May 11, 1998

TO: The Honorable James J. Nakatani, Chairperson
Department of Agriculture

SUBJECT: Acceptance of the Final Environmental Impact Statement
for Waimea-Pa'auilo Watershed

With this memorandum, I accept the Final Environmental Impact
Statement for Waimea-Pa'auilo Watershed, Hāmākua, South Kohala,
the island of Hawai'i, as satisfactory fulfillment of the
requirements of Chapter 343, Hawai'i Revised Statutes. The
economic, social and environmental impacts, which will likely
occur should this project be implemented, are adequately
described in the statement. The analysis, together with the
comments made by reviewers, provides useful information to
policymakers and the public.

My acceptance of the statement is an affirmation of the adequacy
of that statement under the applicable laws but does not
constitute an endorsement of the proposed action.

I find that the mitigation measures proposed in the environmental
impact statement will minimize the negative impacts of the
project. Therefore, if this project is implemented, the
Department of Agriculture and/or its agents should perform these
or alternative and at least equally effective mitigation measures
at the discretion of the permitting agencies. The mitigation
measures identified in the environmental impact statement are
listed in the attached document.

BENJAMIN J. CAYETANO

Attachment

c: Honorable Lawrence Miike
Office of Environmental Quality Control
ATTACHMENT TO ACCEPTANCE MEMORANDUM FROM GOVERNOR BENJAMIN CAYETANO TO THE HONORABLE JAMES NAKATANI, CHAIRPERSON, DEPARTMENT OF AGRICULTURE, REGARDING WAIMEA-PA'AU'UWILDO WATERSHED ENVIRONMENTAL IMPACT STATEMENT MITIGATION MEASURES

The following list of mitigation measures identified in the final environmental impact statement for the Waimea-Pa'auilo Watershed Project will minimize the negative impacts of the project. If the project is implemented, the Department of Agriculture (DOA) and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies.

SHORT-TERM IMPACTS

BURIED AND ABOVE-GROUND UTILITY LINES: Both buried and above-ground utility lines exist in the installation area. Most notable are water, electrical, and telephone lines. Care will be taken during construction to prevent danger to workers and avoid excessive disruption of service. The Sponsors and the installing contractors will be responsible for obtaining the necessary cooperation and assistance from the appropriate utility companies. The DOA will also be responsible for costs associated with modification or relocation of road and utility infrastructure.

AIR QUALITY: The contracts for the installation of the Selected Plan (Alternative 5, Kauahi Reservoir) will stipulate that proper dust, erosion and sediment control measures be undertaken or installed during construction to meet the County of Hawai'i's grading ordinance and to minimize dust to the extent possible.

ARCHAEOLOGY/HISTORICAL: Any changes to design or location of project features will be coordinated with the State Historic Preservation Officer to obtain concurrence. In the event that any unanticipated sites or remains such as artifacts, shell, bone or charcoal deposits, rock or coral alignment, pavings or walls are encountered during construction, work will be stopped and the State Historic Preservation Officer and the U.S. Secretary of the Interior will be contacted in accordance with the procedures outlined in the National Resources Conservation Service (NRCS) General Manual, Title 420, Part 401, October 1983, as amended. NRCS will take actions to protect or recover, or both, any significant cultural resources discovered during construction.

SOIL: The contract(s) for the installation of the Selected Plan will stipulate that proper erosion and sediment control measures will be undertaken or installed during construction to meet the County of Hawai'i's grading ordinance, Chapter 10, Erosion and Sediment Control, Hawai'i County Code.
LONG-TERM IMPACTS

DAM BREACH: To reduce the probability of a dam breach caused by "piping" or internal erosion, high-density polyethylene lining will be used throughout the reservoir, and a chimney filter (a 1-foot vertical layer of gravel in the dam itself, perpendicular to the ground surface, and highly permeable to water seepage) will be installed within the embankment to intercept seepage flows. To reduce the probability of a dam breach caused by an earthquake, the Department will construct the reservoir foundation with a flattened embankment slope of unsaturated lava rock. An Emergency Preparedness Plan, as required for "high hazard" dams by HRS Chapter 13-190, will be developed and implemented for the Kauahi Reservoir. The plan will include embankment monitoring, emergency notification for evacuation areas and procedures, and disaster response procedures and will be filed with the State Dam Safety Program.

VISUAL AND AESTHETICS: Kauahi Reservoir embankment slope will be grassed to blend in with the surrounding grazing land.

THREATENED AND ENDANGERED SPECIES: In the unlikely event that threatened or endangered species are encountered, precautions will be taken to ensure that there are no adverse effects to any such species. The areas disturbed for the reservoir and for the supply pipeline will be the minimum area/width needed.

WETLANDS: Adverse effects to wetlands and other waters from construction of the 1" stockwater pipeline located along the southern boundary of two parcels, TMK 6-4-04:137 and 23, will first be avoided by: 1) bridging the wetland and gulch crossings at the following pipe-lengths from the origin, 2,500 feet, 3,000 feet, and 4,800 feet and 2) shifting the proposed pipeline corridor away from the large gulches and wetland areas at the following pipe-lengths from the origin, 1,200 feet, 2,200 feet, 5,900 feet and 6,600 feet. In three of the drainageways, at the following pipe-lengths from the origin, 2,600, 3,000 and 4,500 feet, the best alternative mitigation will be to trench and bury the pipeline within the gulch corridors and wetland areas.

To insure that there are only minimal, temporary impacts to waters, the conditions and best management practices contained in the U. S. Army Corps of Engineers General Regional Permit for Utility Lines, in, under, or Above the Waters of the United States, Including Navigable Waters, in the State of Hawai‘i (May 20, 1996) will be followed.
WATER USE: The State Department of Agriculture and the State Department of Hawaiian Home Lands will enter into an agreement, approved by both the State Board of Agriculture and the Hawaiian Homes Commission, concerning issues that require interagency coordination during implementation and operation of the project improvements. The agreement will include Waimea Irrigation System water rate structure, water allocation to the Department of Hawaiian Home Lands customers and the priority for water use. This agreement will be approved before the completion of the Waimea-Paʻauilo Watershed Project.
WAIMEA-PAAUILO WATERSHED PROJECT

United States Department of Agriculture

Natural Resources Conservation Service

Honolulu, Hawaii

September 1997

Final

Watershed Plan and Environmental Impact Statement

Waimea-Paauiilo Watershed County of Hawaii, Hawaii
FINAL

WATERSHED PLAN-ENVIRONMENTAL IMPACT STATEMENT

WAIMEA-PAANUILO WATERSHED

LOCATION: South Kohala and Hamakua Districts, Hawaii County, Hawaii

TAX MAP KEY: 3rd Division: 4-4-var., 4-6-var., 4-7-var., 4-9-var., 6-3-var., 6-4-var., 6-5-var., 6-6-var., 6-7-var.

PROPOSING AGENCY: State of Hawaii Department of Agriculture

ACCEPTING AUTHORITY: Governor, State of Hawaii

PREPARED BY: USDA Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, Hawaii 96850

RESPONSIBLE OFFICIAL: [Signature]
James J. Nakatani, Chairperson
Board of Agriculture

September 26, 1997
Date
Final

Watershed Plan and Environmental Impact Statement

Waimea-Paauiro Watershed
County of Hawaii, Hawaii

September 1997

The purpose of the Waimea-Paauiro Watershed project is to alleviate the agricultural water shortage problems caused by the inadequate quantity and distribution of water for crop irrigation and livestock drinking water in the Waimea area on the island of Hawaii. This document is an upgrade of a Plan and Environmental Assessment completed in September 1989. This document presents six alternative plans including a No Action Alternative and five alternatives which propose structural improvements to the existing agricultural water system. The Selected Plan, Alternative 5 - Kauali Reservoir, proposes the installation of 1) a 131-million-gallon reservoir; 2) a reservoir supply pipeline; 3) extension of the irrigation water distribution system; and 4) a livestock drinking water distribution system. The Selected Plan will benefit 167 farmers with 1,985 acres of cropland and 265 ranchers with 28,962 acres of grazing land, most of whom are of native Hawaiian ancestry. Total average annual benefits have been estimated at $1,631,200. Total installation costs have been estimated at $17,376,600 with total average annual costs estimated at $1,555,500. The benefit/cost ratio for the Selected Plan is 1.0:1.0.

Responsible Agencies:

United States Department of Agriculture
Natural Resources Conservation Service

Mauna Kea Soil and Water Conservation District

State of Hawaii
Department of Agriculture

State of Hawaii
Department of Hawaiian Home Lands

Contacts:

Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, Hawaii 96850-0005
Telephone: (808) 541-2601 FAX: (808) 541-1335

James J. Nakatani, Chairperson
Board of Agriculture
State of Hawaii, Department of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96823-2159
The Waimānalo Watershed project was conducted under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566 (PL 83-566), as amended (16 U.S.C. 1001-1008). Project planning was conducted and this Plan-EIS was prepared to fulfill the requirements of the following: 1) the National Environmental Policy Act of 1969 (NEPA), as amended, Public Law 91-190, 42 U.S.C. 4321 et seq.; 2) the requirements of the Hawaii environmental review process as defined in Chapter 343, Hawaii Revised Statutes (HRS), including Act 241, SLH 1992 revisions, and Title 11, Chapter 200, Hawaii Administrative Rules, Department of Health; 3) the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies; and 4) the NRCS's National Watershed Manual.

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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>Ag. Park</td>
<td>Agricultural Park</td>
</tr>
<tr>
<td>DHHL</td>
<td>Department of Hawaiian Home Lands</td>
</tr>
<tr>
<td>DIP</td>
<td>ductile iron pipeline</td>
</tr>
<tr>
<td>DLNR</td>
<td>Department of Land and Natural Resources</td>
</tr>
<tr>
<td>DOA</td>
<td>Department of Agriculture</td>
</tr>
<tr>
<td>DOWALD</td>
<td>Division of Water and Land Development, DLNR</td>
</tr>
<tr>
<td>DWS</td>
<td>Department of Water Supply, County of Hawaii</td>
</tr>
<tr>
<td>FW/O</td>
<td>Future Without (Project Conditions)</td>
</tr>
<tr>
<td>HAAWS</td>
<td>Hamakua Area Agricultural Water Study</td>
</tr>
<tr>
<td>HDPE</td>
<td>high density polyethylene</td>
</tr>
<tr>
<td>MG</td>
<td>million gallons</td>
</tr>
<tr>
<td>mgd</td>
<td>million gallons per day</td>
</tr>
<tr>
<td>NED</td>
<td>National Economic Development</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NRCS</td>
<td>Natural Resources Conservation Service (formerly SCS)</td>
</tr>
<tr>
<td>OM&amp;R</td>
<td>operation, maintenance and replacement</td>
</tr>
<tr>
<td>PL 83-566</td>
<td>Public Law 83-566</td>
</tr>
<tr>
<td>PLAN-EA</td>
<td>Plan and Environmental Assessment</td>
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<tr>
<td>PLAN-EIS</td>
<td>Plan and Environmental Impact Statement</td>
</tr>
<tr>
<td>PVC</td>
<td>polyvinyl chloride</td>
</tr>
<tr>
<td>SCS</td>
<td>Soil Conservation Service (now NRCS)</td>
</tr>
<tr>
<td>SWCD</td>
<td>Soil and Water Conservation District</td>
</tr>
<tr>
<td>UHD</td>
<td>Upper Hamakua Ditch</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
<tr>
<td>WIS</td>
<td>Waimea Irrigation System</td>
</tr>
</tbody>
</table>
METRIC CONVERSION TABLE

The following conversion factors may be used to convert the U.S. customary measuring units, used in this report, to System International d'Unites (SI) measuring units.

<table>
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<th>Multiply U.S. customary units</th>
<th>By</th>
<th>To obtain SI units</th>
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</thead>
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<tr>
<td><strong>Length:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inch (in.)</td>
<td>25.4</td>
<td>millimeter (mm)</td>
</tr>
<tr>
<td>foot (ft.)</td>
<td>0.3048</td>
<td>meter (m)</td>
</tr>
<tr>
<td>mile (mi.)</td>
<td>1.609</td>
<td>kilometer (km)</td>
</tr>
<tr>
<td><strong>Area:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>square foot (ft²)</td>
<td>0.09294</td>
<td>square meter (m²)</td>
</tr>
<tr>
<td>acre (ac.)</td>
<td>0.4047</td>
<td>hectare (ha)</td>
</tr>
<tr>
<td><strong>Liquid Volume:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gallon (gal.)</td>
<td>3.785</td>
<td>liter (L)</td>
</tr>
<tr>
<td>million gallons (MG)</td>
<td>3785.0</td>
<td>cubic meter (m³)</td>
</tr>
<tr>
<td><strong>Discharge:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>gallon per minute (gpm)</td>
<td>0.06309</td>
<td>liter/second</td>
</tr>
<tr>
<td>million gallons per day (mgd)</td>
<td>0.4381</td>
<td>cubic meter/second</td>
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SUMMARY OF
WATERSHED PLAN AND
ENVIRONMENTAL IMPACT STATEMENT

1. INTRODUCTION

Project Name: Waimea-Paauilo Watershed

County, State: County of Hawaii, Hawaii

Project Description: The Waimea-Paauilo Watershed project proposes a plan to alleviate the agricultural water shortage problems experienced by farmers and ranchers in the Waimea area by increasing the storage and distribution capacity of the Waimea Irrigation System. The Selected Plan proposes the installation of a 131-million gallon reservoir, a reservoir supply pipeline, and crop irrigation water and livestock drinking water distribution systems.


Responsible Agencies: USDA, Natural Resources Conservation Service (NRCS)
Mauna Kea Soil and Water Conservation District (SWCD)
State of Hawaii, Department of Agriculture (DOA)
State of Hawaii, Department of Hawaiian Home Lands (DHHL)

2. PROJECT SETTING

Location: Northeast part of the island of Hawaii. Includes part of the South Kohala and Hamakua Districts.

TMK: 3rd Tax Division, 4-4-variou, 4-6-variou, 4-7-variou, 4-9-variou, 6-3-variou, 6-4 variou, 6-5 variou, 6-6 variou, and 6-7 variou.

Size: 143,900 acres

Land Use:

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing</td>
<td>115,492</td>
<td>80</td>
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<tr>
<td>Former sugarcane</td>
<td>12,200</td>
<td>8</td>
</tr>
<tr>
<td>Forest reserve</td>
<td>8,140</td>
<td>6</td>
</tr>
<tr>
<td>Urban and built-up</td>
<td>3,142</td>
<td>2</td>
</tr>
<tr>
<td>Cropland (truck crops)</td>
<td>1,324</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>3,602</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>143,900</td>
<td>100</td>
</tr>
</tbody>
</table>

xi
Land Ownership:

<table>
<thead>
<tr>
<th>Landowner</th>
<th>Acres</th>
<th>Percent</th>
</tr>
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<tbody>
<tr>
<td>Private</td>
<td>88,629</td>
<td>61</td>
</tr>
<tr>
<td>State of Hawaii (not including DHHL)</td>
<td>29,840</td>
<td>21</td>
</tr>
<tr>
<td>Department of Hawaiian Home Lands</td>
<td>25,406</td>
<td>18</td>
</tr>
<tr>
<td>County of Hawaii</td>
<td>25</td>
<td>&lt; 1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>143,900</td>
<td>100</td>
</tr>
</tbody>
</table>

Population: 8,800 persons (1990)

Agriculture: The watershed area is one of the most important agricultural areas in the State of Hawaii. The two main agricultural industries are the production of irrigated truck crops and cattle ranching. Nearly two-thirds of the total state production of Chinese cabbage, celery, head lettuce, burdock, and dainon is grown in the watershed area. There are over 300 ranches with over 40,000 head of cattle on 115,492 acres of grazing land in the watershed area.

Existing Water Supply Systems:
- Waimea Irrigation System (WIS): State of Hawaii-owned agricultural water system operated by the DOA. Provides irrigation water to the Lalamilo, Puukapu, and DHHL farmlots.
- Parker Ranch System: Privately-owned water system which provides stockwater to Parker Ranch.
- Department of Water Supply: County of Hawaii-owned and operated water system which provides domestic water.

3. PROJECT PURPOSE AND NEED

Project Purpose: To alleviate the agricultural water shortage problems caused by the inadequate quantity and distribution of water for crop irrigation and livestock drinking water (stockwater) in the watershed area. The project purpose under PL 83-566 is agricultural water management.

Problems and Opportunities: WIS farmers are often subject to water use restrictions because of insufficient storage capacity of the system, a condition exacerbated by droughts. The restrictions result in reductions in crop quality and yield, total crop losses, reductions in new plantings, and disruptions in marketing patterns. Many ranchers must use the more expensive treated domestic water for stockwater because a source of agricultural water is not available to them. Opportunities to expand both crop and livestock production are limited by the inadequate water supply. Agricultural losses have been estimated at $1,670,400 on an average annual basis, under present conditions. Losses will increase to an estimated $3,749,900 in the future if no action is taken to solve the problems.
4. FORMULATION AND COMPARISON OF ALTERNATIVES

Candidate Plans:

- **Alternative 1**, the *No Action Alternative*, describes and quantifies the conditions expected if no action is taken to solve the problems. It served as the baseline against which the effects of the other alternatives are measured.

- **Alternative 2**, the *National Economic Development (NED) Plan*, provides the highest economic benefits after the cost expenditures is considered (net benefits). It proposes the following improvements to the WIS: 1) installation of a reservoir supply pipeline from the Upper Hamakua Ditch (UHD) to the proposed reservoir; 2) construction of a 131-MG reservoir (Waimea II) with a 2:1 embankment downslope; and 3) expansion of the irrigation distribution system to supply the planned 270-acre Lalamilo Ag. Park expansion area. It does not include improvements to provide stockwater.

- **Alternative 3**, the *Waimea II Reservoir Plan*, is similar to Alternative 2, except that it also includes the installation of a stockwater distribution system to service 265 ranchlots totaling 22,962 acres. The reservoir supply pipeline, reservoir, and irrigation water distribution system are unchanged from Alternative 2.

- **Alternative 4**, the *Modified Waimea II Reservoir Plan*, is similar to Alternative 3, except that it proposes constructing a modified Waimea II Reservoir which incorporates design features to increase the structural stability of the reservoir's embankment, including a lower embankment height and 3:1 downslope. These modifications will lower the storage capacity of the reservoir to 120-million gallons.

- **Alternative 5**, the *Kauahi Reservoir Plan*, differs from the other alternatives, in that it proposes the installation of a 131-million gallon reservoir at the Kauahi site, approximately three miles south of the Waimea II Reservoir site. This plan requires the installation of a longer reservoir supply pipeline. It also includes the expansion of the irrigation distribution system to supply the proposed 270-acre Lalamilo Agricultural Park and a stockwater distribution system to service 265 ranchlots totaling 22,962 acres.

- **Alternative 6**, the *Kauahi Reservoir Plan without Stockwater*, is similar to Alternative 5, except that no improvements to provide livestock drinking water from the WIS are included.

5. SELECTED PLAN

**Rationale for Plan Selection:** The Sponsors designated Alternative 5, the Kauahi Reservoir Plan, as the "Selected Plan" for installation. Alternative 5 proposes an economically feasible plan that addresses the project purpose of alleviating the agricultural water shortage problems, with less potential adverse effects on properties surrounding the proposed reservoir.

**Proposed Works of Improvement:** The Selected Plan proposes the installation of the following structural measures to increase the capacity and reliability of the WIS:

- **Reservoir supply pipeline:** Install 19,200 feet of pipeline from a new intake structure on the Upper Hamakua Ditch to the proposed Kauahi Reservoir.
- **Reservoir:** Construct a 131-MG Kauahi Reservoir.
- **Irrigation water distribution system:** Install 13,300 feet of pipeline to service the State Department of Agriculture-proposed 270-acre Lalamilo Agricultural Park expansion area.
- **Stockwater distribution system:** Install 234,600 feet of pipeline, seven electric pumps, and two diesel pumps to provide stockwater to 265 ranchlots totaling 22,962 acres.
WIS Features (with improvements):
- **Total water storage**: Increased from 161 million gallons to 292 million gallons.
- **Total water supplied**: 4-million gallons per day.
- **Reliability of water supply**: Increased from 68 percent to 78 percent.
- **Service Areas**:
  - Farmlots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranchlots: 265
  - Grazing land acres: 22,962
  - Animal units 19,040

6. EFFECTS OF THE SELECTED PLAN

Economic Effects:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
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<tr>
<td>Installation costs</td>
<td></td>
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<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>6,832,800</td>
<td>569,100</td>
<td>7,401,900</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>5,418,900</td>
<td>322,400</td>
<td>5,741,300</td>
</tr>
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<td>DHHL cost-share</td>
<td>157,200</td>
<td>4,076,200</td>
<td>4,233,400</td>
</tr>
<tr>
<td><strong>Total installation costs</strong></td>
<td><strong>12,408,900</strong></td>
<td><strong>4,967,700</strong></td>
<td><strong>17,376,600</strong></td>
</tr>
<tr>
<td>Average annual installation costs 11&lt;sup&gt;1&lt;/sup&gt;</td>
<td>970,800</td>
<td>388,600</td>
<td>1,359,400</td>
</tr>
<tr>
<td><strong>Total average annual O&amp;M&amp;R 22&lt;sup&gt;2&lt;/sup&gt; costs</strong></td>
<td>101,500</td>
<td>94,600</td>
<td>196,100</td>
</tr>
<tr>
<td>Total average annual costs</td>
<td>1,072,300</td>
<td>483,200</td>
<td>1,555,500</td>
</tr>
<tr>
<td>Average annual benefits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in losses due to water shortages</td>
<td>817,800</td>
<td>41,500</td>
<td>859,300</td>
</tr>
<tr>
<td>Reduction in limited expansion opportunities</td>
<td>517,600</td>
<td>207,700</td>
<td>725,300</td>
</tr>
<tr>
<td>Reduction in water pumping costs</td>
<td>46,600</td>
<td>0</td>
<td>46,600</td>
</tr>
<tr>
<td><strong>Total average annual benefits</strong></td>
<td><strong>1,382,000</strong></td>
<td><strong>249,200</strong></td>
<td><strong>1,631,200</strong></td>
</tr>
<tr>
<td>Average annual benefit : cost ratio</td>
<td>1.3 : 1.0</td>
<td>0.5 : 1.0</td>
<td>1.0 : 1.0</td>
</tr>
</tbody>
</table>

<sup>1</sup> Installation costs amortized at 7.625% interest for 50 years (0.07823).
<sup>2</sup> Operation, maintenance, and replacement.
### Environmental Effects:

<table>
<thead>
<tr>
<th>Item</th>
<th>Effects</th>
<th>Proposed Mitigation Measures</th>
</tr>
</thead>
</table>
| Agriculture and Prime Agricultural Land | - Agricultural industry will be strengthened.  
- Additional potential Prime Agricultural land will be supplied with irrigation water. | None required. |
| Air                   | - Temporary decrease in air quality will occur during construction due to equipment creating dust.  
- Temporary decrease in air quality will occur during construction due to equipment exhaust emissions. | - Dust control measures will be undertaken or installed. Remaining effects considered unavoidable.  
- None feasible for exhaust emissions. Effects considered unavoidable. |
| Cultural Resources    | None anticipated.                                                      | None required.                                |
| Dam Breach            | - One dwelling is located in the Kauahi Reservoir dam breach inundation area.  
- The living area of the dwelling is above the estimated breach flow depth.  
- Dwelling garage, one open livestock shelter, one old silo, livestock fences, and roads may be inundated and damaged by breach flow.  
- Erosion damage and sediment deposition may occur in the pasture areas.  
- Ponding may last for a week or more. | - Kauahi Reservoir located where no stream or introduced runoff will enter dam pool.  
- High-density polyethylene lining will be installed.  
- A chimney filter within the embankment will be installed.  
- Downstream embankment lowered to 3:1 slope to create a broader base and increased flow path.  
- An Emergency Preparedness Plan will be developed and implemented.  
- Remaining effects considered unavoidable. |
| Energy                | - 82,900 kilowatt hours will be required to operate 7 stockwater pumps annually.  
- 3,000 gallons of diesel fuel will be required to operate 2 stockwater pumps annually. | None feasible. Considered an irreversible and irretreivable commitment of resources. |
| Floodplains           | None anticipated.                                                      | None required.                                |
| Groundwater           | None anticipated.                                                      | None required.                                |
| Land Use              | - 29 acres will be converted from grazing land to permanent Kauahi Reservoir site.  
- 270 acres will be converted from grazing land to cropland (Lalamilo Ag. Park). | None feasible. Considered a long-term, irreversible and irretreivable commitment of resources. |
| Soil                  | Temporary increase in soil erosion and sedimentation potential will occur during construction. | Erosion and sediment control measures will be undertaken or installed. Remaining effects considered unavoidable. |
| Streams               | Reduced overflow from UHD will reduce average streamflow of Lualakea Stream by 5% per year. Naturally occurring fluctuations in streamflow will override overflow effects. | None required.                                |
| Threatened and Endangered Species | None anticipated.                                                      | None required.                                |
| Visual                | Kauahi Reservoir will be visible from about 300 properties.             | Kauahi Reservoir embankment slope grassed to blend in with the surrounding grazing land. |
| Water Rights          | None anticipated.                                                      | None required.                                |
| Wetlands              | Minimal effects due to stockwater pipelines.                           | Pipelines will be placed to avoid wetlands, buried, and/or best management practices followed. |
Relationship Between Local Short-term Uses and Enhancement of Long-term Productivity:

The present and most likely continued short-term use of the 29-acre Kauahi Reservoir site, seven-acre stockwater distribution system right-of-way area, is grazing land. The long-term commitment of this grazing land for the installation of the works of improvement will result in a more reliable and expanded source of agricultural water that will enhance long-term productivity on 1,985 acres of cropland and 22,962 acres of grazing land.

Unresolved Issues:
- None were identified.

Relationship to Other Plans, Policies and Controls:
- State Land Use Districts: The land use changes proposed by the Selected Plan will take place on land located in an Agriculture District and will conform with allowable uses.
- The Hawaii State Plan and State Agricultural Functional Plan: Several objectives, policies, and actions stated in the plans support the implementation of the Selected Plan.
- Hawaii County General Plan: Several goals, policies, and courses of action stated in the plan support the implementation of the Selected Plan.
- Hawaii County Water Use and Development Plan (WUDP): The plan recognizes the need for additional water supply to handle new irrigation requirements.
- Department of Hawaiian Home Lands Plans: The Selected Plan supports the efforts of the DHHL to provide infrastructure, including an agricultural water supply, to allow native Hawaiian homesteaders so that they may farm and ranch.
- Department of Transportation: The proposed bypass highway can be compatible with the Selected Plan with the installation of pipeline crossings.
- Waimea Water Roundtable: This group has been informed about the Waimea-Pauuilo Watershed project and continues provide input to assure wise use of the water resources in the Waimea area.
- Parker Ranch 2020 Plan: The 2020 Plan applies to urban-zoned property and does not affect any of the agricultural or pastoral parcels in the project service area.
- County Zoning Code: Project installation will conform with land uses designated by the County Zoning Code.
- Hawaii Coastal Zone Management Program: Project installation will have no effect or positive effect on the ten policy areas of the CZM program.
- Ceded Lands Trust: The use of ceded lands for project improvements conforms with the eligible purposes set forth in Section 5(f) of the Admissions Act.

Permits and Compliance:
- Grading, Grubbing, Excavating, and Stockpiling Permit
- Building Permit
- State Land Use Approval
- Conservation District Use Approval
- Dam Construction Permit
- State Highways Permit
- Department of Army (404) Permit
Consultation and Public Participation:
The general public, as well as federal, state and county agencies, have been provided numerous opportunities to participate in the development of both the Waimea-Paauilo Watershed Plan-Environmental Assessment and Environmental Impact Statement. Efforts were made to ensure a wide review of the Draft Plan-Environmental Impact Statement including: the mailing of copies to approximately 90 parties, the holding of a public meeting, and the publication of notices of availability in local newspapers. Thirty-three sets of written comments were received during the 45-day review period.
1. INTRODUCTION

All changes to the text of the draft Plan-EIS appearing in this document as a result of comments received during the interagency review period are italicized to allow the reader to distinguish the revisions.

1.1 GENERAL

The purpose of the Waimea-Pauuilo Watershed project is to alleviate the agricultural water shortage problems caused by the inadequate quantity and distribution of water for crop irrigation and livestock drinking water in the Waimea area of the island of Hawaii, County of Hawaii.

Project planning began on July 5, 1983 with the authorization of funds by the Chief, Natural Resources Conservation Service (NRCS). The planning process included the identification and quantification of the problems, an inventory of resources, and the formulation and comparison of alternative plans. The results of project planning were described in a combined Watershed Plan and Environmental Assessment (Plan-EA) which was completed in September 1989. Three plans were considered as Candidate Plans and one was selected by the Sponsors as the Recommended Plan for implementation. The Recommended Plan in the Plan-EA proposed improvements to the existing agricultural water system, the WIS, including the construction of a 133-million-gallon reservoir, referred to as the Waimea II Reservoir. Subsequent community opposition to the plan based on concerns about dam safety and possible economic effects on homes adjacent to the proposed Waimea II Reservoir site, prompted further planning efforts which resulted in new alternatives and the preparation of this combined Watershed Plan and Environmental Impact Statement (Plan-EIS). Environmental Impact Statements require a more detailed analysis of the environmental consequences of proposed actions, than do Environmental Assessments.

The further planning efforts included the updating of the information presented in the original Plan-EA, the re-evaluation of the three original Candidate Plans included in the Plan-EA, and the formulation and evaluation of three new alternative plans. The plans were compared and one of the new plans, Alternative 5, the Kauahi Reservoir Plan, was selected by the Sponsors as the plan they would like implemented.

The Waimea-Pauuilo Watershed project was undertaken by the U.S. Department of Agriculture (USDA), NRCS, formerly known as the Soil Conservation Service, at the request of the following local sponsoring organizations (Sponsors): 1) the Mauna Kea Soil and Water Conservation District (SWCD); 2) the State of Hawaii, Department of Agriculture (DOA); and 3) the State of Hawaii, Department of Hawaiian Home Lands (DHHL). The State of Hawaii, Department of Land and Natural Resources (DLNR) was replaced by DOA as a project sponsor, when DOA, pursuant to Act 306, SLH 1987, was granted jurisdiction over the State’s agricultural water systems in 1987. Project planning and the preparation of the Plan-EA and Plan-EIS was led by the NRCS with assistance from the Sponsors. Other
federal, state, and county agencies, groups, and individuals also assisted with project planning by providing information and reviewing draft plans.

The Waimea-Pauiilo Watershed project is planned and implemented under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566 (PL 83-566), as amended (16 U.S.C. 1001-1008). Project planning was conducted and this Plan-EIS was prepared to fulfill the requirements of: 1) the National Environmental Policy Act of 1969 (NEPA), as amended, Public Law 91-190, 42 U.S.C. 4321- et seq.; 2) the requirements of the Hawaii environmental review process as defined in Chapter 343, Hawaii Revised Statutes (HRS), including Act 241, SLH 1992 revisions, and Title 11, Chapter 200, Hawaii Administrative Rules, Department of Health; 3) the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies; and 4) the NRCS's National Watershed Manual.

Three versions of this Plan-EIS have been prepared: 1) Technical Review; 2) Draft; and 3) Final. The Technical Review Plan-EIS was reviewed by the NRCS technical and program specialist and by the Sponsors. Comments from this review will be considered and modifications to the Plan-EIS will be made accordingly to produce the Draft version. The Draft Plan-EIS was made available for public review and comment for a 45-day period. The availability of the Draft Plan-EIS was publicized in the local media and copies were widely distributed to governmental agencies, organizations, and interested individuals. All comments were considered and modifications made to produce the Final Plan-EIS. All comments were responded to in writing and both the comments and responses are included in the Final Plan-EIS. Notices of availability of the Final Plan-EIS will appear in both the Environmental Bulletin and Federal Register. A copy will be sent to each individual, agency, or group providing substantive comments on the Draft Plan-EIS. Following the acceptance of the Final Plan-EIS by the Governor of the State of Hawaii and publication of the Notice of Acceptance in OEQC's Environmental Notice, there will be a 60-day period for an aggrieved party to file suit in circuit court. For the federal process, a 30-day no action period following the publication of the Notice of Availability in the Federal Register will be observed after which a Notice of Intent (to proceed with project implementation) can be issued by the NRCS. The availability of the Notice of Intent will be widely-published and the Notice will be sent to recipients of the Final Plan-EIS.

NRCS will use this Plan-EIS to request funds for the federal share of the installation cost of the Selected Plan. The Sponsors will be responsible for obtaining the necessary local funding from the state legislature or other sources. It is anticipated that appropriations will be requested in increments. The implementation of the Selected Plan will depend on the acquisition of both federal and local funding.

1.2 READER'S GUIDE

This reader's guide briefly describes the contents of this Plan-EIS.

A Table of Contents, List of Tables, List of Figures, Glossary of Abbreviations, and a Metric Conversion Table are provided to make reading and using the Plan-EIS easier.

The Summary describes the plan in brief. Other sections should be consulted if specific details of the project are desired.
Section 1. INTRODUCTION, provides background information about the Waimea-Pauuilo Watershed project and includes this Reader’s Guide.

Section 2. PROJECT SETTING, begins the body of the Plan-EIS. It describes pertinent environmental, social, and economic information about the watershed area.

Section 3. PROJECT PURPOSE AND NEED, describes the purpose of the project and demonstrates the need for the watershed project by describing and quantifying the problems that need to be solved as well as the opportunities for enhancing the quality of life in the watershed area, based on public concerns and desires. Table F, SUMMARY OF PROBLEMS AND OPPORTUNITIES, provides a summary tabulation.

Section 4. FORMULATION AND COMPARISON OF ALTERNATIVES, describes the formulation and comparison of the alternative plans and rationale for the selection of the Selected Plan. Table L, SUMMARY AND COMPARISON OF CANDIDATE PLANS, presents a tabular comparison of the plans considered as the Selected Plan.

Section 5. SELECTED PLAN, describes the measures to be installed as proposed by the Selected Plan. The following tables are included in this section (on blue paper for ready reference):

Table 1 - Estimated Installation Costs
Table 2 - Estimated Cost Distribution
Table 3.A - Structural Data - Pipelines
Table 3.B - Structural Data - Kauahi Dam and Reservoir
Table 4 - Estimated Average Annual Costs
Table 6 - Comparison of Benefits and Costs

Section 6. ENVIRONMENTAL SETTING, EFFECTS, AND MITIGATION MEASURES, describes the economic, environmental, and social effects of the Selected Plan and any planned mitigation measures.

Section 7. CONSULTATION AND PUBLIC PARTICIPATION, documents the opportunities provided for public participation and agency consultation throughout the planning process.

Section 8. PLAN-EIS PREPARERS, is a table listing the names and qualifications of the persons involved in preparing the various drafts of the Plan-EIS.

Section 9. INDEX, is available to make finding information about a particular subject easier.

Section 10. REFERENCES, list the reports used in preparation of this Plan-EIS.

The Appendices consist of the following:

Appendix A - WATER RESTRICTION PERIODS, lists the water restriction periods experienced by users of the WIS from 1965 to January 1997.
Appendix B - COMMENTS AND RESPONSES, includes written comments received regarding the Draft Plan-EIS and letters of response.

Separate documentation with additional information regarding the environmental evaluations conducted for the project have been prepared and are available for review by request from the NRCS contact person listed below.

