prepared upon verbal recommendation from our office that monitoring should occur, even though the current phase of the project (Final Subdivision Plat Review) does not involve ground altering disturbance. Please accept our apologies for the dissemination of incorrect information. State Historic Preservation Division (SHPD) records indicate that an archaeological inventory survey of the project area (formerly TMK (2) 2-4-012: 005, 009) was undertaken by your firm in 2007 (McIntosh and Cleghorn 2007: *Archaeological Inventory Survey of ca. 325 Acres in Hali'imaile Ahupua'a, Makawao District, Island of Maui*) with an associated report subsequently reviewed by SHPD (LOG NO: 2007.1357; DOC NO: 0706MK21). Revisions to that report were requested and a revised report has been received and accepted, pending correction of an SIHP number. We consider the current monitoring plan to be proactively submitted, and expect that it will be followed during future ground altering disturbance within the aforementioned subject parcels.

As specified in the plan, an archaeological monitor will be on site during all activity for which precautionary archaeological monitoring has been recommended by the SHPD, a coordination meeting with the construction crew and all other pertinent parties to explain monitoring procedures and that the monitoring archaeologist has the authority to halt work in the vicinity of a culturally significant find will be undertaken. The plan also states that in the event culturally significant finds are made, the SHPD will be consulted for mitigation recommendations and further, that if human remains are inadvertently exposed, both the SHPD and Maui/Lana'i Islands Burial Council (MLIBC) will be notified and appropriate protocol followed. A draft report detailing the findings of the monitoring will be prepared and submitted to our office for review within 90 days after the completion of monitoring.

The plan contains the required information as specified in HAR §13-279-4(a) regarding the contents of monitoring plans in general; however, the following revisions are requested:

1. Page 6: the location of the inadvertent burial is the southeast, as opposed to northeast, corner of the project area;
2. Please change the text and graphics in accordance with comments for the associated inventory survey report and replace all references to SIHP #50-50-06-6273 with #50-50-06-6274, which is the correct number for the newly identified site.

We will accept this monitoring plan with the provision that two hardcopies of the *revised* version be submitted to our office for archiving. One should be sent to O'ahu and the other to Maui with a copy of this letter attached.

Should you have any questions or comments regarding this letter, please contact Patty Conte (Patty.J.Conte@hawaii.gov).

Aloha,

Nancy McMahon, Archaeologist and Acting Archaeology Branch Chief
State Historic Preservation Division

c: Jeff Hunt, Director, Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793
Lance Nakamura, Engineer, DPWEM, 250 S. High Street, Wailuku, Hawai'i 96793
Maui CRC, Dept. of Planning, 250 S. High Street, Wailuku, Hawai'i 96793

APPENDIX E-3.

June 6, 2006 Letter from Archaeological Services Hawaii LLC

ARCHAEOLOGICAL SERVICES HAWAII, LLC.,
1930 A Vineyard Wailuku, HI; 96793
Ph.808-244-2012;Fx.808-244-9592

6 June 06

Piiholo South LLC.,
Mr. Ron Sturtz
874 Kumulani Drive
Kihei, Hi 96753

Subject: Post Field Summary Letter of Archaeological Investigations at a Parcel TMK 2-4-12:05

Dear Ron,

Per your request, Archaeological Services Hawaii, LLC (ASH) performed test excavations adjacent to an inadvertent burial site designated State Inventory of Historic Places (SIHP) 50-50-06-5501on 12 September 2006. Archaeological personnel consisted of Ms. Holly Formolo, who monitored and recorded the trenches, under the direction of Ms. Lisa Rotunno-Hazuka. The purpose of this investigation was to ascertain if additional burials were present in the immediate vicinity of the burial site. The test area measured approximately 10.0 meters long by 3.5 meters wide (30 ft. long by 10 ft. wide), where a series of four backhoe trenches were carefully excavated just west of Site 5501. The trenches were spaced approximately 1.2 m (4.0 ft.) apart, and measured 2.0 m long by .60 m wide by 1.7 m deep (6.0 ft. by 2.0 ft. by 5.0 ft.). All test excavations were negative for human skeletal remains and/or burial pits. The backhoe trenches were documented with photographs and representative stratigraphic sequences were documented. Upon the completion of the recording, all backhoe trenches were covered, and no further work was performed in the area.

Respectfully,

Lisa Rotunno-Hazuka
Consulting Archaeologist

APPENDIX F.

Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT
HOKU NUI MAUI SUBDIVISION
MAKAWAO, MAUI, HAWAII

FINAL DRAFT

April 1, 2016

Prepared for:

Mr. Joshua Chavez
Hoku Nui Maui
PO Box 1347
Makawao, Hawaii 96768

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
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E-mail: atahnl@atahawaii.com
Honolulu • Wailuku • Hilo, Hawaii

TRAFFIC IMPACT ANALYSIS REPORT
HOKU NUI MAUI SUBDIVISION
MAKAWAO, MAUI, HAWAII

FINAL DRAFT

Prepared for

Hoku Nui Maui

Prepared by
Austin, Tsutsumi & Associates, Inc.

Civil Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

April 1, 2016

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AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TERRANCE S. ARASHIRO, P.E.
IVAN K. NAKATSUKA, P.E.
ADRIENNE W. L. H. WONG, P.E., LEED AP
DEANNA HAYASHI, P.E.
PAUL K. ARITA, P.E.
ERIK S. KANESHIRO, L.P.L.S, LEED AP
MATT NAKAMOTO, P.E.

FINAL DRAFT

HOKU NUI MAUI SUBDIVISION TRAFFIC IMPACT ANALYSIS REPORT

Makawao, Maui, Hawaii

1. INTRODUCTION

This report documents the findings of a traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts resulting from the proposed Hoku Nui Maui Subdivision (hereinafter referred to as the "Project").

1.1 Location

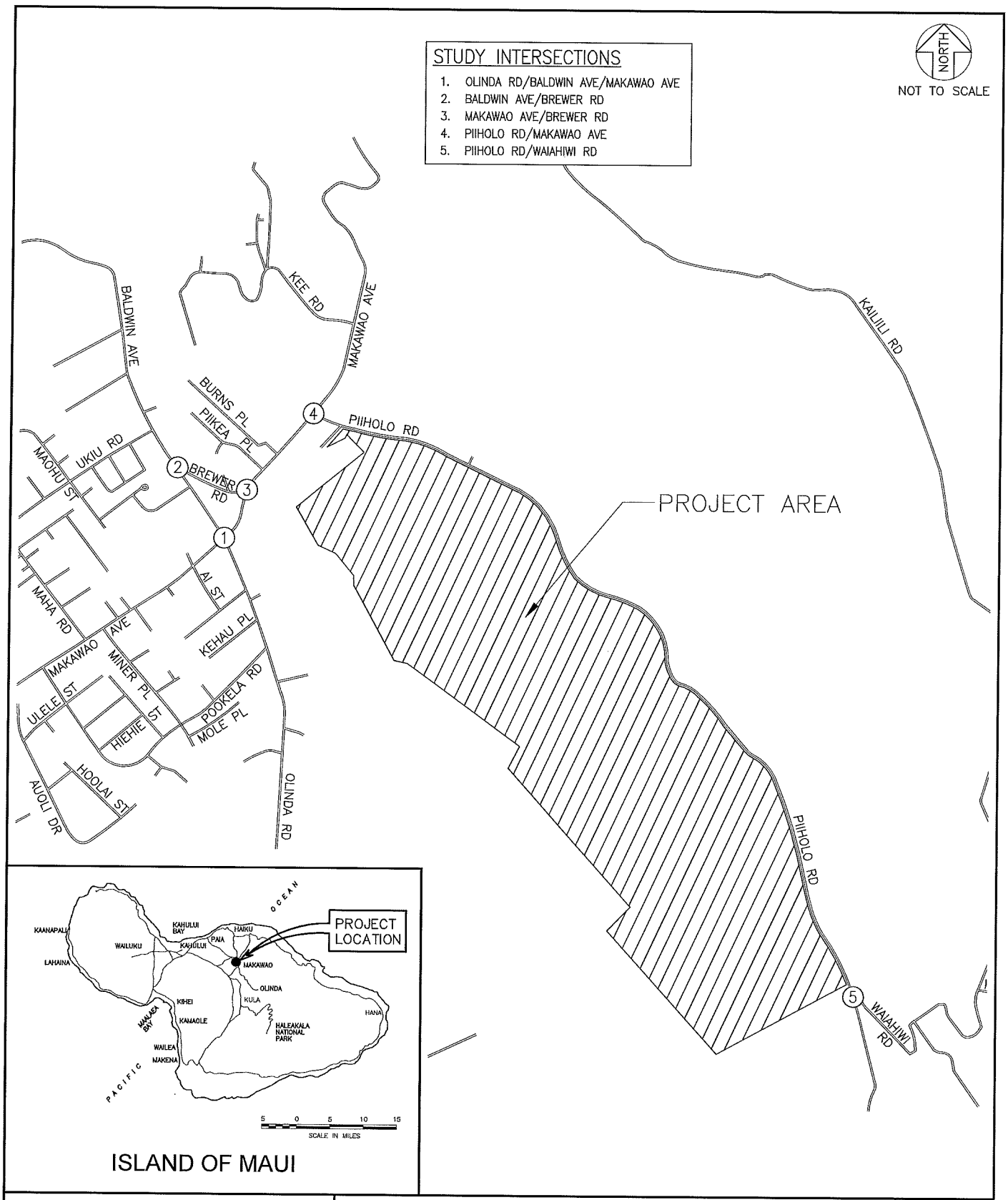
The Project site is located adjacent and to the southwest of Piiholo Road, between Makawao Avenue and Waiahiwi Road. The proposed site is more specifically identified as TMKs: (2) 2-4-012:005 and (2) 2-4-012:039-048. See Figure 1.1 for the Project location and Figure 1.2 for the Project site plan.

1.2 Project Description

The Project is proposed to subdivide the 258 acres into 20 residential lots each with a market priced and affordable residential unit, and a large farm lot with a market priced and two (2) affordable residential units (43 total residential dwelling units), a Farm Market, a Hula Halau and two barns. The remaining land will be allocated to farming and Native Habitat. Access to the Project will be provided by five (5) driveways spread along a one mile stretch of Piiholo Road between Makawao Avenue and Waiahiwi Road. The Project is anticipated to be complete by year 2017.

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267
EMAIL : atahnl@atahawaii.com

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII
HILO, HAWAII

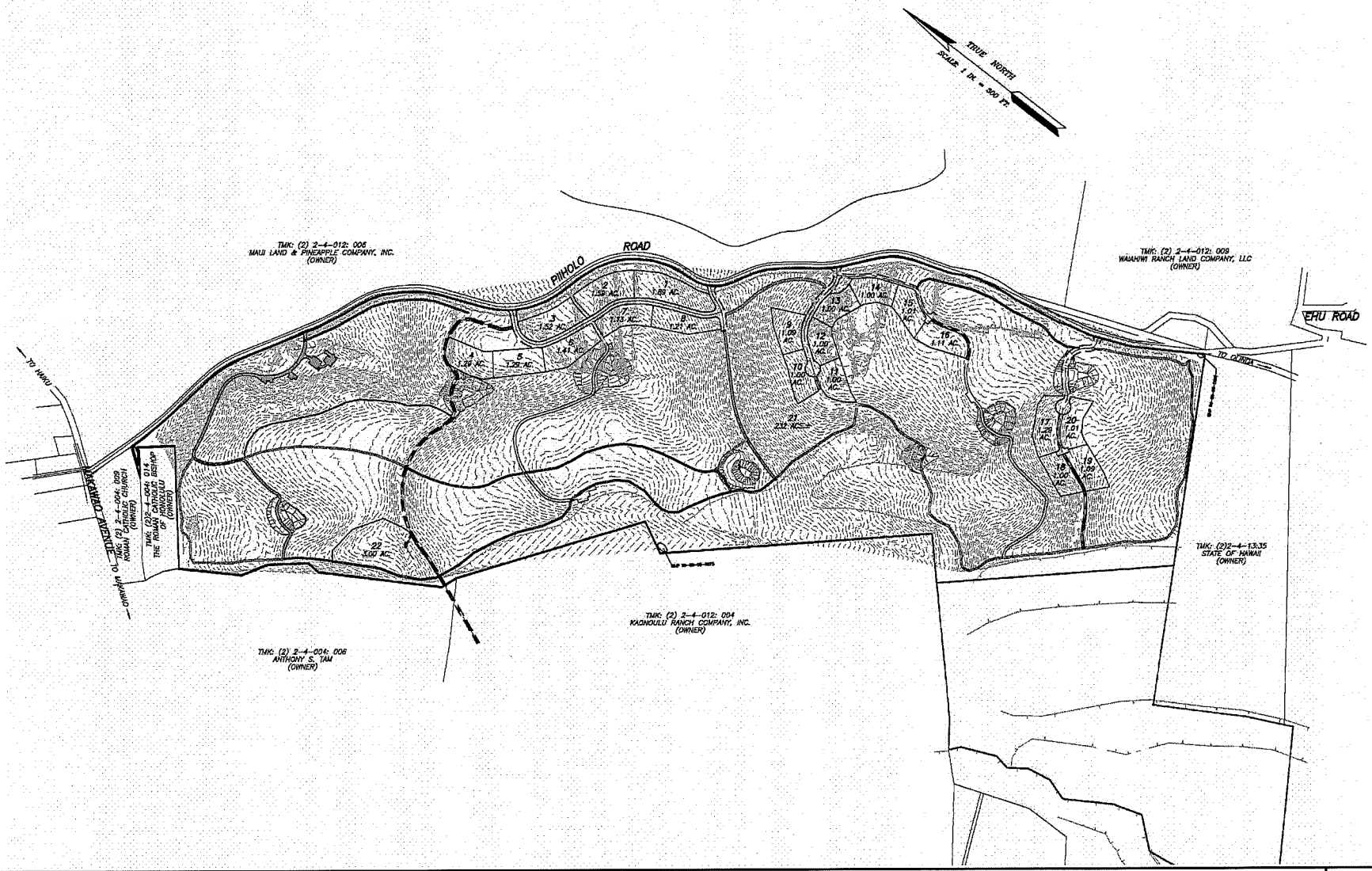


HOKU NUI MAUI SUBDIVISION

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

LOCATION MAP

FIGURE 1.1



HOKU NUI MAUI SUBDIVISION

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

FIGURE 1.2

SITE PLAN

2. STUDY METHODOLOGY

Level of Service (LOS) is a qualitative measure used to describe the conditions of traffic flow at intersections, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F. The Highway Capacity Manual (HCM), dated 2010, methods for calculating volume to capacity ratios, delays and corresponding Levels of Service were utilized in this study. LOS definitions for signalized and unsignalized intersections are provided in Appendix B.

2.1 Intersection Analysis

For applicable intersections as determined in Section 2.2, intersection analysis was performed using the traffic analysis software Synchro, which prepares Highway Capacity Manual (HCM) reports. The reports contain quantitative delay results, as based on intersection lane geometry, signal timing (including coordination and actuated minimums and maximums), and hourly traffic volume.

Based on the vehicular delay, reserve capacity and critical gaps at the intersection, a LOS is assigned (see Appendix B) as a qualitative measure of performance. These results constitute the technical analysis that will form the basis of the recommendations outlined in this report.

2.2 Study Area Intersection Analysis

Intersection analysis within the study area was performed on the following intersections due to their proximity to the Project:

- Olinda Road/Baldwin Avenue/Makawao Avenue (Unsignalized)
- Baldwin Avenue/Brewer Road (Unsignalized)
- Makawao Avenue/Brewer Road (Unsignalized)
- Piiholo Road/Makawao Avenue (Unsignalized)
- Piiholo Road/Waiahiwi Road (Unsignalized)

3. EXISTING TRAFFIC CONDITIONS

The existing conditions scenario represents the traffic conditions within the Project area as it currently stands, with no build-out of the Project.

3.1 Roadway Network

The following are brief descriptions of the existing roadways studied within the vicinity of the Project:

Baldwin Avenue is a north-south, two lane, two-way roadway that extends from Makawao Avenue to the northwest, terminating at Hana Highway in Paia. In the vicinity of the study area, Baldwin Avenue is a two-lane, undivided roadway. Baldwin Avenue provides local access to retail shops, schools, and residential neighborhoods. On-street parking stalls are provided on either side of the roadway between Brewer Road and Makawao Avenue. The posted speed limit along this roadway is 20 miles per hour (mph) within the study area.

Makawao Avenue is an east-west, two lane, two-way, roadway that extends from Haleakala Highway near Pukalani to the northeast through Makawao and terminates at the intersection of Kokomo Road and Kailiili Road, where it continues as Kaupakalua Road. Makawao Avenue provides local access to retail shops, residential neighborhoods, and public facilities. The posted speed limit along this roadway is 20 mph within the study area.

Olinda Road is a north-south, two lane, two-way roadway that extends mauka-bound from Makawao Avenue, the opposite direction of Baldwin Avenue, for approximately five miles before coming to a dead end near the Waihou Spring Forest Reserve. Olinda Road provides local access to residential neighborhoods, agricultural land, and Seabury Hall private school. The posted speed limit along this roadway is 20-30 mph.

Brewer Road is an approximately 800-foot long, two-way, two-lane roadway that provides a cut-through link between Baldwin Avenue and Makawao Avenue. While Brewer Road provides local access to residential lots and a private parking area, the primary use of this roadway is for mauka-bound traffic along Makawao Avenue to access Baldwin Avenue in the makai direction while avoiding the often congested Olinda Road/Baldwin Avenue/Makawao Avenue intersection, and vice versa. The posted speed limit along this roadway is 20 mph.

Piiholo Road is a north-south two-way, two-lane roadway that extends south-bound from Makawao Avenue for approximately five miles before terminating at Olinda Road. Piiholo Road provides local access to residential neighborhoods, agricultural land, Piiholo Ranch, and the Makawao Forest Reserve. The posted speed limit along this roadway is 20 mph.

Waiahiwi Road is a two-way, two-lane roadway that extends eastbound from Piiholo Road approximately 1.5 miles south of Makawao Avenue. This roadway extends for approximately 0.6 miles before becoming a private road for Piiholo Ranch.

3.2 Existing Traffic Volumes

The existing traffic volumes data utilized in this report were collected on Tuesday, December 16 and Wednesday, December 17, 2014. Based on the traffic count data, the weekday morning (AM) and weekday evening (PM) peak hour of traffic were determined to occur from 7:15 AM to 8:15 AM and 3:30 PM to 4:30 PM. See the traffic count data provided in Appendix A for the existing intersections studied.

3.3 Existing Traffic Conditions Analysis and Observations

Olinda Road/Baldwin Avenue/Makawao Avenue is an all-way stop-controlled (AWSC) intersection with shared lanes on all approaches. Based on observations, vehicular AM queues generally occur during a 20-minute window (7:30-7:50AM) along Makawao Avenue at the all-way stop, Olinda Road/Baldwin Avenue/Makawao Avenue intersection. Eastbound queues ranged from about 350-650 feet, while westbound queues ranged from 500-950 feet. This influx of traffic during the 20-minute peak period is likely caused by regional commuters heading to work and traffic generated by numerous schools in the area, such as the Makawao Elementary School along Baldwin Avenue, Kalama Intermediate School off of Makawao Avenue, Seabury Hall located mauka (South) of Makawao Avenue, and King Kekaulike and Kamehameha Schools campuses off of Kula Highway. During the PM peak hour, eastbound vehicular queues along Makawao Avenue fluctuated between 250-400 feet, while westbound queues were generally minimal.

Based on existing traffic, the eastbound approach operates at LOS F during the AM and PM peak hours of traffic and the westbound approach operates at LOS F during the AM peak hour of traffic. The eastbound approach also operates at overcapacity conditions (vehicle/capacity (v/c) ratio > 1.0) during the AM peak, while all other LOS F movements are approaching v/c ratios of 1.0.

Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended.