Comments or questions regarding the contents of this Plan-EIS may be referred to:

Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
Mailing address: P.O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, HI 96850-0050
Telephone number: (808) 541-2601
FAX number: (808) 541-1335.
2. PROJECT SETTING

2.1 LOCATION AND SIZE

The 143,900-acre Waimea-Pauilo Watershed is located on the northeast part of the island of Hawaii, commonly referred to as the Big Island, which comprises the County of Hawaii (Figure A). The watershed area is bounded by Highway 19 to the north and the town of Pauilo to the east. The watershed area extends to the 8,000-foot level of Mauna Kea to the south and to the Waikoloa Stream drainage to the west. The watershed area is located in the following Tax Map Key (TMK) areas: 3rd Tax Division; 4-4-various, 4-6-various, 4-7-various, 4-9-various, 6-3-various, 6-4 various, 6-5 various, 6-6 various, and 6-7 various.

2.2 LAND USE

Land use in the watershed area is strongly influenced by past and present agricultural activity. A large majority of the land is used for grazing cattle (Table A). Approximately 12,200 acres along the Hamakua coastline were used for growing sugarcane until the closing of the Hamakua Sugar Company in 1995. There are several forest reserves located partially or wholly within the watershed area. A portion of the Kohala Forest Reserve is located in the watershed area north of Waimea, the major population center in the watershed area as well as the northern part of the island of Hawaii. Truck crops are grown on approximately 1,300 acres in the Lalalilo and Puukapu areas of Waimea.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing</td>
<td>115,492</td>
<td>80</td>
</tr>
<tr>
<td>Former sugarcane</td>
<td>12,200</td>
<td>8</td>
</tr>
<tr>
<td>Forest reserve</td>
<td>8,140</td>
<td>6</td>
</tr>
<tr>
<td>Urban and built-up</td>
<td>3,142</td>
<td>2</td>
</tr>
<tr>
<td>Cropland (truck crops)</td>
<td>1,324</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>3,602</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>143,900</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Land use as designated by the 1989 County of Hawaii, General Plan Land Use Pattern Allocation Guide Map is shown in Table B and Figure B (County Landuse Districts). The map was developed to assist county planners in making future land use determinations. Land in the watershed area fall in seven out of the twelve possible designations, as described below.

Intensive Agriculture: Sugar, orchard, diversified agriculture, and floriculture.
Extensive Agriculture: Pasture and range lands.

Urban and Rural - Medium Density: Village and neighborhood commercial and residential and related functions (3-story commercial; residential - up to 35 units per acre).

Urban and Rural - Low Density: Single family residential in character, ancillary community and public uses, and convenience type commercial uses.

Urban Expansion Area: Allows for a mix of high density, medium density, low density, industrial and/or open designations in areas where new settlements may be desirable, but where the specific settlement pattern and mix of uses have not yet been determined. Within areas designated for development as resorts, portions of the resort area may be included in the urban expansion area.

Industrial Area: These areas include uses such as manufacturing and processing, wholesaling, large storage and transportation facilities, and light industrial uses.

Conservation Area: Forest and water reserves, natural and scientific preserves, open, lands within the State Land Use Conservation District.

The watershed area does not include any land designated Urban and Rural - High Density (commercial and multiple residential); Resort Area (hotels); Orchard (rocky land suitable of orchards); University; or Open (parks and historic sites).

<table>
<thead>
<tr>
<th>Table B</th>
<th>LAND USE PATTERN ALLOCATION</th>
<th>Waimea-Paauilo Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Acres</td>
<td>Percent</td>
</tr>
<tr>
<td>Intensive Agriculture</td>
<td>64,900</td>
<td>45</td>
</tr>
<tr>
<td>Extensive Agriculture</td>
<td>66,300</td>
<td>46</td>
</tr>
<tr>
<td>Urban and Rural - Medium Density</td>
<td>340</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Urban and Rural - Low Density</td>
<td>3,200</td>
<td>2</td>
</tr>
<tr>
<td>Urban Expansion Area</td>
<td>660</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Industrial Area</td>
<td>360</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Conservation Area</td>
<td>8,140</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>143,900</td>
<td>100</td>
</tr>
</tbody>
</table>
2.3 LAND OWNERSHIP

The following table lists land ownership acreage and percentages in the watershed area. Figure C illustrates land ownership in the watershed area.

<table>
<thead>
<tr>
<th>Landowner</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>88,629</td>
<td>61</td>
</tr>
<tr>
<td>State of Hawaii (not including DHHL)</td>
<td>29,840</td>
<td>21</td>
</tr>
<tr>
<td>Department of Hawaiian Home Lands</td>
<td>25,406</td>
<td>18</td>
</tr>
<tr>
<td>County of Hawaii</td>
<td>25</td>
<td>&lt;1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>143,900</td>
<td>100</td>
</tr>
</tbody>
</table>

*All Department of Hawaiian Home Land parcels and State roadways are ceded lands which were conveyed to the State from the federal government through Sections 3(b) and 3(e) of the Admissions Act. Many of the non-DHHL parcels owned by the State of Hawaii, including road rights-of-way and public facility sites are ceded lands. Approximately 1.75 million acres of Government and Crown Lands were ceded to the United States, when Hawaii was annexed in 1898.*

2.4 POPULATION AND ECONOMY

The resident population of the island of Hawaii was about 120,000 based on the 1990 census. The major industries on Hawaii are tourism and agriculture.

The resident population in the watershed area was estimated at about 8,800 based on the 1990 census. This includes the residents of three communities, Waimea (Kamuela), Honokaa, and Paaülo which lie wholly or partially within the watershed area boundaries. Although Waimea Town is the major population and business center in the watershed area, as well as the entire northern region of the island, it remains a rural farming and ranching community. An area undergoing rapid growth, the resident population of Waimea grew from 1,179 in 1980 to 5,972 in 1990, an increase of about 500 percent. Honokaa and Paaülo are predominantly agricultural communities which are in transition from sugarcane growing and processing to diversified agriculture production.

2.5 AGRICULTURE

Total value of crop and livestock sales for the island of Hawaii topped $159 million in 1994, over 30% of the approximately $502 million in sales statewide.

Agriculture is the major source of employment and income in the watershed area. Until recently, sugarcane production was the major agricultural industry in the watershed area, with about 12,200 acres of sugarcane grown along the Hamakua coast region.
Dwindling profits caused the closing of the area’s major sugarcane plantation in 1985. The State of Hawaii and private enterprises are looking for alternative agricultural uses for the former sugarcane lands.

The primary agricultural industries in the watershed area at the present time are the production of irrigated truck crops and cattle ranching on open pasture lands. The watershed area is one of the most important agricultural areas in the State of Hawaii.

2.5.1 Irrigated Truck Crops

The Waimea area is one of the major truck crop producing areas in the State of Hawaii. The value of crops grown with water from the WIS is estimated at over $2 million and includes nearly two-thirds of the Chinese cabbage, celery, head lettuce and romaine lettuce grown in the State. Broccoli, cauliflower, head cabbage, romaine lettuce, burdock and daikon are also commonly grown. Several farms in the area grow flowers such as roses and carnations in greenhouses and tuberose in fields.

At the present time, there are about 1,324 acres of cropland used for the production of truck crops in the watershed served by the State-run Waimea Irrigation System (WIS). The cropland is concentrated in three main areas: Lalamilo, Puukapu, and Department of Hawaiian Home Lands (DHHL) farmlots. Average farmlot size is about 16 acres. The farmlots are intensively farmed, with crops grown year-round and several crops produced per year. The Lalamilo and Puukapu farmlots are privately-owned by individual farmers. Farmers must be of native Hawaiian descent in order to lease and farm a DHHL lot.

Of the total 1,324 acres, 892 acres are cultivated, with the remaining acres being used for farm roads, windbreaks, and buildings. Of the 892 acres, approximately 624 acres are irrigated at any one time, allowing for non-irrigated periods between crops and during harvesting. Sprinkler irrigation systems are commonly used. Table D shows the cropland acreage and number of farmlots in each area.

When planning for the Plan-EA was being conducted in the late 1980’s, three new areas were designated as future cropland expansion areas. These areas were the Lalamilo Agricultural Park, DHHL Farmlots Phase I, and the DHHL Farmlots Phase II. Expansion of the WIS distribution system to serve DHHL Phase I and II farmlots is currently underway. Total cropland acreage for these two areas is 391, of which an estimated 301 acres will be cultivated and 211 acres actively irrigated. Irrigated acreage in the existing Puukapu farmlots is also expected to increase by 39 acres based on applications on file with the WIS. These acres are expected to be in production under Future Without Project Conditions (Figure D).

The remaining cropland expansion area is the Lalamilo Agricultural Park. The state-operated agricultural park has been tentatively sited in an area between the existing Lalamilo farmlots and the Puukapu/DHHL farmlots. The development of the site is pending the availability of irrigation water and the acquisition of the land. Total cropland area is 270 acres, of which an estimated 163 acres can potentially be cultivated and 115 acres can potentially be irrigated.
Table D
WAIMEA IRRIGATION SYSTEM -
CROPLAND SERVICE AREA
Waimea-Paauilo Watershed

<table>
<thead>
<tr>
<th>Condition/Area</th>
<th>Farmlots</th>
<th>Total Acres</th>
<th>Cultivated Acres</th>
<th>Irrigated Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lalamilo</td>
<td>28</td>
<td>2870</td>
<td>443</td>
<td>310</td>
</tr>
<tr>
<td>Puukapu</td>
<td>24</td>
<td>370</td>
<td>230</td>
<td>161</td>
</tr>
<tr>
<td>DHHL</td>
<td>29</td>
<td>284</td>
<td>219</td>
<td>153</td>
</tr>
<tr>
<td>TOTAL PRESENT</td>
<td>81</td>
<td>1,324</td>
<td>892</td>
<td>624</td>
</tr>
</tbody>
</table>

| FUTURE WITHOUT PROJECT |          |             |                  |                 |
| Lalamilo              | 28       | 670         | 443              | 310             |
| Puukapu               | 24       | 370         | 285              | 200             |
| DHHL                  | 29       | 284         | 219              | 153             |
| DHHL - Phase I        | 45       | 226         | 174              | 122             |
| DHHL - Phase II       | 33       | 165         | 127              | 89              |
| TOTAL FUTURE WITHOUT PROJECT | 159       | 1,715       | 1,248            | 874             |

| POTENTIAL EXPANSION AREA |          |             |                  |                 |
| Lalamilo Agricultural Park | 8        | 270         | 163              | 115             |
| TOTAL (FUTURE + EXPANSION) | 167       | 1,985       | 1,411            | 989             |

2.5.2 Cattle Ranching

Cattle ranching is the other important agricultural industry in the project area. There are approximately 115,500 acres of grazing land in the watershed area used for cattle ranching (Table E).

A large portion of the 225,000-acre Parker Ranch is located in the watershed. Parker Ranch has approximately 23,608 animal units on the 50,400 acres located in the watershed area. The ranch is a cow-calf operation on rangeland, with cattle being shipped to the mainland for finishing.

DHHL and privately-owned ranchlots make up the remaining grazing land. As with the DHHL farmlots, individuals must be of native Hawaiian descent in order to lease a DHHL ranchlot. Smaller DHHL ranchlots or ranches are subsistence type, with larger ranches being commercial cow-calf operations. The privately-owned ranches are mostly commercial cow-calf operations. One 239-acre parcel in the private ranch area was recently converted to golf course.
Figure D
CROPLAND AND POTENTIAL GRAZING LAND SERVICE AREAS
Waimea-Paauilo Watershed
The DHHL and some private ranchlots have been identified as potential areas which can be serviced by the WIS (Table F). With an adequate supply of stockwater, ranchers could increase their livestock herds because they could more efficiently manage their operations and because they would be able to implement intensive grazing methods. See Figure D for location of the potential grazing land service areas.

Intensive grazing methods are based on proper distribution of animals in pasture. Through management techniques and practices to optimize the production of forage plants and assure full utilization of the forage, ranchers can increase their herd size during most periods. Management practices will be included in the Conservation Plans that are prepared for each ranch.

Practices that will be recommended to improve distribution of livestock for efficient forage use include the following. Fencing to reduce pasture size allowing a concentration of animals to graze for short periods between long rest periods. Concentrated grazing will allow full and uniform utilization of the forage. Installation of livestock water facilities in locations distributed so optimum travel distances from pasture to water are not exceeded.

Soil erosion from grazing land will be reduced as a result of improved vegetative cover.

Table E
GRAZING LAND AND LIVESTOCK
Waimea-Pauui Watershed

<table>
<thead>
<tr>
<th>Condition</th>
<th>Ranchlots</th>
<th>Acres</th>
<th>Animal Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT &amp; FUTURE WITHOUT PROJECT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parker Ranch</td>
<td>1</td>
<td>50,400</td>
<td>23,608</td>
</tr>
<tr>
<td>DHHL</td>
<td>239</td>
<td>20,582</td>
<td>9,862</td>
</tr>
<tr>
<td>Other private</td>
<td>70</td>
<td>44,510</td>
<td>10,327</td>
</tr>
<tr>
<td>TOTAL</td>
<td>310</td>
<td>115,492</td>
<td>43,797</td>
</tr>
</tbody>
</table>
Table F
POTENTIAL GRAZING LAND SERVICE AREAS
AND LIVESTOCK PRODUCTION
Waimea-Pauuilo Watershed

<table>
<thead>
<tr>
<th>Condition</th>
<th>Ranchlots</th>
<th>Acres</th>
<th>Animal Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT &amp; FUTURE WITHOUT PROJECT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL</td>
<td>239</td>
<td>20,582</td>
<td>9,862</td>
</tr>
<tr>
<td>Other private</td>
<td>26</td>
<td>2,380</td>
<td>988</td>
</tr>
<tr>
<td>TOTAL</td>
<td>265</td>
<td>22,962</td>
<td>10,850</td>
</tr>
<tr>
<td>POTENTIAL WITH LIVESTOCK WATER SUPPLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL</td>
<td>239</td>
<td>20,582</td>
<td>17,447</td>
</tr>
<tr>
<td>Other private</td>
<td>26</td>
<td>2,380</td>
<td>1,593</td>
</tr>
<tr>
<td>TOTAL</td>
<td>265</td>
<td>22,962</td>
<td>19,040</td>
</tr>
<tr>
<td>INCREASE</td>
<td>0</td>
<td>0</td>
<td>8,190</td>
</tr>
</tbody>
</table>

2.6 CLIMATE

The climate in the watershed area is characterized by moderate variations in annual temperature, and significant variations in average annual rainfall. The average annual temperature varies from 75°F at the coastline to 40°F on the upper slopes of Mauna Kea (Figure E). The average annual rainfall varies from over 175 inches in the Kohala Mountains to 20 inches south of Waimea. This variation occurs in a distance of about 4 miles. Rainfall is not uniform throughout the year. Rainfall is highly dependent on trade wind patterns which occur in island regimes. One major deficiency of this regime is that occasionally, the trade wind pattern is disrupted. When this happens, rainfall diminishes over the island mountain ranges and should such occurrence last over an extended period longer that several weeks, then the surface flows are depleted which causes severe drought conditions that last from 30 to 90 days or more.

2.7 WATER SUPPLY SYSTEMS

There are three major water supply systems in the Waimea-Pauuilo Watershed area, the WIS, the Parker Ranch System, and the County Department of Water Supply domestic water system.

2.7.1 Waimea Irrigation System

At the present time the State-operated Waimea Irrigation System (WIS) provides irrigation water to the existing cropland areas of Lalamilo, Punukapu, and DHHL. The WIS was put into operation in 1961 with the construction of the 60-mg Waimea Reservoir. In
RECEIVED AS FOLLOWS
1963 the WIS served 99 irrigated acres with approximately 86 millions gallons. By 1986 the WIS served 487 irrigated acres with 368 million-gallons. From July 1995 to June 1996 the WIS served about 514 acres with 432 million gallons. Farmers currently pay 16 cents per 1,000 gallons plus a $2.25 per acre per month service charge on each irrigated acres. At the present time, no stockwater is provided by the WIS. The WIS will soon service the DHHL Phase I and II cropland expansion areas.

The source of water for the WIS is five perennial surface water streams located on State-owned land in the Kohala Forest Reserve. The Upper Hamakua Ditch (UHD) serves as the WIS collection system, with intake structures on five of the streams. The major streams, Kawainui, Kawaki, and Alakahi, contribute most of the flow, with Waimea and Kohawo Streams providing lesser amounts. See Figure F.

The UHD was constructed in the early 1900's by the Hawaiian Irrigation company to flume cut sugarcane to the coastal processing mills and to later irrigate the sugarcane fields of the Honokaa Sugar Plantation. The ditch was extended during the period of 1915 to 1922 to supply the Pau Pulehu Reservoir. The UHD consists of man-made open ditches, tunnels, stream diversion works, and natural stream sections. During the peak of its use the UHD was 23 miles long. On August 1, 1948, the Hawaiian Irrigation Company surrendered the license for the ditch system to the government. When Hawaii attained statehood in 1959, the responsibility for the UHD and 4,547 acres of the Kohala Forest Reserve water source was absorbed by the DLNR. At the present time, 8 miles of the ditch is being used as the collection system for the WIS and the 15 miles of ditch beyond the Pau Pulehu Reservoir is not being used and has been covered up or destroyed for the most part. Operational control of WIS was transferred to DOA, but under agreement, DLNR continues to assist with improvement projects.

The State DLNR is rehabilitating the UHD based on the 1986 investigation and evaluation report (Report R-77). The report estimated that during low flows of 4 million gallons per day or less, an estimated 50 to 75 percent of collected water was being lost in transport. Repairs to four of the five man-made sections of the UHD have been completed. Repairs to the remaining man-made section, Kawainui, is pending acquisition of State funding. No improvements are planned for any of the natural stream sections of the ditch. The completion of the UHD repairs should result in a high efficiency retention of 90 to 95 percent of the flows below 4 million gallons per day.

Table G displays the historic monthly flows at USGS Station 16726000 located above the Waimea Reservoir intake. While period of record extends from 1975 to the present, due to problems related to retrieval of the data, the records for this gage station are rated "poor" by USGS. Records from 1984 to 1990 are unreliable and are not used. Only instantaneous discharge measurements are available for the 1992 to 1994 water years. Table H indicates the variability of flow in the Upper Hamakua Ditch by displaying the monthly flow rate which will be exceeded for percentages of time.
Table G

**UPPER HAMAKUA DITCH FLOW RECORD**

<table>
<thead>
<tr>
<th>Waimea-Paulelo Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Year</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>1975</td>
</tr>
<tr>
<td>1976</td>
</tr>
<tr>
<td>1977</td>
</tr>
<tr>
<td>1978</td>
</tr>
<tr>
<td>1979</td>
</tr>
<tr>
<td>1980</td>
</tr>
<tr>
<td>1981</td>
</tr>
<tr>
<td>1982</td>
</tr>
<tr>
<td>1983</td>
</tr>
<tr>
<td>1993</td>
</tr>
</tbody>
</table>

Table H

**UPPER HAMAKUA DITCH FLOW FREQUENCY**

<table>
<thead>
<tr>
<th>Waimea-Paulelo Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exceedence</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>80%</td>
</tr>
<tr>
<td>50%</td>
</tr>
<tr>
<td>20%</td>
</tr>
</tbody>
</table>

The WIS storage system consists of two reservoirs with a combined storage of 161 million-gallons (MG). The Waimea Reservoir is a concrete-lined earthen dam, located three miles northeast of Waimea Town. It has a design capacity of 60 MG, of which 51 is usable. The Waimea Reservoir, with its bottom elevation at 2,935 feet, provides gravity flow to the currently served farming areas. The second reservoir, Puu Pulehu (formerly known as the Puukapu Reservoir) was enlarged from 40 MG to 110 MG in 1986 and lined with watertight geomebrane in 1994. Water stored in the Puu Pulehu Reservoir, at an elevation of 2,830 feet, is pumped into Waimea Reservoir before distribution to farms. The 4.5-million-gallon Lalamilo Reservoir is connected to the WIS distribution system but is not used in normal operations due to its low elevation.

A concrete inlet structure which diverts water from the UHD to the Waimea Reservoir is located in the Waima Section of the UHD approximately seven miles from the first diversion at Kawaihui Stream. A 2,830-foot-long 24-inch ductile iron pipeline conveys water from the inlet to the Waimea Reservoir.

Below the Waimea Reservoir inlet, the UHD uses a section of natural stream (Lalakea Stream) which subsequently connects to the final operational section of the UHD, the Puu Pulehu Section which leads to the 110-MG Puu Pulehu Reservoir. The Puu Pulehu Section was constructed in the 1920s and is newer than the other four UHD sections. Recent DLNR
repairs to the Puu Pulehu Section have been completed. Water enters the Puu Pulehu Section of the UHD only sporadically, when heavy rains in the mauka areas increase the UHD flow substantially. When the Puu Pulehu Reservoir is full, a control gate located where the natural stream meets the Puu Pulehu Section diverts the excess flow into a headwater tributary of the Lalakea Stream at about the 2,920-foot elevation. The Lalakea Stream flows seaward and joins Hililawe Stream at about the 200-foot elevation. Hililawe Stream in turn flows into Waioa Stream, the major stream in Waipio Valley.

The main distribution system from the Waimea Reservoir consists of nearly two miles of 24-inch diameter ductile iron pipeline to the Puukapu and DHHL farmlots and an additional two miles of 18-inch diameter ductile iron pipeline to the Lalamilo farmlots. Pipeline diameters within the service areas vary between 18-inches and 8-inches.

The State Department of Agriculture presently owns one fully developed well completed by the DLNR in spring of 1996. It is located approximately 2,000 feet north of the Waimea Reservoir. The well is 1,200 feet deep with a capacity of 1,000 gpm using a 600-hp motor. The cost of pumping water from the well is estimated to be $0.75 to $1.00 per 1,000 gallons. The well is not normally in use and has been retained for emergency backup supply by the Department of Agriculture. The County Department of Water Supply has also requested and received permission to connect to the well for emergency domestic water supply. A shallower well was also tested at the site but remains undeveloped awaiting legislative appropriation. The shallow well is used as a monitoring well.

2.7.2 Parker Ranch System

The Parker Ranch has a private water system which diverts surface water from the upper reaches of the Alakahi, Kohakohau, and Waikoloa streams, upstream from the corresponding WIS and domestic water system intakes. Water is carried by pipelines to storage tanks and reservoirs for exclusive use by Parker Ranch livestock operations located south and southeast of Waimea.

2.7.3 Department of Water Supply System

The Department of Water Supply (DWS) system is a domestic water system operated by the County of Hawaii. It takes flow from the Waikoloa and Kohakohau streams and stores the discharges in three 50-MG and one 8-MG reservoirs before treatment and distribution of the water to its customers.

In emergency drought situations in the past, water was drawn from the UHD to supplement the domestic water system.

The DWS system services all the households in Waimea and also provides livestock drinking water to many private and DHHL ranches in the watershed area. The domestic system now provides approximately 42 million gallons per year to 11,600 animal units on about 26,000 acres.
2.8 GEOLOGY AND SOILS

The Island of Hawaii, the largest in the Hawaiian Archipelago, was built by five major volcanoes. Kohala Mountains, a long-extinct shield volcano, forms the north end of the island and the upper watershed.

The Waimea Plain area of the watershed was also influenced by eruptions and associated deposits from Mauna Kea immediately southeast of the project. While Mauna Kea has not been active within historical times, ashfalls and cinder deposits originating form this volcano are the parent materials for many of the soils in the watershed. Volcanism continues to occur on the Island of Hawaii, most notably at Mauna Loa and Kilauea Volcanoes to the south of the watershed. Figure G is a map showing the general soils families present in the watershed area. Following is a description of the soil families.

1. TYPIC HYDRUDANDS and 3. HYDRUDANDS are typically deep to very deep soils derived from volcanic ash. These soils are in higher rainfall areas that seldom allow soil drying except in the surface few inches. The ash is highly weathered and textures are fine. Strength when moist is low and have poor trafficability. Total water holding capacity is very high and available water holding capacity is high. Traffic pans can seriously restrict water movement and root penetration. Uncompacted cultivated soils have a moderate to moderately slow water permeability. Organic matter contents are very high, pH values are slightly to strongly acid and liming rates can be high for acid sensitive crops. Phosphorous fixation can be very high. Nitrogen leaching can be high due to high precipitation but may be sequestered below the root zone due to high anion exchange capacity. Nitrates can still reach the water table after several years.

2. ACERDUOXIC HYDRUDANDS have properties similar to Soil Family 1 except have lower cation exchange capacity (CEC) under field conditions. These soils have less calcium, magnesium and potassium holding capacity requiring more careful monitoring unless limed (which increase the CEC).

4. HYDRIC HAPLUDANDS hold somewhat less total and available water than soils in Group 1 or 2 and should be slightly more trafficable in most areas. Other properties are similar to Families 1 and 2.

5. AQUIC HAPLUDANDS are highly weathered volcanic ash soils with properties similar to Families 1 and 2 except that they have a perched water table and a thin ironstone sheet shallow to the surface.

6. DYSTRIC HAPLUDANDS have a dry season. They have moderately low base cation content, acid, and are of higher strength than soil in Group 1 or 2. P-fixation is slightly lower.

7. CALCIC HAPLUDANDS have high base status, a distinct dry season, are deep to moderately deep to rock, and have moderately high wind erodibility if bare.

8. HUMIC HAPLUDANDS are deep to moderately deep volcanic ash soils and have very fine sandy loam to silt loam textures. They have moderate to high base cation status and organic matter content. They have a distinct dry season, are well-drained, fix moderately high amounts of phosphorous, and have a moderately high to high wind erodibility potential.
Water holding capacity is high, but can form traffic pans. Trafficability is good, if not too moist.

9. **Typic Vitirrands** are moderately deep to deep sandy loam and loamy sand volcanic ash soils under an aridic climate. They are droughty, wind erosive, and have a high leaching potential if irrigated.

10. **Typic Ustivitrands** soils are like Soil Family 10 but have enough seasonal moisture in most years to grow one short season crop although supplemental irrigation should be available.

11. **Histic Plaquespts** are soils with organic surface layers underlain by weathered ash and bedrock and are moderately deep and wet throughout the year. They occur in the highland fog forest of the Kohala Mountains.

12. **Vitrands** are volcanic ash soils comprised dominantly of cinders. They are usually deep, stratified, well drained, and less productive than surrounding finer textured soils. Also included are arid area sandy loam soils that may be stony.

13. **Cinder land** consists of deposits of cinders with some larger and smaller size materials that are sparsely vegetated or base. These deposits are relatively young and soils have not formed.

14. **Lava** is made up of a’a and pahoehoe flows with inclusions of shallow typically sparsely vegetated soils or **Typic Tropofols** are shallow organic soils on uplands that formed in a’a flows and are well drained. Some areas are over pahoehoe. Because they are shallow, they are droughty and susceptible to leaching nitrogen, phosphorous, other nutrients and pesticides. They can be well suited to crops such as coffee, papaya, and avocados if properly managed.

The major cropland soils in the Waimea area are Kikoni silt loam, very fine sandy loam, and Waimea very fine sandy loam. Both of these soils are in soil family 8. **Humic Haplustands**. These are deep, well drained soils on nearly level uplands. They are formed in volcanic ash. Wind erosibility of these soils is moderate and wind velocities are erosive on most sites. Wind breaks are recommended. Water erosion hazard is moderate. A primary difference between these two soils is the effective rooting depth, which is 40 to 60 inches for Waimea and 60 inches or more for Kikoni.

Both soils are considered “prime agricultural soils” and when irrigated, 86 percent can be classified as “Prime Farmland” nationally and “Prime Agricultural Land” in Hawaii. Figure H shows the location of the prime agricultural soils in the watershed area. According to the NRCS Hawaii land classification system, “Prime Agricultural Land” is land best suited for the production of food, feed, forage, and fiber crops. The land has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods.

With 624 acres of irrigated cropland in the watershed area at the present time, approximately 537 acres can be classified as Prime Agricultural Land. **Under Future Without Project Conditions**, irrigated cropland acres will increase to 874 acres with 752 acres classified as Prime Agricultural Land.
Both soils are very fertile with liming not normally necessary except for the most acid sensitive crops where prior fertilization has acidified the upper part of the soil. These soils can fix moderately large amounts of phosphorous. Truck crop production may benefit from banding of phosphorous which reduces application rates. Permeability is moderately rapid and the leaching potential of nitrates and potassium could be high during rainfall or irrigation events that exceed the available water holding capacity of the root zone. Smaller, more frequent applications of nitrogen fertilizer is recommended during the rainy season.

Irrigation is required due to seasonal rainfall, short droughts during the rainy season, low available water holding capacity and high wind velocities. Smaller, more frequent applications are recommended along with careful field moisture monitoring. Tillage pans have been noted in these soils. Probe rods should be used to detect restricting layers. These should be removed by subsoiling.

2.9 HAWAIIAN HOME LANDS

Through the Hawaiian Homes Commission Act of 1920, the United States government assumed a trust responsibility to benefit and rehabilitate native Hawaiians. The Act was intended to improve the well-being of the socially and economically disenfranchised native people and reverse the precipitous decline in the native Hawaiian population. The cornerstone of the Act set aside approximately 188,000 acres of government-held land for leasehold homesteading by native Hawaiians. In 1959, when Hawaii attained statehood, most of the trust obligation was transferred to the State of Hawaii. The Hawaiian Homes Commission and the Department of Hawaiian Home Lands (DHHL) were established to administer the provisions of the Hawaiian Homes Commission Act and Admission Act.

The Department of Hawaiian Home Lands administers approximately 23,800 acres of homestead land in the watershed area. The homestead leases include 114 residential lots between 1/4 acre and one acre in size, 104 agricultural lots between 5 and 30 acres in size, and 202 pastoral lots ranging in size from 10 to 300 acres.

The DHHL is responsible to secure legislative funding to provide infrastructure improvements and service to the homestead areas. The lack of infrastructure, such as agricultural water supply, in some of the homestead areas contributes to a low level of farming and ranching activity. Other impediments to full economic development of the homestead lots include lack of sufficient capital for on-farm improvements and insufficient opportunities to obtain necessary skills. The DHHL has recently accelerated their program for infrastructure development and making funds available to homesteaders. The DHHL has also begun to assert its rights to water for DHHL development.

The community group representing the interests of the Hawaiian homesteaders in the watershed area is Waimea Hawaiian Homesteaders’ Association.
2.10 RARE AND UNIQUE ENVIRONMENTAL RESOURCES

The General Plan for Hawaii County (1989) describes the economic, energy, environmental quality, flood control and drainage, historic sites, natural beauty, natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation, and land use resources and controls of the nine districts of the island of Hawaii, including South Kohala.

The Waimea region is associated with cattle ranching, conjuring images of paniolo, horses and cows. While there are other areas of the state where ranching takes place, the predominance of the Parker Ranch, the long history of cattle ranching in the area, and the wide open rangeland of the Waimea Plain have created a strong association of cattle ranching with Waimea.

Waimea is one of the most productive areas for vegetable crops in the state. Many cool weather crops that cannot be grown elsewhere in Hawaii are grown, including cabbage, celery, and lettuce.

The nearby landforms that are culturally important are the Kohala Mountains, Mauna Kea, and Waipio Valley. The cinder cone hills, especially Puu Laelae, Puu Hokaula, and Puuiki, have significant natural beauty.

For significant archaeological resources see Section 6.3.4 Cultural Resources. For significant unique or rare plant and wildlife resources see Section 6.3.13 Threatened and Endangered Species.
3. PROJECT PURPOSE AND NEED

3.1 PROJECT PURPOSE

The purpose of the Waimea-Paaüilo Watershed project is to alleviate the agricultural water shortage problems caused by the inadequate quantity and distribution of water for crop irrigation and livestock drinking water (stockwater) in the watershed area. The project purpose under PL83-566 is agricultural water management.

Specifically the Sponsors requested that the project provide an adequate and consistent supply of irrigation water to the Lalamiło, Paukapu, DHHL farmlots (including the Phase I and II expansion areas), and the proposed Lalamiło Ag. Park farmlots and also stockwater to existing DHHL and other small non-DHHL ranchlot areas shown in Table F. These farmlot and ranchlot areas are here after referred to as the “service area,” as opposed to the entire 143,900 acre “watershed area.”

3.2 PROBLEMS AND OPPORTUNITIES

The inadequate quantity and distribution of crop irrigation and livestock drinking water in the service area cause an estimated $1,670,400 in agricultural losses, measured as average annual net income losses for farmers and ranchers in the service area. Agricultural losses are expected to increase to an estimated $3,750,000 in the future as more land is brought into production with no additional water supplies. The following table summarizes these losses.

<table>
<thead>
<tr>
<th>Table I</th>
<th>SUMMARY OF PROBLEMS AND OPPORTUNITIES</th>
<th>Waimea-Paaüilo Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem or Opportunity</td>
<td>Estimated Average Annual Losses</td>
<td>Future Without Project Conditions</td>
</tr>
<tr>
<td></td>
<td>Present Conditions</td>
<td>Future Without Project Conditions</td>
</tr>
<tr>
<td></td>
<td>Crop (S)</td>
<td>Livestock (S)</td>
</tr>
<tr>
<td>Losses due to water shortages</td>
<td>572,400</td>
<td>53,200</td>
</tr>
<tr>
<td>Limited expansion opportunities</td>
<td>663,600</td>
<td>266,300</td>
</tr>
<tr>
<td>Water pumping costs</td>
<td>114,900</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,350,900</td>
<td>319,900</td>
</tr>
</tbody>
</table>

27
3.2.1 Crop Losses Due to Water Shortages

Service area truck crop farmers have been plagued by water shortage problems which have been exacerbated by droughts since the 1960’s. Often the WIS cannot supply adequate irrigation water to farmers in the existing service areas of the Lalamilo, Puukapu, and the DHHL farmlots.

The most readily available source of agricultural water in the watershed area has been the surface water streams of the Kohala Mountains, which provide water to the WIS via the UHD. The Kohala Mountain streams are flashy, with the tendency to have high flows in the streams and in the UHD only during heavy rainfall periods.

Rainfall in the Kohala Mountains is dependent on trade wind patterns. When the trade wind pattern is disrupted, rainfall diminishes over the island mountain ranges. Should such occurrence last over an extended period longer that several weeks, then the surface flows are depleted which causes severe drought conditions which can last for 90 days or more.

During drought periods, when the water levels in the two existing WIS reservoirs decrease, voluntary and sometimes mandatory water use restrictions are imposed on farmers. See Appendix A for a listing of water restriction periods for the WIS. Water use restriction periods have lasted for over half a year. Inadequate water supply cause reductions in crop quality and yield, total crop losses, reductions in new plantings, and disruptions in marketing patterns. Agricultural losses, measured as net income losses for the affected farmers, have been estimated at $572,400 on an average annual basis under present conditions.

Although the DLNR rehabilitation of the UHD will reduce ditch leakage, the present storage capacity afforded by the Waimea and Pua Pulehu reservoirs will continue to limit the ability of the WIS to supply adequate irrigation water during dry periods. This is evidenced by recent water restrictions imposed on WIS customers. A water conservation notice was issued in February 1995 and not lifted until August 1995. A notice was issued again in September 1995, with a reminder to conserve water issued in December 1995, and critical water status reached in January 1996. The restriction was not lifted until March 1996.