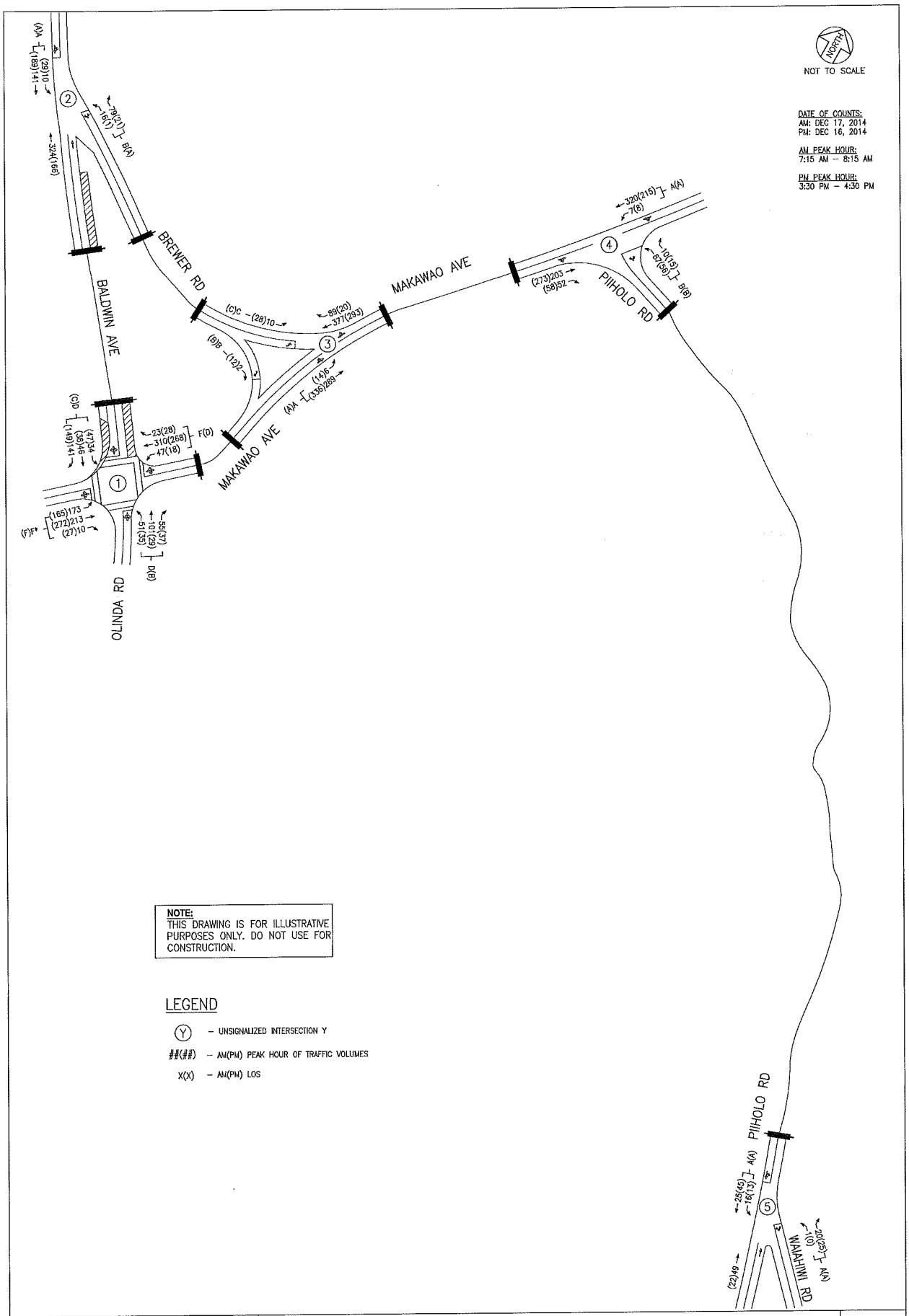
Baldwin Avenue/Brewer Road is an unsignalized T-intersection with stop control on the Brewer Road approach. Shared lanes are provided on all approaches and the northbound right-turn movement from Baldwin Avenue is prohibited due to the skewed intersection geometry. All movements currently operate at LOS B or better during the AM and PM peak hours.

Makawao Avenue/Brewer Road is an unsignalized T-intersection with stop control on the Brewer Road approach. Shared lanes are provided on the eastbound and westbound approaches as well as exclusive channelized turn lanes on the minor southbound approach. All movements currently operate at LOS C or better during the AM and PM peak hours.

Piiholo Road/Makawao Avenue is an unsignalized T-intersection with stop control on the Piiholo Road approach. Shared lanes are provided on all approaches. Based on observation, turning movement queues along Piiholo Road were typically observed to be no longer than 1-2 vehicles long due to frequent gaps in traffic along Makawao Avenue and were able to clear the intersection with minimal delays, consistent with synchro analysis. All movements currently operate at LOS B or better during the AM and PM peak hours.

Piiholo Road/Waiahiwi Road is an unsignalized T-intersection with stop control on the Waiahiwi Road approach. Shared lanes are provided on all approaches. All movements currently operate at LOS A during the AM and PM peak hours.

Figure 3.1 illustrates the existing lane configuration, existing traffic volumes, and LOS for each study intersection. Table 3.1 summarizes the existing LOS at the study intersections. LOS worksheets are provided in Appendix C.



HOKU NUI MAUI SUBDIVISION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII	FIGURE 3.1
	EXISTING LANE CONFIGURATION, VOL AND LOS	

Table 3.1: Existing Conditions LOS

Intersection	Existing Conditions					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Makawao Avenue & Olinda Road/Baldwin Avenue						
EB LT/TH/RT	72.5	**1.24**	**F***	60.6	0.98	F
WB LT/TH/RT	56.5	0.93	F	31.7	0.79	D
NB LT/TH/RT	32.3	0.74	D	14.7	0.31	B
SB LT/TH/RT	29.9	0.72	D	19.4	0.57	C
Overall	52.0	-	F	38.6	-	E
Baldwin Avenue & Brewer Road						
WB LT/RT	11.6	0.16	B	9.4	0.03	A
SB LT/TH	8.0	0.01	A	7.6	0.02	A
Makawao Avenue & Brewer Road						
EB LT/TH	8.4	0.01	A	8.0	0.01	A
SB LT	15.4	0.03	C	15.1	0.08	C
SB RT	11.0	0.00	B	10.2	0.02	B
Makawao Avenue & Piiholo Road						
WB LT/TH	7.8	0.01	A	8.0	0.01	A
NB LT/RT	14.8	0.22	B	13.3	0.15	B
Piiholo Road & Waiahiwi Road						
WB LT/RT	8.7	0.02	A	8.5	0.03	A
SB LT/TH	7.3	0.01	A	7.3	0.01	A

Notes:

* Denotes overcapacity conditions.

4. BASE YEAR 2017 TRAFFIC CONDITIONS

4.1 Defacto Growth Rate

Projections for Base Year 2017 traffic were based upon traffic projections in the Maui Regional Traffic Demand Model (MRTDM). The growth rates along Makawao Avenue to the east and west of Baldwin Avenue were determined to be 1.4 and 1.6 percent per year. The growth rate along Baldwin Avenue was determined to be 0.8 percent per year. These growth rates were applied to the roadway network.

Traffic projections for Brewer Road, Piiholo Road, and Waiahiwi Road were not provided by the MRTDM. Therefore, the average of the growth rates along Makawao Avenue (east of Baldwin Avenue) and Baldwin Avenue was applied to these roadways.

4.2 Planned Roadway Projects

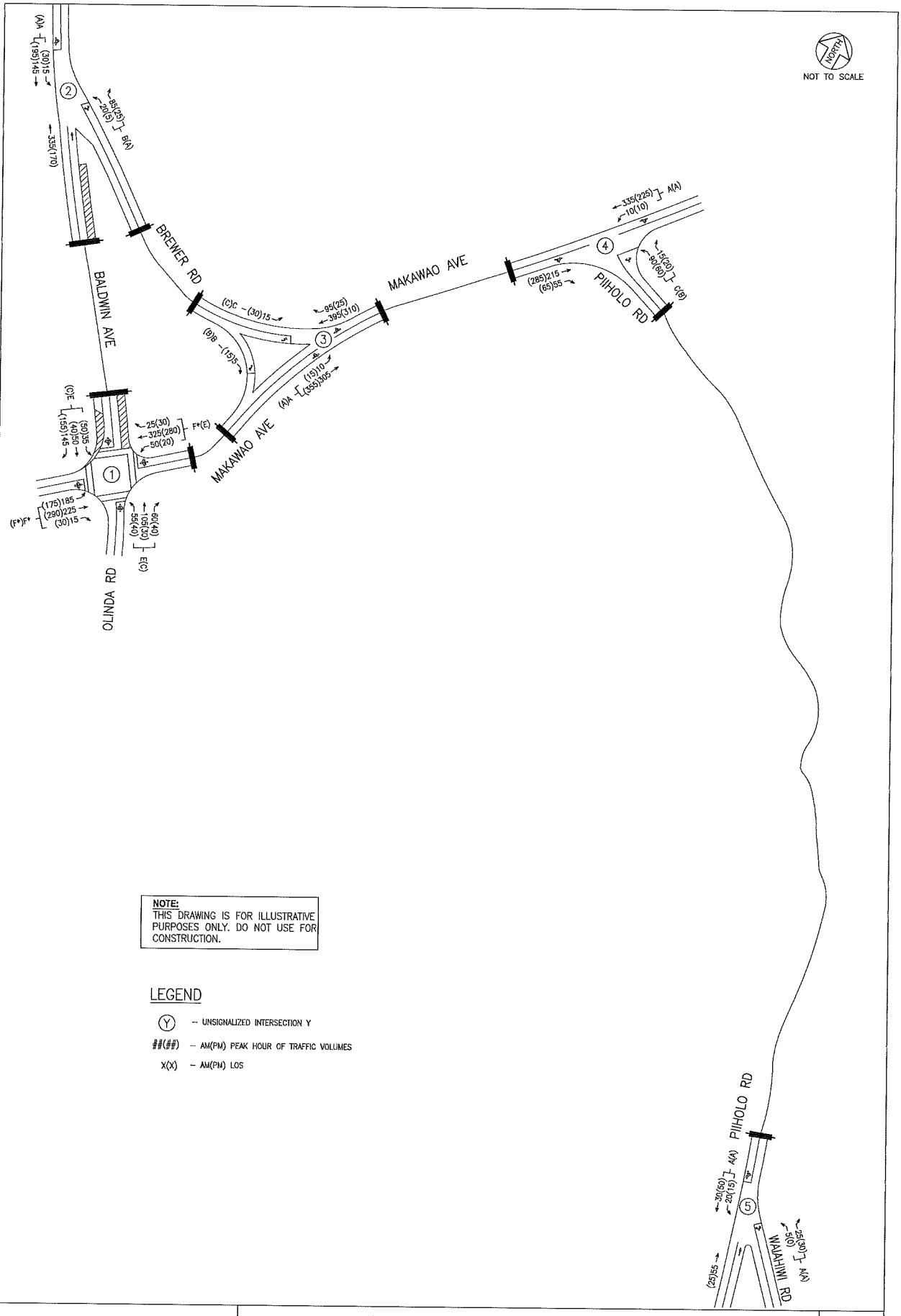
Currently, no improvements are planned in the vicinity of the Project.

4.3 Base Year 2017 Analysis

All study intersections are forecast to operate with LOS similar to existing conditions, with all movements operating at LOS D or better during the AM and PM peak hour conditions except at the following location:

Olinda Road/Baldwin Avenue/Makawao Avenue – With Base Year 2017 growth, traffic is anticipated to increase by approximately 6% at the intersection. The eastbound approach is forecast to operate at LOS F and over-capacity conditions during the AM and PM peak hours of traffic. The westbound approach is forecast to operate at LOS F and overcapacity conditions during the AM peak hour of traffic and worsen to LOS E during the PM peak hour of traffic. The northbound/southbound approaches during the AM peak hour will also worsen to LOS E conditions. As noted in Section 3.3, due to the existing intersection ROW and sight distance constraints, a traffic signal system, roundabout, and/or auxiliary improvement and upgrades will likely be difficult to implement and not recommended.

Figure 4.1 illustrates the Base Year 2017 forecast traffic volumes and LOS without mitigation for the study intersection movements. Table 4.1 summarizes the Base Year 2017 LOS at the study intersections for all scenarios described above. LOS worksheets are provided in Appendix C.



HOKU NUI MAUI SUBDIVISION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE 4.1
	BASE YEAR 2017 LANE CONFIGURATION, VOL AND LOS	

Table 4.1: Base Year 2017 Conditions LOS

Intersection	Base Year 2017 Conditions No Mitigation					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Makawao Avenue & Olinda Road/Baldwin Avenue						
EB LT/TH/RT	74.1	**1.37**	**F***	65.7	**1.08**	**F***
WB LT/TH/RT	73.7	**1.02**	**F***	38.1	0.85	E
NB LT/TH/RT	41.0	0.81	E	15.4	0.35	C
SB LT/TH/RT	36.3	0.77	E	20.9	0.60	C
Overall	60.2	-	F	43.0	-	E
Baldwin Avenue & Brewer Road						
WB LT/RT	11.9	0.18	B	9.8	0.04	A
SB LT/TH	8.1	0.01	A	7.7	0.02	A
Makawao Avenue & Brewer Road						
EB LT/TH	8.5	0.01	A	8.1	0.01	A
SB LT	16.3	0.05	C	15.9	0.09	C
SB RT	11.2	0.01	B	10.3	0.02	B
Makawao Avenue & Piiholo Road						
WB LT/TH	7.9	0.01	A	8.1	0.01	A
NB LT/RT	15.4	0.25	C	13.8	0.18	B
Piiholo Road & Waiahiwi Road						
WB LT/RT	8.8	0.03	A	8.5	0.03	A
SB LT/TH	7.4	0.01	A	7.3	0.01	A

Notes:

* Denotes overcapacity conditions.

5. FUTURE YEAR 2017 TRAFFIC CONDITIONS

The future traffic conditions scenario represents the traffic conditions within the Project study area with the full build-out of the Project. According to the current Project plan, this will occur in year 2017.

5.1 Background

As previously mentioned in Section 1, the Project is proposed to subdivide the 258 acres into 43 dwelling units and provide a Farm Market and space for a Hula Halau, two barns, farming space and Native Habitat.

5.2 Travel Demand Estimations

5.2.1 Trip Generation

The Institute of Transportation Engineers (ITE) publishes a book based on empirical data compiled from a body of more than 4,250 trip generation studies submitted by public agencies, developers, consulting firms, and associations. This publication, titled Trip Generation Manual, 9th Edition, provides trip rates and/or formulae based on graphs that correlate vehicular trips with independent variables. The independent variable can range from Dwelling Units (DU) for single-family attached homes to Gross Floor Area (GFA) for commercial and office development.

Residential Trips - Each of the 20 residential lots will provide a market priced and affordable residential unit, and a large farm lot with a market priced and two (2) affordable residential units. Therefore, trips were generated for a total of 43 dwelling units. See Tables 5.1 and 5.2 for Trip Generation formulae and projections for the housing lots.

Farm Market Trips – In the absence of any ITE trip generation data for farmers markets, this study utilized ITE trip generation rates for supermarkets during the AM peak hour and supplemented PM peak hour trip generation with manual afternoon hourly counts taken at nearby establishments in the upcountry region; Makawao Farmer's Market and Morihara Store. Table 5.3 shows the anticipated trips generated for the Hoku Nui Farm Market during the AM/PM peak hours. The assumptions, descriptions and methodology for the Farm Market trip generation is described further in Table 5.3.

Barn Trips - The barns are anticipated to be used only for internal use within the Hoku Nui site. They will mainly be used for storage of farming vehicle and equipment. Therefore, no external trips are expected to be generated by the barns.

Hula Halau Trips – The Hula Halau is anticipated to service approximately 30 students. Classes will vary depending on schedules, but will likely occur 2-4 times a week with occasional Saturday gatherings. Classes will likely take place between the hours of 6:00-9:00 PM, which is outside of the PM peak hour of traffic (3:30-4:30 PM). Observations at the all-way stop controlled intersection indicated that existing PM peak traffic queues were negligible, between 2-3 vehicles, after 4:40 PM. Therefore, during the PM peak hour, traffic operation should not be impacted by trips generated by the Hula Halau and no external trips were assumed to be generated.

Table 5.1: ITE Trip Generation Rates for Residential Component

Land Use Type	Independent Variable	AM Peak Hour		PM Peak Hour	
		Rate	% Enter	Rate	% Enter
Single-Family Detached Housing (ITE 210)	Dwelling Units (DU)	[a]	25%	[b]	63%

[a] T = 0.70 (X) + 9.74
[b] LN(T) = 0.90 LN (X) + 0.51

Table 5.2: Project Generated Trips for Residential Component

Land Use Type	Quantity	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Single-Family Detached Housing (ITE 210)	43 DU	10	30	40	32	18	50

Table 5.3: Project Generated Trips for Farm Market Component

Land Use Type	Quantity	AM Peak Hour [1]			PM Peak Hour [2]		
		Enter	Exit	Total	Enter	Exit	Total
Farm Market	-	13	8	21	34	35	69

Note:

1. AM peak hour trips generated by the ITE Trip Generation Code 850 for Supermarkets, with a trip rate of 3.40. The assumed size of the Farm Market was approximately 6,000 SF. Since the Farm Market is not anticipated to open until after the AM peak hour of traffic, this was determined to be a conservative estimate.

2. PM peak hour trips were estimated based on the average afternoon hourly trips currently being generated by the nearby Makawao Farmer's Market along Olinda Road and the Morihara Store along Lower Kula Road. The Makawao Farmer's Market provided approximately 22 vendors selling products ranging from produce, jams, prepared foods and plants, while the Morihara Store sells local Kula produce, cooked foods and various general products. The Hoku Nui Farm Market will likely sell a much smaller variety of products than the above two establishments, therefore the trip generation should be conservative. However, since these two trip generators produced comparable trips to one another and are specific to the unique Upcountry region, it should be indicative of future trips generated by the proposed Hoku Nui Farm Market.

5.2.2 Trip Distribution

Trips generated by the Project were assigned throughout the study area based upon existing travel patterns within the vicinity of the Project. The traffic generated by the Project was added to the forecast Base Year 2017 traffic volumes to constitute the traffic volumes for the Future Year 2017 traffic conditions. See Figure 5.1 illustrates the Project-generated trip distribution.

5.3 Future Year 2017 Analysis

Upon completion of the Project, all study intersections are forecast to operate with LOS similar to Base Year 2017 conditions, with all movements operating at LOS D or better during the AM and PM peak hours of traffic with the exception of the Olinda Road/Baldwin Avenue/Makawao Avenue Intersection.

Olinda Road/Baldwin Avenue/Makawao Avenue

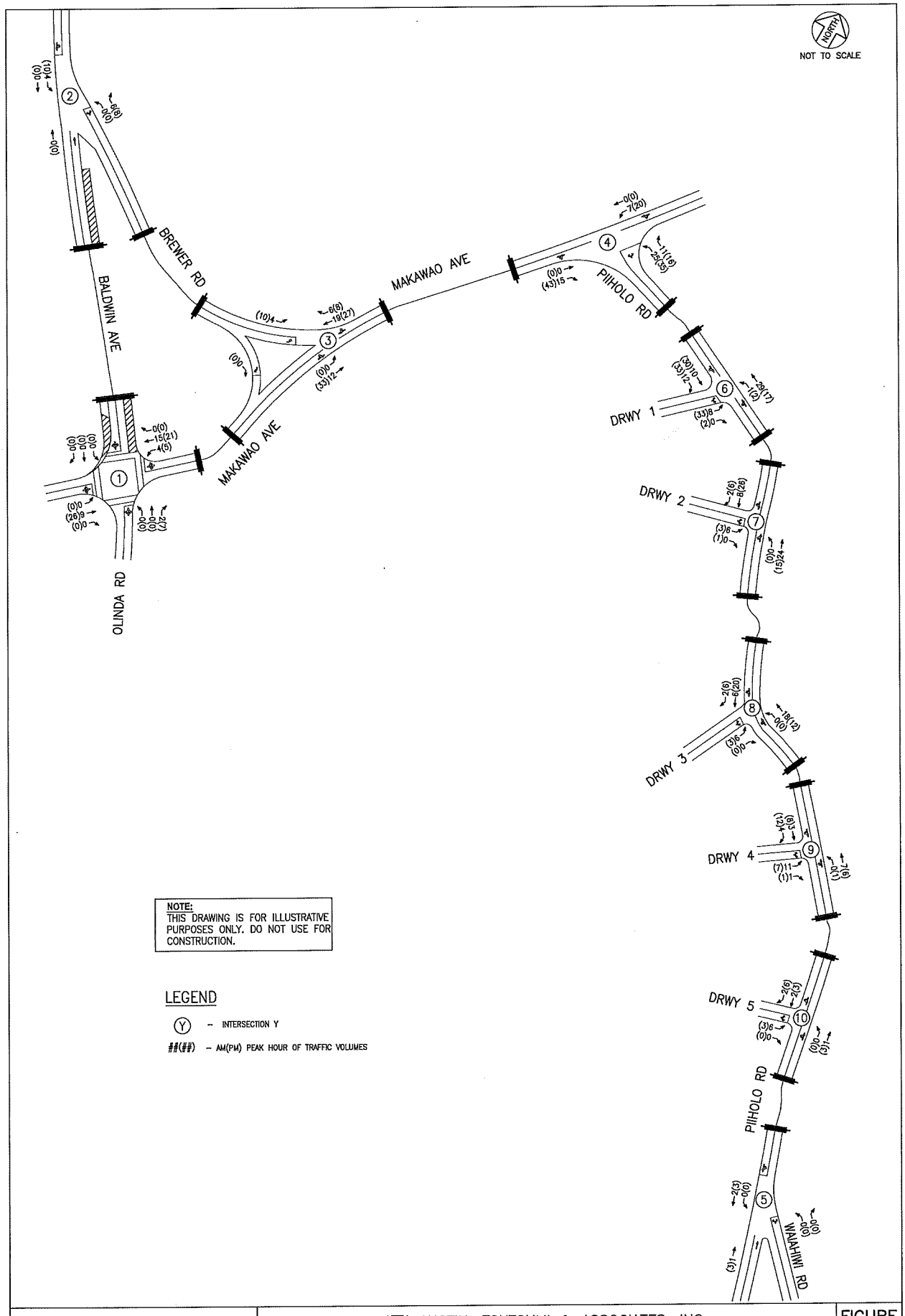
All movements are forecast to continue operating with similar LOS and capacity conditions during the AM and PM peak hours of traffic, with the westbound approach falling from LOS E to F during the PM peak hour of traffic. Trips generated by the Project are anticipated to only increase traffic by approximately 3.4% from Base Year 2017 conditions, at the Olinda Road/Baldwin Avenue/Makawao Avenue intersection during the AM/PM peak hours of traffic.

As discussed in Section 4.3, due to the existing intersection ROW and sight distance constraints, a traffic signal system, roundabout, and/or auxiliary improvement and upgrades will likely be difficult to implement and not recommended.

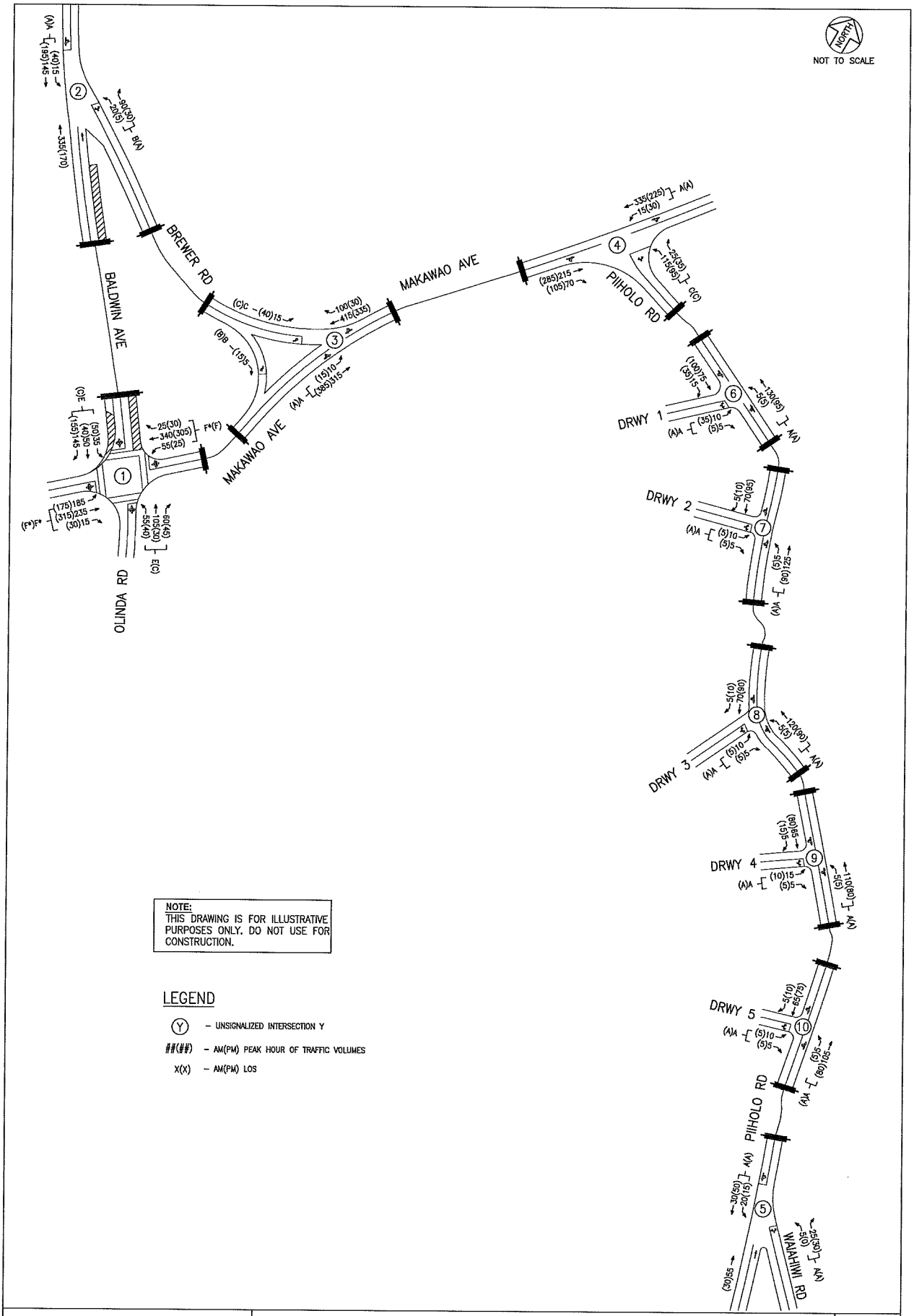
Project Access Driveways along Piiholo Road

Five (5) driveways are proposed along Piiholo Road and will generally be spaced along Piiholo Road at 1,000 feet or more between intersections. Driveway 1, which will service the Farm Market, is anticipated to generate the highest turning movement. However, impacts to the five (5) Project driveways are anticipated to be minimal, with the highest turning movement generating under 35 vehicles during any peak hour. In combination with relatively low mainline throughput traffic under 150 vehicles in either direction along Piiholo Road, turn lanes are likely not needed. Driveway 1 will be located approximately 1700 feet south of Makawao Avenue, so queue spillback onto Makawao Avenue should not be an issue. Driveway 2-5 will service the 20 residential lots, and should not exceed 15 turning movements during any peak hour.

Figure 5.2 illustrates the Future Year 2017 forecast traffic volumes and LOS without mitigation for the study intersection movements. Table 5.3 summarizes the Future Year 2017 LOS at the study intersections for all scenarios described above. LOS worksheets are provided in Appendix C.



HOKU NUI MAUI SUBDIVISION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE 5.1
	PROJECT GENERATED TRAFFIC VOLUMES	



HOKU NUI MAUI SUBDIVISION	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	FIGURE 5.2
	FUTURE YEAR 2017 LANE CONFIGURATION, VOL AND LOS	

Table 5.4: Future Year 2017 Conditions LOS

Intersection	Future Year 2017 Conditions No Mitigation					
	AM			PM		
	HCM Delay	v/c Ratio	LOS	HCM Delay	v/c Ratio	LOS
Makawao Avenue & Olinda Road/Baldwin Avenue						
EB LT/TH/RT	74.0	**1.41**	**F***	66.8	**1.16**	**F***
WB LT/TH/RT	73.6	**1.06**	**F***	52.9	0.94	F
NB LT/TH/RT	40.2	0.81	E	16.1	0.37	C
SB LT/TH/RT	35.8	0.77	E	22.0	0.62	C
Overall	60.3	-	F	48.6	-	E
Baldwin Avenue & Brewer Road						
WB LT/RT	12.0	0.19	B	9.8	0.05	A
SB LT/TH	8.1	0.01	A	7.7	0.03	A
Makawao Avenue & Brewer Road						
EB LT/TH	8.6	0.01	A	8.1	0.01	A
SB LT	16.9	0.05	C	17.4	0.13	C
SB RT	11.4	0.01	B	10.5	0.02	B
Makawao Avenue & Piiholo Road						
WB LT/TH	7.9	0.01	A	8.3	0.03	A
NB LT/RT	16.9	0.34	C	16.5	0.31	C
Piiholo Road & Waiahiwi Road						
WB LT/RT	8.8	0.03	A	8.6	0.03	A
SB LT/TH	7.4	0.01	A	7.3	0.01	A
Piiholo Road & Driveway 1						
EB LT/RT	7.4	0.00	A	7.5	0.00	A
NB LT/TH	9.6	0.02	A	10.0	0.06	B
Piiholo Road & Driveway 2						
EB LT/RT	7.4	0.00	A	7.5	0.00	A
NB LT/TH	9.5	0.02	A	9.3	0.01	A
Piiholo Road & Driveway 3						
EB LT/RT	7.4	0.00	A	7.4	0.00	A
NB LT/TH	9.4	0.02	A	9.3	0.01	A
Piiholo Road & Driveway 4						
EB LT/RT	7.4	0.00	A	7.4	0.00	A
NB LT/TH	9.5	0.03	A	9.4	0.02	A
Piiholo Road & Driveway 5						
EB LT/RT	7.4	0.00	A	7.4	0.00	A
NB LT/TH	9.3	0.02	A	9.2	0.01	A

Notes:

* Denotes overcapacity conditions.

6. CONCLUSION

The Project is proposed to subdivide the 258 acres into 43 residential dwelling units and provide a Farm Market and space for a Hula Halau, two barns, farming space and Native Habitat. Access to the Project will be provided by five (5) driveways spread along a roughly one mile stretch of Piiholo Road between Makawao Avenue and Waiahiwi Road. The Project is anticipated to be complete by year 2017.

6.1 Existing Conditions

All study intersections will operate adequately at LOS D or better except for the all-way stop-controlled (AWSC) Olinda Road/Baldwin Avenue/Makawao Avenue intersection. Vehicular AM queues generally occur during a 20-minute window (7:30-7:50AM) along Makawao Avenue at the all-way stop, Olinda Road/Baldwin Avenue/Makawao Avenue intersection. Eastbound queues ranged from about 350-650 feet, while westbound queues ranged from 500-950 feet. During the PM peak hour, eastbound vehicular queues along Makawao Avenue fluctuated between 250-400 feet, while westbound queues were generally minimal.

The eastbound approach operates at LOS F during the AM/PM peak hours and the westbound approach operates at LOS F during the AM peak hour. The eastbound approach also operates at overcapacity conditions (vehicle/capacity (v/c) ratio > 1.0) during the AM peak, while all other LOS F movements are approaching v/c ratios of 1.0.

Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended.

6.2 Base Year 2017 without the Project

Traffic growth in the study area includes a defacto growth rate along mainline through and turning movements.

All study intersections are forecast to operate with LOS similar to existing conditions, with all movements operating at LOS D or better during the AM and PM peak hour conditions except at the Olinda Road/Baldwin Avenue/Makawao Avenue intersection, where the eastbound and westbound approaches are forecast to continue operating at LOS E/F and over-capacity conditions during the AM and PM peak hours. The northbound/southbound approaches during the AM peak hour and the westbound approach during the PM peak hour will also worsen to LOS E conditions. With Base Year 2017 growth, traffic is anticipated to increase by approximately 6% at the intersection. Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended.

6.3 Future Year 2017 with the Project

The Project is proposed to subdivide the 258 acres into 43 residential dwelling units, and provide a Farm Market and space for a Hula Halau, two barns, farming space and Native Habitat. It was determined that the 43 residential dwelling units and Farm Market will be the only land uses that generate trips during the AM and PM peak hours of traffic. The Project is anticipated to generate approximately 61 AM peak hour trips and 118 PM peak hour trips. Trips

generated by the Project is anticipated to increase traffic by approximately 3.4% from Base Year 2017 conditions, at the Olinda Road/Baldwin Avenue/Makawao Avenue intersection during the AM/PM peak hours of traffic. Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended.

Impacts to the five (5) Project driveways are anticipated to be minimal, with the highest turning movement generating under 35 vehicles during any peak hour. In combination with relatively low mainline throughput traffic under 150 vehicles in either direction along Piiholo Road, turn lanes are likely not needed.

7. RECOMMENDATIONS

Existing Conditions

- Olinda Road/Baldwin Avenue/Makawao Avenue - Due to the existing intersection right-of-way (ROW) and sight distance constraints, the installation of a traffic control signal, roundabout, and/or any auxiliary improvements are not recommended. All-way stop control should be maintained.

Future Year 2017

- No significant Project impact. Therefore, no additional improvements recommended.

8. REFERENCES

1. Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009.
2. Institute of Transportation Engineers, Trip Generation, 9th Edition, 2012.
3. Transportation Research Board, Highway Capacity Manual, 2010.

Y:\2014\14-552\Report

APPENDICES

APPENDIX A

TRAFFIC COUNT DATA

Austin Tsutsumi & Associates

501 Sumner Street Suite 521
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Phone:(808) 533-3646 Fax:(808) 526-1267

File Name : AM_Makawao Ave - Piiholo Rd
Site Code : 00000000
Start Date : 12/17/2014
Page No : 1

Groups Printed- Unshifted

	MAKAWAO AVE From North					PIIHOLO RD From East					MAKAWAO AVE From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	99	2	0	101	5	0	27	0	32	5	12	0	0	17	0	0	0	0	0	150
07:15 AM	0	106	4	0	110	4	0	23	0	27	11	38	0	0	49	0	0	0	0	0	186
07:30 AM	0	83	1	0	84	3	0	30	0	33	7	50	0	0	57	0	0	0	0	0	174
07:45 AM	0	75	2	0	77	0	0	19	0	19	17	56	0	0	73	0	0	0	0	0	169
Total	0	363	9	0	372	12	0	99	0	111	40	156	0	0	196	0	0	0	0	0	679
08:00 AM	0	56	0	0	56	3	0	15	0	18	17	59	0	0	76	0	0	0	0	0	150
08:15 AM	0	66	2	0	68	2	0	18	0	20	14	43	0	0	57	0	0	0	0	0	145
08:30 AM	0	70	1	0	71	1	0	13	0	14	9	55	0	0	64	0	0	0	0	0	149
08:45 AM	0	41	0	0	41	0	0	12	0	12	11	33	0	0	44	0	0	0	0	0	97
Total	0	233	3	0	236	6	0	58	0	64	51	190	0	0	241	0	0	0	0	0	541
Grand Total	0	596	12	0	608	18	0	157	0	175	91	346	0	0	437	0	0	0	0	0	1220
Apprch %	0	98	2	0		10.3	0	89.7	0		20.8	79.2	0	0		0	0	0	0		
Total %	0	48.9	1	0	49.8	1.5	0	12.9	0	14.3	7.5	28.4	0	0	35.8	0	0	0	0	0	

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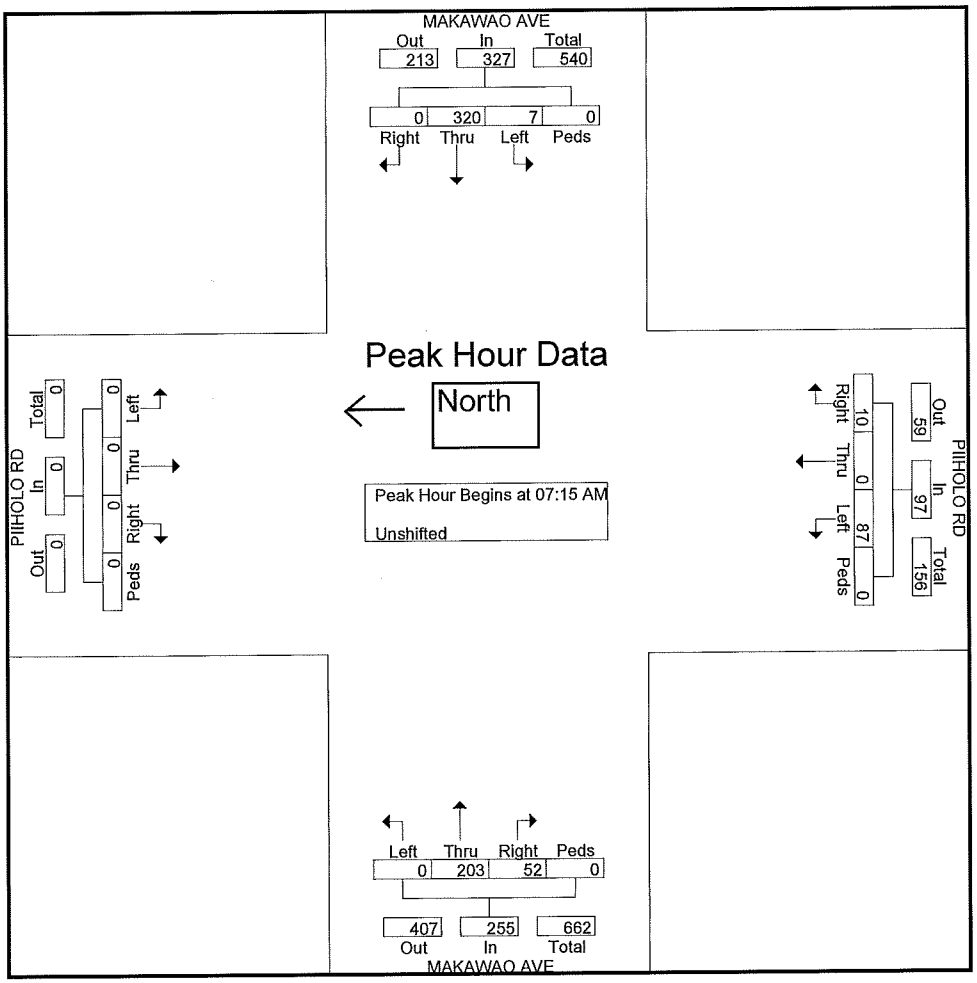
Page No : 2

	MAKAWAO AVE From North					PIIHOLO RD From East					MAKAWAO AVE From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	**106**	**4**	0	**110**	**4**	0	23	0	27	11	38	0	0	49	0	0	0	0	0	**186**
07:30 AM	0	83	1	0	84	3	0	**30**	0	**33**	7	50	0	0	57	0	0	0	0	0	174
07:45 AM	0	75	2	0	77	0	0	19	0	19	**17**	56	0	0	73	0	0	0	0	0	169
08:00 AM	0	56	0	0	56	3	0	15	0	18	17	**59**	0	0	**76**	0	0	0	0	0	150
Total Volume	0	320	7	0	327	10	0	87	0	97	52	203	0	0	255	0	0	0	0	0	679
% App. Total	0	97.9	2.1	0		10.3	0	89.7	0		20.4	79.6	0	0		0	0	0	0		
PHF	.000	.755	.438	.000	.743	.625	.000	.725	.000	.735	.765	.860	.000	.000	.839	.000	.000	.000	.000	.000	.913



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File Name : AM_Brewer Rd - Baldwin Ave
Site Code : 00000000
Start Date : 12/17/2014
Page No : 1