When the DHHL Phase I and Phase II expansion areas come into production in the near future, water shortages and agricultural losses will be become even more acute. The reliability of water supply from the WIS will drop to 68 percent and water restrictions will become more frequent and severe. Reliability is an indicator of the annual frequency of providing an adequate water supply. Farmers will experience further reductions in crop quality and yield, total crop losses, reductions in new plantings, and disruptions in marketing patterns. Agricultural losses, measured as net income losses for the affected farmers, will increase to an estimated at $2,616,900 on an average annual basis under Future Without Project Conditions.

The water shortages and water restrictions not only affect the farmers, but also result in farm employees’ wage and/or job losses. Agriculture-related businesses and tax revenues are also adversely affected. The greenery and open-space setting provided by the agricultural industry benefits tourism. Because the truck crop and livestock industries in the watershed area are such an important part of the region’s economy their continued viability is essential.
3.2.2 Limited Cropland Expansion Opportunities

The inadequate quantity and distribution of irrigation water limits opportunities to expand crop production into new areas.

Increasing the production of truck crops is a desired goal of both the State of Hawaii and County of Hawaii governments. See section 6.5 Relationship to Other Plans, Policies, and Controls. According to the Statistics of Hawaiian Agriculture, 1994, Hawaii’s farmers produced approximately 29 percent of the fresh vegetables consumed in the State in 1994. The remaining 71 percent was imported. The climate and fertile soils of the Waimea make it ideal for growing truck crops, if irrigation water is available.

In an effort to increase local crop production, the State of Hawaii plans to develop the Lalamilo Ag. Park to provide farmlots which can be leased at affordable rates. The inadequate storage capacity of the WIS prevents the expansion of irrigation water distribution system and crop production in the 270-acre Lalamilo Ag. Park.

Of the total cropland in the Lalamilo Ag. Park, potential irrigated acres have been estimated at 115 acres. The net income that could be generated from these acres has estimated at as $663,600 on an average annual basis under present conditions, assuming a 100% reliable water supply. The Ag. Park is not expected to be developed under Future Without Project Conditions.

3.2.3 Livestock Losses Due to Water Shortages

Ranchers in the potential service area experience income losses due to the higher cost of using treated domestic water for stockwater. Most of the DHHL and private ranchers must rely on the County DWS domestic water system for livestock drinking water (stockwater) because a source of agricultural water is not available to them. Current WIS policy prohibits providing stockwater to ranchers. Domestic water rates are high in comparison to agricultural water rates charged by the WIS. DWS customers pay about $1.50 per thousand gallons in comparison to $0.16 per thousand gallons, plus an acreage fee for WIS water. An estimated 40 million gallons per year of domestic water is used for stockwater in the potential service area.

Like the WIS, the DWS system is dependent on rainfall and streamflow in the Kohala Mountains. The DWS system is likewise subject to water shortages and water use restrictions when water levels in its reservoirs are low. During water short periods, livestock consumption is the first to be curtailed. The efficient management of livestock operations is hampered because ranchers must sometimes move their cattle to other areas, haul in water in tanks, or sell their cattle prematurely. During severe droughts, cattle have died due the lack of both drinking water and forage.

Income losses for the affected ranchers have been estimated at $53,200 on an average annual basis under present conditions. This amount is not expected to change under Future Without Project Conditions.
3.2.4 Limited Livestock Expansion Opportunities

The inadequate quantity and distribution of stockwater limits opportunities to expand or increase livestock production on existing grazing lands.

Island ranchers are unable to help reduce the amount of beef imports into the State of Hawaii. Of the total amount of beef and veal consumed in the State during 1994, only 31 percent was raised locally. The main supply came from the mainland U.S. (54 percent) and foreign sources (15 percent).

With an adequate supply of stockwater, ranchers could increase their livestock herds because they could more efficiently manage their operations and because they would be able to implement intensive grazing methods. Potential grazing land service areas and livestock production is shown in Table F. The net income that could be generated from the additional animal units that could be produced, are considered “agricultural losses” and have estimated at $266,300 on an average annual basis under present conditions. This amount is not expected to change under Future Without Project Conditions.

3.2.5 Water Pumping Costs

At the present time, water is pumped from the 110-MG Puu Pulehu Reservoir, located at the 2,830-foot elevation, to the 60-MG Waimea Reservoir, located at the 2,935-foot elevation, before distribution to the existing farms serviced by the WIS. Water pumping costs have been estimated at $114,900 per year under present conditions. The cost is expected to increase to an estimated $150,000 per year under Future Without Project Conditions as more water will have to be pumped in order to service the additional irrigated acres in DHHL Phase I and Phase II farmlots presently being developed.

3.2.6 Natural Resources Conservation and Protection

There is a need to continue ongoing conservation planning efforts to attain the sound use and management of natural resources, particularly soil and water, in the Waimea-Paauilo Watershed area.

The projected increase in farming and ranching activity will increase the potential for higher soil erosion rates and poor water management. Inexperienced operators may implement farming practices that degrade the soil and water resource base. Well-established irrigation technology may be directly transferred to new cropland without consideration of water conserving irrigation systems that may also provide economic advantages.

On existing farms and ranches, additional water conservation measures need to be considered as a means of alleviating the water shortage problems.

The NRCS provides technical assistance to farmers and ranchers to develop conservation plans through conservation districts such as the Mauna Kea Soil and Water Conservation District. Conservation plans prescribe practices such as cross-slope farming, terraces, crop rotation, cover crops, grassed waterways, and field diversions to conserve soil on farms. Water conservation practices for cropland include irrigation scheduling, drip irrigation, windbreaks, and mulching. Livestock management practices such as paddock rotation, cross fencing, water trough management, noxious weed control, and tree plantings for wind protection and shade serve to raise productivity by caring for plant, soil and water resources.
Operators of DHHL lots are required to have a conservation plan for their farms and ranches. Many other non-DHHL farmers and ranchers in the service area also have conservation plans.

Incentive payments and cost-sharing for the implementation of conservation practices is available through the Environmental Quality Incentives Program, a USDA program administered by the NRCS with assistance from the Farm Service Agency (FSA). Other potential sources of USDA financial assistance include the Wetlands Reserve Program, Wildlife Habitat Incentives Program, and Forestry Incentives Program.

3.2.7 Hawaiian Homes Commission Act

An opportunity exists to support the goals of the Hawaiian Homes Commission Act. The Act was passed by the U.S. Congress in 1921 to improve social and economic conditions of native Hawaiians. Under the Act, about 188,000 acres of public land was made available, through the jurisdiction of the Hawaiian Homes Commission, to be leased out to native Hawaiians with 50 percent or more native blood, at a nominal fee for 99 years. Following statehood, administration of the program was transferred to the Department of Hawaiian Home Lands.

Through this Act and other actions the federal government, and later the state government, affirmed the trust responsibility to the native Hawaiian people. Much of the land set aside for agricultural use was marginally suited due to rockiness and low rainfall. The development of agricultural water supply to make such lands, as in the Waimea area, more productive conforms to the trust responsibility of the federal and state governments.
4. FORMULATION AND COMPARISON OF ALTERNATIVES

4.1 FORMULATION OF ALTERNATIVES

A wide range of alternative plans have been formulated and evaluated during the two planning phases - Environmental Assessment (Plan-EA) and Environmental Impact Statement (Plan-EIS) - of the Waimea-Paaulo Watershed project.

The alternative plans were formulated to alleviate the agricultural water shortage problems, with minimal adverse environmental and social effects. Expansion and improvement of the existing agricultural water supply system, the Waimea Irrigation System (WIS), was identified to be the most feasible means to alleviate the problems. A major consideration in the formulation of the alternative plans was the location of a new storage reservoir.

The feasibility of providing agricultural water supply to all areas within the watershed area was evaluated during project planning, but was determined to be infeasible. The smaller, feasibility-determined service area remained unchanged during the two planning phases. During the development of the Plan-EA in the late 1980s, non-irrigated sugarcane was grown on approximately 12,000 acres in the Paaulo mauka lands by the Hamakua Sugar Company. Annual rainfall in this area averages 80 to 120 inches a year. It was determined, at that time, that there was not a critical need for agricultural water supply improvement in Paaulo mauka and that the absence of nearby water sources would make any water supply improvement very costly. There was little interest by the sponsors to expand the WIS service area to Paaulo mauka. Since the closing of Hamakua Sugar Company in March 1993, the former sugarcane land has been idle and is being converted to other agricultural uses, including forestry. While the new agricultural activities may benefit from the more consistent water provided by an agricultural water system, the costs of implementing such a system would be prohibitive.

4.1.1 Other Studies and Reports

This watershed plan builds upon and complements other efforts taken to improve the agricultural water supply in this region of the island of Hawaii. The Hamakua Area Agricultural Water Study (HAAWS), conducted in the late 1970s and early 1980s by the NRCS (then the Soil Conservation Service) identified the need for improved agricultural water supply in Waimea, assessed the area's natural and economic resources, and developed preliminary solutions. During the mid-1980s the State DLNR, responding to a series of droughts, embarked on an effort to repair and restore the capacity of the Upper Hamakua Ditch.

HAAWS identified three potential reservoir storage alternatives to provide additional water storage for the WIS. All three alternatives were considered during preparation of the Plan-EIS, but dropped from further consideration for the various reasons described below.
Alternative A proposed constructing a new reservoir in the Kohala Forest Reserve just west of Puu Iki, approximately one-half mile south of the Upper Hamakua Ditch between the Alakahi and Koiaue intakes. Alternative A was dropped from further consideration because it would require a Conservation District Use Application and because the State Division of Forestry and Wildlife expressed reservations about the construction of a reservoir within the Kohala Forest Reserve due to possible adverse effects on native forest communities.

Alternative B proposed expanding the existing Puukapu Reservoir (formerly known as the Paiaikuli Reservoir), which is located two miles due east of Waimea town. This alternative was dropped from further consideration because the elevation of the reservoir is too low to provide pressure needed for water distribution without pumping.

Alternative C proposed constructing a new reservoir at Holoholoku, approximately 3.5 miles southeast of Waimea town. Alternative C was dropped from further consideration because the high cost of installing a pipeline from the Upper Hamakua Ditch (UHD) to the reservoir site.

The DLNR has been rehabilitating the UHD based on the 1986 investigation and evaluation report (Report R-77). The report estimated that during low flows of 4 million gallons per day or less, an estimated 50 to 75 percent of collected water was being lost in transport. Repairs to four of the five man-made sections of the UHD have been completed and were limited to work to restore transmission efficiency. Repairs to the remaining man-made section, Kawaiului, is pending acquisition of State funding. No improvements are planned for any of the natural stream sections of the ditch. The completion of the UHD repairs should result in retention of 90 to 95 percent of the flows below 4 million gallons per day.

4.1.2 Plan-EA

Development of the Watershed Plan-Environmental Assessment (Plan-EA) took place between 1983 and 1989. The final Plan-EA was published in September 1989. During the planning conducted in preparation of the watershed plan-environmental assessment, the four areas of improvement to the WIS were identified: 1) improvement of the Upper Hamakua Ditch; 2) increase reservoir storage capacity; 3) expand irrigation water distribution system; and 4) install dedicated stockwater distribution system.

Upper Hamakua Ditch

Further improvement of the Upper Hamakua Ditch, beyond what was planned by the State, was recommended in the 1989 Watershed Plan-EA. Pipelines to bypass two natural stream sections of the UHD were included in the Plan-EA alternatives. This recommendation was based on a geologic reconnaissance survey in the mid-1980s of the sections on Koiaue and Waimea streams, which showed the stream bottom to be permeable lava and cinder with several apparent "losing" reaches. "Gaining" reaches were also observed. A gaged streamflow balance was suggested but not conducted.
Storage Reservoirs

As part of planning for the Plan-EA, several reservoir storage locations in addition to the HAALS alternatives, were evaluated. Geological investigations, including boring, penetrometer testing, and geophone soundings, were conducted at most of the sites.

Three potential reservoir sites were evaluated in the vicinity of the three existing Department of Water Supply Waikoloa Reservoirs. These sites were found to be less desirable because of costly rock excavation, lengthy reservoir supply pipeline requirements through the Kohala Forest Reserve or from the Waimea Reservoir, concerns about native forest impacts, hazards posed to Waimea town, and remoteness from the ranchlots to be served.

A reservoir site in the Kohala Forest Reserve near Puu Ohu, one and one-half miles north of Waimea town was evaluated and dropped from further consideration after geological tests indicated unsuitable foundation conditions and because of concerns about possible adverse effects on native forest communities.

A stockwater reservoir on the Hauani Stream at a site north of Puu Kakanihia was evaluated, but dropped from further consideration because of its limited storage volume and insufficient yield/supply from its watershed.

Enlargement and lining of the existing Puu Pulehu Reservoir was evaluated but dropped from further consideration because the reservoir cannot be sufficiently enlarged to provide the needed additional storage and would require considerable pumping to service the cropland areas.

A stockwater reservoir at Puu Io, approximately 7.2 miles southeast of Waimea town, was evaluated, but dropped from further consideration because of high reservoir and reservoir supply pipeline construction, and excessive pump operating costs. Water would have to be pumped up 900 feet in elevation from Puu Pulehu Reservoir to the Puu Io Reservoir through 4.5 miles of pipeline.

The Plan-EA planning efforts concluded that the best site for the construction of a new reservoir was a site adjacent to the existing 60-MG Waimea Reservoir. The site, referred to as Waimea II, provided sufficient area to develop the required storage capacity, minimized reservoir supply pipeline costs, and provided sufficient elevation head for gravity operation of the irrigation water distribution systems.

Irrigation Distribution System

The expansion of the WIS system to supply irrigation water to the three cropland expansion areas as originally planned would require 21,800 feet of pipeline and a pumping station. Replacement of existing pipeline would not be necessary. Pipe flow analysis indicated that the existing WIS pipelines met the project criteria of distributing the peak daily irrigation demand, including the expansion areas, in a 12-hour period. Approximately 900 feet of 24-inch diameter ductile iron pipe would connect the proposed Waimea II Reservoir to the existing distribution system leading from the Waimea Reservoir. Approximately 9,500 feet of PVC pipeline between 4- and 12-inches in diameter was required for the Lalamilo Ag. Park expansion area. Approximately 15,300 feet of PVC pipeline between 4- and 14-inches in diameter and a 25-horsepower pumping plant were required for the DHHL Phase I and
Phase II expansion areas. DHHL Phase I and Phase II expansion areas are currently being developed by the State.

Stockwater Distribution System

A separate livestock water distribution system to service 22,962 acres of grazing land from the Waimea II Reservoir was proposed in the Plan-EA. The distribution system would require installation of 184,400 feet of 3/4- to 6-inch diameter high-density polyethylene pipeline and 11 pumping stations. WIS policy will have to be changed to allow providing stockwater to ranchers.

The benefit to cost analysis indicated that the stockwater distribution system would not result in positive net economic benefits and was not eligible for PL 83-566 financial assistance. Technical assistance for planning and design could be provided by NRCS, however.

Alternatives


The Future Without Project alternative was included as a candidate plan so that the conditions that could be expected in the future, if no action is taken to solve the problems, are described and quantified. It also served as the baseline against which the effects of the implementation alternatives could be measured.

Alternatives 2 and 3 proposed structural improvements to the WIS. Both alternatives proposed the installation of structural measures to increase the capacity and reliability of the WIS. Both alternatives proposed 1) installing 8,000 feet of pipelines to bypass or replace the two natural stream sections of the UHD to improve efficiency; 2) installing a reservoir supply pipeline from the UHD to the proposed reservoir; 3) constructing a 133-million-gallon reservoir (Waimea II Reservoir) to increase water storage; and 4) installing additional irrigation pipeline to service the expansion areas of Lalamilo Ag. Park, DHHL Phase I and DHHL Phase II. Alternative 3 also included installing a stockwater distribution system to service DHHL ranchlots and private ranchlots.

Concerns regarding the location of the Waimea II Reservoir have surfaced since the publication of the Plan-EA. Residents of a subdivision located adjacent to the proposed Waimea II Reservoir are concerned about potential economic effects as well as about dam safety. These concerns prompted further planning efforts and the preparation of this Plan-EIS.

4.1.3 Plan-EIS

This most recent planning phase began with the published notices of preparation of an environmental impact statement for the Waimea-Pauilo Watershed project in both the Federal Register and the OEQC Bulletin in late 1994. The alternatives earlier formulated were re-evaluated and new alternatives were developed. Again, the four areas of improvement that were addressed were the increased efficiency of the UHD, additional reservoir storage capacity, expansion of the irrigation water distribution system, and installation of a stockwater distribution system.
Upper Hamakua Ditch

The repair of the UHD by the State DLNR based on Report R-77 is nearly complete with only the Kawaiului Section remaining to be funded and repaired. Repair of the Kawaiului Section is expected within the next two years. After completion of the repairs, the WIS staff will continue to maintain the UHD.

The proposal to install bypass pipelines to replace the two natural stream sections of the UHD was re-evaluated. The records of two streamflow surveys conducted during low-flow periods in 1962 and 1985 indicate that the two natural stream sections did not contribute significantly to the total transmission losses of the UHD. The manager of the WIS who is responsible for maintaining the UHD and possesses the best “first-hand” knowledge of the system agrees that significant water losses do not occur at the natural stream sections. In addition, Waipio Valley residents/farmers were concerned that bypassing the natural stream sections may reduce the amount of water flowing into their valley. The bypass pipeline component included in the Plan-EA was therefore dropped from further consideration.

Storage Reservoirs

During this most recent planning phase, four additional reservoir sites were evaluated, as well as a re-design of the Waiwaia II Reservoir. The conversion of existing reservoirs from domestic water supply to agricultural use was also considered.

A reservoir within the Kohala Forest Reserve immediately south of Puu Lala and 1,500 feet north of the existing Waimea Reservoir was considered but dropped from further consideration due to potential environmental impacts.

A reservoir constructed at a natural depression located 3.8 miles east of Waimea town, between the Puukapu and Puu Pulehu reservoirs, was dropped from consideration after it was learned that the planned state highway may pass through the site. Development of a reservoir at the site would have also required pumping for the Puukapu farmlots.

A reservoir site on Parker Ranch land near the Poo Kanaka historic site was evaluated but shelved due to cultural resource concerns expressed by the DLNR, Historic Preservation Division and the need to acquire private lands for the reservoir site.

A reservoir site on a Department of Hawaiian Home Lands pastoral parcel, less than one mile from the prospective Parker Ranch site, was evaluated. The site, hereafter referred to as the Kauahi Reservoir site, allows construction of a reservoir large enough to meet the storage requirements for the project and gravity operation nearly all of the irrigation water distribution system. However, nearly four miles of pipeline to transmit water from the UHD to the reservoir would be needed.

As part of planning for the Plan-EIS, different configurations of the Waiwaia II Reservoir were evaluated in an effort to mitigate potential dam reservoir breach effects and reduce the visual impact of the reservoir embankment. A redesign of the Waiwaia II Reservoir dam to a less steep slope for the downstream embankment of 3:1 instead of 2:1 to increase structural stability was evaluated. This 3:1 slope Waiwaia II Reservoir would be larger in area and store only 120-MG, instead of 131-MG possible with the 2:1 slope.
The conversion of the existing Department of Water Supply Waikoloa reservoirs for use as agricultural water storage in exchange for project funding to develop well sources for domestic water supply was evaluated, as suggested by a local County Council member. Federal Safe Drinking Water Act law requirements call for surface water sources for domestic supply to be treated and monitored more intensively than groundwater sources. The Waimea water treatment plant is not in compliance with the 1994 state rules relating to potable water systems. The conversion of the source to groundwater could have reduced the treatment needs while stabilizing the seasonal supply of water. However, the development of the deep wells and the operation of well pumps are costly. This alternative was dropped from further consideration because the Department of Water Supply was unable to provide support due to the uncertainty of the groundwater aquifer's long-term sustainable yield of high quality water. Although the DWS has embarked on a groundwater development program, the management of the DWS sees a need to retain the Waikoloa reservoirs for interim and backup water supply. A detailed investigation of the sustainable yield of the aquifers in the Waimea area has not been conducted.

Wells

Wells were considered as a potential source of agricultural water, but not pursued because of the high cost of developing wells to the depths of the sustainable aquifers and the high cost of pumping water. The Department of Agriculture owns a well recently constructed by the DLNR. It is located 2,000 feet north of the Waimea Reservoir. The WIS well is 1,200 feet deep with a capacity of 1,000 gpm using a 600-hp motor. The cost of pumping water from the well is estimated to be $0.75 to $1.00 per 1,000 gallons. The well is not normally used and has been retained for emergency backup supply by the Department of Agriculture and the County Department of Water Supply.

Irrigation Distribution System

The Department of Hawaiian Home Lands and the Department of Agriculture have elected to install pipelines to service the DHHL Phase I and Phase II expansion areas. They have done so in response to State policy to more quickly provide infrastructure and services to Hawaiian Homes beneficiaries. The Phase I and Phase II farmers will share the water presently available from the WIS. Although the Phase I and Phase II distribution systems will be deleted from the Plan-EIS alternative plans, additional water storage capacity is needed to assure an adequate and consistent water to these and other WIS farmers.

Stockwater Distribution System

Installing pipelines to DHHL ranchlots and private ranchlots as originally planned was included in the alternatives developed for the Plan-EIS.

Natural Resources Conservation and Protection

No additional technical or financial assistance to plan and implement conservation plans and practices is included in the alternative plans. The full "build-out" of farm and ranch production under with project conditions is expected to occur over a 20-year period. The projected annual demand for technical assistance from the SWCD and NRCS to develop conservation plans appears to be within the capacity of the ongoing programs. Incentive payments and cost-sharing for the implementation of needed conservation practices will be
available through ongoing programs, however obtaining funding from these programs is based on meeting program objectives and eligibility requirements.

The implementation of the Waimea-Pauuilo Watershed project will offer opportunities to increase the awareness of the need for conservation practices and the availability of assistance.

4.2 CANDIDATE PLANS

Five alternative plans were considered as "Candidate Plans" and are presented in this Plan-EIS. They are as follows:

Alternative 1 - No Action Alternative
Alternative 2 - National Economic Development (NED) Plan
Alternative 3 - Waimea II Reservoir Plan
Alternative 4 - Modified Waimea II Reservoir Plan
Alternative 5 - Kauahi Reservoir Plan

Alternative 6 - Kauahi Reservoir without Livestock Drinking Water

Alternative 1, the No Action Alternative, describes and quantifies the expected conditions under "future without project" conditions or if no action is taken to solve the water shortage problems. The conditions serve as the baseline against which the effects of the implementation alternatives are measured.

Alternatives 2, 3, 4, 5, and 6 are implementation alternatives which propose structural improvements to increase the storage and distribution capacity of the WIS. The alternatives differ in reservoir design, reservoir site, and/or service areas.

Alternative 2, the NED Plan, maximizes net national economic benefits. It proposes the following improvements to the WIS to provide an irrigation water supply: 1) installing a 3,100-foot-long reservoir supply pipeline from the UHD to the proposed reservoir; 2) constructing a 131-million-gallon Waimea II Reservoir with a 2:1 embankment downslope and 3) installing additional irrigation pipeline to service the planned Lalamilo Ag. Park expansion area. It does not include any improvements to provide a stockwater supply.

Alternative 3, the Waimea II Reservoir Plan, is similar to Alternative 2, except that it proposes installing a stockwater distribution system to service DHHL and some private ranchlots.

Alternative 4, the Modified Waimea II Reservoir Plan, is similar to Alternative 3, except for the Waimea II Reservoir design. It proposes constructing a 120-million-gallon Waimea II Reservoir with reduced embankment height and a 3:1 embankment downslope.

Alternative 5, the Kauahi Reservoir Plan, proposes the following: 1) installing a 19,200-foot-long pipeline from the UHD to supply the proposed reservoir; 2) constructing a 131-million-gallon reservoir at the Kauahi site; 3) installing additional irrigation pipeline to service the planned Lalamilo Ag. Park expansion area; and 4) installing a stockwater distribution system to service DHHL and some private ranchlots.
Alternative 6, the Kauahi Reservoir without Livestock Drinking Water, is similar to Alternative 5 with the exception of the elimination of the stockwater distribution system.

The six Candidate Plans are described in more detail in the following section. The significant economic, environmental, and social effects of each of the alternatives are also described and/or quantified. Table L provides a summary and comparison of the candidate plans.

4.3 RISK AND UNCERTAINTY

Throughout the planning process the best available data was used to minimize risks and uncertainties. However, the uncertainty inherent in data and assumptions of future economic, social, and environmental conditions will create risks in projecting the costs and benefits of the alternative plans. The major areas of risk and uncertainty are discussed below.

4.3.1 Hydrologic Assumptions

Projection for water availability from the Upper Hamakua Ditch are based on WIS and U.S. Geologic Survey (USGS) records of streamflow gages. The relatively short period of record, approximately 20 to 30 years for most gages, in relation to some long-period hydrometeorological cycles may affect the accuracy of water availability projections. A compounding factor is the determination by the USGS that much of the data collected in the 1975 to 1990 period in watershed area is poor or unusable. The reliable records at the ditch gage near the inlet to the Waimea Reservoir, USGS Station 16726000, has been reduced to ten years.

4.3.2 Economic Analysis

The installation cost of the alternative plans are estimates based on previous bids for similar work, national estimating guides, and estimates of work item quantities. The omission of cost considerations and changes in pricing will affect the accuracy of the estimates.

The economic benefits of the alternative plans are estimates of the increase in net income for the affected farmers and ranchers that would be generated, once the alternative is implemented. The estimates of net income are based on cost-return budgets which represent "typical" or "average" farm and ranch operations. Actual benefits to individuals will vary from farmer to farmer, or rancher to rancher and will change if production input and/or prices received change in the future.

4.3.3 Future Agricultural Conditions

Project analysis assumes that build-out, that is, the near complete utilization of all the agricultural land within the areas served by the project, will take place within the next 10 to 20 years. Benefits estimated for the project over its 50-year life are based on fuller utilization of the cropland and grazing land acres than at the present time.
4.3.4 Water Rights

The plan assumes that continuation of the current water rights situation through the life of the project. Streamflow restoration issues may affect the diversion of water by the Upper Hamakua Ditch. Affirmation of native Hawaiian water rights claims may affect the allocation of the water to native Hawaiian and non-native Hawaiian users.

The DOA and the DHHL will enter into an agreement, approved by both the State Board of Agriculture and the Hawaiian Homes Commission, on those issues that require interagency coordination during implementation and operation of the project improvements. The agreement will include WIS water rate structure and water allocation for DHHL customers and the priority for water use. The agreement will be completed before the completion of any Project Agreements.
4.4 ALTERNATIVE 1 - NO ACTION ALTERNATIVE

Alternative 1, the No Action Alternative, describes and quantifies the conditions that are expected in the future, if no action is taken to solve the identified problems. This alternative serves as the baseline against which the effects of the other implementation alternatives are measured. See Table L for a summary and comparison of the Candidate Plans.

4.4.1 Proposed Works of Improvement

- None

4.4.2 WIS Features

- Total water storage: 161-million gallons
- Total water supplied: 3.2-million gallons per day
- Reliability of water supply: 68 percent
- Service areas:
  - Farmlots: 159
  - Total cropland acres: 1,715
  - Irrigated cropland acres: 633
  - Ranchlots: 0
  - Grazing land acres: 0
  - Animal units: 0

4.4.3 Economic Effects

Crop and livestock losses with continue as shown in the following table.

Table J
ALTERNATIVE 1 - ECONOMIC EFFECTS
Walimea-Paauilo Watershed

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
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<tbody>
<tr>
<td>Average annual losses</td>
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<td>Losses due to water shortages</td>
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<td>Limited expansion opportunities</td>
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<td>Water pumping costs</td>
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<td>Total average annual losses</td>
<td>3,430,500</td>
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</table>
4.5 ALTERNATIVE 2 - NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN

Alternative 2, the NED Plan, provides the highest economic benefits after the cost expenditure is considered (average annual net benefits). Alternative 2 proposes structural improvements to increase the storage and distribution capacity of the WIS to provide crop irrigation water. It does not include improvements to provide stockwater.

4.5.1 Proposed Works of Improvement

- Reservoir supply pipeline: Install 3,100 feet of 30-inch diameter ductile iron pipeline (DIP) from a new intake structure on the Upper Hamakua Ditch to the proposed Waimea II Reservoir. See Figure I, Alternatives 2, 3, and 4 - Irrigation Improvements.

- Reservoir: Construct one reservoir (Waimea II Reservoir) with storage of 131-million gallons and an embankment height of 62 feet and downslope of 2:1.

- Irrigation water distribution system: Install a total of 10,400 feet of pipeline, including 900 feet of 24-inch diameter DIP from the proposed Waimea II Reservoir to the existing WIS distribution system and 9,500 feet of 4-inch to 12-inch diameter polyvinyl chloride (PVC) pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.

4.5.2 WIS Features

- Total water storage: 292-million gallons
- Total water supplied: 3.8-million gallons per day
- Reliability of water supply: 82 percent
- Service areas:
  - Farm lots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranch lots: 0
  - Grazing land acres: 0
  - Animal units: 0
### Table K
**ALTERNATIVE 2 - ECONOMIC EFFECTS**

**Waimea-Pauuilo Watershed**

<table>
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<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
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<td>0</td>
</tr>
<tr>
<td><strong>Total average annual costs</strong></td>
<td>1,064,800</td>
<td>0</td>
<td>1,064,800</td>
</tr>
<tr>
<td><strong>Average annual net benefits</strong></td>
<td>676,000</td>
<td>0</td>
<td>676,000</td>
</tr>
<tr>
<td><strong>Benefit to cost ratio</strong></td>
<td>1.6 : 1.0</td>
<td>N/A</td>
<td>1.6 : 1.0</td>
</tr>
</tbody>
</table>

1\* Installation costs amortized at 7.625% interest for 50 years (0.07823).
2\* Operation, maintenance, and replacement.
Figure 1
ALTERNATIVES 2, 3, AND 4
IRRIGATION IMPROVEMENTS
Waimea-Paauilo Watershed
4.6 ALTERNATIVE 3 - WAIMEA II RESERVOIR PLAN

Alternative 3 proposes structural improvements to increase the storage and distribution capacity of the WIS to provide crop irrigation water, as well as livestock drinking water. The reservoir supply pipeline, reservoir, and irrigation water distribution system are unchanged from Alternative 2.

4.6.1 Proposed Works of Improvement

- **Reservoir supply pipeline**: Install 3,100 feet of 30-inch diameter DIP from a new intake structure on the Upper Hamakua Ditch to the proposed Waimea II Reservoir. See Figure I.

- **Reservoir**: Construct one reservoir (Waimea II Reservoir) with storage of 131-million gallons and an embankment height of 62 feet and downslope of 2:1.

- **Irrigation water distribution system**: Install a total of 10,400 feet of pipeline, including: 900 feet of 24-inch diameter DIP from the Waimea II Reservoir to the existing WIS distribution system and 9,500 feet of 4-inch to 12-inch diameter PVC pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.

- **Stockwater distribution system**: Install 232,250 feet of 3/4-inch to 6-inch diameter high density polyethylene (HDPE) pipeline, three electric pumps, and eight diesel pumps to provide stockwater to 265 ranchlots totaling 22,962 acres. See Figure J.

4.6.2 WIS Features

- **Total water storage**: 292-million gallons
- **Total water supplied**: 4-million gallons per day
- **Reliability of water supply**: 78 percent
- **Service areas**:
  - Farmlots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranchlots: 265
  - Grazing land acres: 22,962
  - Animal units: 19,040
### 4.6.3 Economic Effects

**Table L**

**ALTERNATIVE 3 - ECONOMIC EFFECTS**

**Waimea-Paauilo Watershed**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water</th>
<th>Livestock Drunking Water</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average annual benefits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in losses due to water shortages</td>
<td>817,800</td>
<td>41,500</td>
<td>859,300</td>
</tr>
<tr>
<td>Reduction in limited expansion opportunities</td>
<td>517,600</td>
<td>207,700</td>
<td>725,300</td>
</tr>
<tr>
<td>Reduction in water pumping costs</td>
<td>46,600</td>
<td>0</td>
<td>46,600</td>
</tr>
<tr>
<td><strong>Total average annual benefits</strong></td>
<td>1,382,000</td>
<td>249,200</td>
<td>1,631,200</td>
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<tr>
<td><strong>Installation costs</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>6,811,900</td>
<td>628,300</td>
<td>7,440,200</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>5,441,300</td>
<td>300,000</td>
<td>5,741,300</td>
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<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>4,479,900</td>
<td>4,479,900</td>
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<tr>
<td><strong>Total installation costs</strong></td>
<td>12,253,200</td>
<td>5,408,200</td>
<td>17,661,400</td>
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<td><strong>Average annual installation costs</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>532,900</td>
<td>49,100</td>
<td>582,000</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>425,700</td>
<td>23,500</td>
<td>449,200</td>
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<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>350,500</td>
<td>350,500</td>
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<tr>
<td><strong>Total average annual installation costs</strong></td>
<td>958,600</td>
<td>423,100</td>
<td>1,381,700</td>
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<tr>
<td><strong>Average annual OM&amp;R(^\text{m}) costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>74,800</td>
<td>0</td>
<td>74,800</td>
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<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>107,300</td>
<td>107,300</td>
</tr>
<tr>
<td><strong>Total average annual OM&amp;R(^\text{m}) costs</strong></td>
<td>74,800</td>
<td>107,300</td>
<td>182,100</td>
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<tr>
<td><strong>Total average annual costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>532,900</td>
<td>49,100</td>
<td>582,000</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>500,500</td>
<td>23,500</td>
<td>524,000</td>
</tr>
<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>457,800</td>
<td>457,800</td>
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<tr>
<td><strong>Total average annual costs</strong></td>
<td>1,033,400</td>
<td>530,400</td>
<td>1,563,800</td>
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<tr>
<td><strong>Average annual net benefits</strong></td>
<td>348,600</td>
<td>-281,200</td>
<td>67,400</td>
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<td><strong>Benefit to cost ratio</strong></td>
<td>1.3 : 1.0</td>
<td>0.5 : 1.0</td>
<td>1.0 : 1.0</td>
</tr>
</tbody>
</table>

\(^\text{m}\) Installation costs amortized at 7.625% interest for 50 years (0.07823).

\(^\text{m}\) Operation, maintenance, and replacement.
4.7 ALTERNATIVE 4 - MODIFIED WAIMEA II RESERVOIR PLAN

Alternative 4 is similar to Alternative 3, except that it proposes constructing a modified Waimea II Reservoir which incorporates design features to increase the structural stability of the reservoir's embankment, including a lower embankment height and 3:1 downslope. These modifications will lower the storage capacity of the reservoir to 120-million gallons.

4.7.1 Proposed Works of Improvement

- **Reservoir supply pipeline:** Install 3,100 feet of 30-inch diameter DIP from a new intake structure on the Upper Hamakua Ditch to the proposed Waimea II Reservoir. See Figure I.

- **Reservoir:** Construct one reservoir (Waimea II Reservoir) with storage of 120-million gallons and an embankment height of 52 feet and downslope of 3:1.

- **Irrigation water distribution system:** Install at total of 10,400 feet of pipeline, including: 900 feet of 24-inch diameter DIP from the Waimea II Reservoir to the existing WIS distribution system and 9,500 feet of 4-inch to 12-inch diameter PVC pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.

- **Stockwater distribution system:** Install 256,250 feet of 3/4-inch to 6-inch diameter HDPE pipeline, six electric pumps, and three diesel pumps to provide stockwater to 265 ranchlots totaling 22,962 acres. See Figure K.