Groups Printed- Unshifted

	BREWER RD From North					BALDWIN AVE From East					BREWER RD From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	26	3	0	29	24	0	0	0	24	0	76	0	0	76	129
07:15 AM	0	0	0	0	0	0	33	0	0	33	32	0	5	0	37	0	99	0	0	99	169
07:30 AM	0	0	0	0	0	0	35	2	0	37	31	0	8	0	39	0	129	0	0	129	205
07:45 AM	0	0	0	0	0	0	39	3	0	42	14	0	2	0	16	0	70	0	0	70	128
Total	0	0	0	0	0	0	133	8	0	141	101	0	15	0	116	0	374	0	0	374	631
08:00 AM	0	0	0	0	0	0	34	5	0	39	2	0	1	0	3	0	26	0	0	26	68
08:15 AM	0	0	0	0	0	0	32	9	0	41	11	0	3	0	14	0	44	0	0	44	99
08:30 AM	0	0	0	0	0	0	41	3	0	44	5	0	0	0	5	0	43	0	0	43	92
08:45 AM	0	0	0	0	0	0	30	3	0	33	6	0	2	0	8	1	38	0	0	39	80
Total	0	0	0	0	0	0	137	20	0	157	24	0	6	0	30	1	151	0	0	152	339
Grand Total	0	0	0	0	0	0	270	28	0	298	125	0	21	0	146	1	525	0	0	526	970
Apprch %	0	0	0	0		0	90.6	9.4	0		85.6	0	14.4	0		0.2	99.8	0	0		
Total %	0	0	0	0	0	0	27.8	2.9	0	30.7	12.9	0	2.2	0	15.1	0.1	54.1	0	0	54.2	

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Start Date : 12/17/2014
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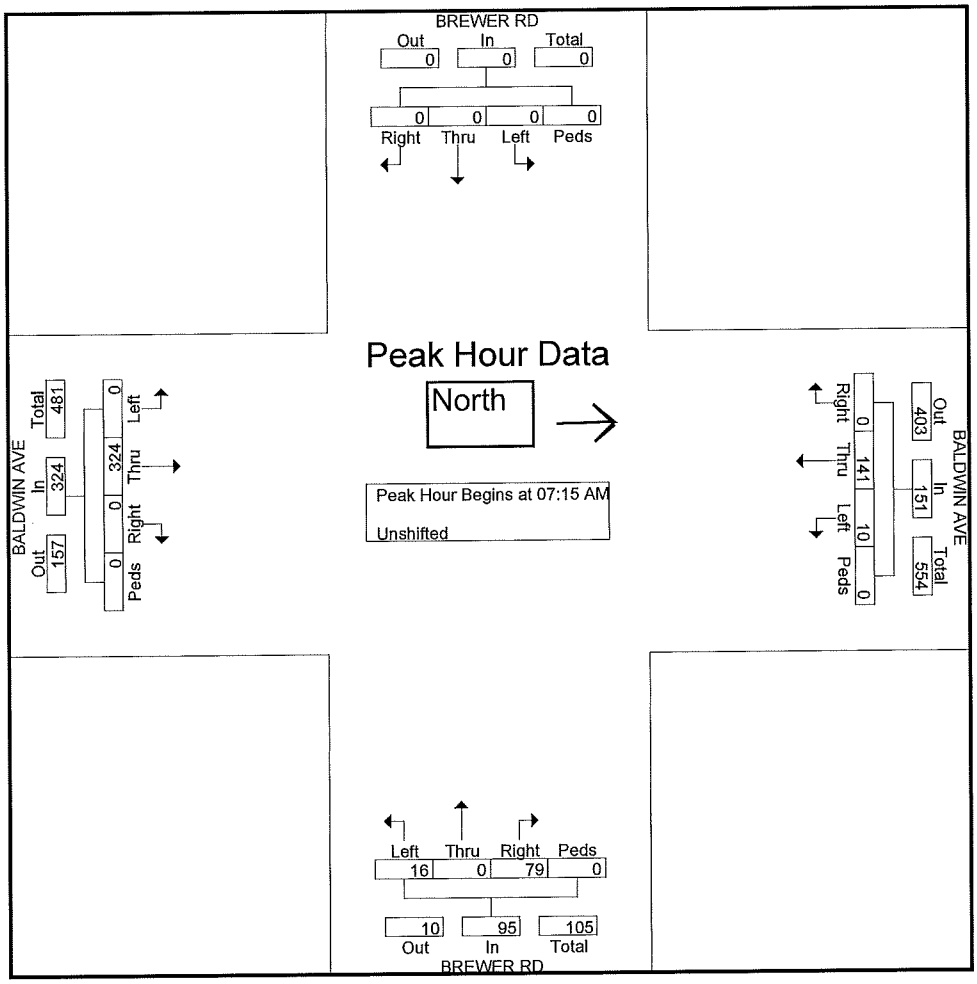
	BREWER RD From North					BALDWIN AVE From East					BREWER RD From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	33	0	0	33	**32**	0	5	0	37	0	99	0	0	99	169
07:30 AM	0	0	0	0	0	0	35	2	0	37	31	0	**8**	0	**39**	0	**129**	0	0	**129**	**205**
07:45 AM	0	0	0	0	0	0	**39**	3	0	**42**	14	0	2	0	16	0	70	0	0	70	128
08:00 AM	0	0	0	0	0	0	34	**5**	0	39	2	0	1	0	3	0	26	0	0	26	68
Total Volume	0	0	0	0	0	0	141	10	0	151	79	0	16	0	95	0	324	0	0	324	570
% App. Total	0	0	0	0		0	93.4	6.6	0		83.2	0	16.8	0		0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.904	.500	.000	.899	.617	.000	.500	.000	.609	.000	.628	.000	.000	.628	.695



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Site Code : 00000000
Start Date : 12/17/2014
Page No : 1

Groups Printed- Unshifted

	MAKAWAO AVE From North					BALDWIN AVE From East					MAKAWAO AVE From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	4	91	5	2	102	3	21	6	3	33	6	21	48	1	76	28	6	4	0	38	249
07:15 AM	4	80	14	0	98	17	32	13	0	62	2	37	57	8	104	29	16	7	0	52	316
07:30 AM	5	81	13	0	99	15	41	9	0	65	1	43	60	1	105	37	13	9	1	60	329
07:45 AM	8	75	11	3	97	10	17	9	3	39	2	63	37	13	115	48	11	13	0	72	323
Total	21	327	43	5	396	45	111	37	6	199	11	164	202	23	400	142	46	33	1	222	1217
08:00 AM	6	74	9	2	91	13	11	20	0	44	5	70	19	6	100	27	6	5	0	38	273
08:15 AM	7	64	12	4	87	12	18	12	1	43	9	38	28	10	85	28	11	6	0	45	260
08:30 AM	1	59	25	7	92	11	17	13	1	42	11	53	33	3	100	27	20	5	0	52	286
08:45 AM	6	68	17	1	92	11	18	19	1	49	13	70	26	5	114	20	10	5	2	37	292
Total	20	265	63	14	362	47	64	64	3	178	38	231	106	24	399	102	47	21	2	172	1111
Grand Total	41	592	106	19	758	92	175	101	9	377	49	395	308	47	799	244	93	54	3	394	2328
Apprch %	5.4	78.1	14	2.5		24.4	46.4	26.8	2.4		6.1	49.4	38.5	5.9		61.9	23.6	13.7	0.8		
Total %	1.8	25.4	4.6	0.8	32.6	4	7.5	4.3	0.4	16.2	2.1	17	13.2	2	34.3	10.5	4	2.3	0.1	16.9	

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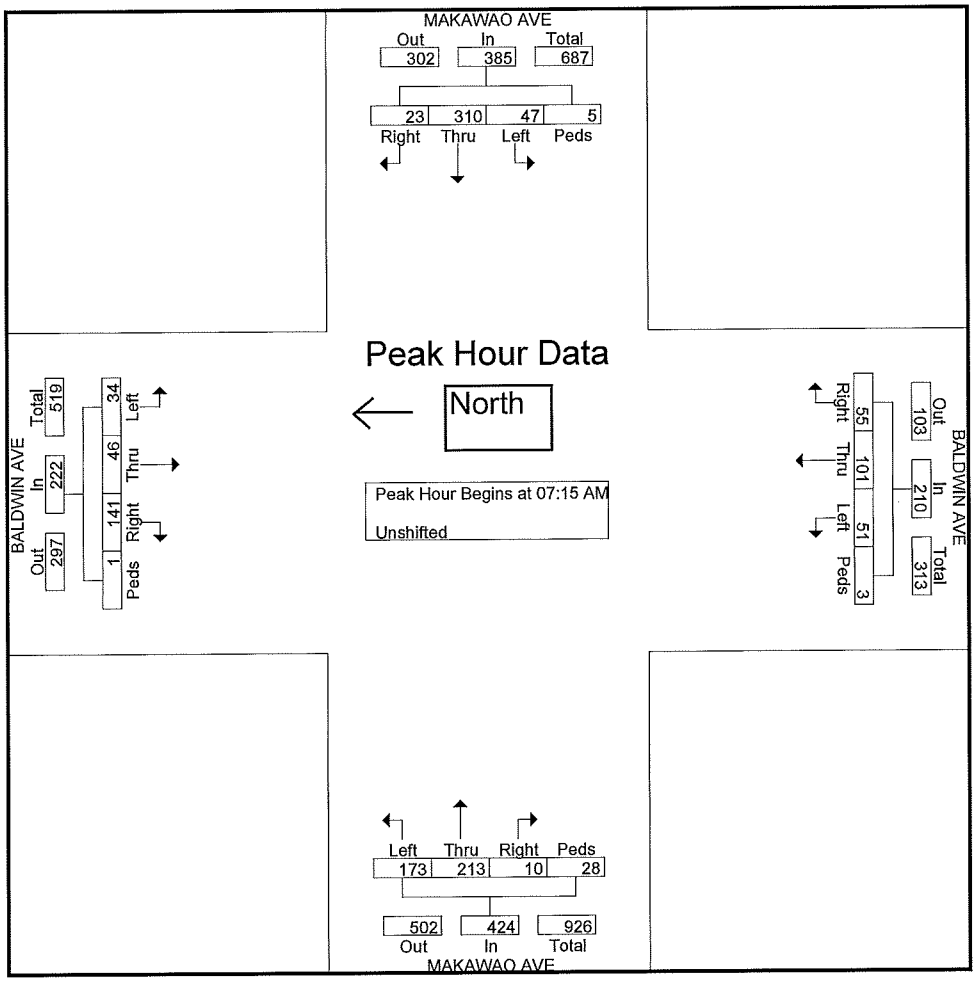
	MAKAWAO AVE From North					BALDWIN AVE From East					MAKAWAO AVE From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	4	80	**14**	0	98	**17**	32	13	0	62	2	37	57	8	104	29	**16**	7	0	52	316
07:30 AM	5	**81**	13	0	**99**	15	**41**	9	0	**65**	1	43	**60**	1	105	37	13	9	**1**	60	**329**
07:45 AM	**8**	75	11	**3**	97	10	17	9	**3**	39	2	63	37	**13**	**115**	**48**	11	**13**	0	**72**	323
08:00 AM	6	74	9	2	91	13	11	**20**	0	44	**5**	**70**	19	6	100	27	6	5	0	38	273
Total Volume	23	310	47	5	385	55	101	51	3	210	10	213	173	28	424	141	46	34	1	222	1241
% App. Total	6	80.5	12.2	1.3		26.2	48.1	24.3	1.4		2.4	50.2	40.8	6.6		63.5	20.7	15.3	0.5		
PHF	.719	.957	.839	.417	.972	.809	.616	.638	.250	.808	.500	.761	.721	.538	.922	.734	.719	.654	.250	.771	.943



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File Name : AM_Makawao Ave - Brewer Rd
Site Code : 00000000
Start Date : 12/17/2014
Page No : 1

Groups Printed- Unshifted

	MAKAWAO AVE From North					BREWER RD From East					MAKAWAO AVE From South					BREWER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	26	111	0	0	137	0	0	0	0	0	0	28	1	0	29	1	0	3	0	4	170
07:15 AM	33	109	0	0	142	0	0	0	0	0	0	53	2	0	55	1	0	0	0	1	198
07:30 AM	39	100	0	0	139	0	0	0	0	0	0	67	0	0	67	1	0	2	0	3	209
07:45 AM	14	90	0	0	104	0	0	0	0	0	0	86	2	0	88	0	0	3	0	3	195
Total	112	410	0	0	522	0	0	0	0	0	0	234	5	0	239	3	0	8	0	11	772
08:00 AM	3	78	0	0	81	0	0	0	0	0	0	83	2	0	85	0	0	5	0	5	171
08:15 AM	13	82	0	0	95	0	0	0	0	0	0	56	0	0	56	3	0	7	0	10	161
08:30 AM	5	84	0	0	89	0	0	0	0	0	0	67	1	0	68	1	0	3	0	4	161
08:45 AM	9	91	0	0	100	0	0	0	0	0	0	80	5	0	85	1	0	4	0	5	190
Total	30	335	0	0	365	0	0	0	0	0	0	286	8	0	294	5	0	19	0	24	683
Grand Total	142	745	0	0	887	0	0	0	0	0	0	520	13	0	533	8	0	27	0	35	1455
Apprch %	16	84	0	0		0	0	0	0		0	97.6	2.4	0		22.9	0	77.1	0		
Total %	9.8	51.2	0	0	61	0	0	0	0	0	0	35.7	0.9	0	36.6	0.5	0	1.9	0	2.4	

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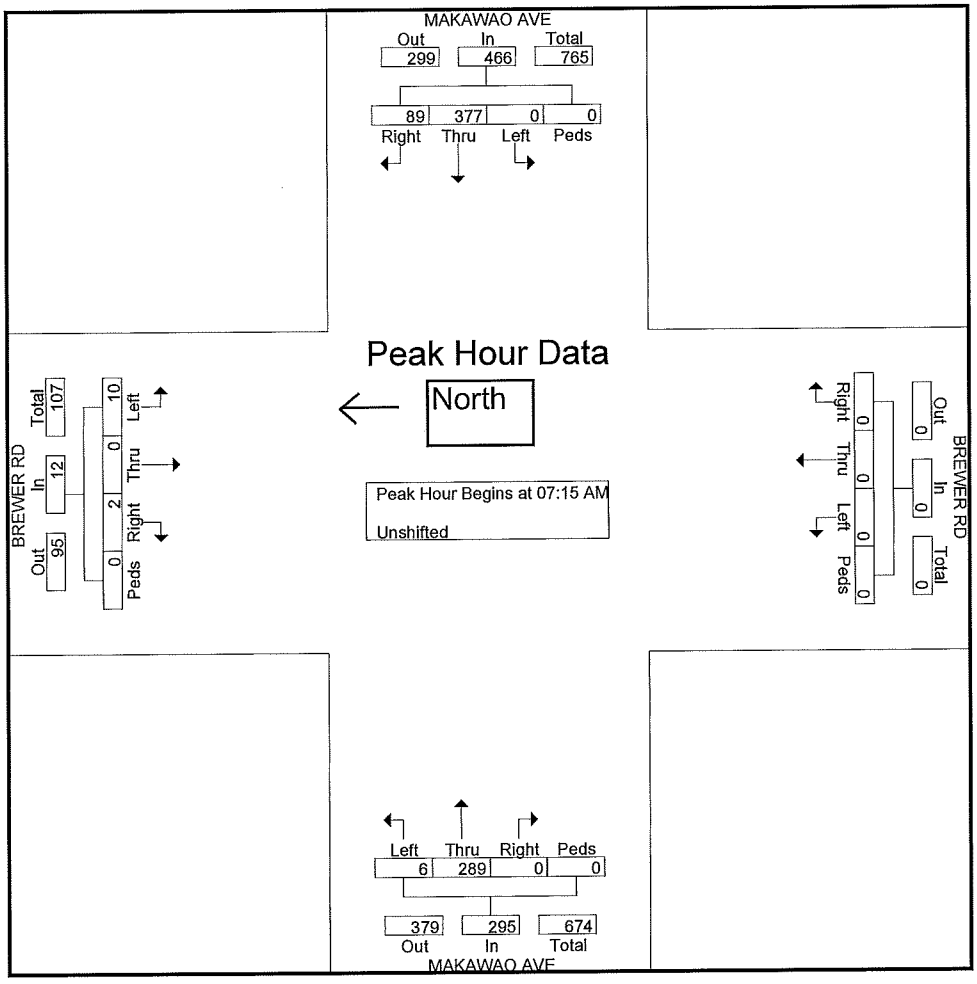
File Name : AM_Makawao Ave - Brewer Rd
Site Code : 00000000
Start Date : 12/17/2014
Page No : 2

	MAKAWAO AVE From North					BREWER RD From East					MAKAWAO AVE From South					BREWER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	33	**109**	0	0	**142**	0	0	0	0	0	0	53	**2**	0	55	**1**	0	0	0	1	198
07:30 AM	**39**	100	0	0	139	0	0	0	0	0	0	67	0	0	67	1	0	2	0	3	**209**
07:45 AM	14	90	0	0	104	0	0	0	0	0	0	**86**	2	0	**88**	0	0	3	0	3	195
08:00 AM	3	78	0	0	81	0	0	0	0	0	0	83	2	0	85	0	0	**5**	0	**5**	171
Total Volume	89	377	0	0	466	0	0	0	0	0	0	289	6	0	295	2	0	10	0	12	773
% App. Total	19.1	80.9	0	0		0	0	0	0		0	98	2	0		16.7	0	83.3	0		
PHF	.571	.865	.000	.000	.820	.000	.000	.000	.000	.000	.000	.840	.750	.000	.838	.500	.000	.500	.000	.600	.925



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File Name : AM_Waiahiwi Rd - Piiholo Rd
Site Code : 00000000
Start Date : 12/17/2014
Page No : 1

Groups Printed- Unshifted

	WAIAHIWI RD From North					PIIHOLO RD From East					WAIAHIWI RD From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	1	0	1	3	0	0	0	3	0	20	0	0	20	24
07:15 AM	0	0	0	0	0	0	7	1	0	8	7	0	0	0	7	0	16	0	0	16	31
07:30 AM	0	0	0	0	0	0	3	0	0	3	4	0	0	0	4	0	17	0	0	17	24
07:45 AM	0	0	0	0	0	0	9	5	0	14	1	0	1	0	2	0	9	0	0	9	25
Total	0	0	0	0	0	0	19	7	0	26	15	0	1	0	16	0	62	0	0	62	104
08:00 AM	0	0	0	0	0	0	6	10	0	16	8	0	0	0	8	0	7	0	0	7	31
08:15 AM	0	0	0	0	0	0	12	7	0	19	3	0	0	0	3	0	10	0	0	10	32
08:30 AM	0	0	0	0	0	0	4	3	0	7	3	0	0	0	3	0	10	0	0	10	20
08:45 AM	0	0	0	0	0	0	9	1	0	10	4	0	0	0	4	0	11	0	0	11	25
Total	0	0	0	0	0	0	31	21	0	52	18	0	0	0	18	0	38	0	0	38	108
Grand Total	0	0	0	0	0	0	50	28	0	78	33	0	1	0	34	0	100	0	0	100	212
Apprch %	0	0	0	0		0	64.1	35.9	0		97.1	0	2.9	0		0	100	0	0		
Total %	0	0	0	0	0	0	23.6	13.2	0	36.8	15.6	0	0.5	0	16	0	47.2	0	0	47.2	