4.7.2 WIS Features

- **Total water storage:** 292-million gallons
- **Total water supplied:** 4-million gallons per day
- **Reliability of water supply:** 75 percent
- **Service areas:**
  - Farmlots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranchlots: 265
  - Grazing land acres: 22,962
  - Animal units: 19,040
### Economic Effects

**Table M**

**ALTERNATIVE 4 - ECONOMIC EFFECTS**

**Waimea-Paaulu Watershed**

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average annual benefits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in losses due to water shortages</td>
<td>572,400</td>
<td>39,900</td>
<td>612,300</td>
</tr>
<tr>
<td>Reduction in limited expansion opportunities</td>
<td>497,700</td>
<td>199,800</td>
<td>697,500</td>
</tr>
<tr>
<td>Reduction in water pumping costs</td>
<td>42,600</td>
<td>0</td>
<td>42,600</td>
</tr>
<tr>
<td><strong>Total average annual benefits</strong></td>
<td>1,112,700</td>
<td>239,700</td>
<td>1,352,400</td>
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<tr>
<td><strong>Installation costs</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>6,513,400</td>
<td>663,300</td>
<td>7,176,700</td>
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<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>5,210,800</td>
<td>300,000</td>
<td>5,510,800</td>
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<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>4,696,600</td>
<td>4,696,600</td>
</tr>
<tr>
<td><strong>Total installation costs</strong></td>
<td>11,724,200</td>
<td>5,659,900</td>
<td>17,384,100</td>
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<tr>
<td><strong>Average annual installation costs</strong></td>
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<td>509,600</td>
<td>51,900</td>
<td>561,500</td>
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<td>State Dept. of Agriculture cost-share</td>
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<td>367,400</td>
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<td>1,360,000</td>
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<td><strong>Average annual OM&amp;R costs</strong></td>
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<td></td>
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<tr>
<td>Federal (PL 83-566) cost-share</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>72,700</td>
<td>0</td>
<td>72,700</td>
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<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>96,800</td>
<td>96,800</td>
</tr>
<tr>
<td><strong>Total average annual OM&amp;R costs</strong></td>
<td>72,700</td>
<td>96,800</td>
<td>169,500</td>
</tr>
<tr>
<td><strong>Total average annual costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>509,600</td>
<td>51,900</td>
<td>561,500</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>480,300</td>
<td>23,500</td>
<td>503,800</td>
</tr>
<tr>
<td>DHHL cost-share</td>
<td>0</td>
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<td>464,200</td>
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<td><strong>Total average annual costs</strong></td>
<td>989,900</td>
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<td><strong>Average annual net benefits</strong></td>
<td>122,800</td>
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<td>-177,100</td>
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<tr>
<td><strong>Benefit to cost ratio</strong></td>
<td>1.1 : 1.0</td>
<td>0.4 : 1.0</td>
<td>0.9 : 1.0</td>
</tr>
</tbody>
</table>

1\(^1\) Installation costs amortized at 7.625% interest for 50 years (0.07823).  
2\(^2\) Operation, maintenance, and replacement.
4.8 ALTERNATIVE 5 - KAUAHI RESERVOIR PLAN

Alternative 5 proposes structural improvements to increase the storage and distribution capacity of the WIS to provide crop irrigation water, as well as livestock drinking water. It differs from the other alternatives, in that it proposes the installation of reservoir at the Kauahi site, which is approximately three miles south of the Waimea II Reservoir site.

4.8.1 Proposed Works of Improvement

- **Reservoir supply pipeline**: Install 19,200 feet of 30-inch diameter DIP from a new intake structure on the Upper Hamakua Ditch to the proposed Kauahi Reservoir. See Figure L.

- **Reservoir**: Construct one reservoir (Kauahi Reservoir) with storage of 131-million gallons and an embankment height of 26 feet and downslope of 3:1.

- **Irrigation water distribution system**: Install a total of 13,300 feet of pipeline, including: 3,800 feet of 30-inch diameter DIP from the proposed 30-inch diameter reservoir supply pipeline to the existing distribution system and 9,500 feet of 4-inch to 12-inch diameter PVC pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.

- **Stockwater distribution system**: Install 234,600 feet of 1-inch to 6-inch diameter HDPE pipeline, seven electric pumps, and two diesel pumps to provide stockwater to 265 ranchlots totaling 22,962 acres. See Figure M.

4.6.2 WIS Features

- **Total water storage**: 292-million gallons
- **Total water supplied**: 4-million gallons per day
- **Reliability of water supply**: 78 percent
- **Service areas**:
  - Farmlots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranchlots: 265
  - Grazing land acres: 22,962
  - Animal units: 19,040
### 4.8.3 Economic Effects

#### Alternative 5 - Economic Effects

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual benefits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in losses due to water shortages</td>
<td>817,800</td>
<td>41,500</td>
<td>859,300</td>
</tr>
<tr>
<td>Reduction in limited expansion opportunities</td>
<td>517,600</td>
<td>207,700</td>
<td>725,300</td>
</tr>
<tr>
<td>Reduction in water pumping costs</td>
<td>46,600</td>
<td>0</td>
<td>46,600</td>
</tr>
<tr>
<td>Total average annual benefits</td>
<td>1,382,000</td>
<td>249,200</td>
<td>1,631,200</td>
</tr>
</tbody>
</table>

#### Installation costs

<table>
<thead>
<tr>
<th>Cost Share</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>6,832,800</td>
<td>569,100</td>
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</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>5,576,100</td>
<td>322,400</td>
<td>5,898,500</td>
</tr>
<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>4,076,200</td>
<td>4,076,200</td>
</tr>
<tr>
<td>Total installation costs</td>
<td>12,408,900</td>
<td>4,967,700</td>
<td>17,376,600</td>
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</tbody>
</table>

#### Average annual installation costs<sup>1</sup>

<table>
<thead>
<tr>
<th>Cost Share</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>534,600</td>
<td>44,500</td>
<td>579,100</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>436,200</td>
<td>25,200</td>
<td>461,400</td>
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<td>DHHL cost-share</td>
<td>0</td>
<td>318,900</td>
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<td>Total average annual installation costs</td>
<td>970,800</td>
<td>388,600</td>
<td>1,314,400</td>
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</table>

#### Average annual OM&R<sup>2</sup> costs

<table>
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<th>Cost Share</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>101,500</td>
<td>0</td>
<td>101,500</td>
</tr>
<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>94,600</td>
<td>94,600</td>
</tr>
<tr>
<td>Total average annual OM&amp;R&lt;sup&gt;2&lt;/sup&gt; costs</td>
<td>101,500</td>
<td>94,600</td>
<td>196,100</td>
</tr>
</tbody>
</table>

#### Total average annual costs

<table>
<thead>
<tr>
<th>Cost Share</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>534,600</td>
<td>4,395,100</td>
<td>579,100</td>
</tr>
<tr>
<td>State Dept. of Agriculture cost-share</td>
<td>537,700</td>
<td>5,356,300</td>
<td>562,900</td>
</tr>
<tr>
<td>DHHL cost-share</td>
<td>0</td>
<td>413,500</td>
<td>413,500</td>
</tr>
<tr>
<td>Total average annual costs</td>
<td>1,072,300</td>
<td>482,200</td>
<td>1,555,500</td>
</tr>
</tbody>
</table>

#### Average annual net benefits

| Benefit to cost ratio                          | 1.3 : 1.0                     | 0.5 : 1.0                   | 1.0 : 1.0 |

---

<sup>1</sup> Installation costs amortized at 7.625% interest for 50 years (0.07823).

<sup>2</sup> Operation, maintenance, and replacement.
4.9 ALTERNATIVE 6 - KAUahi Reservoir Plan Without Stockwater

Alternative 6 proposes the installation of the Kauahi Reservoir and irrigation distribution system improvements without implementation of a livestock drinking water distribution system. The reliability of water supply to cropland irrigators is improved by elimination of the livestock water demand. The inclusion of this alternative in the FEIS was requested by EPA.

4.9.1 Proposed Works of Improvement

- Reservoir supply pipeline - Install 19,200 feet of 30-inch diameter ductile iron pipeline (DIP) from a new intake structure on the Upper Hamakua Ditch to the proposed Kauahi Reservoir. See Figure L

- Reservoir - Construct a 131-million-gallon Kauahi Reservoir with storage of 131-million gallons, embankment height of 26 feet and 3:1 downstream embankment slope.

- Irrigation water distribution pipeline - Install a total of 13,300 feet of pipeline, including: 3,800 feet of 24-inch DIP from the proposed 30-inch diameter reservoir supply pipeline to the existing WIS distribution pipeline and 9,500 feet of 4-inch to 12-inch polyvinyl chloride (PVC) pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.

4.9.2 WIS Features

- Total water storage: 292 million gallons
- Total water supplied: 3.8 million gallons per day
- Reliability of water supply: 82 percent
- Service areas:
  - Farmlots: 167
  - Total cropland acres: 1,985
  - Irrigated cropland acres: 989
  - Ranchlots: 0
  - Grazing land acres: 0
  - Animal units: 0
### 4.9.3 Economic Effects

**Table N**

**ALTERNATIVE 6 - ECONOMIC EFFECTS**

*Waimea-Pauuiilo Watershed*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cropland Irrigation Water ($)</th>
<th>Livestock Drinking Water ($)</th>
<th>Total ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average annual benefits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in income losses</td>
<td>1,144,900</td>
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<td>1,144,900</td>
</tr>
<tr>
<td>Reduction in limited expansion opportunities</td>
<td>544,100</td>
<td>0</td>
<td>544,100</td>
</tr>
<tr>
<td>Reduction in water pumping costs</td>
<td>51,800</td>
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<td>51,800</td>
</tr>
<tr>
<td><strong>Total average annual benefits</strong></td>
<td>1,740,800</td>
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<tr>
<td><strong>Installation costs</strong></td>
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<td></td>
</tr>
<tr>
<td>Federal (PL 83-566) cost-share</td>
<td>7,028,500</td>
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<td>State Dept. of Agriculture cost-share</td>
<td>5,832,400</td>
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<td>DHHL cost-share</td>
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<td><strong>Total installation costs</strong></td>
<td>12,860,900</td>
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<tr>
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<td></td>
</tr>
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1. Installation costs amortized at 7.625% interest for 50 years (.07823).
2. Operation, maintenance, and replacement.
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<th>Unit</th>
<th>Alt. 1 No Action</th>
<th>Alt. 2 NED Plan</th>
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<th>Alt. 4 Modified Waimea II Reservoir Plan</th>
<th>Alt. 5 Kauali Reservoir Plan</th>
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58
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<td>Alt. 5 Kaauli Reservoir Plan</td>
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| Item                          | Alt. 1: No Action | Alt. 2: NED Plan | Alt. 3: Waiamea II Reservoir Plan | Alt. 4: Modified Waiamea II Reservoir Plan | Alt. 5: Kauahi Reservoir Plan | Alt. 6: Kauahi Reservoir 
Waiamea-Paraun Water Project (Page 4 of 4) |
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<td>Reduced overflow from UHD will reduce average streamflow of Lualualei Stream by 5% per year. Naturally occurring fluctuations in streamflow will override overflow effects.</td>
<td>Reduced overflow from UHD will reduce average streamflow of Lualualei Stream by 5% per year. Naturally occurring fluctuations in streamflow will override overflow effects.</td>
<td>Reduced overflow from UHD will reduce average streamflow of Lualualei Stream by 5% per year. Naturally occurring fluctuations in streamflow will override overflow effects.</td>
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</tr>
<tr>
<td>Visual</td>
<td>Waiamea II Reservoir will be visible from about 170 properties.</td>
<td>Waiamea II Reservoir will be visible from about 170 properties.</td>
<td>Waiamea II Reservoir will be visible from about 170 properties.</td>
<td>Waiamea II Reservoir will be visible from about 170 properties.</td>
<td>Kauahi Reservoir will be visible from about 300 properties.</td>
<td>Kauahi Reservoir will be visible from about 300 properties.</td>
</tr>
</tbody>
</table>
5. SELECTED PLAN

5.1 RATIONALE FOR PLAN SELECTION

While Alternative 2, the National Economic Development Plan, proposes the most efficient plan in terms of average annual net benefits and benefit to cost ratio, the Sponsors have selected Alternative 5, as the "Selected Plan" for implementation. Alternative 5 proposes an economically feasible plan that addresses the project purpose of alleviating the agricultural water shortage problems, with less potential adverse effects on properties surrounding the proposed reservoir. See Table L - Summary and Comparison of Candidate Plans, Economic Effects for a comparison of the net benefits and benefit to cost ratios for the alternatives.

5.2 PROPOSED WORKS OF IMPROVEMENT

This section of the Plan-EIS contains a detailed description of the works of improvement (structural measures) proposed by the Selected Plan, including financing, methods of installation, and operation and maintenance requirements. The Selected Plan does not propose project-funded installation of any land treatment measures and relies on the ongoing conservation program to provide complementary soil and water conservation measures.

The Selected Plan proposes structural measures to increase the capacity and reliability of the WIS, including the following:

- **Reservoir supply pipeline**: Install 19,200 feet of 30-inch diameter DIP from a new intake structure on the Upper Hamakua Ditch to the proposed Kauahi Reservoir.
- **Reservoir**: Construct one reservoir (Kauahi Reservoir) with storage of 131-million gallons and an embankment height of 26 feet and downslope of 3:1.
- **Irrigation water distribution system**: Install a total of 13,300 feet of pipeline, including: 3,800 feet of 30-inch diameter DIP from the proposed 30-inch diameter reservoir supply pipeline to the existing distribution system and 9,500 feet of 4-inch to 12-inch diameter PVC pipeline to service the planned 270-acre Lalamilo Ag. Park expansion area.
- **Stockwater distribution system**: Install 234,600 feet of 1-inch to 6-inch diameter HDPE pipeline, seven electric pumps, and two diesel pumps to provide stockwater to 265 ranchlots totaling 22,803 acres.

5.2.1 Reservoir Supply Pipeline

The existing UHD inlet structure for the Waimea Reservoir will be reconstructed and enlarged to accommodate both the proposed 30-inch diameter and the existing 24-inch diameter ductile iron reservoir supply pipeline (Figure N). The elevation of the inlet invert will be the same as the existing inlet for the Waimea Reservoir, 3032 feet mean sea level (MSL).
Construction of the inlet structure will require a Conservation District Use Application and approval to conduct construction activity in the Kohala Forest Reserve and may also require a Department of the Army Section 404 permit. Approximately 2,000 feet of the pipeline will be within the State-owned Kohala Forest Reserve. The pipeline will be buried within the existing corridor for the Waimea Reservoir pipeline to the Department of Hawaiian Home Lands-owned parcel (TMK 6-4-02:125) where the Waimea Reservoir is located. One major gulch crossing will be constructed along this section. Approximately 1,500 feet of pipeline on Hawaiian Homes Lands will pass through easements “C” and “B” on TMK 6-4-02:137 and the Waimea Reservoir site. Approximately 4,500 feet of pipeline will be installed within the existing 40-foot wide right-of-way (TMK 6-4-17:6) for the Upper Hamakua Ditch leading to Puu Pulehu reservoir. The pipeline will cross under Mamalahoa Highway through the existing tunnel for the New Hamakua Ditch.

On the south side of Mamalahoa Highway the pipeline will extend west to a small State of Hawaii-owned parcel (TMK 6-4-02:21). A valved tee will be installed at station 84+00, on the state parcel, for the connection to the existing irrigation water distribution system. The ground elevation at the tee is 2,874 feet MSL. The remaining 10,500 feet of pipeline to the Kauahi Reservoir will be installed within the right-of-way of the unnamed road which runs north-south and crosses Mana Road at the northwest corner of the parcel leased to Clarence Kauahi (TMK 6-4-04:12).

Approximately 8.8 acres of construction easements will be required. Nearly all easements will be existing road right-of-way or WIS-used easements. The estimated installation cost for the inlet and reservoir supply pipeline is $5,104,500.

Pipeline controls and layouts for both the supply and irrigation pipelines will be further evaluated during the design phase to provide an effective combination of ease of operation, low maintenance, low pumping requirement, efficient transfer of water from the Upper Hamakua Ditch to the reservoirs and between the reservoirs, and minimum risk to irrigation efficiency due to component failure or operation error.

5.2.2 Kauahi Reservoir

The proposed Kauahi Reservoir will be located on the southeastern side of the Mana Road/DHHL road intersection on the DHHL pastoral lot (TMK 6-4-04:12) leased to Clarence Kauahi (Figures 0 and P). The proposed reservoir will have a high-density polyethylene lining, be partially excavated and partially embanked, trapezoidal in plan, approximately 1,400 feet by 800 feet along its sides, and will have a capacity of 131-million gallons. The reservoir bottom will be at elevation 2,933 feet and the top of the embankment will be at elevation 2,966 feet. The top of the water surface, at capacity, will be at elevation 2,960 feet. When full, water depth will be 23 feet.

On the west side of the reservoir, along the DHHL road, a compacted earth embankment approximately 800 feet long with a maximum height of 26 feet will be constructed. The embankment will have a top width of 20 feet and upstream and downstream slopes of 3:1. On the north side of the reservoir, a smaller embankment approximately 500 feet long with a maximum height of six feet will be constructed.
The soil at the site is Kikoni Series which is a sandy loam. A’a (lava) can be expected at an average depth of four feet. Approximately 550,000 cubic yards of excavation and 73,800 cubic yards of embankment fill will be required.

A emergency spillway leading north will be vegetated earth with a reinforced concrete crest control structure. A diversion channel will divert all runoff from upstream of the reservoir around the reservoir. The reservoir area will be fenced for safety and all earth surfaces vegetated to minimize erosion and for aesthetic purposes.

Approximately 29 acres of pastureland will be acquired for the reservoir site. Post-project expansion of the reservoir is possible at the site and may require acquisition of additional land. The installation cost of the Kauahi Reservoir is $6,067,300.

5.2.3 Irrigation Water Distribution System

The existing WIS will be expanded with 13,300 feet of pipeline to connect the Kauahi Reservoir to the system and to serve additional cropland acreage in the proposed Lalamilo Ag. Park. Approximately 3,800 feet of 30-inch diameter ductile iron pipeline will connect the Kauahi Reservoir supply pipeline to the existing 24-inch diameter ductile iron pipeline leading from Waiwai Reservoir at Mamalahoa Highway. The new pipeline will be placed within the highway right-of-way and will parallel the existing 16-inch diameter pipeline from Pua Pulehu reservoir. The 30-inch diameter pipeline will allow use of gravity flow into the distribution system from Kauahi Reservoir without excessive pressure loss.

The WIS will serve 874 acres of irrigated cropland located in the existing Lalamilo Farmlots, Puukapu Farmlots and the DHHL Puukapu Farmlots. The WIS will be expanded with 9,500 feet of 4-inch to 12-inch diameter PVC pipeline to service the 270-acre planned Lalamilo Ag. Park expansion area.

When fully developed in irrigated cropland, the average annual gross irrigation demand for the future with project condition will be 3.8 MGD. This will serve an estimated area of 1,985 acres of cropland, of which 989 acres will be in irrigation. The peak daily gross irrigation demand will be 6.4 MGD. The distribution system will be capable of providing 10 MGD from the Kauahi Reservoir. A booster pump will be installed at the submain to the DHHL Puukapu farmlots to provide adequate pressure to irrigators. The project improvements do not include water meters and assistance with on-farm irrigation systems.

The installation cost for the irrigation water distribution system is estimated to be $1,689,100. Installation will take place on existing road rights-of-way and dedicated easements when the Lalamilo Ag. Park is designed.

5.2.4 Stockwater Distribution System

A new, separate livestock water distribution system will be constructed to provide stockwater to approximately 19,040 animals on an estimated 239 DHHL and 26 private ranchlots (Figure Q). The total length of the stockwater pipeline is 234,600 feet. The stockwater pipeline will be buried high-density polyethylene (HDPE) pipe ranging in diameter from 1 inch to 6 inches. Seven electric and two diesel pumps will be required to provide water to higher elevations beyond the effective reach of gravity pressure. Storage
tanks will reduce pressure fluctuation and allow for repairs, electrical failure, and other shutdowns. Storage tank level and pipeline pressure sensors will automate pump operation. The details of the automated pumping system and exact pump and storage tank locations will be made during final design.

The distribution system is planned to provide stockwater to a boundary of each ranchlot in the service area. The average consumption is assumed to be 10 gallons per animal per day. The distribution system capacity is 30 gallons per animal per day. Meters and assistance with on-ranch systems will not be provided by the project.

The stockwater distribution system will be serviced by two reservoirs. The northern stockwater distribution system, servicing approximately 6,800 acres in the Puukapu, Waikokeo, and Kamoku areas, will be supplied by the existing Waimea Reservoir. The southern stockwater distribution system, servicing 16,200 acres in Puukapu 1 and Nienie, will be supplied by the Kauahi Reservoir.

The total installation cost of the stockwater distribution system is $4,515,700, of which $4,145,900 is for DHHL ranchlots.

Nearly all of the stockwater distribution system will be installed on road rights of way and existing pipeline easements. Approximately 14,100 feet of pipeline will be installed across pastureland requiring acquisition of easements. The easements, necessary for construction and maintenance activity, will be 20-feet in width. All of the 6.5 acres of required pipeline right-of-way will be on DHHL ranchlots. An additional one-half acre of easement will be needed for several of the pump stations. Total required right-of-way is 7.0 acres.

5.2.5 System Water Budget

A simplified reservoir water budget is presented below. The total capacity of the three reservoirs - Waimea Reservoir, Piuu Palehu, and the proposed Kauahi Reservoir - is 291 MG. Inflow into the reservoir system will be diversion from the Upper Hamakua Ditch and rainfall into the reservoirs. Outflow from the reservoir system will be irrigation water supply, livestock drinking water supply, and evaporation from the surface of the reservoir. No leakage from the reservoirs is assumed.

The ditchflow and irrigation demand below are estimated for a "dry" year or low rainfall condition which is assumed to be exceeded 80 percent of the time. It is near this frequency, 78 percent, that water shortages are estimated to begin to occur. While the reservoir water budget below does not indicate the reservoirs going empty, a low initial storage volume together with a couple of months of low ditchflow can exhaust the water supply stored in the reservoirs.

Overflow from the Upper Hamakua Ditch into Lalakea Stream is expected to occur even in the "dry" years when instantaneous flow rates exceed the transmission rates to the reservoirs and once the reservoirs are filled. Overflow will be less frequent and reduced in volume during "dry" years. The average annual overflow to Lalakea Stream has been estimated to be 863 MG per year.
The average daily and annual flow rates in the Upper Hamakua Ditch were calculated using stream flow records from USGS Station 16726000 located on the ditch above the Waimea Reservoir. While records from this station exist from 1974 to present, USGS has discovered inaccuracies in the data. Records from 1975 to 1983 have been recently revised by USGS. Records from 1984 to 1990 have been deemed unreliable and unusable. Records from 1991 to 1994 are incomplete. For the analysis for this project the nine years of revised record from 1974 to 1983 and the record for 1995 were used. Monthly flow volumes were used to develop an average distribution of ditchflow throughout the year. A annual flow volume vs. frequency analysis was conducted using the ten years of record.

Agricultural demand is based on the average gross annual irrigation requirement for the 989 acres of cropland located in the WIS service area and livestock drinking water requirement for 19,040 animal units. The irrigation requirement analysis was originally prepared for the Hamakua Area Agricultural Water Study (1981) and was updated for increased irrigation efficiency gained by using drip and trickle irrigation methods. The average gross annual irrigation requirement is estimated to be 1.4 MG/acre/year. The gross livestock drinking water demand is assumed to be 15 gallons/animal unit/day.

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<td>UHD</td>
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<td>Evaporation</td>
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### Table S
**MONTHLY WRS RESERVOIR WATER BUDGET**
Waimea-Paanilo Watershed  
(MG/Month)

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<th>Feb</th>
<th>Mar</th>
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### Table T
**OVERFLOW FROM UHD TO LALAKEA STREAM**
Waimea-Paanilo Watershed  
(MG/Month)

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</table>
5.3 COSTS

This section describes the cost elements of the watershed project displays, quantifies major project components, and displays project costs and benefits in tabular form.

Installation cost includes construction, engineering services, project administration, and land rights costs for each work of improvement. Table 1 -Estimated Installation Cost displays the installation cost of each improvement and the funding obligation of each agency by purpose (irrigation water versus stockwater supply). For the Selected Plan, all works of improvement are structural measures to be installed on non-federal land. Cost-sharing arrangements will be set forth in a Watershed Agreement. The estimated total installation cost for the Selected Plan is $17,376,600 in 1996 dollars.

Construction costs include the material, equipment, labor, and any other direct costs of installing or constructing each of the proposed improvements. Construction costs associated with providing irrigation water can be cost-shared up to 50 percent by PL 83-566 funds, with the remaining 50 percent to be borne by local sponsors. The economic analysis conducted by NRCS indicated that providing stockwater is not incrementally feasible, thus the construction costs associated with providing stockwater cannot be cost-shared by PL 83-566 funds and must be funded totally by local sponsors. (See Section 5.1 Rationale for Plan Selection.) The Department of Agriculture and the DHHL will be responsible for funding stockwater improvements for non-DHHL and DHHL ranchlots, respectively.

Engineering services costs are an estimate of the cost associated with survey, investigation and final design of the proposed structures; preparation of specifications and plans; preparation of operation and maintenance plans; and inspection during construction. Engineering services costs, for both irrigation water and stockwater supply, can be cost-shared up to 100 percent with PL 83-566 funds.

Project administration costs include costs of preparing invitations to bid, administrating contracts, providing government representatives, conducting acceptance inspections, relocation assistance, permit acquisitions, legal opinions, and other overhead costs. Project administration costs will be funded by each agency as they occur.

Land rights costs include acquisition of land through purchase, permanent and temporary land easements, and rights-of-way needed for the installation of the works of improvement. Associated surveys, legal costs, and modifications to existing road and utility infrastructure are also included as land rights costs. Land rights costs cannot be cost-shared by PL 83-566 funds and must be funded by local sponsors.

Table 2 - Estimated Cost Distribution displays the estimated construction, engineering services, project administration, and land rights costs for each work of improvement by funding and purpose.

A benefit to cost analysis conforming to the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Resources Council, 1983) was required for this Plan-EIS by PL 83-566 policy. Costs and benefits were annualized to provide a basis for comparison. Table 4 - Estimated Average Annual Costs displays the average annual total installation costs, consisting of the amortized installation cost and the average annual operation, maintenance, and replacement costs by

73
project purpose. Total installation costs were amortized at 7.625 percent interest for the estimated project life of 50 years (factor .07823) as directed by NRCS policy. The interest rate of 7.625 percent is the discount rate for fiscal year 1996 which should be used by the NRCS in the formulation and evaluation of water and related land resource plans.

Table 6 - Comparison of Benefits and Costs displays the average annual benefits and costs by purpose (irrigation water versus stockwater supply). Providing an irrigation water supply is economically feasible, with economic benefits exceeding economic costs and a 1.3 : 1.0 benefit to cost ratio. Providing stockwater is not economically feasible, with economic benefits not exceeding economic costs and a 0.5 : 1.0 benefit to cost ratio. The Selected Plan in its entirety, is economically feasible, with total economic benefits exceeding total economic costs and a 1.0 to 1.0 benefit to cost ratio.

5.4 INSTALLATION AND FINANCING

The following section describes the planned sequence of installation, responsibilities for installation, contracting procedures, real property acquisition and relocations, financing, and conditions for providing assistance.

5.4.1 Planned Sequence of Installation

The installation period for the Selected Plan is estimated to be six years. Construction of each work of improvement will be preceded by one year during which surveys, design, land rights acquisition, and permit acquisition will take place. The sequence of installation proceeds from the Kauahi Reservoir to the reservoir supply pipeline, then, to the irrigation water distribution system.

The installation of the stockwater distribution system will take place throughout the six year installation period. As approximately one-third of the stockwater pipeline will be supplied from the existing Waimea Reservoir, those subsystems can be constructed and put into operation before the Kauahi Reservoir is operational.

Table 1, Sequence of Installation and Schedule of Obligations displays an estimated timeline for installation of the works of improvement over a six year period. Approximate costs for the phases of installation by funding source are shown.

74
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Irrigation water dist. system</td>
<td>0</td>
<td>7,500</td>
<td>2,100</td>
<td>10,000</td>
</tr>
<tr>
<td></td>
<td><strong>Construction</strong></td>
<td>2,206,900</td>
<td>2,206,900</td>
<td>208,000</td>
<td>4,621,800</td>
</tr>
<tr>
<td></td>
<td>Kauauli Reservoir</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stockwater distribution system</td>
<td>0</td>
<td>0</td>
<td>800,000</td>
<td>800,000</td>
</tr>
<tr>
<td></td>
<td><strong>Total Year 3</strong></td>
<td>2,782,300</td>
<td>2,376,800</td>
<td>1,076,300</td>
<td>6,235,400</td>
</tr>
</tbody>
</table>

Table U
SEQUENCE OF INSTALLATION AND SCHEDULE OF OBLIGATIONS
Waimea-Paaalolo Watershed
(Dollars)

75
Table U
SEQUENCE OF INSTALLATION AND SCHEDULE OF OBLIGATIONS
Waimea-Paauilo Watershed
(Dollars)
(Continued)

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost Item</th>
<th>Federal (PL 83-566)</th>
<th>DOA</th>
<th>DHHL</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>4</td>
<td>Technical Assistance</td>
<td></td>
<td></td>
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<td></td>
<td>Engineering Services</td>
<td>Stockwater distribution system</td>
<td>100,000</td>
<td>0</td>
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<td></td>
<td></td>
<td>Irrigation water dist. system</td>
<td>101,500</td>
<td>0</td>
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<td>Project Administration</td>
<td>Stockwater distribution system</td>
<td>6,000</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td>Irrigation water dist. system</td>
<td>47,200</td>
<td>33,100</td>
<td>10,000</td>
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<td></td>
<td>Construction</td>
<td>Stockwater distribution system</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
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<td>Irrigation water dist. system</td>
<td>671,600</td>
<td>530,600</td>
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<td>Total Year 4</td>
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<td>926,300</td>
<td>563,700</td>
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<tr>
<td>5</td>
<td>Technical Assistance</td>
<td>Stockwater distribution system</td>
<td>100,000</td>
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<td>0</td>
</tr>
<tr>
<td></td>
<td>Project Administration</td>
<td>Stockwater distribution system</td>
<td>6,000</td>
<td>10,000</td>
<td>50,000</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td>Stockwater distribution system</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total Year 5</td>
<td></td>
<td>106,000</td>
<td>10,000</td>
<td>850,000</td>
</tr>
<tr>
<td>6</td>
<td>Technical Assistance</td>
<td>Stockwater distribution system</td>
<td>33,500</td>
<td>0</td>
<td>0</td>
</tr>
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<td>Project Administration</td>
<td>Stockwater distribution system</td>
<td>5,600</td>
<td>16,600</td>
<td>43,500</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
<td>Stockwater distribution system</td>
<td>0</td>
<td>295,800</td>
<td>60,700</td>
</tr>
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<td>Total Year 6</td>
<td></td>
<td>39,100</td>
<td>312,400</td>
<td>104,200</td>
</tr>
<tr>
<td></td>
<td>Total Project</td>
<td></td>
<td>7,493,600</td>
<td>5,741,300</td>
<td>4,233,400</td>
</tr>
</tbody>
</table>

5.4.2 Responsibilities

The NRCS, Hawaii Department of Agriculture, Department of Hawaiian Home Lands, and the Mauna Kea Soil and Water Conservation District will be responsible for carrying out the following actions and functions in order to implement the Selected Plan. Each agency’s responsibilities will be specified in the Watershed Agreement and in subsequently executed Project Agreements for each phase of installation.
The Natural Resources Conservation Service (NRCS) will be responsible for the following:

1. Acquiring funds for the installation cost items shown in the tables under "PL 83-566 Funds."
2. Ensuring compliance with federal environmental laws.
3. Designing all works of improvement.
4. Performing construction inspections as necessary.

The Department of Agriculture (DOA) will be responsible for the following:

1. Acquiring funds for the installation cost items shown in the tables under "Other Funds - DOA."
2. Acquiring the necessary permits and approvals for the installation of the reservoir supply pipeline, Kauahi Reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots.
3. Ensuring compliance with state and county laws and policies.
4. Acquiring the land rights needed through purchase, easements, or approvals of use of existing rights-of-way and easements, to install the reservoir supply pipeline, Kauahi Reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots.
5. Performing land rights-related tasks such as modification or relocation of existing road and utility infrastructure affected by project installation.
6. Administering construction contracts through an agreement with the Department of Land and Natural Resources for the reservoir supply pipeline, Kauahi Reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots.
7. Performing construction inspections for the reservoir supply pipeline, Kauahi reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots.
8. Accepting and operating and maintaining the all the works of improvement, including the stockwater distribution system for DHHL ranchlots, as part of the WIS.
9. Funding operation, maintenance, and replacement (OM&R) work on the reservoir supply pipeline, Kauahi Reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots throughout the 50-year project life, as described in section 5.4.
10. Developing an operational policy for the improved/expanded Waimea Irrigation System.
12. Changing WIS policy to allow the provision of stockwater to ranchers.
The Department of Hawaiian Homelands (DHHL) will be responsible for the following:

1. Acquiring funds for the reservoir stockwater storage and the stockwater distribution system shown in the tables under "Other Funds - DHHL."
2. Acquiring the necessary permits and approvals for the installation of the stockwater distribution system for DHHL ranchlots.
3. Acquiring the land rights needed through purchase, easements, or approvals of use of existing rights-of-way and easements, to install the stockwater distribution system for DHHL ranchlots.
4. Administering construction contracts for the stockwater distribution system for DHHL ranchlots.
5. Performing construction inspections for the stockwater distribution system for DHHL ranchlots.
6. Providing funds to the WIS/DOA to cover the OM&R costs of the stockwater distribution system for DHHL ranchlots.
7. Participating in the development of an operational policy for the improved/expanded WIS.

The Mauna Kea Soil and Water Conservation District will be responsible for the following:

1. Providing opportunities for the public to participate during installation by developing and distributing information/articles and conducting meetings to keep the public informed.
2. Participating in the development of an operational policy for the improved/expanded WIS.

The DOA and the DHHL will enter into an agreement, approved by both the State Board of Agriculture and the Hawaiian Homes Commission, on those issues that require interagency coordination during implementation and operation of the project improvements. The agreement will include WIS water rate structure and water allocation for DHHL customers and the priority for water use. The agreement will be completed before the completion of any Project Agreements.

The implementation of practices on farms and ranches to conserve and protect the natural resource base is needed to complement the expansion of agricultural water supply and to assure sustainable agricultural activity in the service area. The ongoing conservation program offered by the SWCD, NRCS, and Farm Service Agency (FSA) will provide technical and financial assistance to farmers and ranchers.

The DHHL will ensure that each agricultural lessee develops and implements a conservation plan as required by the lease agreement. Staff at the DHHL West Hawaii District Office should be familiar with the SWCD, NRCS, and FSA conservation programs to be able to direct lessees to appropriate assistance. In addition, the development of DHHL staff capability to provide conservation planning assistance on DHHL parcels could increase
the effectiveness of the natural resources conservation effort and provide for more unified and consistent application of soil and water conservation over all of the DHHL parcels.

The DOA will ensure that operators of state-owned agricultural parcels develop and implement conservation plans. The requirement for all users of the WIS to prepare and implement conservation plans should be considered by the Board of Agriculture.

The SWCD and NRCS will continue to provide conservation planning assistance to area ranchers and farmers. Efforts will be made to have farmers install water conserving irrigation systems and practices. Technical and economic analysis to promote implementation of water conservation practices will be developed to assist NRCS conservation planners. The SWCD and the public affairs function of NRCS will publicize, through various media, the need for natural resource conservation and protection and the availability of technical and financial assistance.

5.4.3 Permits and Compliance

Installation of the Selected Plan will be performed in full compliance with applicable laws and policies of the County of Hawaii, State of Hawaii, and the federal government. The following permits and approvals may be required for project installation.

County of Hawaii Requirements

GRADING, GRUBBING, EXCAVATING AND STOCKPILING PERMIT
Department of Public Works
25 Aupuni Street
Hilo, Hawaii 96720

BUILDING PERMIT
Department of Public Works
25 Aupuni Street
Hilo, Hawaii 96720

State of Hawaii Requirements

STATE LAND USE APPROVAL
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96809

CONSERVATION DISTRICT USE APPLICATION
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96809

DAM CONSTRUCTION PERMIT
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96809
STATE HIGHWAYS PERMIT
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813

Federal Requirements

DEPARTMENT OF THE ARMY (404) PERMIT
U.S. Army Corps of Engineers
Pacific Ocean Division
Building 230
Fort Shafter, Hawaii 96858

Compliance With Federal Environmental Laws

Installation of the Selected Plan will be performed in full compliance with applicable federal environmental laws as designated by the Water Resource Council and as shown in the following table.

Table V
COMPLIANCE WITH DESIGNATED FEDERAL ENVIRONMENTAL LAWS
Waimea-Pauuilo Watershed

<table>
<thead>
<tr>
<th>Federal Law</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Clean Water Act (Federal Water Pollution Control Act), 33 U.S.C. 1251,</td>
<td>Applicable</td>
</tr>
<tr>
<td>et seq.</td>
<td></td>
</tr>
</tbody>
</table>
5.4.4 Contracting

Formal contracts for the construction of the proposed works of improvement will be let by competitive bid. The Hawaii Department of Agriculture will be responsible for administering the construction contracts for the reservoir supply pipeline, Kaua‘i reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots. The Department of Land and Natural Resources will provide contract administration services to the DOA through an interdepartmental agreement. The DHHL will be responsible for administering construction contracts for the stockwater distribution system for DHHL ranchlots.

The DOA will also be responsible for coordinating the administration of all contracts with the NRCS.

The construction contracts involving PL 83-566 funds will be prepared in conformance with OMB Circular A-102 and the National Contracts and Grants and Cooperative Agreements Manual.

5.4.5 Real Property Acquisition and Relocations

The DOA is responsible for acquiring the land rights needed through purchase, easements, or approvals of use of existing rights-of-way and easements, to install the reservoir supply pipeline, Kaua‘i Reservoir, irrigation water distribution system, and the stockwater distribution system for non-DHHL ranchlots. The DHHL is responsible for acquiring the necessary permits and approvals for the installation of the stockwater distribution system for DHHL ranchlots.

Acquisition of all lands, easements, or rights-of-way shall be made in compliance with the Uniform Relocation Assistance and Real Property Acquisition policies Act of 1970, Public Law 91-646, and appropriate USDA and federal regulations. These provide that in cases where land rights are not obtained by donation or land exchange, every reasonable effort will be made to acquire real property rights by negotiation. Prior to the initiation of negotiations, an appraisal of the fair market value of the real property interest will be made by a qualified land appraiser. No relocations of houses or businesses are known to be required by this project.

Both buried and above-ground utility lines exist in the installation area. Most notable are water, electrical, and telephone lines. Care will be taken during construction to prevent danger to workers and avoid excessive disruption of service. The Sponsors and the installing contractors will be responsible for obtaining the necessary cooperation and assistance from the appropriate utility companies. The Sponsors will also be responsible for costs associated with modification or relocation of road and utility infrastructure.

5.4.6 Cultural Resources

Any changes to design or location of project features will be coordinated with the State Historical Preservation Officer to obtain concurrence.

In the event that any unanticipated sites or remains such as artifacts, shell, bone or charcoal deposits; human burials; rock or coral alignment, pavings, or walls are encountered during construction, work will be stopped and the State Historic Preservation Officer and the
U.S. Secretary of the Interior will be contacted in accordance with the procedures outlined in the NRCS General Manual, Title 420, Part 401, October 1983, as amended. NRCS will take actions to protect or recover, or both, any significant cultural resources discovered during construction.

5.4.7 Financing

Federal assistance for installing the works of improvement as described in this plan will be provided under the authority of the Watershed Protection and Flood Prevention Act, PL83-566, 83rd Congress, 68 Stat. 666, as amended.

DOA and DHHL are legally constituted agencies of state government and will finance their part of the project costs with funds appropriated by state legislature.

5.4.8 Conditions for Providing Assistance

Financial or other assistance to be furnished by NRCS for installing the Selected Plan is contingent on the fulfillment of the Sponsors' obligations as described in the Watershed Agreement and in Section 5.3.2 of this Plan-EIS and is contingent on congressional approval of funds for the PL 83-566 program.

Neither the Watershed Agreement nor this Plan-EIS constitute documents for the obligation of PL 83-566 or other funds.

The following conditions shall be met before the issuance of invitations to bid:

1. The Project Agreement will developed and signed.
2. The necessary permits and approvals will be acquired and compliance with federal, state, and county laws and regulations will be obtained. Reasonable evidence of each such shall be provided to the mutual satisfaction of all parties.
3. The needed land rights (purchase, easements, and rights-of-way) will be acquired.
4. Funding in the cost-sharing proportions stated in the Watershed Agreement must be provided by the state and federal governments.
5. The Operation, Maintenance, and Replacement Agreement will be developed and signed.
6. An Emergency Preparedness Plan will be developed for the Kauahi Reservoir (dam).

5.5 OPERATION, MAINTENANCE, AND REPLACEMENT

Operation, maintenance, and replacement (OM&R) will be provided to the works of improvement to ensure that the projected beneficial effects of project installation will continue to occur throughout the 50-year project life. No federal PL 83-566 funds will be used for OM&R.

The DOA, pursuant to authority under Chapters 167 and 168, Hawaii Revised Statutes, will be responsible for 1) funding operation, maintenance, and replacement (OM&R) activities on the reservoir supply pipeline, Kauahi Reservoir, irrigation water
distribution system, and the stockwater distribution system for non-DHHL ranchlots; 2) developing an operational policy for the improved/expanded WIS; and 3) developing, maintaining, and implementing an Emergency Preparedness Plan for the Kauahi Reservoir (dam).

The DHHL will be responsible for 1) providing funds to the WIS/DOA to cover the OM&R costs of the stockwater distribution system for DHHL ranchlots and 2) participating in the development of an operational policy for the improved/expanded WIS.

The DOA, with assistance from the DHHL, will be responsible to ensure that the agricultural water supply is used for the highest value use. Irrigation of commercial truck and flower crops and livestock drinking water have been identified as high value use. Pasture irrigation is not considered to be highest value use and should not be allowed except during periods of excess water supply.

An OM&R Agreement outlining DOA and DHHL responsibilities will be prepared and entered into before the issuance of invitations to bid on any portion of construction. The OM&R Agreement will include specific provisions for retention and disposal of property acquired or improved with PL 83-566 financial assistance. The Agreement will be based on the NRCS National Operation and Maintenance Manual and will include an operation and maintenance plan for each structural measure.

All works of improvement will be inspected annually and after unusually severe events or conditions to determine the need for maintenance and/or repair. The inspection party should consist of representatives from each of the Sponsor organizations. An NRCS representative will participate in the annual inspection during the first five years of project operation. The DOA will prepare an annual OM&R report describing the inspection and operation for the year and submit a copy to NRCS.

Following is a description of the essential OM&R responsibilities of the DOA:

1. Operate the improved/expanded WIS in a responsible manner to provide a consistent water supply to farmers and ranchers. Control water levels in the system’s reservoirs to optimize storage capability.
2. Inspect pipelines for leaks, damage, and unauthorized connections. Check appurtenant devices for proper operation.
3. Inspect and clear the Upper Hamakua Ditch intakes.
4. Inspect and assure proper operation of system pumps and storage tanks.
5. Maintain access roads to ensure timely correction of pipeline problems.
6. Collect and analyze water supply and customer water use to adjust operating policy, identify wasteful water use, and assure efficient delivery with minimal system loss.
7. Disseminate safety information regarding health hazards of cross-connections to the domestic water system and household use of untreated agricultural water.
8. Assess customers a service charge to recover the cost of OM&R.
OM&R costs include increased WIS staff for administration and operations functions, electrical and diesel power costs for distribution system pumping, maintenance and repair of structures, and replacement of components.

The estimated yearly OM&R costs for the various structural elements are shown in the table below. The values shown below are then converted to average annual values and aggregated into the various evaluation units, the results of which are shown in Table 4 - Annualized Adverse NED Effects.

<table>
<thead>
<tr>
<th>OM&amp;R Item</th>
<th>Average Annual Cost (S)</th>
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</thead>
<tbody>
<tr>
<td>Irrigation water supply</td>
<td></td>
</tr>
<tr>
<td>System operation and administration</td>
<td>20,300</td>
</tr>
<tr>
<td>Reservoir supply pipeline</td>
<td>37,100</td>
</tr>
<tr>
<td>Kauahi Reservoir</td>
<td>21,000</td>
</tr>
<tr>
<td>Irrigation water distribution system</td>
<td>23,100</td>
</tr>
<tr>
<td>Total irrigation water supply</td>
<td>101,500</td>
</tr>
<tr>
<td>Stockwater supply</td>
<td></td>
</tr>
<tr>
<td>System operation and administration</td>
<td>20,200</td>
</tr>
<tr>
<td>Stockwater distribution system</td>
<td></td>
</tr>
<tr>
<td>DHHL ranchlots</td>
<td>71,600</td>
</tr>
<tr>
<td>Non-DHHL ranchlots</td>
<td>2,800</td>
</tr>
<tr>
<td>Total stockwater supply</td>
<td>94,600</td>
</tr>
<tr>
<td>Grand total</td>
<td>169,000</td>
</tr>
</tbody>
</table>

5.6 TABLES

The tables on the following six pages are to assist the NRCS and Sponsors to evaluate the economic efficiency of the project and allocation of funding. These tables, and their numbering are in conformance with the NRCS National Watershed Manual.
<table>
<thead>
<tr>
<th>Installation Cost Item</th>
<th>Units</th>
<th>Number (Nonfederal Land)</th>
<th>Federal (PL 83-566 Funds)</th>
<th>Other Funds</th>
<th>Estimated Installation Cost (Dollars³)</th>
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<tr>
<td><strong>STRUCTURAL MEASURES</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cropland irrigation water supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir supply pipeline</td>
<td>feet</td>
<td>19,200</td>
<td>2,761,200</td>
<td>2,142,300</td>
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<tr>
<td>Kauahi Reservoir</td>
<td>MG</td>
<td>131</td>
<td>3,131,300</td>
<td>2,685,000</td>
<td>0</td>
</tr>
<tr>
<td>Irrigation water dist. system</td>
<td>feet</td>
<td>13,300</td>
<td>940,300</td>
<td>591,600</td>
<td>157,200</td>
</tr>
<tr>
<td>Total irrigation water supply</td>
<td>N/A</td>
<td>N/A</td>
<td>6,832,800</td>
<td>5,418,900</td>
<td>157,200</td>
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<tr>
<td>Livestock drinking water supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Supply Pipeline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kauahi Reservoir</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Stockwater distribution system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL ranchlots</td>
<td>feet</td>
<td>213,400</td>
<td>521,700</td>
<td>0</td>
<td>3,624,200</td>
</tr>
<tr>
<td>Non-DHHL ranchlots</td>
<td>feet</td>
<td>21,200</td>
<td>47,400</td>
<td>322,400</td>
<td>0</td>
</tr>
<tr>
<td>Total stockwater dist. system</td>
<td>feet</td>
<td>234,600</td>
<td>569,100</td>
<td>322,400</td>
<td>3,624,200</td>
</tr>
<tr>
<td>Total livestock water supply</td>
<td>N/A</td>
<td>N/A</td>
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<td>322,400</td>
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<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>7,401,900</td>
<td>5,741,300</td>
<td>4,233,400</td>
</tr>
</tbody>
</table>

¹ Price base 1996.
² The Reservoir Supply Pipeline and Kauahi Reservoir prorated as follows: irrigation water approximately 96% and stockwater approximately 4%, based on total water requirements.
³ Table prepared: August 1997.
Table 2

ESTIMATED COST DISTRIBUTION
Waloea-Pauuilo Watershed

<table>
<thead>
<tr>
<th>Installation Cost Item</th>
<th>Installation Costs - Federal (PL 83-566) Funds^I</th>
<th>Installation Costs - Other Funds^II</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction  Engineering  Project Admin.  Total</td>
<td>Construction  Project Admin.  Land Rights  Total  Responsible Party</td>
<td></td>
</tr>
<tr>
<td></td>
<td>($)   ($)   ($)   ($)</td>
<td>($)  ($)  ($)  ($)</td>
<td>($)  ($)  ($)</td>
</tr>
<tr>
<td><strong>STRUCTURAL MEASURES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop Irrigation water supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir supply pipeline</td>
<td>1,946,100  611,300  203,800  2,761,200</td>
<td>1,946,100  187,000  9,200  2,142,300</td>
<td>DOA  4,903,500</td>
</tr>
<tr>
<td>Kauahi Reservoir^III</td>
<td>2,206,900  693,300  231,100  3,131,300</td>
<td>2,206,900  212,000  266,100  2,685,000</td>
<td>DOA  5,816,300</td>
</tr>
<tr>
<td>Irrigation water distribution system</td>
<td>671,600  201,500  67,200  940,300</td>
<td>530,600  53,100  7,900  591,600</td>
<td>DOA  1,531,900</td>
</tr>
<tr>
<td></td>
<td>141,000  14,100  2,100  157,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Irrigation water supply</td>
<td>4,824,600  1,506,100  502,100  6,832,800</td>
<td>4,824,600  466,200  285,300  5,556,100</td>
<td>N/A  12,408,900</td>
</tr>
<tr>
<td>Livestock drinking water supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Supply Pipeline^V</td>
<td>0  0  0  0</td>
<td>183,400  16,600  800  201,000</td>
<td>DIHIL  201,000</td>
</tr>
<tr>
<td>Kauahi Reservoir^VII</td>
<td>0  0  0  0</td>
<td>208,000  19,100  23,900  251,000</td>
<td>DIHIL  251,000</td>
</tr>
<tr>
<td>Stockwater distribution system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIHIL ranchlots</td>
<td>0  489,100  32,600  521,700</td>
<td>3,260,700  293,500  70,000  3,624,200</td>
<td>DIHIL  4,145,960</td>
</tr>
<tr>
<td>Non-DIHIL ranchlots</td>
<td>0  44,400  3,000  47,400</td>
<td>295,800  26,600  0  322,400</td>
<td>DOA  322,400</td>
</tr>
<tr>
<td>Total stockwater distribution system</td>
<td>0  533,500  35,600  569,100</td>
<td>3,556,500  310,100  70,000  3,946,600</td>
<td>N/A  4,515,700</td>
</tr>
<tr>
<td>Total livestock water supply</td>
<td>0  533,500  35,600  569,100</td>
<td>3,947,900  356,000  94,700  4,398,600</td>
<td>N/A  4,967,700</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td>4,824,600  2,039,600  537,700  7,401,900</td>
<td>8,772,500  822,200  380,000  9,974,700</td>
<td>N/A  17,376,600</td>
</tr>
</tbody>
</table>

^I Price base 1996.

^II The Reservoir Supply Pipeline and Kauahi Reservoir prorated as follows: irrigation water approximately 96% and stockwater approximately 4%, based on total water requirements.

Table prepared: August 1997
### Table 3.A
**STRUCTURAL DATA - PIPELINES**
Waimea-Pauuilo Watershed
(Page 1 of 2)

<table>
<thead>
<tr>
<th>Item</th>
<th>Capacity</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESERVOIR SUPPLY PIPELINE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, ductile iron, 30-inch diameter</td>
<td>15 MGD</td>
<td>19,200 feet</td>
</tr>
<tr>
<td><strong>IRRIGATION WATER DISTRIBUTION SYSTEM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KAUahi RESERVOIR CONNECTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, ductile iron, 30-inch diameter</td>
<td>15 MGD</td>
<td>3,800 feet</td>
</tr>
<tr>
<td><strong>LALAMILO AG. PARK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, PVC, 12-inch diameter</td>
<td>2.4 MGD</td>
<td>2,400 feet</td>
</tr>
<tr>
<td>Pipe, PVC, 8-inch diameter</td>
<td>1.1 MGD</td>
<td>2,100 feet</td>
</tr>
<tr>
<td>Pipe, PVC, 6-inch diameter</td>
<td>0.66 MGD</td>
<td>3,100 feet</td>
</tr>
<tr>
<td>Pipe, PVC, 4-inch diameter</td>
<td>0.30 MGD</td>
<td>1,900 feet</td>
</tr>
<tr>
<td>Pump Station, 25 hp, electric</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td><strong>STOCKWATER DISTRIBUTION SYSTEM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL PUUKAPU 1 RANCHLOTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, HDPE, 6-inch diameter</td>
<td>0.52 MGD</td>
<td>4,000 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 5-inch diameter</td>
<td>0.36 MGD</td>
<td>10,200 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 4-inch diameter</td>
<td>0.24 MGD</td>
<td>6,400 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 3-inch diameter</td>
<td>0.14 MGD</td>
<td>2,600 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 2-inch diameter</td>
<td>0.07 MGD</td>
<td>11,900 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/2-inch diameter</td>
<td>0.04 MGD</td>
<td>16,900 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/4-inch diameter</td>
<td>0.03 MGD</td>
<td>19,400 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1-inch diameter</td>
<td>0.02 MGD</td>
<td>18,200 feet</td>
</tr>
<tr>
<td>Pump Station, 20-hp, electric</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td>Pump Station, 10-hp, diesel</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td><strong>DHHL PUUKAPU 2 RANCHLOTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, HDPE, 6-inch diameter</td>
<td>0.52 MGD</td>
<td>700 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1-inch diameter</td>
<td>0.02 MGD</td>
<td>8,000 feet</td>
</tr>
<tr>
<td>Pump Station, 0.5-hp, electric</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td>Item</td>
<td>Capacity</td>
<td>Quantity</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>DHHL NIENIE RANCHLOTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, HDPE, 5-inch diameter</td>
<td>0.36</td>
<td>35,600 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 4-inch diameter</td>
<td>0.24</td>
<td>4,700 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 3-inch diameter</td>
<td>0.14</td>
<td>11,500 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 2-inch diameter</td>
<td>0.07</td>
<td>2,400 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/2-inch diameter</td>
<td>0.04</td>
<td>9,900 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1-inch diameter</td>
<td>0.02</td>
<td>6,400 feet</td>
</tr>
<tr>
<td>Pump Station, 15-hp, electric</td>
<td></td>
<td>4 each</td>
</tr>
<tr>
<td>Pump Station, 5-hp, diesel</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td>DHHL KAMOKU RANCHLOTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, HDPE, 6-inch diameter</td>
<td>0.52</td>
<td>MGD 6,200 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 4-inch diameter</td>
<td>0.24</td>
<td>MGD 7,400 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 3-inch diameter</td>
<td>0.14</td>
<td>MGD 10,000 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 2-inch diameter</td>
<td>0.07</td>
<td>MGD 1,100 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/2-inch diameter</td>
<td>0.04</td>
<td>MGD 8,000 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/4-inch diameter</td>
<td>0.03</td>
<td>MGD 1,000 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1-inch diameter</td>
<td>0.02</td>
<td>MGD 10,900 feet</td>
</tr>
<tr>
<td>Pump Station, 5-hp, electric</td>
<td></td>
<td>1 each</td>
</tr>
<tr>
<td>OTHER RANCHLOTS (PRIVATE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe, HDPE, 6-inch diameter</td>
<td>0.52</td>
<td>MGD 3,100 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 4-inch diameter</td>
<td>0.24</td>
<td>MGD 3,600 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 3-inch diameter</td>
<td>0.14</td>
<td>MGD 3,700 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/2-inch diameter</td>
<td>0.04</td>
<td>MGD 4,000 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1 1/4-inch diameter</td>
<td>0.03</td>
<td>MGD 3,500 feet</td>
</tr>
<tr>
<td>Pipe, HDPE, 1-inch diameter</td>
<td>0.02</td>
<td>MGD 3,300 feet</td>
</tr>
</tbody>
</table>

Table prepared: August 1997
<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of structure</td>
<td>N/A</td>
<td>B</td>
</tr>
<tr>
<td>Seismic zone</td>
<td>N/A</td>
<td>3</td>
</tr>
<tr>
<td>Uncontrolled drainage area</td>
<td>sq. mile</td>
<td>0.03</td>
</tr>
<tr>
<td>Controlled drainage area</td>
<td>sq. mile</td>
<td>0</td>
</tr>
<tr>
<td>Total drainage area</td>
<td>sq. mile</td>
<td>0.03</td>
</tr>
<tr>
<td>Maximum height of dam</td>
<td>feet</td>
<td>26.0</td>
</tr>
<tr>
<td>Volume of fill</td>
<td>cubic yard</td>
<td>71,000</td>
</tr>
<tr>
<td>Elevation at top of dam</td>
<td>ft. MSL</td>
<td>2,966.0</td>
</tr>
<tr>
<td>Elevation at top of emergency spillway</td>
<td>ft. MSL</td>
<td>2,960.0</td>
</tr>
<tr>
<td>Emergency spillway type</td>
<td>N/A</td>
<td>vegetated</td>
</tr>
<tr>
<td>Emergency spillway bottom width</td>
<td>feet</td>
<td>20.0</td>
</tr>
<tr>
<td>Emergency spillway exit slope</td>
<td>%</td>
<td>5.5</td>
</tr>
<tr>
<td>Total capacity (crest of spillway)</td>
<td>acre feet</td>
<td>400.6</td>
</tr>
<tr>
<td>Sediment submerged</td>
<td>acre feet</td>
<td>0</td>
</tr>
<tr>
<td>Beneficial use pool (irrigation &amp; stockwater)</td>
<td>acre feet</td>
<td>400.6</td>
</tr>
<tr>
<td>Surface area</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Sediment pool</td>
<td>acres</td>
<td>0</td>
</tr>
<tr>
<td>Beneficial use pool (irrigation &amp; stockwater)</td>
<td>acres</td>
<td>19.2</td>
</tr>
<tr>
<td>Frequency operation-emergency spillway</td>
<td>% chance</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Emergency spillway hydrograph</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Rainfall volume</td>
<td>inches</td>
<td>15.0</td>
</tr>
<tr>
<td>Runoff volume</td>
<td>inches</td>
<td>15.0</td>
</tr>
<tr>
<td>Storm duration</td>
<td>hours</td>
<td>24</td>
</tr>
<tr>
<td>Maximum reservoir water surface elevation</td>
<td>ft. MSL</td>
<td>2,960.6</td>
</tr>
<tr>
<td>Freeboard hydrograph</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Rainfall volume</td>
<td>inches</td>
<td>32.0</td>
</tr>
<tr>
<td>Runoff volume</td>
<td>inches</td>
<td>32.0</td>
</tr>
<tr>
<td>Storm duration</td>
<td>hours</td>
<td>24</td>
</tr>
<tr>
<td>Maximum reservoir water surface elevation</td>
<td>ft. MSL</td>
<td>2,961.1</td>
</tr>
</tbody>
</table>

Table prepared: August 1997
Table 4  
**ESTIMATED AVERAGE ANNUAL COSTS**  
Waimea-Pauuilo Watershed  

<table>
<thead>
<tr>
<th>Evaluation Unit</th>
<th>Average Annual Installation Costs ($)</th>
<th>Average Annual Operation, Maintenance &amp; Replacement Costs ($)</th>
<th>Total Average Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop irrigation water supply</td>
<td>970,800</td>
<td>101,500</td>
<td>1,072,300</td>
</tr>
<tr>
<td>Livestock drinking water supply</td>
<td>388,600</td>
<td>94,600</td>
<td>483,200</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,359,400</strong></td>
<td><strong>196,100</strong></td>
<td><strong>1,555,500</strong></td>
</tr>
</tbody>
</table>

* Price base 1996.  
* Table prepared: August 1997  
* Total installation costs amortized at 7.625% interest for 50 years (.07823).

Table 6  
**COMPARISON OF BENEFITS AND COSTS**  
Waimea-Pauuilo Watershed

<table>
<thead>
<tr>
<th>Evaluation Unit</th>
<th>Agriculture-related Average Annual Benefits ($)</th>
<th>Total Average Annual Costs ($)</th>
<th>Benefit: Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Damage Reduction</td>
<td>Intensification</td>
<td>Total Average Annual Benefits ($)</td>
</tr>
<tr>
<td>Crop irrigation water supply</td>
<td>864,400</td>
<td>517,600</td>
<td>1,382,000</td>
</tr>
<tr>
<td>Livestock drinking water supply</td>
<td>41,500</td>
<td>207,700</td>
<td>249,200</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>905,900</strong></td>
<td><strong>725,300</strong></td>
<td><strong>1,631,200</strong></td>
</tr>
</tbody>
</table>

* Price base 1996.  
* Table prepared: August 1997  
* Benefits are the reduction in crop losses due to water shortages and the reduction in water pumping costs.  
* See page 37, Alternative 3 Economic Effects.  
* Benefits are the reduction in livestock losses due to water shortages.  
* Benefits are the reduction in crop limited expansion opportunities.  
* Benefits are the reduction in livestock limited expansion opportunities.  
* Figure from Table 4, Estimated Average Annual Costs.
6. EFFECTS OF THE SELECTED PLAN

6.1 GENERAL

This section describes the effects of the Selected Plan on the identified problems and opportunities, natural resources, and human health, safety, and welfare.

Under each effect category a “Setting” is included to provide the background information necessary to understand what is presented under “Effects.” Under “Effects,” beneficial or adverse effects are described in terms of significance and/or whether the effects are temporary/short-term or permanent/long-term. The “Mitigation” section describes measures that will be included in the Selected Plan to reduce or eliminate any negative effects caused by the Selected Plan. The effects of other alternatives are also discussed when important for comparison sake.

This section also includes information under the following separate headings, as required by federal and/or state law: 1) Relationship Between Local Short-term Uses and Enhancement of Long-term Productivity; 2) Unresolved Issues; and 3) Relationship to Other Plans, Policies, and Controls.

6.2 ECONOMIC EFFECTS

This section includes a description and estimation of the effects of the Selected Plan on the identified problems and opportunities. The reduction in agricultural losses are beneficial economic effects and installation costs are adverse economic effects. Potential or indirect economic effects are included in section 6.3 Environmental Effects.

Beneficial economic effects or benefits of the Selected Plan were measured as the reduction in net income losses for the affected farmers and ranchers due to the installation of the Selected Plan. Income losses under “Future With Project Conditions,” were measured against income losses under “Future Without Project Conditions,” with the reduction in losses considered benefits. Total economic benefits for the Selected Plan have been estimated at $1,631,200 on an average annual basis. See the Table O for a summary of Economic Benefits.

6.2.1 Reduction in Crop Losses Due to Water Shortages

Setting

Waimea Irrigation System water restrictions result in reductions in crop quality and yield, total crop losses, reductions in new plantings, and disruptions in marketing patterns. Agricultural losses measured as net income losses for the affected farmers have been estimated at $2,616,900 under FW/O Project Conditions.

Effects

The Selected Plan proposes the installation of the 131-million-gallon Kauahi Reservoir, which will increase the total storage capacity of the WIS from 161 to 292 -million-gallons. System reliability will increase from 68 percent under Future Without Project Conditions to 78 percent with the Selected Plan. Reliability is an indicator of the annual frequency of providing adequate water supply to users. The additional storage capacity of the WIS will reduce water restrictions and subsequent crop losses by an estimated $817,800 on an average annual basis.
An estimated 159 existing farmers will have a more reliable irrigation water supply, including 107 native Hawaiians.

Mitigation

None required.

6.2.2 Reduction in Crop Limited Expansion Opportunities

Setting

The inadequate storage capacity of the WIS prevents the expansion of the irrigation water distribution system and crop production in the DOA-proposed 270-acre Lalamilo Agricultural Park.

Effects

The installation of the Kauai Reservoir and expansion of the irrigation water distribution system will allow crop production in the Lalamilo Agricultural Park. An estimated $517,600 in net income could be generated in the Park with the installation of the Selected Plan.

As currently planned, the 270-acre Agricultural Park will be divided into eight lots. Thus, eight potential new farmers will benefit from a source of irrigation water.

Mitigation

None required.

6.2.3 Reduction inLivestock Losses Due to Water Shortages

Setting

Ranchers in the potential service area experience income losses due to the higher cost of using treated domestic water for stockwater. Most of the DHHL and private ranchers must rely on the County DWS domestic water system for livestock drinking water (stockwater) because a source of agricultural water is not available to them. Income losses for the affected ranchers have been estimated at $53,200 on an average annual basis under FW/O Project Conditions.

Effects

The installation of the Kauai Reservoir and a stockwater distribution system will allow ranchers to use less expensive agricultural water from the WIS instead of domestic water. Economic benefits are attributable to a reduction in water costs and have been estimated at $41,500 on an average annual basis.

The amount of domestic water used for agricultural purposes will be decreased by an estimated 40 million gallons annually. This released domestic water can be used to alleviate the domestic water shortage problems in the Waimea area.

An estimated 265 existing ranchers, including 239 native Hawaiians, will have an agricultural water supply for stockwater.

Mitigation

None required.
6.2.4 Reduction in Livestock Limited Expansion Opportunities

Setting

Livestock production is limited by the inadequate quantity and distribution of stockwater making it difficult for ranchers to efficiently manage their operations. An estimated additional 8,190 animal units could be raised if stockwater were available and intensive grazing methods were employed. See Table X. The net income that could be generated with the additional animal units have been estimated at $266,300 under Future Without Project Conditions.

Effects

The installation of the Kauahi Reservoir and a stockwater distribution system will not improve the range or pasture, but adequate and properly located water will make it possible to apply good grazing management, one of several “facilitating” practices that enable good grazing management to be applied. Carrying capacity in the grazing land service area can be increased by an estimated 8,190 animal units. The net income that could be generated from the animal units are considered benefits and been estimated at as $207,700 on an average annual basis. (Table W)

Mitigation

None required.

6.2.5 Reduction in Water Pumping Costs

Setting

Water must be pumped from the WIS Puu Puehu Reservoir to the Waimea Reservoir when supplies in the Waimea reservoir are low. Water pumping costs have been estimated at $150,000 under Future Without Project Conditions.

Effects

With the installation of the Kauahi Reservoir, less water will have to be pumped from the Puu Puehu Reservoir to the Waimea Reservoir. Water pumping costs will be reduced by an estimated $46,600 on an average annual basis under with project conditions.

Mitigation

None required.

6.2.6 Adverse Economic Effects / Costs

Setting

Costs associated with the installation and operation, maintenance and replacement of the Selected Plan are considered adverse economic effects.
### Table X
ECONOMIC BENEFITS
Waimea-Pauulu Watershed

<table>
<thead>
<tr>
<th>Problem or Opportunity</th>
<th>Estimated Average Annual Losses</th>
<th>Average Annual Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Future Without Project Conditions</td>
<td>Future With Project Conditions</td>
</tr>
<tr>
<td></td>
<td>Crop ($)</td>
<td>Livestock ($)</td>
</tr>
<tr>
<td>Losses due to water shortages</td>
<td>2,616,900</td>
<td>53,200</td>
</tr>
<tr>
<td>Limited expansion opportunities</td>
<td>663,600</td>
<td>266,300</td>
</tr>
<tr>
<td>Water pumping costs</td>
<td>150,000</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3,430,500</td>
<td>319,500</td>
</tr>
</tbody>
</table>

**Note:** From Table F, Summary of Problems and Opportunities.

### Table Y
GRAZING LAND AND LIVESTOCK SERVICED
Waimea-Pauulu Watershed

<table>
<thead>
<tr>
<th>Condition/Area</th>
<th>Ranchlots</th>
<th>Acres</th>
<th>Animal Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUTURE WITHOUT CONDITIONS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL</td>
<td>239</td>
<td>20,582</td>
<td>9,862</td>
</tr>
<tr>
<td>Other private</td>
<td>26</td>
<td>2,380</td>
<td>988</td>
</tr>
<tr>
<td>TOTAL</td>
<td>265</td>
<td>22,962</td>
<td>10,850</td>
</tr>
<tr>
<td>POTENTIAL WITH STOCKWATER SUPPLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHHL</td>
<td>239</td>
<td>20,582</td>
<td>17,447</td>
</tr>
<tr>
<td>Other private</td>
<td>26</td>
<td>2,380</td>
<td>1,593</td>
</tr>
<tr>
<td>TOTAL</td>
<td>265</td>
<td>22,962</td>
<td>19,040</td>
</tr>
</tbody>
</table>
| INCREASE                                | 0         | 0      | 8,190        

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Effects

The estimated cost of the Selected Plan is as follows:

Total installation costs: $17,376,600

Average annual installation costs: $1,359,400
Average annual OM&R costs: $196,100
Total average annual costs: $1,555,500

See Tables 1, 2, and 4 in section 5.5 for a more detailed cost breakdown.

Mitigation

None required.

6.3 ENVIRONMENTAL EFFECTS

This section describes the effects of the Selected Plan on natural resources such as air, water, soil, plants, and animals; social effects which consider effects on human health, safety, and welfare; and also potential or indirect economic effects.

6.3.1 Agriculture and Prime Agricultural Land

Setting

Waimea is predominately a rural farming and ranching community with the employment and income of most residents dependent, directly or indirectly, on agriculture. The expanding tourism sector also capitalizes on the agricultural setting of Waimea. Comments made by community members for the maintenance and expansion of agriculture and state and county policies and goals supporting agricultural activity in Waimea reflect the widespread desire to protect and expand the area's agricultural base.

The federal and state governments recognize the importance of the soil and other natural resources needed to support commercial agriculture. The federal government, through the Prime and Unique Farmland Policy and the USDA Farmland Protection Policy, and the State of Hawaii Board of Agriculture, through adoption of the Agricultural Lands of Importance to the State of Hawaii, have defined prime farmland as land best suited for the production of food, feed, forage, and fiber crops. The land has the soil quality, growing season, and moisture supply needed to sustain high yields of crops economically when treated and managed, including irrigation water management, according to modern farming methods.

Effects

The Selected Plan will provide an expanded and more consistent agricultural water supply to area farmers and ranchers creating a more stable and potentially more profitable environment for agricultural enterprise. Irrigated cropland acreage is expected to increase from 874 acres under Future Without Project Conditions to 989 acres under future with project conditions. The reliability
of the irrigation water supply will increase from 68 percent to 78 percent with the Selected Plan installed.

The development of the stockwater distribution system will provide water to many ranchlots that are not directly served by the existing DWS system. The proposed water system will also allow more intensely managed and more profitable livestock grazing operations. The improved viability of commercial livestock grazing will help maintain the agricultural character of Waimea.

The major soils in the cropland area are Kikoni silt loam and Waimea sandy loam. Both soils are considered prime agricultural soils and when irrigated 86 percent is classified as “Prime Farmland,” nationally or “Prime Agricultural Land,” in Hawaii. The Selected Plan will provide a more reliable supply of irrigation water to 752 acres of Prime Agricultural Land under Future Without Project Conditions.