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Site Code : 00000000
Start Date : 12/17/2014
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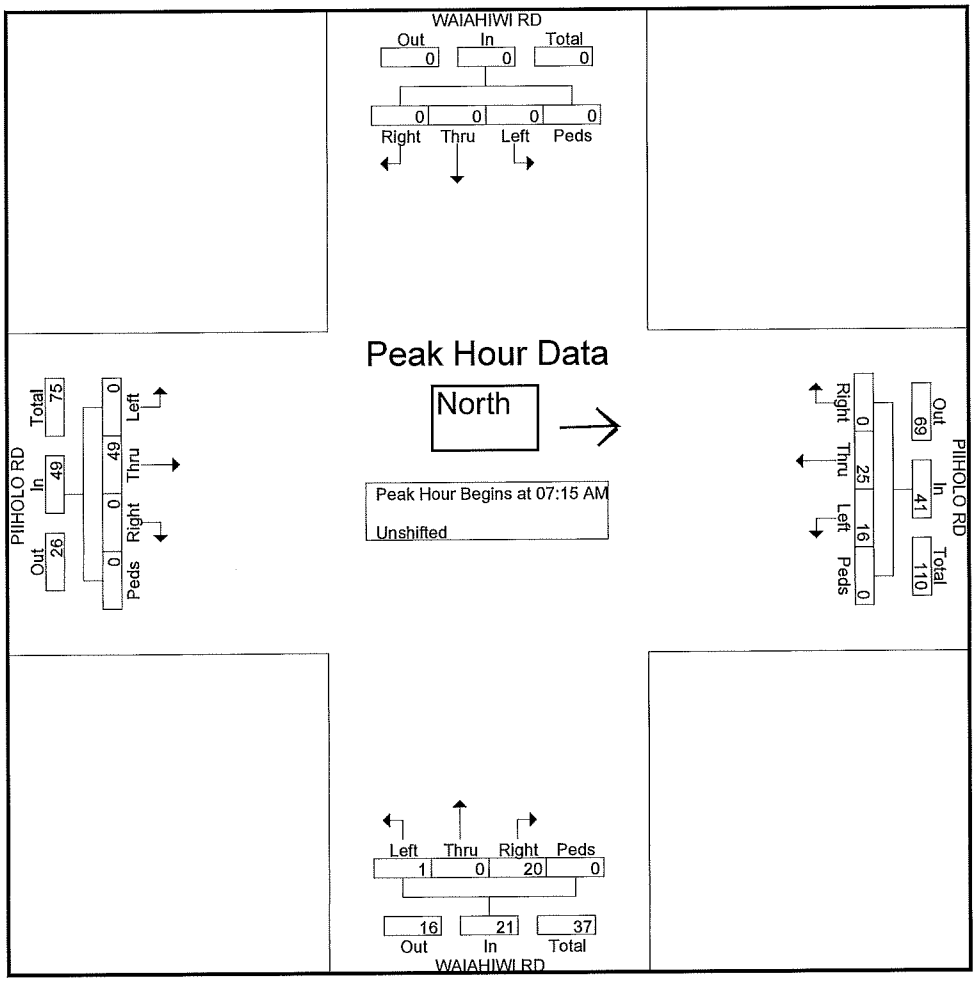
	WAIAHIWI RD From North					PIIHOLO RD From East					WAIAHIWI RD From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 08:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	7	1	0	8	7	0	0	0	7	0	16	0	0	16	**31**
07:30 AM	0	0	0	0	0	0	3	0	0	3	4	0	0	0	4	0	**17**	0	0	**17**	24
07:45 AM	0	0	0	0	0	0	**9**	5	0	14	1	0	**1**	0	2	0	9	0	0	9	25
08:00 AM	0	0	0	0	0	0	6	**10**	0	**16**	**8**	0	0	0	**8**	0	7	0	0	7	31
Total Volume	0	0	0	0	0	0	25	16	0	41	20	0	1	0	21	0	49	0	0	49	111
% App. Total	0	0	0	0		0	61	39	0		95.2	0	4.8	0		0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.694	.400	.000	.641	.625	.000	.250	.000	.656	.000	.721	.000	.000	.721	.895



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File Name : PM_Makawao Ave - Piiholo Rd
Site Code : 00000000
Start Date : 12/16/2014
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Groups Printed- Unshifted

	MAKAWAO AVE From North					PIIHOLO RD From East					MAKAWAO AVE From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	0	60	1	0	61	3	0	15	0	18	19	65	0	0	84	0	0	0	0	0	163
03:15 PM	0	64	2	0	66	4	0	25	0	29	10	66	0	0	76	0	0	0	0	0	171
03:30 PM	0	60	2	0	62	4	0	12	0	16	11	62	0	0	73	0	0	0	0	0	151
03:45 PM	0	55	2	0	57	3	0	13	0	16	12	56	0	0	68	0	0	0	0	0	141
Total	0	239	7	0	246	14	0	65	0	79	52	249	0	0	301	0	0	0	0	0	626
04:00 PM	0	47	1	0	48	4	0	14	0	18	17	83	0	0	100	0	0	0	0	0	166
04:15 PM	0	53	3	0	56	4	0	17	0	21	18	72	0	0	90	0	0	0	0	0	167
04:30 PM	0	62	2	0	64	3	0	19	0	22	10	87	0	0	97	0	0	0	0	0	183
04:45 PM	0	55	3	0	58	0	0	9	0	9	13	62	0	0	75	0	0	0	0	0	142
Total	0	217	9	0	226	11	0	59	0	70	58	304	0	0	362	0	0	0	0	0	658
Grand Total	0	456	16	0	472	25	0	124	0	149	110	553	0	0	663	0	0	0	0	0	1284
Apprch %	0	96.6	3.4	0		16.8	0	83.2	0		16.6	83.4	0	0		0	0	0	0		
Total %	0	35.5	1.2	0	36.8	1.9	0	9.7	0	11.6	8.6	43.1	0	0	51.6	0	0	0	0	0	

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File Name : PM_Makawao Ave - Piiholo Rd
Site Code : 00000000
Start Date : 12/16/2014
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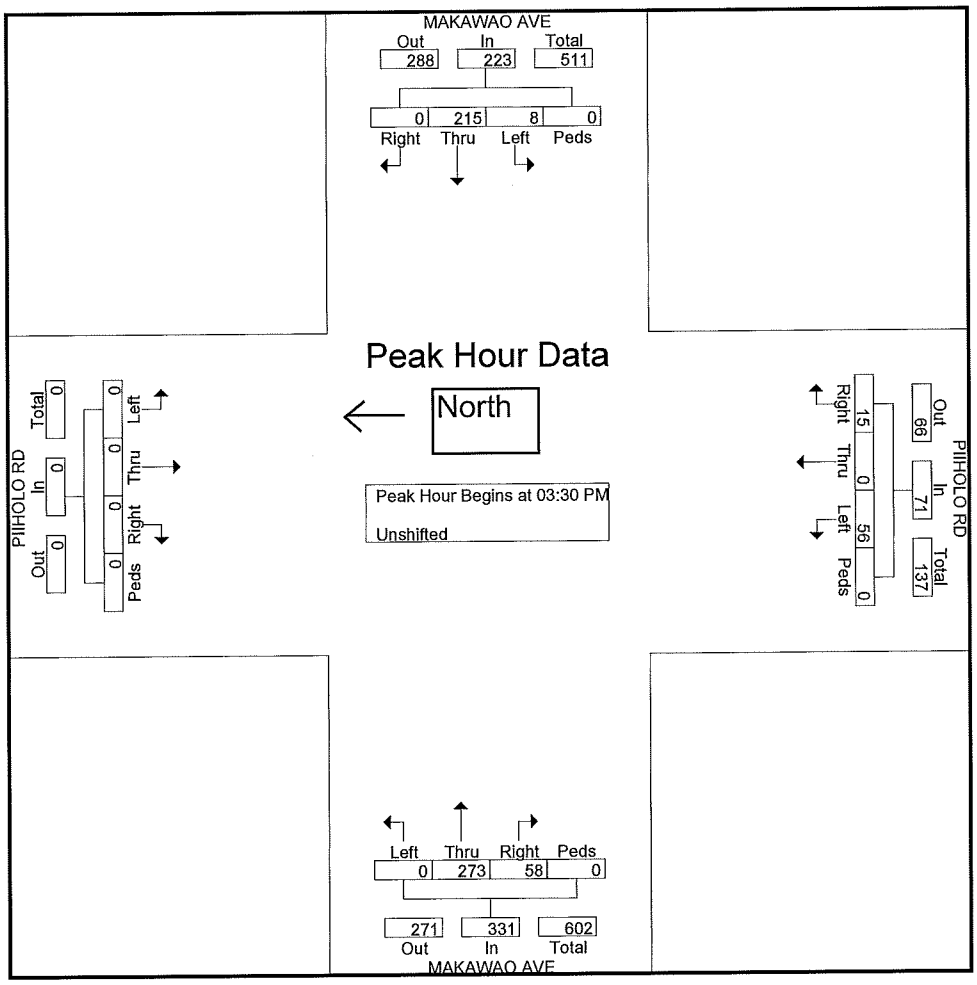
	MAKAWAO AVE From North					PIIHOLO RD From East					MAKAWAO AVE From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	**60**	2	0	**62**	**4**	0	12	0	16	11	62	0	0	73	0	0	0	0	0	151
03:45 PM	0	55	2	0	57	3	0	13	0	16	12	56	0	0	68	0	0	0	0	0	141
04:00 PM	0	47	1	0	48	4	0	14	0	18	17	**83**	0	0	**100**	0	0	0	0	0	166
04:15 PM	0	53	**3**	0	56	4	0	**17**	0	**21**	**18**	72	0	0	90	0	0	0	0	0	**167**
Total Volume	0	215	8	0	223	15	0	56	0	71	58	273	0	0	331	0	0	0	0	0	625
% App. Total	0	96.4	3.6	0		21.1	0	78.9	0		17.5	82.5	0	0		0	0	0	0		
PHF	.000	.896	.667	.000	.899	.938	.000	.824	.000	.845	.806	.822	.000	.000	.828	.000	.000	.000	.000	.000	.936



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File Name : PM_Brewer Rd - Baldwin Ave
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Start Date : 12/16/2014
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Groups Printed- Unshifted

	BREWER RD From North					BALDWIN AVE From East					BREWER RD From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	0	0	0	0	0	0	43	9	0	52	10	0	2	0	12	0	46	0	0	46	110
03:15 PM	0	0	0	0	0	0	48	8	0	56	12	0	1	0	13	0	53	0	0	53	122
03:30 PM	0	0	0	0	0	0	43	8	0	51	4	0	0	0	4	0	49	0	0	49	104
03:45 PM	0	0	0	0	0	0	52	3	0	55	5	0	0	0	5	0	52	0	0	52	112
Total	0	0	0	0	0	0	186	28	0	214	31	0	3	0	34	0	200	0	0	200	448
04:00 PM	0	0	0	0	0	0	49	10	0	59	2	0	0	1	3	0	36	0	0	36	98
04:15 PM	0	0	0	0	0	0	45	8	0	53	10	0	1	0	11	0	29	0	0	29	93
04:30 PM	0	0	0	0	0	0	40	5	0	45	2	0	2	0	4	1	31	0	0	32	81
04:45 PM	0	0	0	0	0	0	51	14	0	65	2	0	0	0	2	1	35	0	3	39	106
Total	0	0	0	0	0	0	185	37	0	222	16	0	3	1	20	2	131	0	3	136	378
Grand Total	0	0	0	0	0	0	371	65	0	436	47	0	6	1	54	2	331	0	3	336	826
Apprch %	0	0	0	0		0	85.1	14.9	0		87	0	11.1	1.9		0.6	98.5	0	0.9		
Total %	0	0	0	0	0	0	44.9	7.9	0	52.8	5.7	0	0.7	0.1	6.5	0.2	40.1	0	0.4	40.7	

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Start Date : 12/16/2014
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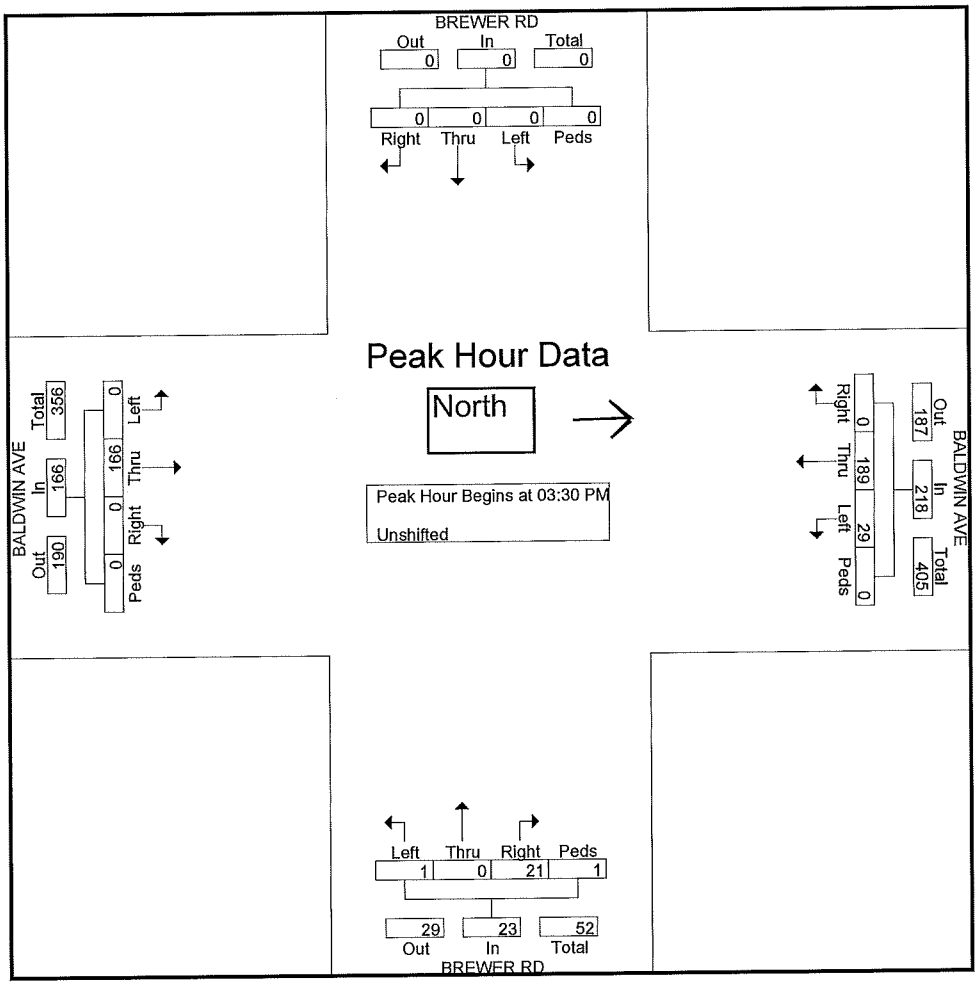
	BREWER RD From North					BALDWIN AVE From East					BREWER RD From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	0	0	0	0	0	43	8	0	51	4	0	0	0	4	0	49	0	0	49	104
03:45 PM	0	0	0	0	0	0	**52**	3	0	55	5	0	0	0	5	0	**52**	0	0	**52**	**112**
04:00 PM	0	0	0	0	0	0	49	**10**	0	**59**	2	0	0	**1**	3	0	36	0	0	36	98
04:15 PM	0	0	0	0	0	0	45	8	0	53	**10**	0	**1**	0	**11**	0	29	0	0	29	93
Total Volume	0	0	0	0	0	0	189	29	0	218	21	0	1	1	23	0	166	0	0	166	407
% App. Total	0	0	0	0		0	86.7	13.3	0		91.3	0	4.3	4.3		0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.909	.725	.000	.924	.525	.000	.250	.250	.523	.000	.798	.000	.000	.798	.908



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File Name : PM_Makawao Ave - Baldwin Ave
Site Code : 00000000
Start Date : 12/16/2014
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Groups Printed- Unshifted

	MAKAWAO AVE From North					BALDWIN AVE From East					MAKAWAO AVE From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	6	56	11	6	79	19	16	14	3	52	8	71	36	3	118	42	10	4	0	56	305
03:15 PM	11	66	9	10	96	12	17	8	6	43	4	59	36	10	109	42	17	10	3	72	320
03:30 PM	6	84	6	6	102	9	11	13	3	36	7	53	42	18	120	35	8	5	3	51	309
03:45 PM	6	66	0	5	77	9	7	8	3	27	8	62	46	6	122	41	10	13	0	64	290
Total	29	272	26	27	354	49	51	43	15	158	27	245	160	37	469	160	45	32	6	243	1224
04:00 PM	2	62	8	4	76	8	6	6	1	21	4	77	40	5	126	40	13	17	0	70	293
04:15 PM	14	56	4	3	77	11	5	8	0	24	8	80	37	5	130	33	7	12	1	53	284
04:30 PM	10	70	2	10	92	11	5	5	3	24	4	78	32	6	120	47	9	12	2	70	306
04:45 PM	12	64	5	3	84	9	7	8	0	24	8	72	35	4	119	53	2	8	1	64	291
Total	38	252	19	20	329	39	23	27	4	93	24	307	144	20	495	173	31	49	4	257	1174
Grand Total	67	524	45	47	683	88	74	70	19	251	51	552	304	57	964	333	76	81	10	500	2398
Apprch %	9.8	76.7	6.6	6.9		35.1	29.5	27.9	7.6		5.3	57.3	31.5	5.9		66.6	15.2	16.2	2		
Total %	2.8	21.9	1.9	2	28.5	3.7	3.1	2.9	0.8	10.5	2.1	23	12.7	2.4	40.2	13.9	3.2	3.4	0.4	20.9	

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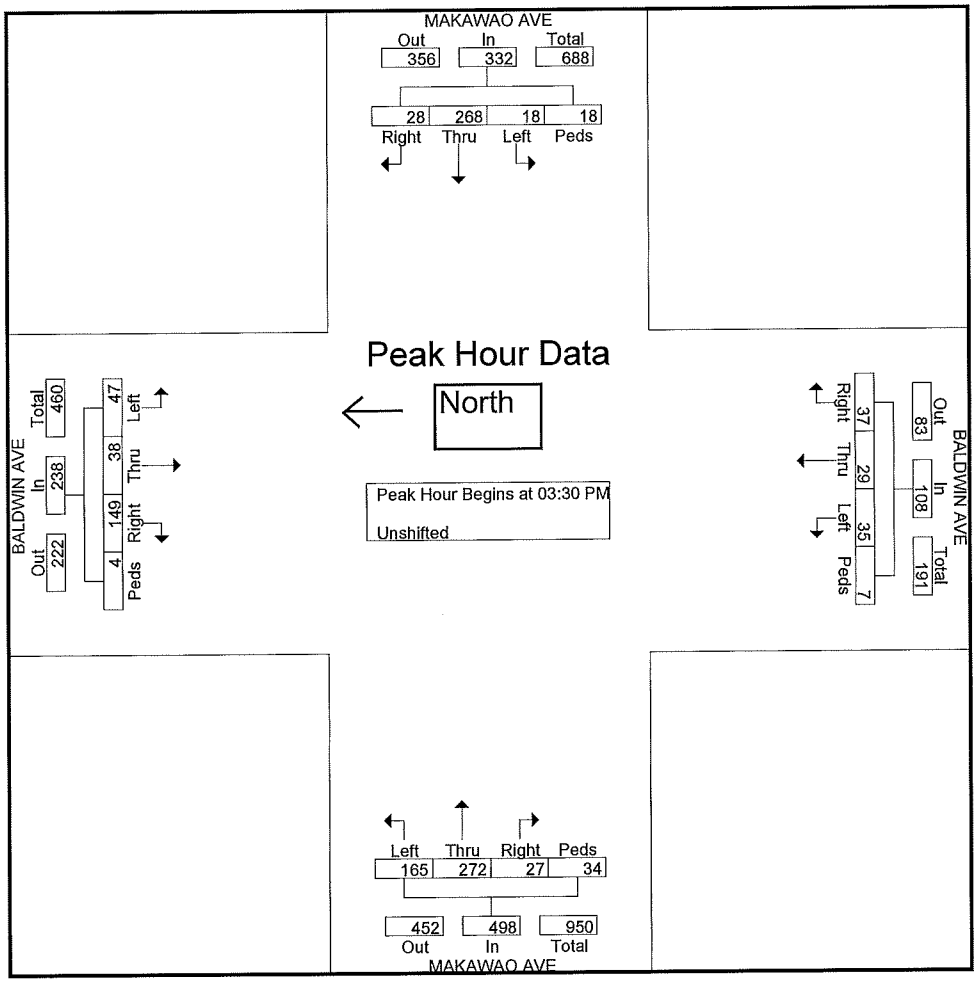
	MAKAWAO AVE From North					BALDWIN AVE From East					MAKAWAO AVE From South					BALDWIN AVE From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	6	**84**	6	**6**	**102**	9	**11**	**13**	**3**	**36**	7	53	42	**18**	120	35	8	5	**3**	51	**309**
03:45 PM	6	66	0	5	77	9	7	8	3	27	**8**	62	**46**	6	122	**41**	10	13	0	64	290
04:00 PM	2	62	**8**	4	76	8	6	6	1	21	4	77	40	5	126	40	**13**	**17**	0	**70**	293
04:15 PM	**14**	56	4	3	77	**11**	5	8	0	24	8	**80**	37	5	**130**	33	7	12	1	53	284
Total Volume	28	268	18	18	332	37	29	35	7	108	27	272	165	34	498	149	38	47	4	238	1176
% App. Total	8.4	80.7	5.4	5.4		34.3	26.9	32.4	6.5		5.4	54.6	33.1	6.8		62.6	16	19.7	1.7		
PHF	.500	.798	.563	.750	.814	.841	.659	.673	.583	.750	.844	.850	.897	.472	.958	.909	.731	.691	.333	.850	.951