The Selected Plan will provide irrigation water to 270 additional acres of cropland in the Lalamilo Ag. Park future expansion area, of which an additional 115 acres will be irrigated. Of the 115 irrigated acres, approximately 99 acres can be classified as Prime Agricultural Land.

Implementation of the Selected Plan will ensure that the most productive agricultural land will remain in crop production, thereby strengthening the agricultural industry and enabling it to better withstand pressure to urbanize.

Mitigation
None required.

6.3.2 Air

Setting
The watershed area has been subject to air pollution due to volcanic emission (“vog”) from the erupting Kilauea Volcano located on the south-eastern side of the island of Hawaii, although not to the extent of the Hilo and Kona areas of the island. It is difficult to predict how long the Kilauea Volcano will continue to erupt. Other than vog, no other air quality problems in the watershed area were identified at the present time, none were expressed by the watershed area community, and none are anticipated in the future under without project conditions.

Effects
The Selected Plan will result in a temporary decrease in air quality during construction. Use of heavy equipment such as backhoes and bulldozers to construct the Kauahi Reservoir site will create dust and will produce emissions from engine exhausts. These effects will be limited to the immediate surrounding area, only during the actual conducting of these activities, and experienced only by the construction workers as well as the residents of the one house located in the vicinity of the Kauahi Reservoir site. Use of gasoline and diesel powered equipment in connection with conducting farming activities are a normal occurrence in the watershed area.

Other construction activities such as the installation of supply and distribution systems may also create dust and produce engine exhaust emissions, but not to the degree which reservoir construction will. Again effects will be limited to the immediate surrounding area only during the actual conducting of these activities and experienced only by construction workers and other persons in the immediate vicinity.
Mitigation

The contracts for the installation of the Selected Plan will stipulate that proper dust, erosion and sediment control measures be undertaken or installed during construction to meet the County of Hawaii's grading ordinance and to minimize dust to the extent possible. Remaining dust considered an unavoidable adverse environmental effect.

No mitigation measures for exhaust emission are feasible. Exhaust emissions due to construction activities are considered an unavoidable adverse environmental effect.

6.3.3 Coastal Zone

(content moved to Section 6.6.10)

6.3.4 Cultural Resources

Setting

Project improvements may affect existing historical, cultural, architectural and/or archaeological resources such those listed on the Hawaii Register and/or National Register of Historic Places.

Effects

No effects on cultural resources are anticipated due to the installation of works of improvement proposed by the Selected Plan.

Reservoir Supply Pipeline - The April 1988 report entitled "Environmental Assessment - Improvements to the Upper Hamakua Ditch," prepared by Hilo Engineering, Inc. for the Division of Water and Land Development, DLNR, concluded that "no significant archaeological features have been found or thought to exist within the potential project right-of-way," which included the entire length of the Upper Hamakua Ditch to Puu Pulehu Reservoir.

The 19,200-foot-long reservoir supply pipeline will be aligned within existing WIS pipeline easements or within existing road right-of-way. See section 5.1.1 for a more detailed description of the pipeline alignment. No significant archaeological features were identified to exist in this area by surveys and investigations conducted as part of the Wai‘anae-Wai‘alu Watershed project.

Kauahi Reservoir - The NRCS contracted a consultant, William Bonk, to conduct an archeological reconnaissance survey of the Kauahi Reservoir site a land area of approximately 284,400 square yards. See section 5.2.2 for a more detailed description of the reservoir site. The results of the contracted work were published in May 1996 under the title "An Archaeological Survey of a Small Portion of Land in Pu‘ukapu, South Kohala, County of Hawaii‘i, Hawaii‘i."

Transects uncovered nothing that can be attributed to humans of the prehistoric or historic periods. The report recommended that archaeological clearance to construct the Kauahi Reservoir be given on the basis of a lack of archaeological evidence to support requirements of further archaeological work, mitigation, or preservation.
Irrigation Water Distribution System - Alan C. Spencer, NRCS Cultural Resource Specialist, conducted archaeological investigations for the Waimea-Pauiulo Watershed project. The results of his investigations were included in a January 1989 report entitled “Archaeological Investigations of the Lalamilo Agricultural Addition Irrigation Pipeline Corridor and the Livestock Water Distribution System and Management Area, Waimea-Pauiulo Watershed, Hawaii County, Hawaii.”

As part of the literature search conducted by Spencer, the National Register of Historic Places was consulted. Only one property, the Iniolu Congregational Church, was listed in the watershed area. This was confirmed by a search of the National Register Information System (NRIS). Other properties that are eligible but not formally listed are: Parker Homestead, and the cemetery at Mana, and the Hind and Spencer Homes in Waimea.

One historic district, the Waimea Agricultural System, is located adjacent to the proposed Lalamilo Ag. Park expansion area. The Waimea Agricultural System is a subdistrict of the larger Kohala Field System. The Waimea Agricultural System is composed of four complexes. Field Complex 4 borders the Agricultural Park. It consists of mostly early and middle 19th century agricultural fields, irrigation ditches, boundary walls, and residential features. Some features of this complex may date to the 13th or 14th centuries. Although not nominated to the National Register of Historic Places, this historic district is eligible under several criteria.

The irrigation pipeline corridors for the Lalamilo Agricultural Park expansion area have been located to avoid the Waimea Agricultural System by approximately 500 feet.

The NRCS contracted a consultant, William Bonk, to conduct an archaeological literature search, and an on-ground archaeological reconnaissance survey of the three potential reservoir sites and a land area of approximately 500 acres, about 278 of which are potential new cropland areas in the State Department of Agriculture's proposed Lalamilo Agricultural Park. The results of the contracted work were published in October 1985 under the title “An Archaeological Survey in the Waimea-Pauiulo Watershed Area of Portions of the Districts of South Kohala and Hamakua, County of Hawaii, Hawaii.”

Field investigations conducted as part of the above mentioned contract found nothing of archaeological significance within the bounds of any of the three potential reservoir sites or the 500 acres potential new cropland areas. However, a more recent archaeological investigation conducted for the Parker Ranch Town Center has expanded the area extent of the Waimea Agricultural System. Additional archaeological survey will be necessary if the State Department of Agriculture decides to proceed with development of the Agricultural Park at this site.

Stockwater Distribution System - The January 1989 report entitled “Archaeological Investigations of the Lalamilo Agricultural Addition Irrigation Pipeline Corridor and the Livestock Water Distribution System and Management Area, Waimea-Pauiulo Watershed, Hawaii County, Hawaii,” identified no cultural resources along the proposed stockwater distribution system corridor.

The changes in the stockwater pipeline alignment required, by Alternative 5 were field surveyed by Carol Kawachi, NRCS Cultural Resources Specialist. No cultural resources were observed during the survey. The results of the survey were forwarded by letter to the State Historic Preservation Officer in January 1997 and concurrence was requested.
Mitigation

None required.

Any changes to design or location of project features will be coordinated with the State Historical Preservation Officer to obtain concurrence.

In the event that any unanticipated sites or remains such as artifacts, shell, bone or charcoal deposits; human burials; rock or coral alignment, pavings, or walls are encountered during construction, work will be stopped and the State Historic Preservation Officer and the U.S. Secretary of the Interior will be contacted in accordance with the procedures outlined in the NRCS General Manual, Title 420, Part 401, October 1983, as amended. NRCS will take actions to protect or recover, or both, any significant cultural resources discovered during construction.

6.3.5 Dam Breach

Setting

The location of the proposed reservoir was an issue because of the possibility of a dam breach.

Effects

Both the Kauahi Reservoir and the Waimea II Reservoir dams pose a hazard to properties and persons present in the identified breach inundation area, in the unlikely event of a dam breach.

The Kauahi Reservoir breach inundation area extends from the intersection of Mana Road and the unnamed DHHL road to the natural depression one mile north-northeast of the reservoir (Figure R). The estimated peak discharge from the breach is 7,600 cfs. As much as 100 million gallons will be discharged from the reservoir. Due to the rolling topography, the breach flow can be several hundred feet wide and divided into more than one channel. Maximum flow depths will be about five feet with an average velocity of seven feet per second. The water will settle in a pond approximately 4,000 feet long and 500 feet wide with an average depth of six feet.

The Kauahi Reservoir dam falls under the controls of HRS Chapter 13-190, Dams and Reservoirs due to its storage capacity exceeding 50 acre-feet. The Kauahi Reservoir dam is rated a "moderate hazard" meaning the dam's failure could possibly result in loss of life and appreciable property damage.

The identified breach inundation area for the Kauahi Reservoir affects five DHHL pastoral lots and three Puukapu Homestead agricultural subdivision lots. There are one ranch dwelling, one open livestock shelter, and one toolshed located within the breach inundation area. The ranch dwelling is located approximately 1,500 feet north of the reservoir at the eastern edge of the breach inundation area. The living area of the dwelling is above the estimated breach flow depth. The lower-level garage may receive damage. The two other structures and other improvements such as livestock fences and roads on the DHHL pastoral lots may be inundated and damaged by the breach flood. Erosion damage and sediment deposition may occur in the pasture areas. Ponding of the breach flood may last for a week or more before it completely percolates into the ground.
The identified breach inundation area for the Waimea II Reservoir affects fifteen properties adjacent to the proposed reservoir, 3 of which presently have houses built on them. Four houses located along Lalakea Stream on the floor of Waipio Valley would also be affected.

Mitigation

A Kauahi Reservoir dam breach caused by overtopping of the embankment by water will not occur because the dam will not be placed across a stream or drainageway which will introduce runoff into the reservoir.

The probability of a dam breach caused by "piping" or internal erosion within the embankment will be reduced significantly by the high-density polyethylene lining used throughout the reservoir, the installation of a chimney filter within the embankment to intercept seepage flows through the embankment, and the broader base and increased flow path created by the 3:1 downstream embankment slope.

The probability of a dam breach caused by an earthquake will be reduced significantly by the polyethylene lining, the flattened embankment slope, and the reservoir foundation which is unsaturated lava rock. No geologic faults are located near the reservoir. The nearest faults are located five miles to the north in the Kohala Mountains. The failure of an earth embankment due to an earthquake is exceedingly rare. An inventory conducted for the 1984 Symposium on Large Dams found that three of 27,255 significantly-sized compacted earth dams had failed worldwide due to earthquake damage during the 131-year period from 1853 to 1984. Another study, Observed Performance of Dams During Earthquakes, by the U.S. Committee on Large Dams in 1992, concluded that three of 61,411 compacted earth dams inventoried in the United States were collapsed or severely damaged by earthquakes during the 106-year period between 1886 and 1992.

An Emergency Preparedness Plan, as required for "high hazard" dams by HRS, Chapter 13-190, will be developed and implemented for the "moderate hazard" Kauahi Reservoir. The plan will include embankment monitoring, emergency notification and evacuation areas and procedures, and disaster response procedures and will be filed with the State Dam Safety Program.

Remaining risk after all mitigation measures undertaken, is considered an unavoidable adverse environmental effect.

The owner of the Kauahi Reservoir will be the State of Hawaii. In the event of a dam breach, damage liability will be assumed by the State. The USDA Natural Resources Conservation Service will assume responsibility if the dam design is determined to be technically deficient.
6.3.6 Energy

Setting

This section describes the energy requirements for the Selected Plan.

Effects

An estimated 82,900 kilowatt hours of electricity will be required to operate seven stockwater pumps annually. Approximately 60 percent of the electricity generated on the Island of Hawaii is produced using fossil fuel oil.

An estimated 3,000 gallons of diesel fuel will be required to operate two stockwater pumps annually.

Mitigation

None feasible. Energy requirements are considered an irreversible and irretrievable commitment of resources.

6.3.7 Floodplains

Setting

There is a national and local interest to manage floodplains to minimize economic and social losses and to allow natural processes to occur. The policy that federal programs and projects will avoid support of floodplain development (i.e. urbanization) is contained in Executive Order 11988, Floodplain Management.

Floodprone areas in the watershed area have been identified by the National Flood Insurance Program and are displayed on the Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency. Little floodplain exists in the watershed. The floodprone areas identified in the watershed area are along Waikoloa and Lanimuamau streams as the cross through Waimea Town and south of the Pua Nani subdivision to the Puukapu (formerly Paia'kuli) Reservoir and the Puukapu flood control basin.

Effects

The Selected Plan will not affect floodplains in the watershed. The installation of irrigation distribution pipeline along the roadway through the Puukapu floodplain area will not affect the operation of the Puukapu flood control basin. The Selected Plan will not directly or indirectly support increased development of floodplains.

Mitigation

None required.
6.3.8 Groundwater

Setting

Groundwater conditions within the watershed are extremely variable because of the nature of the volcanic bedrock. Lava flows in the upper watershed (Kohala Mountains area) frequently contain highly fractured zones or lava tubes. These conditions provide extremely high permeability, often reaching the point where entire streams percolate into/recharge the ground water system. Other sections of the watershed underlain by ash deposits have very slow permeability.

The use of groundwater as a potential source of agricultural water was considered, but not pursued because of the high cost of digging wells to the depths of the sustainable aquifers and the high cost of pumping water.

There are two means by which the alternative plan could potentially affect groundwater resources, with subsequent potential effects on human health, safety, and welfare. The first would be due to increased fertilizer and chemicals used on new cropland which would be provided water and brought into production via the Selected Plan affecting groundwater quality. The second would be increased water diversion, decreasing groundwater recharge or quantity.

Effects

The Selected Plan will increase the total amount of fertilizer and chemical use due to the new cropland, however no effects on groundwater quality and on human health, safety, and welfare are anticipated. The same can be said for Alternatives 2, 3, and 4.

The installation of the Selected Plan will increase irrigated cropland by 115 acres from 870 to 989 acres or by about 13 percent. Use of restricted agricultural chemicals is regulated by one of the project Sponsors; the State of Hawaii, Department of Agriculture, Division of Plant Industries; which requires that all purchasers and users of restricted agricultural chemicals attend and pass a certification course. The DOA also conducts periodic update courses for purchasers and users. The NRCS also provides assistance to farmers, through its ongoing conservation program, to design efficient irrigation systems which would lessen the chances of excess irrigation water carrying agricultural chemicals down to the groundwater lens.

The State of Hawaii, Department of Health’s Safe Drinking Water Branch periodically tests all well sources of drinking water for chemical and microbiological contamination. No wells in the watershed area have ever shown such contamination.

The Selected Plan does not include any works of improvement to increase the diversion of surface waters from any streams, including the Kawainui, Kawaiki, Alakahi, Koawe, and Waima streams. Nor do any of the alternatives include the installation of pipelines which would cause UHD ditch flows to by-pass stream sections of the UHD, as originally proposed by the Recommended Plan in the Plan-EA. The Selected Plan will therefore have no affect on the amount of water which percolates to the groundwater lens from the above mentioned streams or UHD stream sections.

Mitigation

None required.
6.3.9 Land Use

Setting

There is concern that the Selected Plan may cause land use changes due to the installation of the works of improvement. See also sections 6.3.1 Agriculture and Prime Agricultural Land and 6.3.10 Population / Urban Growth for related effects.

Effects

The Selected Plan will require the conversion of 29 acres of grazing land to permanent Kauahi Reservoir site and seven acres of grazing land for the stockwater distribution system right-of-way. The conversion of 270 acres of grazing land to cropland (Lalamilo Ag. Park) does not constitute a land use change because the land will remain in agricultural use. All other works of improvement will be installed on existing road or pipeline easements.

Mitigation

None required. Conversion of grazing land to reservoir site is considered an long-term, irreversible and irretrievable commitment of resources.

6.3.10 Population / Urban Growth

Setting

Although the Waimea area continues to increase in population and commercial activity, community members have commented that uncontrolled urban growth can diminish or destroy the "country" character of the Waimea area. State and local policies and goals also seek to maintain the agrarian character of the area. Concerns have been expressed that the increase in water supply will ultimately lead to more subdivisions and commercial development.

Effects

The project improvements to the Waimea Irrigation System consists of expanding water supply for cropland irrigation and livestock drinking water. All system water will be untreated and unsuitable for domestic drinking water purposes. No connections to the DWS domestic system will be made from the WIS.

With the project installed, the DWS water supply will only be increased by the amount, approximately 40 million gallons per year, that is currently being used for livestock drinking water. The return of the 40 million gallons per year can be seen as an improvement to the reliability of the domestic water supply rather than supply to be allocated to new users.

The improved outlook for agriculture in the Waimea area, as a result of implementation of this project, may restrain the subdivision and sale of larger parcels, support maintenance of areas in agricultural land use zoning, and provide opportunities for the community to direct commercial growth in areas that support the agricultural base.

The most important control of growth remains land use zoning at the county level. The hearings during general plan revision and those that accompany land use designation changes present opportunities for the community to direct urban growth and development.
The Selected Plan will provide a source of irrigation water for eight new farmlots in the planned Lalamilo Ag. Park. These new farmlots could potentially be operated by farmers new to the watershed area and thereby increase the population. The potential increase in population is not significant and will not affect urban growth.

Mitigation

None required.

6.3.11 Soil

Setting

See section 2.8, Geology and Soils, for a description of the soil resources in the watershed area. Of concern is soil erosion. A discussion of sedimentation effects are also included in this section.

Effects

The Selected Plan will cause a temporary increase in the soil erosion and sedimentation potential during construction. The major activity of concern is the use of heavy equipment such as backhoes to excavate the Kauahi Reservoir site. Other construction activities such as the installation of the reservoir supply and distribution systems will also increase the soil erosion potential, but not to the degree which reservoir excavation will.

Mitigation

The contract(s) for the installation of the Selected Plan will stipulate that proper erosion and sediment control measures be undertaken or installed during construction to meet the County of Hawaii's grading ordinance, Chapter 10, Erosion and Sediment Control, Hawaii County Code. The measures should minimize the soil erosion and sedimentation potential to the extent possible. Remaining erosion and sedimentation considered an unavoidable adverse environmental effect.

6.3.12 Streams

Setting

This section discusses effects on stream flow or quantity. Effects on stream water quality due to sedimentation are addressed in section 6.3.11 Soil. Effects on stream biota is discussed in section 6.3.13 Threatened and Endangered Species.

Much of the surface water and groundwater occurring in the region of the Upper Hamakua Ditch and Lalakea Stream later appears in Waipio Valley as it moves toward the ocean. Waipio Valley taro farmers, tour operators, and others require the continuance of the valley's abundant water resources.

Effects

The Selected Plan and the other alternative plans do not include any improvements to increase water diversion from any of the streams in the watershed, including the Kawainui, Kawaiiki, Alakahi, Koiawe, and Waima streams. An earlier proposal to install pipelines around the natural stream reaches of the UHD to prevent seepage losses was eliminated from the
alternative that was selected. The DLNR-led repairs of the UHD will decrease seepage losses from the ditch by as much as 50 to 75 percent during periods when the ditch flow is less than 4 MGD. During higher flows in the ditch, the percentage increase in ditchflow will be considerably less.

The overflow from the UHD, once the reservoirs are filled to capacity, enters Lalakea Stream near its headwater to augment the naturally occurring streamflow. This overflow has taken the present form since, at least, 1960 when the Waimea Reservoir was constructed. The increase in agricultural water demand created by the project improvements over the future without project condition is approximately 377 million gallons per year. Overflow to Lalakea Stream from the UHD will be reduced from 1,240 million gallons per year to 863 million gallons per year. The combined annual streamflow in Lalakea Stream, measured at Hiilawe Falls, will be reduced by five percent from 7,080 million gallons per year to 6,703 million gallons per year (Table S).

The flow rate in the Upper Hamakua Ditch, agricultural water demand analysis, and data sources are discussed in Section 5.2.5 System Water Budget.

The reduction in overflow volume is distributed throughout the year (Table T). The base runoff from the 3.05 square mile drainage area is not affected. The naturally occurring fluctuations in the Lalakea streamflow will override the effects of the reduced overflow from the UHD. In addition, it is important to note that the overflow from UHD augments the naturally occurring streamflow of Lalakea Stream. Thus, even if the overflow were completely eliminated, the Selected Plan would not be affecting the natural condition of Lalakea Stream or Waipio Valley.

Lalakea Stream is diverted by the Lalakea Ditch at the 2,000-foot elevation. The diversion, which supplies a 30-MG reservoir is unused at present. All of the ditch, including the intakes and Lalakea Reservoir, is located on Kamehameha Schools/Bishop Estate (KS/BE) land. It is probable the KS/BE will someday utilize the Lalakea Ditch.

Mitigation

None required.
### Table Z
EFFECT OF OVERFLOW REDUCTION FROM UPPER HAMAKUA DITCH
Waimea-Puaulu Watershed

<table>
<thead>
<tr>
<th>Water Body</th>
<th>Unit</th>
<th>Future without Project</th>
<th>Future with Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Hamakua Ditch</td>
<td>MG per day</td>
<td>6.4</td>
<td>6.4</td>
</tr>
<tr>
<td>UHD average daily flow rate</td>
<td>MG per day</td>
<td>2.351</td>
<td>2.351</td>
</tr>
<tr>
<td>(-) Agricultural water demand from UHD</td>
<td>MG per year</td>
<td>1,111</td>
<td>1,488</td>
</tr>
<tr>
<td>(**) Overflow from UHD to Lalakea Stream</td>
<td>MG per year</td>
<td>1,240</td>
<td>863</td>
</tr>
<tr>
<td>Overflow reduction with project installed</td>
<td>MG per year</td>
<td>N/A</td>
<td>377</td>
</tr>
<tr>
<td>% Overflow reduction</td>
<td>%</td>
<td>N/A</td>
<td>30</td>
</tr>
<tr>
<td>Lalakea Stream</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural average flow rate Lalakea Stream @ Hiilawe Falls</td>
<td>MG per year</td>
<td>5,840</td>
<td>5,840</td>
</tr>
<tr>
<td>(**) Overflow from UHD</td>
<td>MG per year</td>
<td>1,240</td>
<td>863</td>
</tr>
<tr>
<td>(=) Total average flow rate</td>
<td>MG per year</td>
<td>7,080</td>
<td>6,703</td>
</tr>
<tr>
<td>% Streamflow reduction</td>
<td>%</td>
<td>N/A</td>
<td>5</td>
</tr>
</tbody>
</table>

**Wailea River**

| Natural average flow rate into ocean 27   | MG per year| 24,366                 | 24,366              |
| Overflow from UHD                         | MG per year| 1,240                  | 863                 |
| Total average flow rate                   | MG per year| 25,606                 | 25,229              |
| % Streamflow reduction                    | %          | N/A                    | 1.5                 |

27 Estimated through regional analysis using seven gaged streams in Hilo/Hamakua/Kohala area.

### Table AA
MONTHLY LALAKEA STREAMFLOW
Waimea-Puaulu Watershed

[MONTHLY LALAKEA STREAMFLOW Diagram]

### Diagram
MONTHLY LALAKEA STREAMFLOW
- Present Condition
- Future without Project
- Future with Project
- Without UHD Overflow
6.3.13 Threatened and Endangered Species

Setting


The Selected Plan includes work in the following areas: (1) the reservoir supply pipeline connection site at UHD, (2) the reservoir supply pipeline alignment corridor from the UHD to the proposed Kauali Reservoir, (3) the Kauali Reservoir site, (4) the irrigation water distribution pipeline alignment corridor, (5) the planned Lalamilo Ag. Park, and (6) the stockwater distribution pipeline alignment corridor. Figures N and Q identifies these areas and pipeline corridors.

Botanical and wildlife assessment studies have been completed within the project area since the project's genesis in 1984.

There has been considerable correspondence between wildlife agencies and NRCS since 1984. The following is an additive list of threatened, endangered or rare species that were identified as potentially being found in the project area by USFWS and DLNR, or from reviews of former reports and surveys:

1984
1) Hawaii creeper (bird) Loxops maculatus mana **(E)
2) Hawaii akeapa (bird) Loxops coccineus, coccineus (E)
3) O‘u (bird) Psittirostra psitacea (E)
4) Akiapolau (bird) Hemignathus munroi (E)
5) Hawaiian goose (nene) Nesochen sandvicensis (E)
6) Palila (bird) Loxioides bailleui (E)
7) Hawaiian hoary bat Lasiurus cinereus semotus (E)
8) Hawaiian Hawk or 'io Buteo solitarius (E)
9) O‘puu alamo‘o Lentipes concolor (SOC)

1985
10) Hawaiian duck or koloa Anas wvivilliana (E)
11) Nukupuu (bird) Hemignathus lucidus (E)
12) Hawaiian creeper (bird) Oreomyzis mana (E)
13) Oha (plant) Clermontia drepanomorpha (E)
14) Aku'Aku (plant ) Cyanea triloba (SOC)
15) (plant) Diplazium melekaia (E)
16) 'Aiwa tree (plant) Neoeostachyum breviflorum (E)
17) (plant) Tetraplasandra kohalae (olahensis) (SOC)

1987
18) Orangeblack HI damselfly Megagargion xanthomelas (C)
19) Flying carwig HI damselfly Megagargion nesiotis (C)

**The current (Feb 97) status of the species: (E) = endangered, (T) = threatened, (C) = Candidate(SOC) = Species of Concern, taxa for which the FWS has on file enough substantial information on biological vulnerability and threat(s) to support proposals for listing as endangered or threatened species.
Existing Flora and Fauna

In February, 1987, Lani Stemmermann and Joyce Davis Jacobson completed the “Botanical Survey of the Upper Hamakua Ditch Improvements, Waimae-Paaulu Watershed, Island of Hawaii”. This study included assessments of sections of the UHD that are no longer planned in the preferred alternative. The current plan only proposes work in section 6 of the UHD, not in sections 1-5. *Trapsandra oahuensis*, now a “Species of Concern”, not endangered in (USFWS Plant Species List November 7, 1996) was found in 1987 by Stemmerman & Jacobson in sections 1 and 3 of the UHD; *Clermontia* spp. were found in sections 1, 2 and 5; *Cyanea* spp. were found in section 5; *Diplazium molkaiense* was found in section 2; *Tetraplasandra kohala* (*oahuensis*) was found in section 1. None of these species were found within the current project boundaries—section 6 of the ditch. Section 6 was dominated by “exotic herbaceous and grass community found along roadsides and trails and within pasture” (Stemmerman 1987).

On August 6, 1996, Derral R. Herbst, Ph.D. prepared the “Botanical Survey of the Proposed Kauahi Reservoir Site, Waima-Paaulu Watershed, Hawaii,” under contract for the NRCS. The report concluded that no candidate, proposed, or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), were seen during the survey of the preferred reservoir site, and none are known historically from the proposed Kauahi Reservoir site. The dominant vegetation was identified as Kikuyu grass (*Pennisetum clandestinum*) and rattle grass (*Sporobolus africanus*), with white clover (*Trifolium repens*), yellow wood sorrel (*Oxalis comiculata*), and hairy cat’s ear (*Hypochoeris radicata*) as the common forbes.

Dr. Herbst also prepared the “Botanical Survey for the Proposed Kamuela Irrigation Pipeline System, Waima-Paaulu Watershed, Hawaii” on January 27, 1997. This survey also concluded that there are no candidate, proposed or listed threatened or endangered species seen during the survey, and none are known historically from the proposed project sites. Furthermore, none of the trees on the sites are, nor could be considered Species of Concern for the county exceptional tree program. The vegetative community of the sites are not pristine nor unique; the dominant vegetation was separated into three different sub-communities: Pasture, gulch, and wetland associations. The dominant in all of the pasture areas was Kikuyu grass (* Pennisetum clandestinium*). The gulches contained a few native ‘ohi’a (*Metrosideros polymorpha*), and other exotic species such as strawberry guava (*Psidium cattleianum*) and understory ferns and forbs. The wetlands at the bottom of the gulches could be classified as riparian wetlands around small permanent streams. The dominant species in these areas was honohono grass (*Commelina diffusa*). Very few native species were found within the pipeline boundaries.

No threatened or endangered birds have been sighted within the project boundaries. USFWS’ bird survey data showed that the majority of sightings were of the Japanese white-eye, melodious laughing thrush, red-billed leiothrix, and the native common amakih, Elepaio, and Apapane. (Mamelstein, USFWS, February 1985; Yuen, USFWS, June 1986.) Because the majority of the plants along the pipeline corridor are non-native, grass species, it is unlikely to be habitat for native forest birds. The ‘io or the nene may use the grassland area, although none were seen during the recent plant and historic properties surveys.
In the last decade, the Hawaiian duck has been reintroduced to the Kohala Mountains because there is suitable habitat in the forest preserve. These birds normally restrict their activities to forest seeps, ponds, and streams. Members of this species occasionally use the slower section of the UHD for loafing or possibly for feeding (Griffin 1983). The value of the UHD as Hawaiian duck habitat is minimal. It lacks the quiet pools, shoreline vegetation, natural bottom and food items preferred by these birds. The Koloa duck may possibly use the small stream areas along the stockwater distribution pipeline alignment, but these areas are isolated systems and provide minimal habitat. No ducks were seen during past or recent surveys.

The Hawaiian hoary bat, Lasiurus cinereus semotus, potentially resides in the isolated gulch/stream systems that were found along the stockwater pipeline alignment. However, not much information is known about habitat requirements of the bat, and thus it is difficult to determine whether bats indeed frequent these areas. No night surveys of the project area were conducted.

In 1994, the USFWS indicated that two rare (now candidate) damselfly species may occur in the project area. Megalagrion xanthomelas is a lowland species that occurs most commonly in coastal wetland fed by basal springs, as seen in the Puna, Kau, and North Kona districts of Hawaii. It occasionally breeds along the terminal and lower midreaches of perennial streams and can exploit temporary habitats, as shown by its occupation of ephemeral side pools bordering flashy streams in Hawaii. Megalagrion nigrofusca has yet to be recollected on Hawaii despite intensive recent surveys by the workers from the National Park Service at Volcano, where several long series were captured in the last century. This suggests that the Hawaii island populations may have been extirpated. (Hawaiian Damselflies, A Field Identification Guide, by Adam Asquith and Dan Polhemus, Hawaii Biological Survey Handbook, 1996).

The USFWS recommended that surveys of these two species in the proposed project area be conducted. USFWS staff recently confirmed that they conducted insect surveys in the project area and did not find either species (Pers. Communication, Adam Asqueth, February 1997).

Much of the watershed is heavily grazed by cattle. Feral pigs (Sus scrofa), range freely and disturb the floor by rooting and consuming plants, facilitating weed invasion and contributing to soil erosion. Feral dogs and cats and alien mongoose and rats also rove unencumbered within the watershed. These feral and alien mammals are considered detrimental to native ecosystems.

USFWS and DLNR raised concern about the cumulative impacts on streams within the watershed, which could be exacerbated by the diversion of additional water. Changes in instream flow could affect endemic crustaceans, fish, and mollusks, which may be present in the middle reaches of Alakahi, Kawainui, and Koiaue streams and throughout Waipio Valley. Concern was also raised about the decreased overflow from the UHD to Lalakea Stream indirectly impacting the habitat of Lalakea Stream and Waipio Valley biota. The Hawaii Stream Assessment recommends Lalakea Stream as a candidate for protection due to the diversity of aquatic and cultural resources and “blue ribbon” cultural and recreational resources.
Effects

No effects on endangered or threatened plant species are anticipated because none were found within the preferred alternative project area. Few native plants will be disturbed by the project, since the majority of the area is dominated by alien grasses and forbs. Construction of the pipeline will entail trenching and replacing topsoil. It is likely that surrounding grasses will revegetate the area within months. Trenching and pipelaying in the two small gulches that contain ‘ōhi’a trees can likely avoid any impacts to this endemic species.

No adverse effects on the ‘io (Hawaiian Hawk) or the nene are anticipated because 1) use of the UHD, reservoir site, and pipeline corridor areas by these species is apparently infrequent or rare; 2) construction activities will be concentrated in the open range land, which is dominated by nonnative vegetation; and 3) construction effects will be temporary.

No adverse effects on the Hawaiian Duck are anticipated because 1) construction activities will be confined to Segment 6 of the UHD, which is not likely to be used by the duck for loafing or feeding because it is not one of the slower sections; 2) it is unlikely that the koloa use the upland reservoir site or open areas; 3) environmental impacts within the small gulches will be minimized by avoiding these areas, bridging the pipeline across them, and/or ensuring best management practices (as outlined in the Corps of Engineers Regional General Permit for Utility Line Crossings); and 4) construction effects will be temporary.

No adverse effects on the Hawaiian hoary bat are anticipated because 1) use of the majority of the area (grazed grasslands) by bats is apparently infrequent or rare; 2) construction will take place during the day, and bats are nocturnal; and 3) effects from the work within the gulches, the areas that are more likely than any other within the project site to be bat habitat, will be minimized.

No cumulative impacts on streams will be caused by the diversion of additional water because the Selected Plan will not include any improvements to increase water diversion from any of the streams in the watershed.

No impacts on Lalakea Stream and Waipio Valley biota are anticipated because the naturally occurring fluctuations in streamflow will override the effects of the reduced overflow from the UHD (see section 6.3.12 Streams). In addition, the overflow from the UHD augments the natural streamflow of Lalakea Stream. Thus, even if the overflow were completely eliminated, the Selected Plan would not be affecting the natural condition of Lalakea Stream or Waipio Valley.

Mitigation

All necessary precautions will be taken to ensure that there are no adverse effects to any threatened or endangered species, in the unlikely event that any are encountered. The areas disturbed for the reservoir and for the supply pipeline will be the minimum area/width needed.
6.3.14 Visual

Setting

The following section describes the effects of the Selected Plan on the visual landscape.

Effects

The reservoir supply and distribution systems will not affect the visual landscape because they will be buried pipelines.

The Kauahi Reservoir will be visible from approximately 300 properties. The reservoir will not block any visual planes from any of properties. The reservoir will have a earthen berm embankment approximately 26 feet high and will create a surface pool of about 19 acres.

Mitigation

The embankment slopes of the Kauahi Reservoir will be grassed to blend in with the surrounding grazing land.

6.3.15 Water Rights

Setting

Water rights issues are becoming more politically sensitive as competition for the available water increases.

Concerns were expressed regarding the legal right to divert additional water from the Kohala Mountains via Upper Hamakua Ditch to supply the proposed Kauahi Reservoir.

Concerns were also expressed regarding the allocation of water from the WIS after the improvements proposed by the Selected Plan are installed. The native Hawaiian people with DHHL farmlots and ranchlots want to be assured that they will have a sufficient amount of water to meet their current and future needs.

Under provisions of the federal law known as the Hawaiian Homes Commission Act (HHCA) passed by the U.S. Congress in 1921, Section 221, provides first call to the DHHL for its native Hawaiian beneficiaries to any government-owned water statewide.

Under the mandate of the Admissions Act of 1959, Section 4, the HHCA was adopted in its entirety as part of the Hawaii State Constitution and says in part that the state and its people do further agree and declare that the spirit of the HHCA shall be faithfully carried out.

The State Water Code passed by the state legislature in 1987, under Section 174c-101 states that in part that decisions of the Commission on Water Resource Management (CWRM) shall incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian Home Lands. In addition, the appurtenant of water rights of kuleana and taro lands, along with traditional and customary gathering rights of shupua's tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, shall not be abridged or denied.

The State Water Code stipulates that any new construction or alteration of a stream diversion works or stream channel other than activities in the course of normal maintenance can only proceed by obtaining a permit from the CWRM. Also, new diversions of streamflow cannot be made without a waiver of the interim instream flow standard from the CWRM.
Act 325, SLH 1991, further buttressed and re-confirmed protections of water rights guaranteed by prior federal and state laws. Consistent with the above authorities, the CWRM has already acknowledged the first call rights of the DHHL by reserving water for native Hawaiians on the islands designated as water management areas, namely Oahu and Molokai.

Effects

The UH-D presently diverts water from five streams on State-owned lands in the Kohala Mountains (Kawaihui, Kawaiki, Alakahi, Koiawe, and Waima) to supply the two existing WIS reservoirs. Because the Upper Hamakua Ditch system has been in existence for over 80 years and no new stream diversion works are proposed by the Selected Plan, a permit and waiver of the interim in-stream flow standard from the CWRM are not required.

The Selected Plan is designed so that native Hawaiian farmers and ranchers will have the potential to be supplied the same amount of water as non-Hawaiian farmers and ranchers. Pipelines and water meters for native Hawaiian farm and ranch lots are and will be the same size as those for non-Hawaiians. At the present time, all farmers serviced by the WIS share equally in the available water, no group is cut off first, when water restrictions are imposed.

The waters flowing through the Upper Hamakua Ditch are considered government-owned waters and are therefore subject to the protections guaranteed by the laws cited above. If conflict arises among competing interests for the ditch waters, the DHHL on behalf of its native Hawaiian constituency is entitled to first call of unallocated water except in cases of disaster (Chapter 127, HRS) and fire protection (Chapter 185, HRS) which retains priority call.

Mitigation

The DOA and the DHHL will enter into an agreement, approved by both the State Board of Agriculture and the Hawaiian Homes Commission, on those issues that require interagency coordination during implementation and operation of the project improvements. The agreement will include WIS water rate structure and water allocation for DHHL customers and the priority for water use. The agreement will be completed before the completion of the Waimea-Paauiu Watershed Project Agreement.

6.3.16 Wetlands

Agricultural wetlands are defined as follows: Wetlands are lands that 1) have a predominance of hydric soil; and 2) are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and 3) under normal circumstances do support a prevalence of hydrophytic vegetation (Subpart A, 513.11, National Food Security Act Manual, November 1996). The Corps of Engineers has jurisdiction over wetlands and other “waters of the U.S.”, including intermittent or permanent streams, ponds, and natural drainageways where an “ordinary high water mark” is observed. Department of the Army (DA) permits are necessary for placement of fill materials into waters of the U.S.

The proposed project area was assessed to determine whether any “water of the U.S.”, including wetlands, were found and would be affected by the project.
The existing UHD inlet structure for the Waimea Reservoir will be reconstructed and enlarged to accommodate two pipelines. This work within the ditch may possibly be defined as work within a jurisdictional water, and therefore may require a DA permit. The pipeline alignment from the ditch to the proposed reservoir does not have hydrophytic vegetation.

In July, 1996, Dr. Herbst identified the dominant plant species at the proposed Kauahi reservoir site. The site clearly lacks hydrophytic vegetation and is not determined to be a wetland.

In December, 1996, NRCS surveyed the proposed stockwater distribution pipeline corridor to ascertain whether wetlands or other waters of the U.S. would be affected by the proposed project. Eight small, isolated drainageways and two large gulches were discovered along the southern border of TMK 6-4-04:137, 23. At the time of the survey, all of the areas had running water. The riparian areas in four of the small, isolated drainageways were confirmed to meet the criteria for wetlands: hydrophytic vegetation, hydric soils, and hydrology.

**Effects**

The effect of the installation of the one-inch diameter pipeline within the drainageways and gulches will be minimal.

**Mitigation**

Adverse effects to wetlands and other waters from construction of the 1" pipeline will first be avoided by 1) bridging the wetland and gulch crossings at 25+00, 30+00, 46+00, and by 2) shifting the proposed pipeline corridor away from the large gulches and wetland areas at 12+00, 22+00, 59+00, 66+00. In three of the drainageways, 26+00, 3+00, 45+00, the best alternative will be to trench and bury the pipeline within the gulch corridors and wetland areas. To insure there are only minimal, temporary impacts to waters, the conditions and best management practices contained in the U.S. Army Corps of Engineers General Regional Permit for Utility Lines in, under, or above waters of the United States, including navigable waters, in the State of Hawaii (May 20, 1996) will be followed.

**6.3.17 Hazardous Materials and Hazardous Waste Sites**

**Setting**

Hazardous materials are defined as any solid, liquid, or contained gas that is ignitable, corrosive, reactive, and/or toxic. Hazardous wastes are hazardous materials that is discarded or being disposed of. While small amounts of hazardous materials and hazardous wastes exist in most businesses and residences, concentrations of hazardous materials and high volume hazardous waste streams fall under regulation by the State Department of Health.

Consultation with the State of Hawaii Department of Health's Hazardous Waste, Solid Waste, and Clean Water Branches and Hawaii County Department of Public Works' Solid Waste and Wastewater Divisions did not bring to light the existence of any known hazardous materials or hazardous waste sites in the project area. Two closed dump/landfill sites are located outside of the project area to the west. One site is at the location of the present refuse transfer station.
Effects

The installation of the recommended alternative will not require use of hazardous materials nor will hazardous waste be generated. The project will have no effect on hazardous materials or hazardous waste sites.

Mitigation

None required.

6.4 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The present and most likely continued short-term use of the 29-acre Kauahi Reservoir site and the seven-acre storage water distribution system right-of-way area, is grazing land. The long-term commitment of this grazing land for the installation of the works of improvement will result in a more reliable and expanded source of agricultural water that will enhance long-term productivity on 1,985 acres of cropland and 22,962 acres of grazing land.

6.5 UNRESOLVED ISSUES

None were identified.

6.6 RELATIONSHIP TO OTHER PLANS, POLICIES, AND CONTROLS

This section describes the relationship of the Selected Plan to federal, state, and local plans, policies, and controls for the watershed area.

6.6.1 State Land Use Districts

All lands in Hawaii are designated as one of four major land use categories by the State Land Use Commission as directed by Chapter 205, Hawaii Revised Statutes. The intent of the legislation is to provide land use controls at the state level in order to preserve, protect, and encourage best use of lands in the state for the benefit of all of the people of the State of Hawaii. The Land Use Districts are Urban, Rural, Agricultural, and Conservation.

The works of improvement (reservoir supply pipeline, reservoir, and distribution systems) proposed by the Selected Plan will be installed on land designated Agricultural. See following Figure S. The use of this land for such works of improvement is permitted in Agricultural districts.

The land use changes caused by the Selected Plan will also conform to the allowable uses in the Agricultural district (see section 6.9.2 Land Resources).
6.6.2 The Hawaii State Plan and State Agricultural Functional Plan

The Hawaii State Plan, established by Chapter 226, Hawaii Revised Statutes, provides goals, objectives, policies, and priorities to guide long-range development of the State of Hawaii. Twelve State Functional Plans develop in greater detail policies and priorities in twelve subject areas.

The 1991 State Agricultural Functional Plan states the following objective, policy, and action under water, which directly supports the implementation of the Selected Plan:

**OBJECTIVE I:** ACHIEVEMENT OF EFFICIENT AND EQUITABLE PROVISION OF ADEQUATE WATER FOR AGRICULTURAL USE.

**POLICY I(1):** Expand agricultural water resources statewide.

**ACTION I(1)(a):** Develop new, expanded, or improved water source and delivery systems in support of agriculture and aquaculture, as needed and economically feasible.

The 1991 State Agricultural Functional Plan states the following objective, policy, and action under land, which supports the implementation of the Selected Plan to enable the development of the Lalamilo Ag. Park:

**OBJECTIVE H:** ACHIEVEMENT OF PRODUCTIVE AGRICULTURAL USE OF LANDS MOST SUITABLE AND NEEDED FOR AGRICULTURE.

**POLICY H(1):** Provide suitable public lands at reasonable cost and with long-term tenure for commercial agricultural purposes.

**ACTION H(1)(a):** Complete agricultural park projects presently committed, and develop additional projects in accordance with the Ad Hoc Agricultural Park Site Selection Committee.

6.6.3 Hawaii County General Plan

The Hawaii County General Plan, 1989, outlines the goals, policies, and courses of action for the long-range comprehensive physical development of the county with respect to the most desirable use of land within the county. The following items support the implementation of the Selected Plan.

**ECONOMIC - POLICIES:** The County of Hawaii shall assist the expansion of the agriculture industry, especially diversified agriculture, through the protection of important agricultural lands, capital improvements and other programs, and continued cooperation with appropriate state and federal agencies.

**Land Use - Agricultural Land**

**GOAL:** To identify, protect and maintain important agricultural lands on the Island of Hawaii.

**POLICY:** The County shall assist in the development of basic resources such as water, roads, transportation and distribution facilities for the agricultural industry.

The Plan states the following as courses of action for the South Kohala District in which the watershed area is located:
ECONOMIC - Course of Action: The County shall assist the development of agriculture in South Kohala by protecting important agricultural land from urbanization, by providing or having provided the necessary capital improvements, such as water, and by working cooperatively with other agencies.

PUBLIC UTILITIES - WATER - Course of Action: Additional sources for the Waimea System (domestic water) shall be investigated. Encourage expansion of sources and storage capacity for both the agricultural and domestic water systems.

LAND USE - AGRICULTURE - Course of Action: Assist in the provision of water in agricultural areas.

6.6.4 Hawaii County Water Use and Development Plan (WUDP)

The Hawaii County WUDP is part of the Hawaii Water Plan required by the State Water Code (HRS Chapter 174C). The county-prepared plan includes an inventory of water sources, uses, and future water needs. The plan aids the State Commission on Water Resources Management and county planners in reviewing and granting approvals and permits for development and water use.

For the South Kohala region, the WUDP project the "present 2 to 3 mgd consumption [of Waimea farmers] will require up to an additional 2 mgd to handle the new irrigation requirements." (WUDP, draft 2/92) The Waimea-Paauilo Watershed project is described in Section 7.5.1 under the heading "Expansion of the Waimea Irrigation System."

6.6.5 Department of Hawaiian Home Lands Plans

The Selected Plan will support the efforts of the DHHL to provide infrastructure, including an agricultural water supply, to native Hawaiian homesteaders so they may farm and ranch. The Selected Plan will provide a more reliable source of irrigation water to DHHL farmers and will provide a stockwater distribution system that will service DHHL ranchlots.

6.6.6 Department of Transportation

The State of Hawaii, Department of Transportation is seeking an alignment for a bypass highway route to alleviate problems caused by the flow of through traffic through Waimea Town. Four alternatives were identified in the Waimea By-Pass Project Route Study (January 1995). As of this writing, a preferred route has not been selected. Two of the alternatives, R-1 and R-2, will place the by-pass highway adjacent to the Kauahi Reservoir and will utilize the same alignment as the reservoir supply pipeline for approximately 10,000 feet. At least four pipeline crossings of the by-pass highway will be required. Preliminary discussions indicate that even with the selection of alternative route R-1 or R-2, the two projects can be compatible.

6.6.7 Waimea Water Roundtable

The goal of the Waimea Water Roundtable is to achieve better coordination of the development and management of water resources in Waimea. Organized in 1996, the Roundtable is a diverse group of persons from the private sector, government, and the Waimea community with various water development and/or management interests. The group hopes to achieve it's goal by sharing information, working cooperatively, seeking input from, and establishing communication links among it's members, as well as with those in the community.

The Roundtable group has been briefed regarding the Waimea-Paauilo Watershed project.
6.6.8 Parker Ranch 2020 Plan

The Parker Ranch has developed a draft 2020 Plan for development of 338 acres near the Waimea Town core for public, commercial, industrial, and residential development. In response to community concerns, the plan was scaled back from the 580-acre plan which was approved by the county in 1992. In addition to a 72 acres of industrial and commercial area and 730 residential units, the Plan proposes over 45 acres of park and open space and enhancement of the visual character and beauty of Waimea through preservation of vistas and existing architectural styles. The plan will be implemented over a 15- to 25-year period beginning in 1997.

The 2020 Plan applies to urban-zoned property and does not affect any of the agricultural or pastoral areas served by the WIS. Parker Ranch lands have a proprietary water system and will not participate in the watershed project. Agricultural water supply and demand will not be affected by the Parker Ranch development.

6.6.9 County Zoning Code

The Kauahi Reservoir will be constructed on lands designated by the County Zoning Code as Agricultural-40 (A-40a). Its construction will be allowed by Sections 25-4-11(a) and (c) of the County Zoning Code which state that "Communication, transmission, and power lines of public and private utilities and government agencies are permitted uses within any district" and that "Public uses, structures and buildings and community buildings are permitted uses in any district . . . ." respectively.

6.6.10 Hawaii Coastal Zone Management Program

The Hawaii Coastal Zone Management (CZM) Program is charged to balance marine and coastal resources protection and sustainable economic development. The CZM area encompasses the entire state, including the Waimea-Pauuilo Watershed. The program is built upon ten policy areas: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

The Waimea-Pauuilo Watershed project will have no effect on recreational resources, coastal ecosystems, coastal hazards, beach protection, or marine resources.

Planning of the Waimea-Pauuilo Watershed project has included historic and archaeological surveys of the affected area and has utilized a public participation process to discuss and raise awareness of resource development issues in the CZM area. Implementation of the Waimea-Pauuilo Watershed project will improve agricultural conditions to maintain scenic and open space resources. The project will also result in fuller economic use of agriculturally-zoned lands in agricultural enterprise.
6.6.11 Ceded Lands Trust

When the United States annexed Hawaii in 1898, approximately 1.75 million acres of Government and Crown Lands were ceded to the United States. The Joint Resolution of Congress at the time of annexation and the Organic Act establishing Hawaii as a Territory in 1900, affirmed the trust responsibility to use the ceded lands "for the benefit of the inhabitants of the territory." When Hawaii became a State in 1959, the ceded lands were transferred to the state government.

The state's primary responsibilities with regard to ceded lands are established in Section 5 of the Admissions Act. Section 5(f) of the act provides that these lands and the income and proceeds derived from them are to be held by the state as public trust. The eligible uses of ceded lands are:

1. Support of the public schools and other public educational institutions.
2. Betterment of the conditions of native Hawaiians as defined in the Hawaiian Homes Commission Act of 1920.
3. Development of farm and home ownership on as widespread a basis as possible.
5. Provision of land for public use.

The Selected Plan utilizes ceded lands for a reservoir site and installation alignments for the pipelines. The plan also provides agricultural water to agricultural operators of DHHL and other parcels on ceded land. The project's use of ceded land conforms to the eligible uses set forth in Section 5(f) of the Admissions Act. The expansion of the WIS is a public improvement providing beneficial service to all farmers and ranchers within the service area. The expansion of the WIS will especially benefit native Hawaiian farmers in the developing DHHL Puukapu farmlots and DHHL ranchers in Puukapu, Nienie, and Kamoku.
7. CONSULTATION AND PUBLIC PARTICIPATION

7.1 ACTIVITIES CONDUCTED

The following section describes the opportunities provided for the public’s participation, as well as federal, state and county agencies, in developing both the Waimea-Peauilo Watershed Plan and Environmental Assessment and Watershed Plan and Environmental Impact Statement.

Following is a description of date, type, and purpose of the activities conducted to involve the public and agencies.

March 1982
Hamakua Area Agricultural Water Study (HAAWS) completed by NRCS. Study included the development of resource reports and potential alternatives to solve water shortage problems.

July 7, 1982
Sponsors (Department of Land and Natural Resources and the Mauna Kea Soil and Water Conservation District) filed a Preapplication for Federal Assistance indicating their intent to apply for federal assistance under PL 83-566 with the State Clearinghouse (Department of Land and Natural Resources). Copy sent to the State Conservationist for the USDA, NRCS.

March 28, 1983
Sponsors submitted Application for Assistance under PL 83-566 to prepare a watershed plan to the Secretary of Agriculture.

April 7, 1983
Approved Application submitted by the Sponsors to the NRCS.

April 22, 1983
Request for planning authorization submitted by NRCS Hawaii to NRCS National Headquarters in Washington, D.C.

July 5, 1983
Authorization for NRCS Hawaii to provide planning assistance to develop a watershed plan to provide irrigation water for the Waimea-Peanauilo Watershed under the authority of PL 83-566 granted by the Chief of the NRCS. The Chief also notified Hawaii congressional delegation.

July 19, 1983
Letters sent by NRCS to 29 various agencies and individuals notifying them of the receipt of planning authorization.

August 3, 1983
Project assigned to NRCS West National Technical Center Planning Staff.

Dec. 7, 1984
Public meeting held to discuss future planning activities and to hear public concerns. Meeting notice sent to over 300 individuals or organizations, including all boxholders in the watershed area and to federal, state, and county agencies. Public service announcements sent to local radio stations, posters put up, news release sent to local newspapers, and a legal notice published in the local newspaper.

Feb. 21, 1985
FWS responded to request to become a cooperating agency with comments.

March 28, 1985
DHHL became a project Sponsor.
May 15, 1985  Public Participation Plan completed by the Mauna Kea SWCD, listing actions items to be taken and dates for completion. Action items included public and Sponsors’ meetings, radio announcements, publication of new articles and/or notices of meetings in local newspapers, and mass mailings of meeting notices.

June 26, 1986  Public meeting held to present the Alternative Report “Cost & Benefit Summary” and to receive comments. Notice of meeting mailed to over 300 local farmers and ranchers, public agencies, local politicians, and Department of Water Supply domestic water customers, news release sent to local newspapers, and a legal notice published in the local newspaper. An article about the project and the public meeting was published in the local newspaper, Hawaii Tribune-Herald, on June 20, 1986.

Sept. 2, 1986  Letter sent by NRCS Hawaii to the NRCS Chief requesting an exception to the planning authorization to add stockwater, in addition to irrigation water, as a project purpose.

October 1, 1986  Letter sent by NRCS Chief to NRCS Hawaii authorizing the amendment of the planning authorization to provide for technical assistance only for the addition of stockwater development.

Feb. 4, 1987  Public Participation Plan update prepared which includes action items for stockwater “public participation.”

April 1987  The Mauna Kea SWCD mailed 58 watershed area ranchers survey questionnaires to determine current status of stockwater use and future projections for stocking rates and stockwater needs. 22 questionnaires mailed back.

April 7, 1987  NRCS personnel invited to meeting of watershed area ranchers to present information regarding stockwater alternatives developed to date. A Stockwater Steering Committee was formed by the ranchers to assist with planning and to provide rancher input.

Sept. 20, 1988  Public Meeting held to discuss proposed actions and to receive comments. Notice of meeting mailed to over 300 local farmers and ranchers, public agencies, local politicians, and Department of Water Supply domestic water customers and a public meeting notice was published in two local newspapers, the Hawaii Tribune Herald and the West Hawaii Today.

April 17, 1989  Draft Plan-EA mailed to numerous federal, state, and county agencies; legislators, local farm groups, environmental groups, interested individuals, and local libraries (see section 7.2). The Draft was available for a 45-day review and comment period.


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July 1, 1989  DOA became a Sponsor instead of DLNR because DOA took over the operation and administration of the WIS.

Sept. 14, 1989  Letter received by NRCS from a party in the process of purchasing a home that abuts the proposed Waimea II Reservoir requesting that the Watershed Agreement not be signed due to their concerns about safety and negative effects on property values.

Sept. 20, 1989  Watershed Agreement signed.

Feb. 27, 1990  Final Plan-EA mailed to appropriate federal, state, and county agencies and those providing substantive comments on the Draft.

Sept. 27, 1992  Letter received by NRCS from the same party (who purchased the home abutting the proposed Waimea II Reservoir) voicing opposition to the reservoir because of concerns about safety and negative effects on property values.

January 1993  Topographic survey of the proposed Waimea II Reservoir site completed.

April 1993  NRCS began contracting for geologic and soils investigations of the proposed Waimea II Reservoir site.

June 4, 1993  Letter received by NRCS from same party again voicing opposition to the proposed Waimea II Reservoir. Party sent copies of letter to Hawaii U.S. congresspersons, local politicians, and other interested parties.

July 8, 1993  Letter received by NRCS from another party with home abutting the proposed Waimea II Reservoir voicing concerns about safety. Party sent copies of letter to Hawaii U.S. congresspersons, local politicians, and other interested parties.

July 26, 1993  Letter received by Secretary of Agriculture from Hawaii Congresswoman Patsy Mink regarding copies of letters from the two above mentioned parties inquiring whether an EIS could be prepared so that concerns about the Waimea II Reservoir could be addressed.

August 13, 1993  NRCS met with the two above mentioned parties to provide update of project planning and to hear their concerns.

Sept. 2, 1993  Informational meeting held by the Mauna Kea SWCD attended by Sponsors, farmers, ranchers, and the two parties with homes abutting the proposed Waimea II Reservoir. Overview, history, and update of project provided by NRCS and discussion of concerns was held.

September 1994  Decision made to prepare an EIS.

Sept. 19, 1994  Notice of Intent to Prepare an Environmental Impact Statement published in the Federal Register. Also mentioned September 21, 1994 Public Scoping Meeting. In response to the notice, the following written correspondence was received:
Dr. Bruce S. Anderson, Interim Director, Office of Environmental Quality Control, State of Hawaii, Department of Health (DOH) recommended the submission of a Chapter 343 EIS Preparation Notice in order to prepare a single EIS that will meet both State and Federal requirements.

Sept. 21, 1994
Public meeting held to discuss planning to date, future EIS planning activities, and to identify public concerns. Meeting notice sent to over 600 individuals or organizations, including all boxholders in the watershed area and to federal, state, and county agencies. Public service announcements sent to local radio stations, news release sent to local newspapers, and a legal notice published in the local newspaper. Article published in Hawaii Tribune-Herald, September 18, 1994 about the meeting. Approximately 85 persons attended the meeting.

Sept. 27, 1994
Residents for Relocating the Reservoir sent a letter to NRCS, through their attorney, with 22 specific concerns they want addressed in the EIS, including reservoir safety, hydrology, water rights, and construction traffic effects.

Nov. 8, 1994
Environmental Impact Statement Preparation Notice published in the State of Hawaii, Department of Health, Office of Environmental Quality Control (OEQC) Bulletin. The following written comments were received in response to the notice:

Mr. John H. Shaw requested to be a "consulted party" and receive a copy of the Draft Plan-EIS.

Dr. Bruce S. Anderson, requested a list of agencies to be consulted in preparation of the Plan-EIS.

Paul J. Schwind, Planning Program Administrator, State of Hawaii, DOA, requested that the matter of the location of the Lalamilo Ag. Park be resolved.

Department of Business, Economic Development & Tourism submitted a request from the Land Use Commission that the Plan-EIS include a map showing the project site in relation to the State Land Use Districts.

Leslie L. Harakawa, Attorney at Law, on behalf of Ardis Shaw-Kim, requested further information regarding the project.

Peter A. Sybinsky, Ph.D., Director of Health, State of Hawaii, DOH, had no comments to offer at the time, however requested to receive a copy of the Draft Plan-EIS.

Keith W. Ahue, Chairperson, State of Hawaii, Board/Department of Land and Natural Resources, submitted two letters. In response to numerous telephone calls the Division of Land Management (DLM) received from residents of the Kamuela area expressing their concerns and opposition regarding the development of water resources in the Kohala Forest Reserve, the DLM will reserves comments until they had an opportunity to review the Draft Plan-EIS.
Late 1995  
Hawaii NRCS began project planning and preparation of the Plan-EIS.

June 4, 1996  
Residents to Relocate the Reservoir sent a letter to NRCS, through their attorney, reiterating the concerns included in the September 1994 letter and threatening legal action if implementation of the Waimea II Reservoir proceeded.

Sept. 26, 1996  
NRCS invited to a Waimea Hawaiian Homesteaders’ Association, Inc. meeting to provide update of project planning.

October 1996  
Technical Review Plan-EIS completed and sent to the Sponsors for review.

December 1996  
Comments received from Sponsors.

March 1997  
Draft Plan-EIS completed. A copy of the Draft Plan-EIS was mailed to the organizations/individuals listed in section 7.3, and comments were requested. A Notice of Availability was forwarded by EPA for publication in the Federal Register and to the State of Hawaii, Office of Environmental Quality Control (OEQC) for publication in its Bulletin. A 45-day review period was be allowed beginning on the date that the notice is published in the Federal Register by EPA. NRCS was publicized the availability of and invited comments on the Draft Plan-EIS through notices in local newspapers and other media.

April 23, 1997  
A public meeting was held in Waimea to solicit comments on the Draft Plan-EIS. The meeting was widely publicized and meeting notices were mailed to the over 300 individuals or organizations on the mailing list.

October 1997  
Final Plan-EIS completed. Comment and response letters on the Draft Plan-EIS are included in the Final Plan-EIS. Copies of the Final Plan-EIS were mailed to the EPA, the OEQC, and other appropriate agencies and to those providing substantive comments on the Draft. Following the acceptance of the Final-EIS by the Governor of the State of Hawaii, there will be a 30-day no action period during which objection to the project may be brought to the Hawaii Circuit Court. The NRCS Hawaii State Conservation will issue a Record of Decision which will be published in the Federal Register, Environmental Bulletin, and local newspapers.

Numerous activities were conducted to provide the appropriate agencies with an opportunity to comment on potential impacts on threatened and endangered species. The U.S. Fish and Wildlife Service (FWS) (Pacific Islands Administrator) and the State of Hawaii, DLNR, Division of Forestry and Wildlife were specifically requested throughout project planning to provide information and/or comment. See section 6.3.13 Threatened and Endangered Species for a detailed account of the activities conducted.

Numerous activities were also conducted to provide the appropriate agencies with an opportunity to comment on potential impacts on cultural resources. The State Historic Preservation Officer was specifically requested throughout project planning to provide information and/or comment. See section 6.3.4 Cultural Resources for a detailed account of the activities conducted.
The Stockwater Committee, comprised of ranchers from the DHHL pastoral lots, was active during both phases of planning to promote and assure inclusion of the livestock drinking water component in the project plan. The Stockwater Committee assisted with data gathering and review of project alternatives. Their efforts were largely responsible for the decision of the DHHL to fund the livestock drinking water distribution system.

7.2 DRAFT PLAN-EA MAILING LIST

The Draft Plan-EA was mailed to the parties shown on the following list. Comments were received from those parties marked with a “*.”

**Federal**

Department of Agriculture
Office of Equal Opportunity
Agricultural Stabilization and Conservation Service (now Farm Service Agency), Hawaii State Office, State Executive Director
Rural Development (formerly Farmer Home Administration), Hawaii State Office
 Soil Conservation Service (now NRCS), Waimea Field Office, District Conservationist
 Soil Conservation Service (now NRCS), Big Island RC&D Office, RC&D Coordinator

Forest Service, Pacific Southwest, Regional Forester

Department of the Army
U.S. Army Corps of Engineers, Honolulu, Planning Branch

Department of Commerce
National Oceanic and Atmospheric Administration, Ecology and Conservation Division, Director

Department of Energy
Secretary of Energy

Department of Housing and Urban Development
Environmental Clearing Officer
Community Planning and Development Division, Honolulu Office, Director *

Department of Health and Human Services
Center for Environmental Health and Injury Control, Environmental Health Specialist *

Department of the Interior
Secretary of the Interior
Advisory Council on Historic Preservation
Fish and Wildlife Service, Pacific Islands Office, Supervisor *
Fish and Wildlife Service, Ecological Services Division, Field Supervisor
United States Geological Survey, Water Resources Division, District Chief
National Park Service, Pacific Island System Support Office, Superintendent
Office of Environmental Project Review, Director

Advisory Council on Historic Preservation, Executive Director

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Environmental Protection Agency
   Office of Federal Activities, Region 9, San Francisco, CA *
   Pacific Islands Contact Office, Manager *
Department of Transportation *
Hawaii Delegates to the U.S. House of Representatives and Senate

State of Hawaii

Department of Agriculture
   Board of Agriculture, Chairperson *
Department of Business and Economic Development (now DBEDT)
   Director *
Department of Health
   Environmental Health Administration, Deputy Director *
Department of Land and Natural Resources
   Board of DLNR, Chairperson and State Historic Preservation Officer *
   Forestry and Wildlife Division, Administrator *
   State Parks Division, Outdoor Recreation and Historic Sites
   Division of Water and Land Development, Manager-Chief Engineer *
   Waimea Irrigation System, Manager
   Mauna Kea Soil and Water Conservation District
Department of Hawaiian Home Lands
   Hawaiian Homes Commission, Chairman
   Planning Office *
Department of Transportation, Director *
Office of the Governor
   Governor * (response via Administrative Director)
   Office of State Planning (now Office of Planning), Director *
Office of Environmental Quality Control, Director *
University of Hawaii
   Cooperative Extension Service
   Hamilton Library, Hawaiiana Collection
   Hawaii State Archives, State Archivist
Department of Education
   Hawaii State Public Library System, Hawaii State Library
   Hawaii State Public Library System, Honokaa Library
   Hawaii State Public Library System, Thelma Parker (Waimea) Library

County of Hawaii

Planning Department, Director
Department of Water Supply, Manager

Others

Advisory Council on Historic Preservation, Executive Director
Alu Like, Executive Officer
American Society of University Women, Honolulu Branch, President
Audubon Society, Hawaii, President
Conservation Council of Hawaii
Hawaiian Botanical Society, President
Hawaiian Entomology Society, President
Hawaiian Historical Society, Administrative Director
Hawaii's Thousand Friends, President
League of Women Voters, President
Life of the Land, President
National Wildlife Federation, Legislative Representative
Natural Resources Defense Council, Inc., Executive Director
Nature Conservancy, Hawaii, Executive Director
Outdoor Circle, Hawaii, President
Sierra Club, Washington D.C.
Sierra Club, Hawaii Chapter, Chairperson
Stockwater Steering Committee
Waimea Farmers Association
Waipio Valley Taro Farmers Association
Wildlife Society, Hawaii Chapter, President

Comments were also received from the Mr. Terrance R. Shumaker representing the Waipio River Instream Users group, Mr. Christopher Rathburn, and Mr. Edward K. Kalama representing the Aged Hawaiians group. Copies of the comment letters and the written responses to those letters were included in the 1989 Plan-EA as Appendix A.

7.3 DRAFT PLAN-EIS MAILING LIST

A copy of the Draft Plan-EIS was mailed to the following organizations/individuals listed and comments were requested.

Federal

Department of Agriculture
  Secretary of Agriculture
  Office of Advocacy and Enterprise, Director
  Farm Service Agency, Hawaii State Office, State Executive Director
  Rural Development, Hawaii State Office
  Forest Service, Pacific Southwest Research Station, Director
  NRCS, Watersheds and Wetlands Division, Director
  NRCS, Kamuela Field Office, District Conservationist

Department of the Army

U.S. Army Engineer District, Honolulu, Planning Branch, Chief, Engineering Division
U.S. Army Support Command Hawaii, Environmental Management Office, Directorate of Facilities Engineer
Naval Base, Pearl Harbor, Commander
Department of Commerce
National Oceanic and Atmospheric Administration, Administrator
Environmental Clearance Officer
Department of Housing and Urban Development
Center for Environmental Health and Injury Control, Environmental Health Specialist
Department of the Interior
Secretary of the Interior
Office of Environmental Project Review, Director
Fish and Wildlife Service, Pacific Islands Ecoregion, Manager
United States Geological Survey, Water Resources Division, District Chief
Environmental Protection Agency
Office of Federal Activities (A-104), Director
Office of Federal Activities (E-3), Region 9, San Francisco, CA, Chief
Department of Transportation
U.S. Coast Guard G-MPS1, Water Resources, Coordinator

State of Hawaii
Department of Accounting and General Services
Comptroller
Archives Division, State Archivist
Department of Agriculture, Board of Agriculture, Chairman
Department of Budget and Finance, Housing Finance and Development Corporation
Executive Director
Department of Business, Economic Development and Tourism
Director
Research and Economic Analysis Division, Head Librarian
Energy Division, Division Head
Department of Defense, Adjutant General and Director of Civil Defense
Department of Health, Director
Department of Land and Natural Resources
Board of DLNR, Chairperson
State Historic Preservation Office
Department of Hawaiian Home Lands, Hawaiian Homes Commission, Chairman
Department of Transportation, Director
Office of the Governor
Office of Planning, Director
Office of Environmental Quality Control, Director
Office of the Legislative Reference Bureau, Director
University of Hawaii
Environmental Center, Director
Water Resources Research Center, Director
Hilo Campus Library
Hamilton Library
Department of Education, Hawaii State Public Library System
Hawaii State Library
Bond Memorial (Kohala) Library
Honokaa Library
Thelma Parker (Waimea) Library
Kaimuki Regional Library
Kaneohe Regional Library
Pearl City Regional Library
Hilo Regional Library
Wailuku Regional Library
Kauai Regional Library
State Legislature Representatives (senators and house representatives for the watershed area)

County of Hawaii

Planning Department, Director
Department of Parks and Recreation, Director
Department of Public Works, Chief Engineer
Department of Research and Development, Director
Department of Water Supply, Manager
County Council, Chair
County Council, Member (representing watershed area)
Mayor
Civil Defense Agency, Administrator

Others

Alu Like, Executive Officer
American Lung Association
Audubon Society, Hawaii, President
Conservation Council of Hawaii
Ms. Teresa Espaniola
Hawaii Delegates to the U.S. Congress
Hawaii Tribune Herald
Hawaii's Thousand Friends, President
Hawaiian Botanical Society, President
Hawaiian Electric Company
Hawaiian Entomology Society, President
Hawaiian Historical Society, Administrative Director
Honolulu Advertiser
Honolulu Star Bulletin
Legal Aid Society of Hawaii
Life of the Land, President
Mauna Kea Soil and Water Conservation District
National Wildlife Federation, Legislative Representative
Natural Resources Defense Council, Inc., Executive Director
Nature Conservancy, Hawaii, Executive Director
Office of Hawaiian Affairs, Chair
Outdoor Circle, Hawaii, President
Mr. Christopher Rathbun c/o Honokaa Law Office
Residents for Relocating the Reservoir c/o Bays Dever Hiatt Kawachika Lezak, Attorneys
at Law
Mrs. Ardis Shaw-Kim
Mr. John and Juanita H. Shaw
Mr. Brian Shaw
Mr. Terrance R. Shumaker, Attorney at Law
Sierra Club, Hawaii Chapter, Chairperson
Stockwater Steering Committee
Sun Press
The Aged Hawaiians, President
Waimea Farmers Association
Waimea Hawaiian Homesteaders' Association
Waimea Irrigators Association
Mr. and Mrs. Robert F. Walden
Waipio Valley Taro Farmers Association
West Hawaii Today
8. PLAN-EIS PREPARERS

Table AB lists names and qualifications of NRCS staff who worked on the Plan-EIS.