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Groups Printed- Unshifted

	MAKAWAO AVE From North					BREWER RD From East					MAKAWAO AVE From South					BREWER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	11	74	0	0	85	0	0	0	0	0	0	90	1	0	91	0	0	9	0	9	185
03:15 PM	13	81	0	0	94	0	0	0	0	0	0	83	1	1	85	4	0	7	0	11	190
03:30 PM	7	87	0	0	94	0	0	0	0	0	0	67	1	0	68	5	0	7	0	12	174
03:45 PM	4	68	0	0	72	0	0	0	0	0	0	75	4	0	79	1	0	3	0	4	155
Total	35	310	0	0	345	0	0	0	0	0	0	315	7	1	323	10	0	26	0	36	704
04:00 PM	1	63	0	0	64	0	0	0	0	0	0	100	3	0	103	4	0	11	0	15	182
04:15 PM	8	75	0	0	83	0	0	0	0	0	0	94	6	0	100	2	0	7	0	9	192
04:30 PM	3	80	0	0	83	0	0	0	0	0	0	106	3	0	109	1	0	7	0	8	200
04:45 PM	1	77	0	0	78	0	0	0	0	0	0	87	2	0	89	3	0	13	0	16	183
Total	13	295	0	0	308	0	0	0	0	0	0	387	14	0	401	10	0	38	0	48	757
Grand Total	48	605	0	0	653	0	0	0	0	0	0	702	21	1	724	20	0	64	0	84	1461
Apprch %	7.4	92.6	0	0		0	0	0	0		0	97	2.9	0.1		23.8	0	76.2	0		
Total %	3.3	41.4	0	0	44.7	0	0	0	0	0	0	48	1.4	0.1	49.6	1.4	0	4.4	0	5.7	

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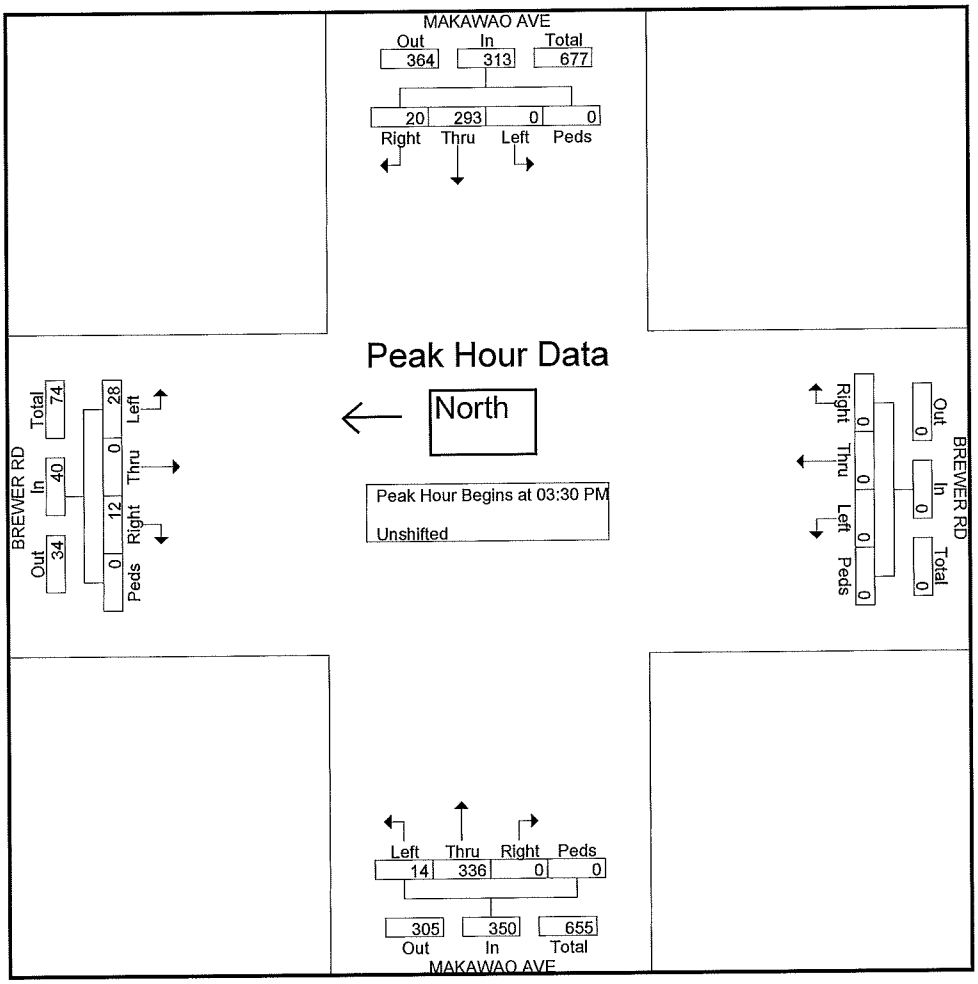
File Name : PM_Makawao Ave - Brewer Rd
Site Code : 00000000
Start Date : 12/16/2014
Page No : 2

	MAKAWAO AVE From North					BREWER RD From East					MAKAWAO AVE From South					BREWER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	7	**87**	0	0	**94**	0	0	0	0	0	0	67	1	0	68	**5**	0	7	0	12	174
03:45 PM	4	68	0	0	72	0	0	0	0	0	0	75	4	0	79	1	0	3	0	4	155
04:00 PM	1	63	0	0	64	0	0	0	0	0	0	**100**	3	0	**103**	4	0	**11**	0	**15**	182
04:15 PM	**8**	75	0	0	83	0	0	0	0	0	0	94	**6**	0	100	2	0	7	0	9	**192**
Total Volume	20	293	0	0	313	0	0	0	0	0	0	336	14	0	350	12	0	28	0	40	703
% App. Total	6.4	93.6	0	0		0	0	0	0		0	96	4	0		30	0	70	0		
PHF	.625	.842	.000	.000	.832	.000	.000	.000	.000	.000	.000	.840	.583	.000	.850	.600	.000	.636	.000	.667	.915



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File Name : PM_Waiahiwi Rd - Piiholo Rd
Site Code : 00000000
Start Date : 12/16/2014
Page No : 1

Groups Printed- Unshifted

	WAIAHIWI RD From North					PIIHOLO RD From East					WAIAHIWI RD From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
03:00 PM	0	0	0	0	0	0	10	7	0	17	2	0	0	0	2	0	7	0	0	7	26
03:15 PM	0	0	0	0	0	0	4	5	0	9	12	0	1	0	13	0	7	0	0	7	29
03:30 PM	0	0	0	0	0	0	8	3	0	11	2	0	0	0	2	0	7	0	0	7	20
03:45 PM	0	0	0	0	0	0	8	3	0	11	4	0	0	0	4	0	4	0	0	4	19
Total	0	0	0	0	0	0	30	18	0	48	20	0	1	0	21	0	25	0	0	25	94
04:00 PM	0	0	0	0	0	0	14	2	0	16	6	0	0	0	6	0	8	0	0	8	30
04:15 PM	0	0	0	0	0	0	15	5	0	20	13	0	0	0	13	0	3	0	0	3	36
04:30 PM	0	0	0	0	0	0	9	2	0	11	4	0	0	0	4	0	5	0	0	5	20
04:45 PM	0	0	0	0	0	0	14	4	0	18	0	0	0	0	0	0	5	0	0	5	23
Total	0	0	0	0	0	0	52	13	0	65	23	0	0	0	23	0	21	0	0	21	109
Grand Total	0	0	0	0	0	0	82	31	0	113	43	0	1	0	44	0	46	0	0	46	203
Apprch %	0	0	0	0		0	72.6	27.4	0		97.7	0	2.3	0		0	100	0	0		
Total %	0	0	0	0	0	0	40.4	15.3	0	55.7	21.2	0	0.5	0	21.7	0	22.7	0	0	22.7	

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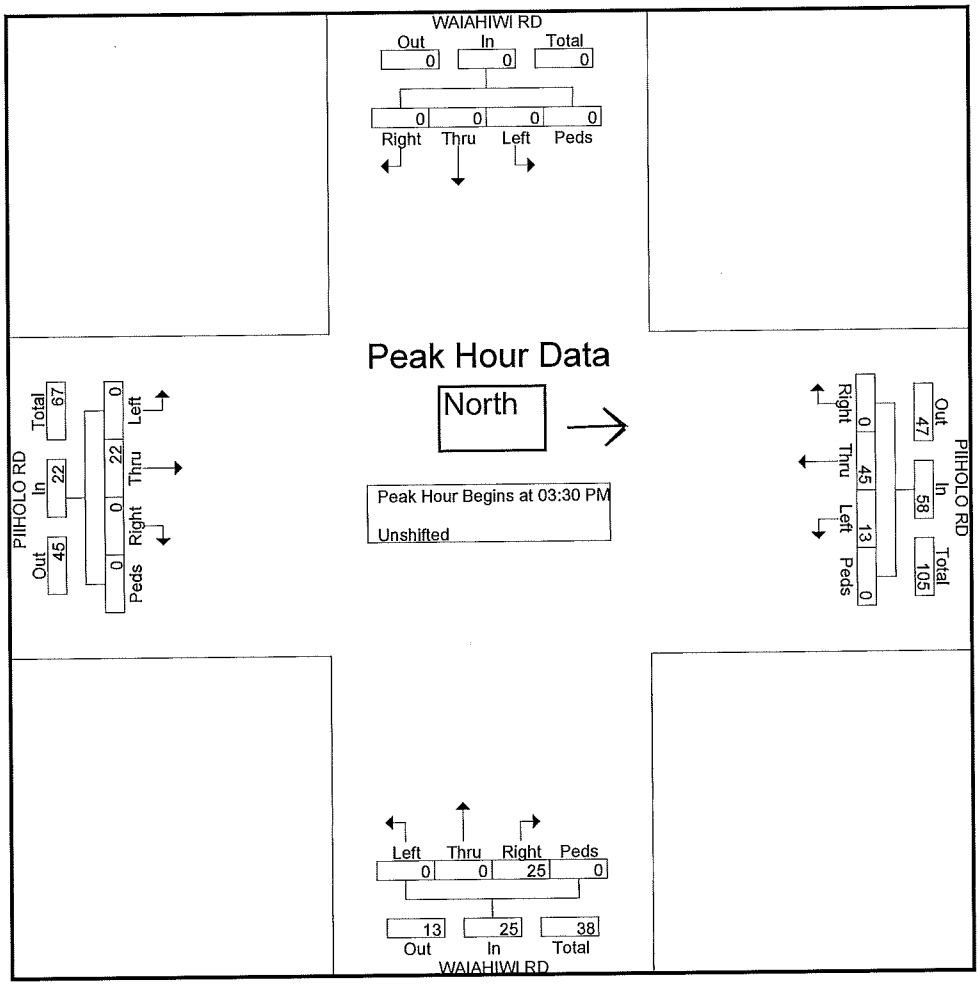
	WAIAHIWI RD From North					PIIHOLO RD From East					WAIAHIWI RD From South					PIIHOLO RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 04:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 03:30 PM																					
03:30 PM	0	0	0	0	0	0	8	3	0	11	2	0	0	0	2	0	7	0	0	7	20
03:45 PM	0	0	0	0	0	0	8	3	0	11	4	0	0	0	4	0	4	0	0	4	19
04:00 PM	0	0	0	0	0	0	14	2	0	16	6	0	0	0	6	0	**8**	0	0	**8**	30
04:15 PM	0	0	0	0	0	0	**15**	**5**	0	**20**	**13**	0	0	0	**13**	0	3	0	0	3	**36**
Total Volume	0	0	0	0	0	0	45	13	0	58	25	0	0	0	25	0	22	0	0	22	105
% App. Total	0	0	0	0		0	77.6	22.4	0		100	0	0	0		0	100	0	0		
PHF	.000	.000	.000	.000	.000	.000	.750	.650	.000	.725	.481	.000	.000	.000	.481	.000	.688	.000	.000	.688	.729



APPENDIX B

LEVEL OF SERVICE CRITERIA

APPENDIX B – LEVEL OF SERVICE (LOS) CRITERIA

VEHICULAR LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS (HCM 2010)

Level of service for vehicles at signalized intersections is directly related to delay values and is assigned on that basis. Level of Service is a measure of the acceptability of delay values to motorists at a given intersection. The criteria are given in the table below.

Level-of Service Criteria for Signalized Intersections

Level of Service	Control Delay per Vehicle (sec./veh.)
A	< 10.0
B	>10.0 and ≤ 20.0
C	>20.0 and ≤ 35.0
D	>35.0 and ≤ 55.0
E	>55.0 and ≤ 80.0
F	> 80.0

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

VEHICULAR LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 2010)

The level of service criteria for vehicles at unsignalized intersections is defined as the average control delay, in seconds per vehicle.

LOS delay threshold values are lower for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections than those of signalized intersections. This is because more vehicles pass through signalized intersections, and therefore, drivers expect and tolerate greater delays. While the criteria for level of service for TWSC and AWSC intersections are the same, procedures to calculate the average total delay may differ.

Level of Service Criteria for Two-Way Stop-Controlled Intersections

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	> 50

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

APPENDIX C-1

LEVEL OF SERVICE CALCULATIONS

- Existing AM Peak

Intersection	
Intersection Delay, s/veh	52
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	173	213	10	0	47	310	23	0	51	101	55
Peak Hour Factor	0.92	0.72	0.76	0.50	0.92	0.84	0.96	0.72	0.92	0.64	0.62	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	240	280	20	0	56	323	32	0	80	163	68
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	72.5	56.5	32.3
HCM LOS	F	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	44%	12%	15%
Vol Thru, %	49%	54%	82%	21%
Vol Right, %	27%	3%	6%	64%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	207	396	380	221
LT Vol	51	173	47	34
Through Vol	101	213	310	46
RT Vol	55	10	23	141
Lane Flow Rate	310	541	411	307
Geometry Grp	1	1	1	1
Degree of Util (X)	0.738	1	0.931	0.714
Departure Headway (Hd)	8.557	8.327	8.162	8.375
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	422	438	444	429
Service Time	6.632	6.327	6.232	6.45
HCM Lane V/C Ratio	0.735	1.235	0.926	0.716
HCM Control Delay	32.3	72.5	56.5	29.9
HCM Lane LOS	D	F	F	D
HCM 95th-tile Q	5.9	12.7	10.6	5.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	34	46	141
Peak Hour Factor	0.92	0.65	0.72	0.74
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	52	64	191
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	29.9
HCM LOS	D

Lane

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	16	79	324	0	10	141
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	86	352	0	11	153

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	527	352	0	0	352	0
Stage 1	352	-	-	-	-	-
Stage 2	175	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	512	692	-	-	1207	-
Stage 1	712	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	507	692	-	-	1207	-
Mov Cap-2 Maneuver	507	-	-	-	-	-
Stage 1	712	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.6	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	652	1207	-
HCM Lane V/C Ratio	-	-	0.158	0.009	-
HCM Control Delay (s)	-	-	11.6	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	6	289	377	89	10	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	314	410	97	11	2

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	507	0	-	0	785	458
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	327	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1058	-	-	-	361	603
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1058	-	-	-	358	603
Mov Cap-2 Maneuver	-	-	-	-	358	-
Stage 1	-	-	-	-	637	-
Stage 2	-	-	-	-	725	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1058	-	-	-	358	603
HCM Lane V/C Ratio	0.006	-	-	-	0.03	0.004
HCM Control Delay (s)	8.4	0	-	-	15.4	11
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0

Intersection	
Int Delay, s/veh	2.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	203	52	7	320	87	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	221	57	8	348	95	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	277	0	612	249
Stage 1	-	-	-	-	249	-
Stage 2	-	-	-	-	363	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1286	-	456	790
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1286	-	452	790
Mov Cap-2 Maneuver	-	-	-	-	452	-
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	698	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	14.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	473	-	-	1286	-
HCM Lane V/C Ratio	0.223	-	-	0.006	-
HCM Control Delay (s)	14.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	20	49	0	16	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	22	53	0	17	27

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	115	53	0	0	53	0
Stage 1	53	-	-	-	-	-
Stage 2	62	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	881	1014	-	-	1553	-
Stage 1	970	-	-	-	-	-
Stage 2	961	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	871	1014	-	-	1553	-
Mov Cap-2 Maneuver	871	-	-	-	-	-
Stage 1	970	-	-	-	-	-
Stage 2	950	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.7	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1006	1553	-
HCM Lane V/C Ratio	-	-	0.023	0.011	-
HCM Control Delay (s)	-	-	8.7	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C-2

LEVEL OF SERVICE CALCULATIONS

- Existing PM Peak

Intersection	
Intersection Delay, s/veh	38.6
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	165	272	27	0	18	268	28	0	35	29	37
Peak Hour Factor	0.92	0.90	0.85	0.85	0.92	0.56	0.80	0.50	0.92	0.67	0.66	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	183	320	32	0	32	335	56	0	52	44	44
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	60.6	31.7	14.7
HCM LOS	F	D	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	35%	36%	6%	20%
Vol Thru, %	29%	59%	85%	16%
Vol Right, %	37%	6%	9%	64%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	101	464	314	234
LT Vol	35	165	18	47
Through Vol	29	272	268	38
RT Vol	37	27	28	149
Lane Flow Rate	140	535	423	284
Geometry Grp	1	1	1	1
Degree of Util (X)	0.311	0.984	0.798	0.568
Departure Headway (Hd)	7.981	6.62	6.79	7.199
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	449	546	533	500
Service Time	6.071	4.679	4.856	5.267
HCM Lane V/C Ratio	0.312	0.98	0.794	0.568
HCM Control Delay	14.7	60.6	31.7	19.4
HCM Lane LOS	B	F	D	C
HCM 95th-tile Q	1.3	13.6	7.6	3.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	47	38	149
Peak Hour Factor	0.92	0.69	0.73	0.91
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	68	52	164
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	19.4
HCM LOS	C

Lane

Intersection	
Int Delay, s/veh	1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	1	21	166	0	29	189
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	23	180	0	32	205

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	448	180	0	0	180	0
Stage 1	180	-	-	-	-	-
Stage 2	268	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	568	863	-	-	1396	-
Stage 1	851	-	-	-	-	-
Stage 2	777	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	553	863	-	-	1396	-
Mov Cap-2 Maneuver	553	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	757	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	842	1396	-
HCM Lane V/C Ratio	-	-	0.028	0.023	-
HCM Control Delay (s)	-	-	9.4	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	14	336	293	20	28	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	15	365	318	22	30	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	340	0	-	0	725	329
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1219	-	-	-	392	712
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	680	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1219	-	-	-	386	712
Mov Cap-2 Maneuver	-	-	-	-	386	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	670	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1219	-	-	-	386	712
HCM Lane V/C Ratio	0.012	-	-	-	0.079	0.018
HCM Control Delay (s)	8	0	-	-	15.1	10.2
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0.1

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	273	58	8	215	56	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	297	63	9	234	61	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	360	0	579	328
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	251	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1199	-	477	713
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	791	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1199	-	473	713
Mov Cap-2 Maneuver	-	-	-	-	473	-
Stage 1	-	-	-	-	730	-
Stage 2	-	-	-	-	784	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	509	-	-	1199	-
HCM Lane V/C Ratio	0.152	-	-	0.007	-
HCM Control Delay (s)	13.3	-	-	8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	25	22	0	13	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	27	24	0	14	49

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	101	24	0	0	24	0
Stage 1	24	-	-	-	-	-
Stage 2	77	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	898	1052	-	-	1591	-
Stage 1	999	-	-	-	-	-
Stage 2	946	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	890	1052	-	-	1591	-
Mov Cap-2 Maneuver	890	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	937	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1052	1591	-
HCM Lane V/C Ratio	-	-	0.026	0.009	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C-3

LEVEL OF SERVICE CALCULATIONS

- Base Year 2017 AM Peak

Intersection	
Intersection Delay, s/veh	60.2
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	185	225	15	0	50	325	25	0	55	105	60
Peak Hour Factor	0.92	0.72	0.76	0.50	0.92	0.84	0.96	0.72	0.92	0.64	0.62	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	257	296	30	0	60	339	35	0	86	169	74
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	74.1	73.7	41
HCM LOS	F	F	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	44%	12%	15%
Vol Thru, %	48%	53%	81%	22%
Vol Right, %	27%	4%	6%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	220	425	400	230
LT Vol	55	185	50	35
Through Vol	105	225	325	50
RT Vol	60	15	25	145
Lane Flow Rate	329	583	433	319
Geometry Grp	1	1	1	1
Degree of Util (X)	0.814	1	1	0.776
Departure Headway (Hd)	8.894	8.576	8.498	8.756
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	408	426	424	415
Service Time	6.936	6.661	6.582	6.8
HCM Lane V/C Ratio	0.806	1.369	1.021	0.769
HCM Control Delay	41	74.1	73.7	36.3
HCM Lane LOS	E	F	F	E
HCM 95th-tile Q	7.4	12.5	12.5	6.6

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	35	50	145
Peak Hour Factor	0.92	0.65	0.72	0.74
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	54	69	196
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	36.3
HCM LOS	E

Lane

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	20	85	335	0	15	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	92	364	0	16	158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	554	364	0	0	364	0
Stage 1	364	-	-	-	-	-
Stage 2	190	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	493	681	-	-	1195	-
Stage 1	703	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	486	681	-	-	1195	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	829	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	633	1195	-
HCM Lane V/C Ratio	-	-	0.18	0.014	-
HCM Control Delay (s)	-	-	11.9	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	10	305	395	95	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	332	429	103	16	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	533	0	-	0	834	481
Stage 1	-	-	-	-	481	-
Stage 2	-	-	-	-	353	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1035	-	-	-	338	585
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	711	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1035	-	-	-	334	585
Mov Cap-2 Maneuver	-	-	-	-	334	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	702	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1035	-	-	-	334	585
HCM Lane V/C Ratio	0.011	-	-	-	0.049	0.009
HCM Control Delay (s)	8.5	0	-	-	16.3	11.2
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	215	55	10	335	90	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	234	60	11	364	98	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	293	0	650	264
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1269	-	434	775
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	687	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1269	-	429	775
Mov Cap-2 Maneuver	-	-	-	-	429	-
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	679	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	458	-	-	1269	-
HCM Lane V/C Ratio	0.249	-	-	0.009	-
HCM Control Delay (s)	15.4	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1	-	-	0	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	5	25	55	0	20	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	27	60	0	22	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	136	60	0	0	60	0
Stage 1	60	-	-	-	-	-
Stage 2	76	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	857	1005	-	-	1544	-
Stage 1	963	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	844	1005	-	-	1544	-
Mov Cap-2 Maneuver	844	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	933	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	974	1544	-
HCM Lane V/C Ratio	-	-	0.033	0.014	-
HCM Control Delay (s)	-	-	8.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C-4

LEVEL OF SERVICE CALCULATIONS

- Base Year 2017 PM Peak

Intersection	
Intersection Delay, s/veh	43
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	175	290	30	0	20	280	30	0	40	30	40
Peak Hour Factor	0.92	0.90	0.85	0.85	0.92	0.56	0.80	0.50	0.92	0.67	0.66	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	194	341	35	0	36	350	60	0	60	45	48
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	65.7	38.1	15.4
HCM LOS	F	E	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	36%	35%	6%	20%
Vol Thru, %	27%	59%	85%	16%
Vol Right, %	36%	6%	9%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	110	495	330	245
LT Vol	40	175	20	50
Through Vol	30	290	280	40
RT Vol	40	30	30	155
Lane Flow Rate	153	571	446	298
Geometry Grp	1	1	1	1
Degree of Util (X)	0.343	1	0.853	0.603
Departure Headway (Hd)	8.092	6.84	6.887	7.29
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	443	531	526	494
Service Time	6.158	4.913	4.936	5.34
HCM Lane V/C Ratio	0.345	1.075	0.848	0.603
HCM Control Delay	15.4	65.7	38.1	20.9
HCM Lane LOS	C	F	E	C
HCM 95th-tile Q	1.5	14	9	3.9

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	50	40	155
Peak Hour Factor	0.92	0.69	0.73	0.91
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	72	55	170
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	20.9
HCM LOS	C

Lane

Intersection	
Int Delay, s/veh	1.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	5	25	170	0	30	195
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	27	185	0	33	212

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	462	185	0	0	185	0
Stage 1	185	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	558	857	-	-	1390	-
Stage 1	847	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	543	857	-	-	1390	-
Mov Cap-2 Maneuver	543	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	749	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	782	1390	-
HCM Lane V/C Ratio	-	-	0.042	0.023	-
HCM Control Delay (s)	-	-	9.8	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	15	355	310	25	30	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	386	337	27	33	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	364	0	-	0	769	351
Stage 1	-	-	-	-	351	-
Stage 2	-	-	-	-	418	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1195	-	-	-	369	692
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	664	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1195	-	-	-	363	692
Mov Cap-2 Maneuver	-	-	-	-	363	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	653	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1195	-	-	-	363	692
HCM Lane V/C Ratio	0.014	-	-	-	0.09	0.024
HCM Control Delay (s)	8.1	0	-	-	15.9	10.3
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3	0.1

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	285	65	10	225	60	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	310	71	11	245	65	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	380	0	611	345
Stage 1	-	-	-	-	345	-
Stage 2	-	-	-	-	266	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1178	-	457	698
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	779	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1178	-	452	698
Mov Cap-2 Maneuver	-	-	-	-	452	-
Stage 1	-	-	-	-	717	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	13.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	496	-	-	1178	-
HCM Lane V/C Ratio	0.175	-	-	0.009	-
HCM Control Delay (s)	13.8	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	30	25	0	15	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	27	0	16	54

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	114	27	0	0	27	0
Stage 1	27	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	882	1048	-	-	1587	-
Stage 1	996	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	873	1048	-	-	1587	-
Mov Cap-2 Maneuver	873	-	-	-	-	-
Stage 1	996	-	-	-	-	-
Stage 2	927	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	1.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1048	1587	-
HCM Lane V/C Ratio	-	-	0.031	0.01	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

APPENDIX C-5

LEVEL OF SERVICE CALCULATIONS

- Future Year 2017 AM Peak

Intersection	
Intersection Delay, s/veh	60.2
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	185	235	15	0	55	340	25	0	55	105	60
Future Vol, veh/h	0	185	235	15	0	55	340	25	0	55	105	60
Peak Hour Factor	0.92	0.72	0.76	0.50	0.92	0.84	0.96	0.72	0.92	0.64	0.62	0.81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	257	309	30	0	65	354	35	0	86	169	74
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	74	73.6	40.2
HCM LOS	F	F	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	25%	43%	13%	15%
Vol Thru, %	48%	54%	81%	22%
Vol Right, %	27%	3%	6%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	220	435	420	230
LT Vol	55	185	55	35
Through Vol	105	235	340	50
RT Vol	60	15	25	145
Lane Flow Rate	329	596	454	319
Geometry Grp	1	1	1	1
Degree of Util (X)	0.808	1	1	0.771
Departure Headway (Hd)	8.834	8.631	8.557	8.696
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	408	423	427	415
Service Time	6.923	6.631	6.557	6.785
HCM Lane V/C Ratio	0.806	1.409	1.063	0.769
HCM Control Delay	40.2	74	73.6	35.8
HCM Lane LOS	E	F	F	E
HCM 95th-tile Q	7.2	12.5	12.6	6.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	35	50	145
Future Vol, veh/h	0	35	50	145
Peak Hour Factor	0.92	0.65	0.72	0.74
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	54	69	196
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	35.8
HCM LOS	E

Lane

Intersection	
Int Delay, s/veh	2.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	20	90	335	0	15	145
Future Vol, veh/h	20	90	335	0	15	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	98	364	0	16	158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	554	364	0	0	364	0
Stage 1	364	-	-	-	-	-
Stage 2	190	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	493	681	-	-	1195	-
Stage 1	703	-	-	-	-	-
Stage 2	842	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	486	681	-	-	1195	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	703	-	-	-	-	-
Stage 2	829	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	635	1195	-
HCM Lane V/C Ratio	-	-	0.188	0.014	-
HCM Control Delay (s)	-	-	12	8.1	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	10	315	415	100	15	5
Future Vol, veh/h	10	315	415	100	15	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	342	451	109	16	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	560	0	-	0	869	505
Stage 1	-	-	-	-	505	-
Stage 2	-	-	-	-	364	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1011	-	-	-	322	567
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	703	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1011	-	-	-	318	567
Mov Cap-2 Maneuver	-	-	-	-	318	-
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	694	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1011	-	-	-	318	567
HCM Lane V/C Ratio	0.011	-	-	-	0.051	0.01
HCM Control Delay (s)	8.6	0	-	-	16.9	11.4
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2	0

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	215	70	15	335	115	25
Future Vol, veh/h	215	70	15	335	115	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	234	76	16	364	125	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	310	0	669	272
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	397	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1250	-	423	767
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	679	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1250	-	416	767
Mov Cap-2 Maneuver	-	-	-	-	416	-
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	668	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	16.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	453	-	-	1250	-
HCM Lane V/C Ratio	0.336	-	-	0.013	-
HCM Control Delay (s)	16.9	-	-	7.9	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.5	-	-	0	-

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	25	55	0	20	30
Future Vol, veh/h	5	25	55	0	20	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	27	60	0	22	33

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	136	60	0	0	60	0
Stage 1	60	-	-	-	-	-
Stage 2	76	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	857	1005	-	-	1544	-
Stage 1	963	-	-	-	-	-
Stage 2	947	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	844	1005	-	-	1544	-
Mov Cap-2 Maneuver	844	-	-	-	-	-
Stage 1	963	-	-	-	-	-
Stage 2	933	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.8	0	2.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	974	1544	-
HCM Lane V/C Ratio	-	-	0.033	0.014	-
HCM Control Delay (s)	-	-	8.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	10	5	5	130	75	15
Future Vol, veh/h	10	5	5	130	75	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	141	82	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	242	90	98	0	-	0
Stage 1	90	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	746	968	1495	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	743	968	1495	-	-	-
Mov Cap-2 Maneuver	743	-	-	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	872	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1495	-	805	-	-
HCM Lane V/C Ratio	0.004	-	0.02	-	-
HCM Control Delay (s)	7.4	0	9.6	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	10	5	5	125	70	5
Future Vol, veh/h	10	5	5	125	70	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	136	76	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	226	79	82	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	147	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	762	981	1515	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	880	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	759	981	1515	-	-	-
Mov Cap-2 Maneuver	759	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	876	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1515	-	821	-	-
HCM Lane V/C Ratio	0.004	-	0.02	-	-
HCM Control Delay (s)	7.4	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	10	5	5	120	70	5
Future Vol, veh/h	10	5	5	120	70	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	130	76	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	220	79	82	0	-	0
Stage 1	79	-	-	-	-	-
Stage 2	141	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	768	981	1515	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	886	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	765	981	1515	-	-	-
Mov Cap-2 Maneuver	765	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	882	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1515	-	826	-	-
HCM Lane V/C Ratio	0.004	-	0.02	-	-
HCM Control Delay (s)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	15	5	5	110	65	5
Future Vol, veh/h	15	5	5	110	65	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	5	5	120	71	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	203	73	76	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	130	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	786	989	1523	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	783	989	1523	-	-	-
Mov Cap-2 Maneuver	783	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	892	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.5	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1523	-	826	-	-
HCM Lane V/C Ratio	0.004	-	0.026	-	-
HCM Control Delay (s)	7.4	0	9.5	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	10	5	5	105	65	5
Future Vol, veh/h	10	5	5	105	65	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	114	71	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	198	73	76	0	-	0
Stage 1	73	-	-	-	-	-
Stage 2	125	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	791	989	1523	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	901	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	788	989	1523	-	-	-
Mov Cap-2 Maneuver	788	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	897	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.3	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1523	-	845	-	-
HCM Lane V/C Ratio	0.004	-	0.019	-	-
HCM Control Delay (s)	7.4	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

APPENDIX C-6

LEVEL OF SERVICE CALCULATIONS

- Future Year 2017 PM Peak

Intersection	
Intersection Delay, s/veh	48.6
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	175	315	30	0	25	305	30	0	40	30	45
Peak Hour Factor	0.92	0.90	0.85	0.85	0.92	0.56	0.80	0.50	0.92	0.67	0.66	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	194	371	35	0	45	381	60	0	60	45	54
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	66.8	52.9	16.1
HCM LOS	F	F	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	35%	34%	7%	20%
Vol Thru, %	26%	61%	85%	16%
Vol Right, %	39%	6%	8%	63%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	115	520	360	245
LT Vol	40	175	25	50
Through Vol	30	315	305	40
RT Vol	45	30	30	155
Lane Flow Rate	159	600	486	298
Geometry Grp	1	1	1	1
Degree of Util (X)	0.365	1	0.941	0.618
Departure Headway (Hd)	8.269	7.031	6.969	7.475
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	433	516	520	482
Service Time	6.356	5.13	5.033	5.544
HCM Lane V/C Ratio	0.367	1.163	0.935	0.618
HCM Control Delay	16.1	66.8	52.9	22
HCM Lane LOS	C	F	F	C
HCM 95th-tile Q	1.6	13.8	11.7	4.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	50	40	155
Peak Hour Factor	0.92	0.69	0.73	0.91
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	72	55	170
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	22
HCM LOS	C

Lane

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	5	30	170	0	40	195
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	33	185	0	43	212

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	484	185	0	0	185	0
Stage 1	185	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	542	857	-	-	1390	-
Stage 1	847	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	523	857	-	-	1390	-
Mov Cap-2 Maneuver	523	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	726	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	1.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	785	1390	-
HCM Lane V/C Ratio	-	-	0.048	0.031	-
HCM Control Delay (s)	-	-	9.8	7.7	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	15	385	335	30	40	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	Stop
Storage Length	-	-	-	-	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	418	364	33	43	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	397	0	-	0	831	380
Stage 1	-	-	-	-	380	-
Stage 2	-	-	-	-	451	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1162	-	-	-	340	667
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	642	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1162	-	-	-	334	667
Mov Cap-2 Maneuver	-	-	-	-	334	-
Stage 1	-	-	-	-	691	-
Stage 2	-	-	-	-	630	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1162	-	-	-	334	667
HCM Lane V/C Ratio	0.014	-	-	-	0.13	0.024
HCM Control Delay (s)	8.1	0	-	-	17.4	10.5
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0	-	-	-	0.4	0.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	285	105	30	225	95	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	310	114	33	245	103	38

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	424	0	677	367
Stage 1	-	-	-	-	367	-
Stage 2	-	-	-	-	310	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1135	-	418	678
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	744	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1135	-	404	678
Mov Cap-2 Maneuver	-	-	-	-	404	-
Stage 1	-	-	-	-	701	-
Stage 2	-	-	-	-	719	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	16.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	453	-	-	1135	-
HCM Lane V/C Ratio	0.312	-	-	0.029	-
HCM Control Delay (s)	16.5	-	-	8.3	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	1.3	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	30	30	0	15	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	33	33	0	16	54

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	120	33	0	0	33	0
Stage 1	33	-	-	-	-	-
Stage 2	87	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	876	1041	-	-	1579	-
Stage 1	989	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	867	1041	-	-	1579	-
Mov Cap-2 Maneuver	867	-	-	-	-	-
Stage 1	989	-	-	-	-	-
Stage 2	927	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.6	0	1.7
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1041	1579	-
HCM Lane V/C Ratio	-	-	0.031	0.01	-
HCM Control Delay (s)	-	-	8.6	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	35	5	5	95	100	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	38	5	5	103	109	38

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	242	128	147	0	-	0
Stage 1	128	-	-	-	-	-
Stage 2	114	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	746	922	1435	-	-	-
Stage 1	898	-	-	-	-	-
Stage 2	911	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	743	922	1435	-	-	-
Mov Cap-2 Maneuver	743	-	-	-	-	-
Stage 1	898	-	-	-	-	-
Stage 2	907	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1435	-	761	-	-
HCM Lane V/C Ratio	0.004	-	0.057	-	-
HCM Control Delay (s)	7.5	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	5	5	90	95	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	5	5	98	103	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	218	109	114	0	-	0
Stage 1	109	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	770	945	1475	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	767	945	1475	-	-	-
Mov Cap-2 Maneuver	767	-	-	-	-	-
Stage 1	916	-	-	-	-	-
Stage 2	912	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1475	-	847	-	-
HCM Lane V/C Ratio	0.004	-	0.013	-	-
HCM Control Delay (s)	7.5	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	5	5	90	90	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	5	5	98	98	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	212	103	109	0	-	0
Stage 1	103	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	776	952	1481	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	916	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	773	952	1481	-	-	-
Mov Cap-2 Maneuver	773	-	-	-	-	-
Stage 1	921	-	-	-	-	-
Stage 2	912	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1481	-	853	-	-
HCM Lane V/C Ratio	0.004	-	0.013	-	-
HCM Control Delay (s)	7.4	0	9.3	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	10	5	5	80	80	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	5	5	87	87	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	193	95	103	0	-	0
Stage 1	95	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	796	962	1489	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	793	962	1489	-	-	-
Mov Cap-2 Maneuver	793	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	922	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.4	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1489	-	842	-	-
HCM Lane V/C Ratio	0.004	-	0.019	-	-
HCM Control Delay (s)	7.4	0	9.4	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	5	5	80	75	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	5	5	87	82	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	185	87	92	0	-	0
Stage 1	87	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	804	971	1503	-	-	-
Stage 1	936	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	802	971	1503	-	-	-
Mov Cap-2 Maneuver	802	-	-	-	-	-
Stage 1	936	-	-	-	-	-
Stage 2	923	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.2	0.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1503	-	878	-	-
HCM Lane V/C Ratio	0.004	-	0.012	-	-
HCM Control Delay (s)	7.4	0	9.2	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

APPENDIX G.

Agreement for Allocation of Future Subdivision Potential

R-250 STATE OF HAWAII
BUREAU OF CONVEYANCES
RECORDED
DEC 06, 2007 08:01 AM
Doc No(s) 2007-210782

/s/ CARL T. WATANABE
REGISTRAR OF CONVEYANCES

20 1/1 Z8

LAND COURT SYSTEM | REGULAR SYSTEM

AFTER RECORDATION, RETURN BY: MAIL (X) PICK-UP (X)
Development Services Administration
County of Maui
250 South High Street
Wailuku, Hawai`i 96793

2545756

FAM

THIS INSTRUMENT FILED FOR RECORD BY FIRST AMERICAN TITLE COMPANY, INC. AS AN ACCOMMODATION ONLY IT HAS NOT BEEN EXAMINED AS TO ITS EXECUTION OR AS TO ITS EFFECT UPON THE TITLE.

S:\DSA\STANDARD FORMS\Subdivision\Standard Agreements\...

TMK NO. (2) 2-4-12:5 Total Number of Pages: 9

Subdivision File No.: 2.2994

AGREEMENT FOR ALLOCATION OF FUTURE SUBDIVISION POTENTIAL

THIS AGREEMENT is made and entered into this ______ day of NOV 28 2007, 20____, by and between PIIHOLO INVESTORS LLC, (A HAWAII LIMITED LIABILITY COMPANY), whose principal place of business or residence address is 874 KUMULANI DRIVE, KIHEI, HI 96753, and whose mailing address is 874 KUMULANI DRIVE, KIHEI HI 96753, (hereinafter "Subdivider"), and COUNTY OF MAUI, through its Department of Public Works, a political subdivision of the State of Hawaii, whose principal place of business and mailing address is 200 South High Street, Wailuku, Hawaii 96793 (hereinafter "County").

The Subdivider is the owner of a certain parcel of real property situate at PIIHOLO ROAD, MAKAWAO, County of Maui, State of Hawaii, Tax Map Key No. (2) 2-4-12:5, containing an area of approximately 323.030 acres, which is the subject of the PIIHOLO SOUTH SUBDIVISION, Subdivision File No. 2.2994 (hereinafter "Subject Subdivision").

Section 19.30A.040 of the Maui County Code, requires the Subdivider of land in the agricultural district to allocate the maximum number of lots that may be created when subdividing lands within the agricultural district.

The Director of Public Works, in accordance with Subsection 19.30A.040.A.1 of the Maui County Code, has determined the maximum number of lots that may be created from the subject parcel is 23, based upon the subject parcel's gross area of 323.030 acres within the County agricultural district.

Pursuant to Subsection 19.30A.040.A.2 of the Maui County Code, the Subdivider hereby declares that the maximum number of future lots that may be created from each new lot created by the Subject Subdivision, is as set forth in Exhibit "A", which is attached hereto and made a part hereof.

The restriction on the number of lots shall not apply to subdivisions identified in Subsections 19.30A.040.B, 19.30A.040.C and Section 19.30A.070 of the Maui County Code.

The maximum number of future lots for each lot as set forth in Exhibit "A" may be reallocated or transferred among the newly created lots within the Subject Subdivision after review by the Director of Public Works for compliance with Section 19.30A.040 of the Maui County Code, by executing and recording an Amended Agreement for Allocation of Future Subdivision Potential.

The maximum number of future lots, as established in Exhibit "A", shall be set forth as a covenant in the deed, agreement of sale or other conveyance document to each lot created by the Subject Subdivision.

The provisions of this Agreement shall be a covenant running with the land and shall be binding on all present and future owners, lessees and occupants and anyone claiming under said owners, their heirs, personal representatives, successors and assigns; provided that any of the foregoing may petition for the termination of this Agreement as it applies to a lot that is no longer zoned agricultural district.

This Agreement shall be recorded by the Subdivider with the State of Hawaii Bureau of Conveyances or the Land Court of the State of Hawaii, as the case may be, prior to the granting of any permit or approval sought by the Subdivider, with all fees to be paid by the Subdivider.

This Agreement may be executed in counterparts, each of which shall be deemed an original, and said counterparts shall together constitute one and the same agreement, binding all parties

hereto, notwithstanding all parties are not signatory to the original or the same counterparts.

This Agreement shall become effective upon the date of final approval of the Subject Subdivision.

SUBDIVIDER:

By _____
(Signature)

RONALD P. STURTZ, MANAGING MEMBER
(Print name)

Its PINOLO SOUTH LLC, MANAGER FOR PINOLO
(Title) INVESTORS LLC (OWNER)

By _____
(Signature)

_____
(Print name)

Its _____
(Title)

By _____
(Signature)

_____
(Print name)

Its _____
(Title)

COUNTY OF MAUI:

DEPARTMENT OF PUBLIC WORKS

By _____
MILTON M. ARAKAWA
Its Director

APPROVED AS TO FORM
AND LEGALITY:

_____
DAVID A. GALAZIN
Deputy Corporation Counsel
County of Maui

STATE OF HAWAII)
) SS.
COUNTY OF Maui)

On this 28 day of September, 2007, before me personally appeared Ronald P Sturtz, to me personally known, who, being by me duly sworn or affirmed, did say that such person(s) executed the foregoing instrument as the free act and deed of such person(s), and if applicable in the capacities shown, having been duly authorized to execute such instrument in such capacities.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

LS

NOTARY PUBLIC, State of Hawaii.
Print Name Noel K. Kaina
My commission expires: May 27, 2011

STATE OF HAWAII)
) SS.
COUNTY OF _____)

On this _____ day of _____, 20____, before me personally appeared _____, to me personally known, who, being by me duly sworn or affirmed, did say that such person(s) executed the foregoing instrument as the free act and deed of such person(s), and if applicable in the capacities shown, having been duly authorized to execute such instrument in such capacities.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

NOTARY PUBLIC, State of Hawaii.
Print Name_____
My commission expires:_____

STATE OF HAWAII)
) SS.
COUNTY OF _____)

On this _____ day of _____, 20____, before me personally appeared _____, to me personally known, who, being by me duly sworn or affirmed, did say that such person(s) executed the foregoing instrument as the free act and deed of such person(s), and if applicable in the capacities shown, having been duly authorized to execute such instrument in such capacities.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

_____
NOTARY PUBLIC, State of Hawaii.
Print Name_____
My commission expires:_____

STATE OF HAWAII)
) SS.
COUNTY OF MAUI)

On this 28th day of November, 2007, before me personally appeared MILTON M. ARAKAWA, to me personally known, who being by me duly sworn, did say that he is the Director of Public Works of the County of Maui, a political subdivision of the State of Hawaii, and that the seal affixed to the foregoing instrument is the lawful seal of the said County of Maui, and that the said instrument was signed and sealed on behalf of said County of Maui pursuant to Title 18 of the Maui County Code, the Subdivision Ordinance, and the said MILTON M. ARAKAWA acknowledged the said instrument to be the free act and deed of the said County of Maui.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

L.S.

Jill Anne A. Ono

NOTARY PUBLIC, State of Hawaii.
Print Name JILL ANNE S. ONO
My commission expires: 11/30/10

EXHIBIT "A"

TMK PARCEL'S AGRICULTURAL AREA = 323.030 ACRES

MINIMUM LOT SIZE	NUMBER OF LOTS ALLOWED PURSUANT TO MCC §19.30A.030(G)
2 ACRES	14
15 ACRES	5
25 ACRES	3
40 ACRES	1

ALLOCATION OF LOTS

MINIMUM LOT SIZE	LOT 1	LOT 2	LOT 3	LOT 4	LOT 5	LOT 6	LOT 7	LOT 8	LOT 9	LOT 10	LOT 11	LOT ___	LOT ___
2 ACRES	0	0	0	0	3	3	2	3	2	0	1		
~~15 ACRES~~	0	0	0	3	0	0	0	0	1	1	0		
25 ACRES	1	0	1	0	0	0	1	0	0	0	0		
40 ACRES	0	1	0	0	0	0	0	0	0	0	0		
*TOTAL LOT ALLOCATION	1	1	1	3	3	3	3	3	3	1	1		

*A TOTAL LOT ALLOCATION OF ONE (1) INDICATES NO FURTHER SUBDIVISION POTENTIAL.

LSN S:\LUCA\ALL\ENGR\LSN\QUATTRO PRO\ALLOCATION EXHIBIT.QPW
REVISED: AUGUST 29, 2001

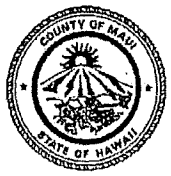
APPENDIX H.

Piiholo South Subdivision – Final Approval Letter and Map

CHARMAINE TAVARES
Mayor

MILTON M. ARAKAWA, A.I.C.P.
Director

MICHAEL M. MIYAMOTO
Deputy Director



RALPH M. NAGAMINE, L.S., P.E.
Development Services Administration

CARY YAMASHITA, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
DEVELOPMENT SERVICES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

June 13, 2008

Mr. Stacy A. Otomo, President
OTOMO ENGINEERING, INC.
305 S. High Street, Suite 102
Wailuku, Hawaii 96793

SUBJECT: **PIIHOLO SOUTH SUBDIVISION**
TMK: (2) 2-4-012:005, 039, 040, 041, 042, 043, 044, 045, 046, 047, & 048
SUBDIVISION FILE NO. 2.2994

Dear Mr. Otomo:

Final approval for the subject subdivision (consolidation of eleven lots and resubdivision into eleven lots) has been granted on June 13, 2008. This final approval is based upon Section 18.04.020(C) of the Maui County Code (Ordinance 2372). An approved final plat is enclosed for your records.

In accordance with Section 18.04.020(D) of the Maui County Code, the lots created by this subdivision shall not qualify for this exception with respect to any subsequent consolidation/resubdivision of any of the parcels.

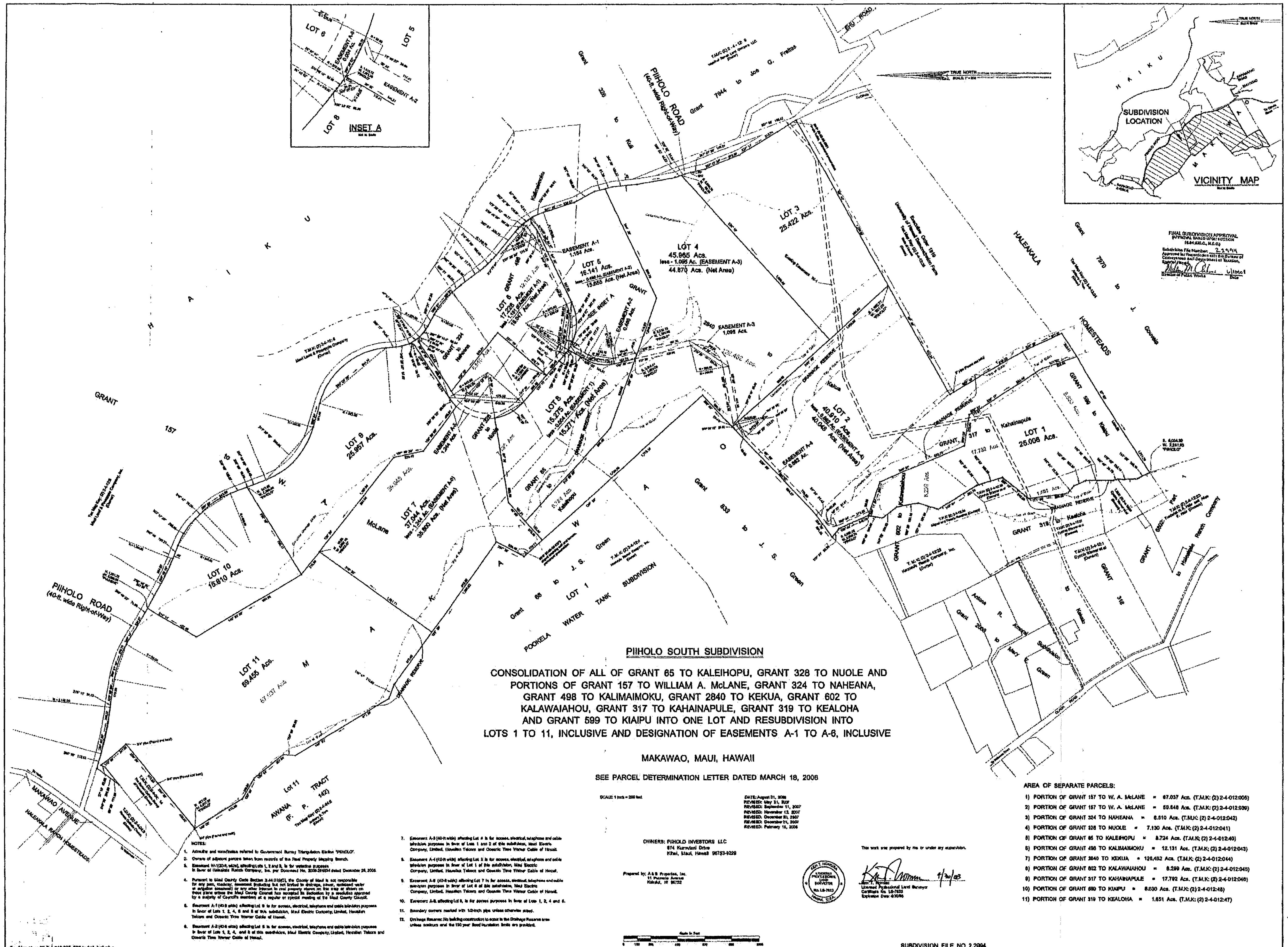
If you have any questions regarding this letter, please contact Lesli Otani of our Development Services Administration at 270-7252.

Sincerely,

MILTON M. ARAKAWA, A.I.C.P.
Director of Public Works

Enclosure: Approved Final Plat
eri S:\DSA\Subd\Reg2\2#2994-1.fin
c: Dept. of Finance, Real Property Tax Division w/final plat
Dept. of Finance, Tax Map Division w/final plat
Building Permit Section w/final plat
Engineering Division w/final plat
Dept. of Planning w/final plat
Dept. of Water Supply w/final plat
Police Dept. w/final plat
State Dept. of Health w/final plat
Maui Electric Co. w/final plat

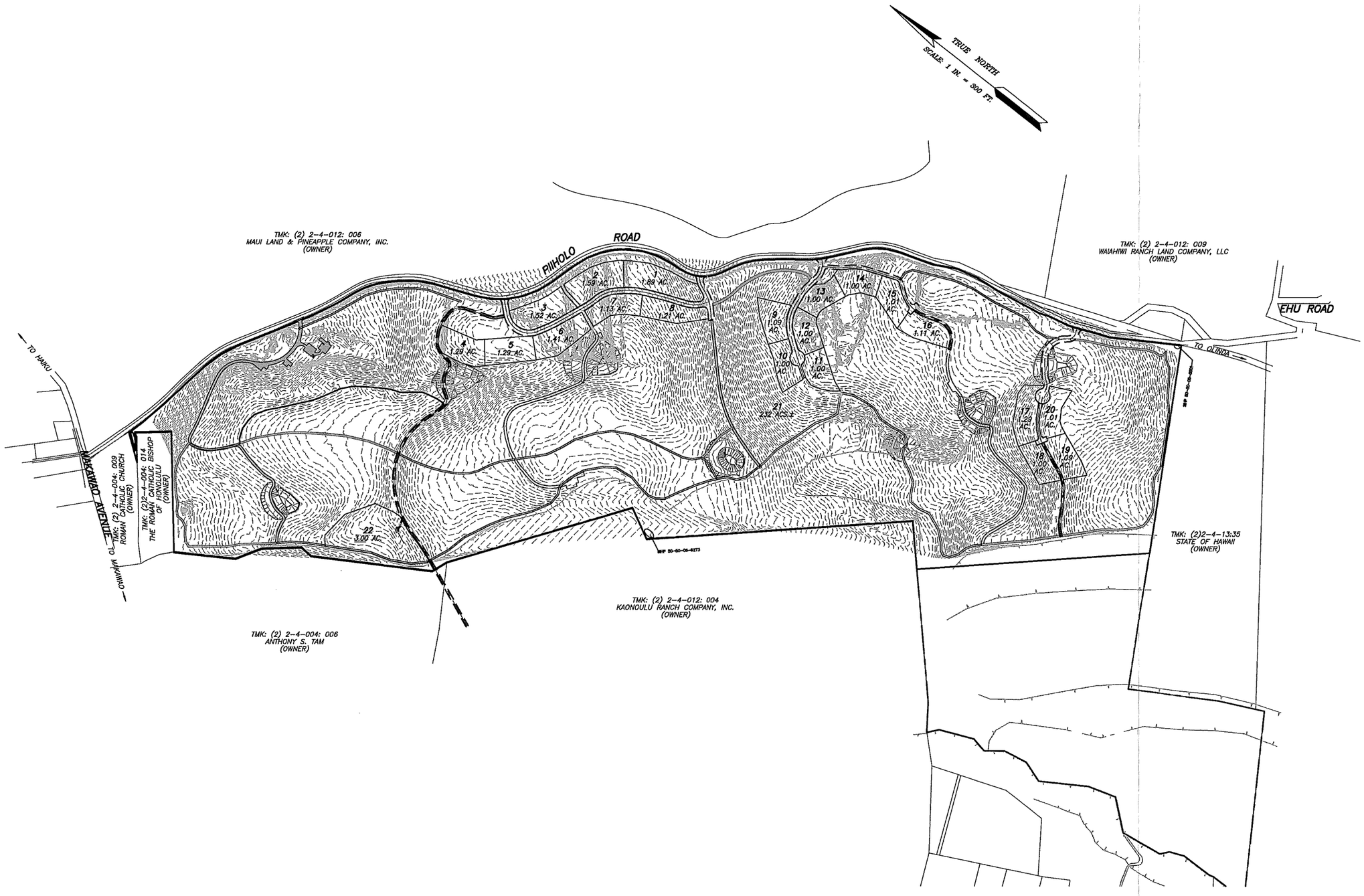
RECEIVED
JUN 13 2008
OTOMO ENGINEERING, INC.



PIIHOLO SOUTH SUBDIVISION
CONSOLIDATION OF ALL OF GRANT 65 TO KALEIHOPU, GRANT 328 TO NUOLE AND PORTIONS OF GRANT 157 TO WILLIAM A. McLANE, GRANT 324 TO NAHEANA, GRANT 498 TO KALIMAIMOKU, GRANT 2840 TO KEKUA, GRANT 602 TO KALAWAIAHOU, GRANT 317 TO KAHAINAPULE, GRANT 319 TO KEALOHA AND GRANT 599 TO KIAIPU INTO ONE LOT AND RESUBDIVISION INTO LOTS 1 TO 11, INCLUSIVE AND DESIGNATION OF EASEMENTS A-1 TO A-6, INCLUSIVE
MAKAWAO, MAUI, HAWAII
SEE PARCEL DETERMINATION LETTER DATED MARCH 18, 2008
INSET A
VICINITY MAP
SUBDIVISION LOCATION
PIIHOLO ROAD (40-ft. wide Right-of-Way)
MAKAWAO AVENUE
LOT 1 25.006 Acs.
LOT 3 25.422 Acs.
LOT 4 45.965 Acs. less - 1.095 Ac. (EASEMENT A-3) 44.870 Acs. (Net Area)
LOT 8 25.957 Acs.
LOT 10 15.819 Acs.
LOT 11 69.455 Acs.
EASEMENT A-1 1.164 Acs.
EASEMENT A-3 1.095 Acs.
AREA OF SEPARATE PARCELS:
1) PORTION OF GRANT 157 TO W. A. McLANE = 67.037 Acs. (T.M.K: (2) 2-4-012:005)
2) PORTION OF GRANT 157 TO W. A. McLANE = 59.848 Acs. (T.M.K: (2) 2-4-012:039)
3) PORTION OF GRANT 324 TO NAHEANA = 6.510 Acs. (T.M.K: (2) 2-4-012:042)
4) PORTION OF GRANT 328 TO NUOLE = 7.130 Acs. (T.M.K: (2) 2-4-012:041)
5) PORTION OF GRANT 65 TO KALEIHOPU = 8.724 Acs. (T.M.K: (2) 2-4-012:40)
6) PORTION OF GRANT 498 TO KALIMAIMOKU = 12.131 Acs. (T.M.K: (2) 2-4-012:043)
7) PORTION OF GRANT 2840 TO KEKUA = 126.482 Acs. (T.M.K: (2) 2-4-012:044)
8) PORTION OF GRANT 602 TO KALAWAIAHOU = 8.299 Acs. (T.M.K: (2) 2-4-012:045)
9) PORTION OF GRANT 317 TO KAHAINAPULE = 17.792 Acs. (T.M.K: (2) 2-4-012:046)
10) PORTION OF GRANT 599 TO KIAIPU = 8.030 Acs. (T.M.K: (2) 2-4-012:48)
11) PORTION OF GRANT 319 TO KEALOHA = 1.651 Acs. (T.M.K: (2) 2-4-012:47)
OWNERS: PIIHOLO INVESTORS LLC
SUBDIVISION FILE NO. 2.2994

APPENDIX I.

Proposed Conceptual Subdivision Map



CONCEPTUAL SUBDIVISION PLAN

SCALE: 1 IN. = 300 FT.

OTOMO ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS
305 S. HIGH STREET, STE. 102
WAILUKU, MAUI, HAWAII 96793
PHONE: (808) 242-0032
FAX: (808) 242-5779

STACY A. OTOMO
LICENSED PROFESSIONAL ENGINEER
No. 5115-C
HAWAII, U.S.A.
4-30-16

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION. ("OBSERVATION OF CONSTRUCTION" AS DEFINED UNDER SECTION 16-115-3 OF THE HAWAII ADMINISTRATIVE RULES, PROFESSIONAL ENGINEERS, ARCHITECTS, SURVEYORS, AND LANDSCAPE ARCHITECTS.)

SIGNATURE DATE

NOTE: THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AT THE JOB SITE BEFORE PROCEEDING WITH THE WORK.

HOKU NUI PIIHOLO SUSTAINABLE
MAKAWAO, MAUI, HAWAII

CONCEPTUAL SUBDIVISION PLAN

REVISION	DATE	NOTE
1		
2		
3		
4		
5		
6		
7		

DESIGNED BY: S.A.O.
DRAWN BY: L.C.O.
PROJECT NO.: 2012-46
DRAWING NAME: CONCEPT SUBD PLAN
DATE: 2-25-16

SHEET NO.
OF SHEETS

G:\2012 PROJECTS\2012-46\dwg\construction plans\CONCEPT SUBD PLAN.dwg Feb. 26, 2016 - 1:05pm