<table>
<thead>
<tr>
<th>Name</th>
<th>Present Title (Years)</th>
<th>Previous Job Experience (Years)</th>
<th>Education Degree(s)</th>
<th>Other Qualifications</th>
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<td>Hawaii State Office</td>
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<tr>
<td>Glenn G. Ahuna</td>
<td>Hydrologist (16)</td>
<td>Civil Engineer (8)</td>
<td>BS-Civil Eng.</td>
<td>PE - HI ( ^c )</td>
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<td>PE - CA ( ^c )</td>
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<td></td>
<td>PE - HI ( ^c )</td>
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<tr>
<td>Michael Hayama</td>
<td>Design Engineer (20)</td>
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<td>BS-Civil Eng.</td>
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<tr>
<td>Fen Hunt</td>
<td>Economist (2)</td>
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<td>BA-Economics</td>
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<tr>
<td>Gail H. Ichikawa</td>
<td>Economist (12)</td>
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<td>BS-Agriculture</td>
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<tr>
<td>Carol Kawachi</td>
<td>Cultural Resource Specialist (1)</td>
<td>Archeologist (10) Teacher (12)</td>
<td>BS-Education MA-Education MA-Anthropology</td>
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<tr>
<td>Terrell Kelly</td>
<td>State Biologist (1)</td>
<td></td>
<td>BA-Political Sci. MS-Environ. Sci.</td>
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<tr>
<td>Dudley Kubo</td>
<td>Planning Engineer (11)</td>
<td></td>
<td>BA-History MA-History BS-Civil Eng.</td>
<td>PE - HI ( ^c )</td>
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<tr>
<td>Robin S. White</td>
<td>Planning Geologist (3)</td>
<td></td>
<td>BA-Geology MS-Geoscience</td>
<td>RG - NC ( ^c )</td>
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<tr>
<td>Kamuela Field Office</td>
<td></td>
<td>Geophysical Tech/Supvr/Mgr (5)</td>
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<tr>
<td>Gary Kam</td>
<td>District Conservationist (13)</td>
<td>Soil Conservationist (7)</td>
<td>BS-Soil Science</td>
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<tr>
<td>Jerome F. Williams</td>
<td>Soil Conservationist (18)</td>
<td>Arborist (4)</td>
<td>BS-Forest Resources Met.</td>
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\( ^c \) No longer working at the Hawaii State Office. Represents status at the time when work on the project was conducted.

\( ^c \) Professional Engineer - state.

\( ^c \) Registered Geologist - state.
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County of Hawaii, Department of Research and Development (March 1995). *Data Book 1994.*


State of Hawaii, Department of Agriculture. *Numerous letters and other correspondence.*


State of Hawaii, Department of Hawaiian Home Lands. *Numerous letters and other correspondence.*

State of Hawaii, Department of Land and Natural Resources, Board of Land and Natural Resources. *Numerous letters.*

State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife. *Numerous letters.*


Appendix A

WAIMEA IRRIGATION SYSTEM
WATER RESTRICTION HISTORY


WAIMEA IRRIGATION SYSTEM
WATER RESTRICTION PERIODS
1965 to 1986

<table>
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<th>Location</th>
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<td>Nov 5, 1965</td>
<td>64 days</td>
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<td>Jun 15, 1967</td>
<td>Jul 17, 1967</td>
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<td>Nov 2, 1967</td>
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<td>&quot;</td>
<td>Jan 15, 1981</td>
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**SUMMARY OF RESTRICTIONS**

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<th>Total Days of Restrictions</th>
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</thead>
<tbody>
<tr>
<td>1965</td>
<td>64 days (Lalamilo)</td>
</tr>
<tr>
<td>1967</td>
<td>62 &quot;</td>
</tr>
<tr>
<td>1968</td>
<td>26 &quot;</td>
</tr>
<tr>
<td>1969</td>
<td>14 &quot;</td>
</tr>
<tr>
<td>1971</td>
<td>38 &quot;</td>
</tr>
<tr>
<td>1972</td>
<td>9 &quot;</td>
</tr>
<tr>
<td>1981</td>
<td>98 &quot; (Lalamilo, Puukapu &amp; HHL)</td>
</tr>
<tr>
<td>1983</td>
<td>49 &quot;</td>
</tr>
<tr>
<td>1984</td>
<td>63 &quot;</td>
</tr>
<tr>
<td>1985</td>
<td>24 &quot;</td>
</tr>
<tr>
<td>1986 (5 mos.)</td>
<td>30 &quot;</td>
</tr>
</tbody>
</table>

### WAIMEA IRRIGATION SYSTEM
### WATER RESTRICTION PERIODS
### 1987 Through January 24, 1997

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 1, 1987</td>
<td>Issued conservation notice (requesting voluntary conservation).</td>
</tr>
<tr>
<td>September 4, 1987</td>
<td>Imposed water restriction (mandatory restriction - set water allocation)</td>
</tr>
<tr>
<td>October 5, 1987</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>October 16, 1987</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>August 30, 1988</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>September 2, 1988</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>September 12, 1988</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>September 26, 1989</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>October 4, 1989</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>October 9, 1989</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>November 7, 1989</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>November 14, 1989</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>January 11, 1990</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>February 21, 1990</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>November 9, 1990</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>September 26, 1991</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>October 1, 1991</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>November 26, 1991</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>March 7, 1992</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>March 26, 1992</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>April 11, 1992</td>
<td>Imposed water restriction.</td>
</tr>
<tr>
<td>May 7, 1992</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>May 20, 1992</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>August 7, 1992</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>October 22, 1992</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>November 10, 1992</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>October 7, 1994</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>November 1, 1994</td>
<td>Lifted water restriction.</td>
</tr>
<tr>
<td>February 23, 1995</td>
<td>Issued conservation notice.</td>
</tr>
<tr>
<td>August 10, 1995</td>
<td>Lifted water restriction.</td>
</tr>
</tbody>
</table>
September 27, 1995  Issued conservation notice.
December 7, 1995  Issued conservation notice reminder.
January 17, 1996  Reached critical water status. Issued irrigation water status report.
March 8, 1996    Lifted water restriction.
August 26, 1996  Issued conservation notice.
October 14, 1996  Issued irrigation water status report.
October 29, 1996  Imposed water restriction.
November 12, 1996 Lifted water restriction.
November 26, 1996 Lifted conservation notice.

Source: Waimea Irrigation System
Appendix B

LETTERS AND COMMENTS

This section contains letters and comments received during the review of the Draft Plan-EIS and responses to those comments. Notes from the Public Meeting held during the review period are included.
Written comments were received from thirty-three groups and individuals during the 45-day DEIS review. A written response was returned for every comment. The notes of the Public Meeting held during the DEIS are also included.

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MEMORANDUM

TO: Michael Kolman, NRCS Assistant State Conservationist
   Natural Resources Conservation Service
   United States Department of Agriculture

FROM: Maurice H. Kaya

SUBJECT: Waimoku-Paunilo Watershed Project, Hanakua/South Kohala Districts

Thank you for the copy of the draft plans. The Energy, Resources, and Technology Division does not have any comments to offer.

Sincerely,

[Signature]

KENNETH M. KANESHIRO
State Conservationist
STOCKWATER COMMITTEE
P. O. BOX 104
KAHULUA, HI 96743
605-0153

MARCH 24, 1997

ETHYL ANDRADE
DON MINTERS
CLARENCE KAWAKAMI
VICE CHAIRMAN
SECRETARY
MEMBERS:

SHONI KAHINO
PAI ASING
MARK KALAKAIA
TEDDY BEIL
SHIRLEY KEALOA
MAHAI'OPONKAOKAI
DAI KAHINO, JR.
JIMMY WRIGHT
JIN DUPONT

Mr. Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P. O. Box 5004
Honolulu, Hawaii 96850-0050

Dear Mr. Kaneshiro:

RE: Draft Watershed Plan & Environmental Impact Statement

THANK YOU FOR YOUR LETTER OF MARCH 20, 1997 WITH ENCLOSURES AS ADVISED.

SINCE OUR COMMITTEE HAS BEEN INVOLVED WITH THIS SUBJECT MATTER FROM MARCH 31, 1997, WE WOULD APPRECIATE SUCH NOTIFICATION BE INCLUDED IN THIS STATEMENT WHEREVER APPLICABLE, HAPAALO.

SECONDLY, WE ENCLOSE LES WISHARD JR. LETTER OF OCTOBER 14, 1994, WHICH WE BELIEVE SHOULD ALSO BE ADDED TO THIS STATEMENT.

THIRDLY, WOULD YOU BE KIND ENOUGH TO SEND A COPY OF THIS STATEMENT TO MR. NABA LUCAS, NATIVE HAWAIIAN LEGAL CORPORATION, 1205 BISHOP SUITE 1205, HONOLULU, HI 96813-3206, HAPAALO.

IT HAS BEEN OUR DISTINCT PLEASURE WORKING WITH YOU OVER THESE PAST YEARS, AND YOUR KIND ATTENTION TO OUR HUMBLE REQUEST IS DEEPLY APPRECIATED, HAPAALO.

Sincerely yours,

(Mrs.) Alfred Andrade
Esq.

AC: Each Member

HHNA Lucas, Esquire

P.S. Members: Please call me if you want to read this statement.
October 14, 1994

Mr. Michael Kolman
Assistant State Conservationist
U.S.D.A., Soil Conservation Service
P. O. Box 50004
Honolulu, Hawaii 96850-0001

Dear Mr. Kolman:

Re: Waimea-Paauilo Watershed Project,

Diverion of Water from Waipio Valley

At the E.I.S. Scoping Meeting September 21, 1994 in Kamuela, concerns were expressed regarding the diversion of water from Waipio Valley that the Waimea-Paauilo Watershed-Project would collect.

To give a little background on myself, I spent most of my working career in Hamakua with the Plantations & Hawaiian Irrigation Company, Ltd. Also for many years I owned over an acre of land in Waipio Valley. I retired from Hamakua Sugar Co., Inc. during 1987.

There are presently three ditch systems, two above and one in, Waipio Valley. All three systems were constructed early in the 1900's and have been in use since then. A brief description follows:

1. Lalakea Ditch System, built by Pacific Sugar Mill, Ltd. (sold to Imonokaa Sugar Co. 1928). Located mauka of Hiiawae Falls east of Waipio Valley. System of lined tunnels and open ditch, of which I have walked and worked on, to a 20 million gallon reservoir, with a large pipeline discharging water into the Lower Hamakua Ditch east of Kukuihaele Village. During low water flow periods there is no water flowing into this system or over Hiiawae Falls. Future ownership?

2. Upper Hamakua Ditch System, which is the source for the proposed Waimea-Paauilo Watershed Project, built by Hawaiian Irrigation Co., Ltd. Intakes are located mauka of Waipio Valley in the forest north of Waimea (Kamuela). Starting west in Kawaihau Stream and traversing east thru tunnels and ditches to mauka Paauilo with numerous storage reservoirs along its route originally. During 1948 this system was taken over by the Territory of Hawaii from Hawaiian Irrigation Co., Ltd. During the 1950's Territory of Hawaii completed the existing Waimea Reservoir with transmission pipelines to Waimea farm lots. The balance of the ditch system east of Puu Pulihou Reservoir (Lakeland) to Paauilo mauka was abandoned when the Territory took over. In 1945 I rode horseback from Ahualoa to the first intake at Kawaihau Stream, and more recently hiked from Kawaihau intake to Waimea Reservoir many times. During low water flow periods, there is no water flowing into this system or over the waterfalls into Waipio Valley.

3. Lower Hamakua Ditch System, built by Hawaiian Irrigation Co., Ltd., and completed and in operation during 1910. Again, this ditch starts west in Waipio Valley at Kawaihau Stream intake 1,030 feet elevation. Traversing east with three other stream intakes, thru seven miles of transportation tunnels, emerging at Kukuihaele Wier 945 feet elevation. Again traversing easterly to Paauilo Village thru open lined ditches, tunnels and flumes. In the past, this water was used by the Plantations for Irrigation, industrial and domestic use. I am familiar with the four intakes in Waipio, worked in the transmission tunnels, and other system related projects. During low water flow periods Kawaihau intake has a very meager flow into it, with the other three stream intakes yielding no water at all into this system.
Hawaiian Irrigation Co., Ltd., originally was owned by Parker Ranch, Pacfic Sugar Mill, Ltd., Honokaa Sugar Co., Paauhau Sugar Co., Hamakua Mill Co., and other individuals. Final ownership of Hawaiian Irrigation Co., Ltd., was Hamakua Sugar Co., Inc., until bankruptcy. The State of Hawaii will probably be the future owner, or Bishop Estate.

Water for Waipio Taro Farmers during low flow periods is from water springs below the Lower Hamakua Ditch in Waipio Valley. During the extremely dry years of 1961 and 1962, I noted that water which had flowed thru taro patches in Waipio and discharging from Waiola River into the ocean was below normal, but still a considerable amount of water.

Current conflicts over available water for Taro Farmers in Waipio is the result of long on-going funds among farmers and new Federal and State water regulations which are in some cases not realistic for Waipio.

In summary, the water source for the Upper Hamakua Ditch (Waimea-Paauilo Watershed Project) will collect some water mauka of Waipio Valley during heavy and normal flow periods, with the balance of water flowing into Waipio Valley. However, during low flow periods there is NO water flowing into this system or over waterfalls into Waipio Valley.

These intermittent flows are the reason that a large holding reservoir is proposed for a reliable agriculture water availability during dry periods. Also, the Upper Hamakua Ditch collection system has been in existence for many years; therefore, the proposed system will not change flows into the valley.

I ask that my comments in this letter be included in the draft and final E.I.S. Please feel free to contact me should you have questions. Your cooperation is always appreciated.

Sincerely,

Les Wishard, Jr.

*Certified January 24, 1966.*
Mr. Kenneth H. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50000
Honolulu, HI 96850-5000

DRIFT WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT
MAKENA-PANAULI WATERSHED PROJECT, HANAI-IHULI-KEALOA DISTRICTS

Thank you for the opportunity to comment on the subject EIS. There is one correction that should be made on Line 31, Page 20. The Department of Water Supply (OWS) maintains three 50-MG reservoirs instead of two 50-MG reservoirs.

If you have any questions, please contact our Water Resources and Planning Branch at 961-6400.

Hilton D. Pavao, P.E.
Manager

DEPARTMENT OF WATER SUPPLY \ COUNTY OF HAWAII
23 AUPUNI STREET \ Hilo, Hawaii 96720
TELEPHONE: 961-6000 \ FAX: 961-1617

April 2, 1997

United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 20520
Washington, DC 20005

July 8, 1997

Mr. Kenneth H. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50000
Honolulu, HI 96850-5000

Draft Watershed Plan and Environmental Impact Statement for the
Waimanalo-Puna'a Watershed

Thank you for your letter of April 2, 1997 with the Department of Water Supply
comments on the subject document.

Section 2.2.3 Department of Water Supply System will be corrected to reflect the
existence of three 50-MG reservoirs in Waimanalo.

Sincerely,

Kenneth M. Kaneshiro
State Conservationist
Mr. Kenneth Kaneshiro  
State Conservationist  
USDA  
Natural Resources Conservation Service  
P.O. Box 5004  
Hilo, HI 96720-0504

Dear Ken:

Thank you for sharing a copy of the draft watershed plan and environmental impact statement for the Wai'anae-Pa'auilo Watershed project with me.

I know that the Wai'anae farmers and ranchers have struggled for years with water availability and distribution problems. I commend you for your efforts to address this problem through the federal watershed program.

Please do not hesitate to call on me if I can assist you in any way.

Aloha puehana,

Danny

DANIEL K. AKAKA  
U.S. Senator

---

United States Senate  
WASHINGTON, D.C. 20510

United States Department of Agriculture  
Natural Resources Conservation Service  
P.O. Box 5004  
Hilo, HI 96720

Senator Daniel K. Akaka  
United States Senate  
730 Hart Senate Office Building  
Washington, D.C. 20510

Dear Senator Akaka:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Wai'anae-Pa'auilo Watershed

Thank you for your letter of March 31, 1997 with words of encouragement for the Wai'anae-Pa'auilo Watershed project. The project sponsors and beneficiaries look forward to your continued support.

Sincerely,

Kenneth M. Kaneshiro  
State Conservationist

---

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.  
AN EQUAL OPPORTUNITY EMPLOYER
April 4, 1997

Planning and Operations Division

Mr. Kenneth M. Kaneshiro
State Conservationist
U.S. Department of Agriculture
Natural Resources Conservation Service
300 Ala Moana Boulevard, Room 4316
Honolulu, Hawaii 96850-0050

Dear Mr. Kaneshiro:

Thank you for the opportunity to review and comment on the Draft Watershed Plan and Environmental Impact Statement (EIS) for the Waimau-Palolo Watershed Project, Hamakua/South Kohala Districts, Hawaii (THK 4-4, 4-6, 5-3, 6-4, 6-5, 6-6, and 6-7). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act, the Rivers and Harbors Act of 1899, and the Marine Protection, Research and Sanctuaries Act.

a. As indicated on page 76 and more fully described in Section 63.14, a DA permit will be required for discharge of dredged or fill material into waters of the U.S. associated with installation of the stockwater distribution pipeline. Authorization from the Corps may also be needed for activities associated with intake structures and for the reservoir supply pipeline gulch crossing discussed on page 61. Please contact Kathy Daday of our Regulatory Section at 438-9258 (extension 15) for further information and refer to file number 96000155.

b. The flood hazard information provided on page 102 of the EIS is correct.

Sincerely,

Paul Mizue, P.E.
Acting Chief, Planning and Operations Division

July 8, 1997

USDA

Our People...Our Islands...In Harmony

Paul Mizue, P.E., Acting Chief
Planning and Operations Division
Pacific Ocean Division
U.S. Army Corps of Engineers
Fort Shafter, Hawaii 96818-9140

Dear Mr. Mizue:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimau-Palolo Watershed

Thank you for your letter of April 4, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: A Department of Army permit will be required for discharge of dredged or fill material into waters of the U.S. associated with installation of the stockwater distribution pipeline. Authorization from the Corps may also be needed for activities associated with intake structures and for the reservoir supply pipeline gulch crossing.

RESPONSE: When the designs of the livestock drinking water pipeline system and the supply pipeline are started, further consultation with the Corps' Regulatory Section will be conducted to assure proper permitting for construction.

COMMENT: The flood hazard information provided in the DEIS is correct.

RESPONSE: Thank you for affirming the flood hazard information contained in the DEIS.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve our nation's resources on private lands. AN EQUAL OPPORTUNITY EMPLOYER
April 5, 1997

Mr. James J. Nakatani, Chairperson
Board of Agriculture
State of Hawaii, Department of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Dear Mr. Nakatani:

Draft Watershed Plan and Environmental Impact Statement
Waimea-Paunio Watershed Project, Hamakua/South Kohala Districts

This responds your request for comment on the above-named document. Generally, I have no objection to the selected Alternative 5 but strongly opposed implementation of Alternatives 3 and 4.

I currently own a small house and lot in Lindsey Subdivision, within the project area. This property is in close proximity to the proposed Waimea II Reservoir, which is included as part of Alternatives 3 and 4. I anticipate that noise and dust from construction of the Waimea II Reservoir will be disruptive to the peaceful community near the reservoir site. More importantly, I believe that the presence of the 133 HC reservoir at that location would endanger properties and residents. The potential for a dam breach would create a stressful and worrisome environment. Beyond the psychological impact of this threat, is the actual damage that would occur in the event of a breach. Also of concern is the potential impact that leaking subterranean water might have on soil conditions and house foundations located down gradient from the reservoir.

Thank you for the opportunity to again participate in this planning effort. Please notify me of any informational meetings or public hearings which might be scheduled on this project. I also request that a copy of the Final Environmental Impact Statement be sent to me.

Sincerely,

Ardis Shaw-Kim
2076-A Mott-Smith Drive
Honolulu, Hawaii 96822

cc: Brian Shaw
John Shaw

July 8, 1997

USDA

Our People...Our Islands...In Harmony

Ardis Shaw-Kim
2076-A Mott-Smith Drive
Honolulu, Hawaii 96822

Dear Mr. Shaw-Kim:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimea-Paunio Watershed

Thank you for your letter of April 5, 1997 to James J. Nakatani, Chairperson, Board of Agriculture with comments on the subject document. Through the intergovernmental partnership for this project with the State Department of Agriculture, the Natural Resources Conservation Service will respond to your comments. A separate reply by the State Department of Agriculture will not be mailed.

COMMENT: I have no objection to the Selected Alternative (Alternative 5), but strongly oppose implementation of Alternatives 3 and 4. I own a house and lot in the Lindsey subdivision which is in close proximity to the Waimea II reservoir proposed in Alternatives 3 and 4. I anticipate noise and dust will be disruptive. More importantly, the reservoir in that location would endanger properties and residents. Beyond the psychological impact of this threat, is the actual damage that would occur in the event of a breach. Also of concern is the potential impact that leaking subterranean water might have on soil conditions and house foundations.

RESPONSE: Alternative 5, the Selected Alternative, proposes the construction of the reservoir approximately three miles to the south of the Waimea II site eliminating the adverse impacts to your Lindsey Subdivision property.

COMMENT: Please notify me of any public meetings or hearings that might be scheduled for this project. I also request a copy of the FEIS be sent to me.
RESPONSE: We will inform you of any meetings or hearings related to this project. A FEIS will be mailed to you when it is completed.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc: James Nakatani, Chairperson, State of Hawaii Department of Agriculture
April 7, 1997

Mr. Kea Kaneshiro
State Conservationist
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96850

Dear Mr. Kaneshiro:

The Farm Service Agency has reviewed the Draft Watershed Plan and EIS for Waima-Paulea and has no comments at this time.

Sincerely,

JoAnna Nakata
State Executive Director

July 8, 1997

JoAnna Nakata
State Executive Director
Farm Service Agency
P.O. Box 50004
Honolulu, HI 96850

Dear Ms. Nakata:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waima-Paulea Watershed

Thank you for your letter of April 7, 1997 stating that the Farm Service Agency has no comments on the subject document.

Sincerely,

Kenneth M. Kaneshiro
State Conservationist
April 11, 1997

Mr. Kenneth M. Kaneshiro
State Conservator
Natural Resources Conservation Service
U.S. Department of Agriculture
P.O. Box 50004
Honolulu, Hawaii 96850-0004

Dear Mr. Kaneshiro:

Subject: Draft Watershed Plan and Environmental Impact Statement (EIS), Waiman-Pauwai Watershed Project, Hamakua/South Kohala Districts, TMK: 3rd Div.; 4-4, 4-6, 4-9, 6-3, 6-4, 6-5, 6-6, 6-7

We have reviewed the above EIS and have the following comments. We recommend that the EIS include an assessment of the project’s compliance with the Coastal Zone Management (CZM) objectives and policies in Chapter 6.6, Relationship to Other Plans, Policies, and Controls, in the document. The statutory reference for this is Chapter 255A, Hawaii Revised Statutes.

If you have any questions about this, please contact Christina Miller of our CZM Program at 587-2845.

Sincerely,

Rick Egged
Director
Office of Planning
process to discuss and raise awareness of resource development issues in the CZM area. Implementation of the Wai'anae-Pa'auilo Watershed project will improve agricultural conditions to maintain scenic and open space resources. The project will also result in fuller economic use of agriculturally-zoned lands in agricultural enterprise.

Sincerely,

[Signature]

KENNETH M. KANESHIRO
State Conservationist
April 18, 1997

Kenneth M. Kanehiro
State Conservationist
USDA Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Boulevard, Room 4216
Honolulu, Hawaii 96850-0009

Subject: Draft Watershed Plan and Environmental Impact Statement

Waimea-Pauulu Watershed Project
Hanauma Bay South Kohala, Hawaii
TMK: 31A-4-4, 4-6, 8-3, 6-4, 6-5, 6-6, 6-7

We acknowledge receipt of your letter concerning the subject matter, and provide you with our comments as follows:

1. All earthwork and grading shall be in conformance with Chapter 10, Erosion and Sediment Control, of the Hawaii County Code.

2. Any work within a County right-of-way shall be in conformance with Chapter 22, Streets and Sidewalks, of the Hawaii County Code.

3. Any construction within known watercourses shall be in conformance with Chapter 27, Flood Control, of the Hawaii County Code. A flood study may be required to evaluate the effects to any streams and possible other inundation areas.

Should there be any questions concerning this matter, please feel free to contact Mr. Casey Yanagihara in our Engineering Division at (808) 681-6327.

DOHIA K. KIYOSAKI
Chief Engineer
Department of Public Works

Dona Faye K. Kiyosaki,
Chief Engineer

United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Our People...Our Islands...In Harmony

July 8, 1997

Dona Faye K. Kiyosaki, Chief Engineer
Department of Public Works
County of Hawaii
25 Anapali Street
Hilo, Hawaii 96720-4252

Dear Mr. Kiyosaki:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimea-Pauulu Watershed

Thank you for your letter of April 18, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: All earthwork and grading shall be in conformance with Chapter 10, Erosion and Sediment Control, of the Hawaii County Code.

RESPONSE: Reference to Chapter 10 of the Hawaii County Code will be made in Section 6.3.11 of the chapter on project impacts.

COMMENT: Any work within a County right-of-way shall be in conformance with Chapter 22, Streets and Sidewalks, of the Hawaii County Code.

RESPONSE: While most of the work within road rights-of-way will involve state-owned property, if any work access within a county right-of-way, it will be in conformance with Chapter 22 of the Hawaii County Code.

COMMENT: Any construction within known watercourses shall be in conformance with Chapter 27, Flood Control, of the Hawaii County Code. A flood study may be required to evaluate the effects to any streams and possible other inundation areas.

RESPONSE: This project will have no effect on drainageways or flooding as most of the project improvements, with the exception of the 131-MG reservoir, will be located pipelines. The project will not impact floodplains identified in the Flood Insurance Rate Map.
Mgmt. If any construction in waterscours is necessary, it will be conducted in
conformance with Chapter 27 of the Hawaii County Code.

Sincerely,

[Signature]

KENNETH H. KANEHIRO
State Conservationist
STATE OF HAWAII
OFFICE OF HAWAIIAN AFFAIRS
1146 KAPUOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAII 96813
April 21, 1997

Mr. Kenneth M. Kanehiro
USDA, Natural Resources Conservation Service
P.O. Box 5004
340 Ali Ii Street
Honolulu, HI 96810

Subject: Watershed Plan and Draft Environmental Impact Statement (DEIS) for the Waimanalo-Palolo Watershed, Island of Hawaii.

Dear Mr. Kanehiro:

Thank you for the opportunity to review the Watershed Plan and Draft Environmental Impact Statement (DEIS) for the Waimanalo-Palolo Watershed, Island of Hawaii. According to the United States Department of Agriculture (USDA), the purpose of the plan is to allocate water shortage problems caused by inadequate quantity and distribution of water for agricultural purposes in the Waimanalo area.

The Office of Hawaiian Affairs (OHA) agrees with USDA on existing water inadequacies in the Waimanalo area. But OHA views these inadequacies as largely due to water allocations heavily skewed to large agricultural operations rather than to water shortages per se. OHA would strongly support USDA's effort in Waimanalo if the intent is to overhaul the system and develop an alternative for fair and equal access to water to Waimanalo. OHA views the proposed watershed plan (Alternative 2) as a response to increasing water demands without addressing existing inequities in water distribution and use.

Given the critical role of water in the Waimanalo area, it is somewhat unclear why USDA does not include an overall water budget with current data on water needs of existing and potential agricultural activities. Without such a blueprint, it is virtually impossible to (i) identify water needs, (ii) understand the rationale for the prioritization of water supplies, (iii) elucidate current water allocations, (iv) substantiate the increase in existing water demand by one-third, (v) substantiate the need for an additional reservoir and distribution system, and (vi) justify the reduction of flow patterns in Palolo Stream. Furthermore, USDA fails to provide a detailed account of water sources in the area, namely surface streams, underground water bodies, and rainfall, and determine their role in the overall water budget.

According to the DEIS, Alternative 2 calls for an additional annual water demand of 377 million gallons, which is about an one-third increase in current water demands. USDA claims that (i) no water diversions will be involved in the plan, and (ii) the additional 377 million gallons of water will be met by reducing overflow by 30% from the Upper Hamakua Ditch to Palolo Stream. In plain terms, this means that during overflow periods, the Palolo Stream flow will be reduced by 1.0 million gallons per day. USDA claims that such reduction will not affect Palolo Stream but does not provide information to support otherwise. Also USDA data not provide with an alternative to cover the extra 377 million gallons of water in the event of a drought occurrence.

From the above review, OHA is seriously concerned about the lack of (i) baseline information on hydrological characteristics for all surface streams affected by Alternative 2, and (ii) in-depth detail to substantiate the feasibility of expanding water demands by one-third without rerouting in water diversions. Given the high variability and unpredictability of rainfall in the area, there is a high likelihood that the additional 377 million gallons of water will be eventually met by diverting water from streams supporting critical ecosystems, wildlife habitats, and local livelihood. Because of serious concerns about potential adverse impacts in the Upper Hamakua area and along Wai'pio Valley, OHA is not prepared to endorse Alternative 2.

On the subject of no adverse impacts on water rights, USDA simply fails to recognize that water rights is an intrinsic issue which must be straightforwardly addressed. OHA views USDA's attempt to bypass the issue of water rights as a failure to grasp the realities of current times. Native Hawaiians are striving for sovereignty and control of their lands and natural resources. Thus, OHA finds it somewhat naive to disclose that no effects are anticipated from water rights and no mitigation is required.

OHA strongly urges USDA to take a hard look to this issue again.

Please contact Lynn Lee, Acting Office of the Land and Natural Resources Division, or Luis A. Manrique, should you have any questions on this matter.

Sincerely yours,

[Signature]

Marie Ross
Deputy Administrator, Programs

LH:lm
RESPONSE: While a comprehensive overall water budget, including rainfall, runoff, groundwater, natural and artificial storage, DWS demand and supply, and private water systems demand and supply for the Waimanō region is beyond the scope of the evaluation for this project, a table displaying an average monthly water budget for the Upper Hanamaʻuku Ditch, irrigation demand, livestock drinking water demand, reservoir levels, and effect on flow to Laakea Stream will be included in the FEIS.

An overall water budget for the South Kailua area is included in the Kailua-Kona Water Use and Development Plan (Draft, February 1992). The improvements proposed by this project are included in the projections for future water supply and demand made by the Water Use and Development Plan.

Some discussion about the project's background and context may address some of your concerns. The intent of this project and the Waimanō Irrigation System is to provide, to the greatest extent possible, to farmers in the service area. The source of the water is the existing Upper Hanamaʻuku Ditch which diverts streamflow from Kawainui, Kawaihao, Aliakaha, Kauaoloa, and Waiulua Streams at the 4,000 to 3,000-foot elevation. No alteration of the Upper Hanamaʻuku Ditch is foreseen by the exceptions of reconstruction of the reservoir connections.

COMMENT: The proposed project would have an annual increased water demand of 377 million gallons, which is about a one-third increase in current water demands. Due to the reduction in flow from the Upper Hanamaʻuku Ditch, Laakea Stream flow will be reduced by 1.0 million gallons per day. USDA claims that such reduction will not affect Laakea Stream but does not provide information to support the claim. USDA does not provide an alternative to cover the extra 377 million gallons in the event of drought.

RESPONSE: The expanded Waimanō Irrigation System will reduce flow from the Upper Hanamaʻuku Ditch by an average of 377 million gallons per year in the future with the project installed as compared to the future without the project installed. The average annual reduction amounts to 5 percent of the total streamflow as measured above Kailua Falls. This reduction is expected to be insignificant to residents, including the U.S. Fish and Wildlife Service, especially in light of its transfer into Laakea Stream from other drainages.

The shortage of water from the Upper Hanamaʻuku Ditch during droughts will be made up by use of the Puʻukapua well which is capable of providing 1.4 million gallons per day at an additional cost of $3.75 to $1.00 per 1,000 gallons in pumping cost. Voluntary drought period conservation will be used to stretch existing water supply through dry periods.

COMMENT: OHA is seriously concerned about the lack of (i) baseline information about surface streams affected by the proposed plan and (ii) details to substantiate the feasibility of expanding the water demands by one-third without resorting to additional water diversion.

With best regards,

Mauna Rosa, Deputy Administrator, Programs
Office of Hawaiian Affairs
711 Kapilani Blvd., Suite 500
Honolulu, Hawaii 96813

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimanō Watershed

Thank you for your letter dated April 23, 1997 with your comments on the subject document. We wish to respond to the comments.

First, as a matter of clarification, Alternative 5 was chosen by the sponsoring local organizations as the Selected Alternative, rather than Alternative 2 as stated in your comment letter. (see pg. 60, DEIS) The USDA Natural Resources Conservation Service serves in the role of consultant to the State of Hawaii Department of Agriculture, Department of Hawaiian Home Lands, and the Mauna Kea Soil and Water Conservation District in the preparation of the plan and DEIS.

COMMENT: Water inadequacies are due to inequities in water distribution and use.

RESPONSE: The Waimanō Irrigation System currently provides agricultural water for commercial agricultural activity to all users, both on DHIL parcels and non-DHIL parcels. During droughts, such as that experienced in 1995, all users of the WIS suffered equally.

While the proposed project will not change the core purpose of the WIS, components of this project and native Hawaiian water rights issues may modify the allocation of water by the WIS. This project proposes the addition of livestock drinking water to the purposes of the WIS. The project recommends the participation of the DHIL and WIS users in operating policy discussions.

COMMENT: The USDA should provide an overall water budget with current data on water needs and water sources to (i) be able to picture water needs, (ii) understand the rationale for proliferation of water systems, (iii) elucidate current water allocations, (iv) substantiate the increase in existing water supply by one-third of at least the need for an additional reservoir and distribution system, and (v) justify the reduction of flow pattern in Laakea Stream.

The Natural Resources Conservation Service works hand in hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER
RESPONSE: The inclusion of baseline information on streams other than Lalahua Stream is beyond the scope of the EIS as no direct or indirect effect to other area streams is anticipated due to project installation. The diversion of Kawaih, Kauai, Alakahi, Keawe, and Waino Streams by the Upper Hanalei Diversion, which has been in existence for nearly a century, will be unaffected by the project.

As stated earlier, no further diversion of surface streams is anticipated. Agricultural water shortages will be made up from ground water or will be managed through water conservation measures and use restrictions.

COMMENT: USDA simply fails to recognize that water rights is an unresolved issue that must be straight forwardly addressed. OHA finds it somewhat naive to disclose that no effects are anticipated from water rights and no mitigation is required.

RESPONSE: The USDA planners and project sponsors recognize the gravity of the water rights issues that surround this and other water resource systems. The DEIS discusses the issues of native Hawaiian water rights, DHR water reservation rights, WIS allocation issues, and other State Water Code issues in Section 6.1.15. The water rights issues will be heard and settled in other venues where USDA has no influence.

Sincerely,

KENNETH M. KANEHIRO
State Conservationist
April 24, 1997

Mr. Kenneth M. Kaneshiro
State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96810-0004

Re: Draft Watershed Plan and Environmental Impact Statement for Waimea-Paauilo Watershed Project, Hamakua/South Kohala Districts

Thank you for the opportunity to review the subject draft EIS.
We have no housing related comments to offer at this time.

Sincerely,

ROY S. OSHIRO
Executive Director
April 25, 1997

Mr. Kenneth H. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Boulevard, Room 4316
Honolulu, Hawaii 96850-0050

Dear Mr. Kaneshiro:

Subject: Draft Watershed Plan and Environmental Impact Statement
Project: Waimea-Paauilo Watershed
Location: Hamakua/South Kohala Districts, Hawaii

Thank you for allowing us to review and comment on the subject project. We do not have any comments to offer at this time.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for Environmental Health

July 8, 1997

Bruce S. Anderson, Ph.D.
Deputy Director For Environmental Health
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96818

Dear Dr. Anderson:

Subject: Draft Watershed Plan and Environmental Impact Statement for the
Waimea-Paauilo Watershed

Thank you for your letter of April 25, 1997 stating that the Department of Health has no comments on the subject document at this time.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist
April 28, 1997

Kenneth M. Kameshiro
State Conservationist
USDA, Natural Resources Conservation Service
300 Ala Moana Blvd., Room 4216
Honolulu, Hawaii 96815-0050

Dear Mr. Kameshiro:

Enclosed are comments on the Draft Environmental Impact Statement for Watershed Plan Waimanalo-Palolo Watershed County of Hawaii, Hawaii. We hope our comments will assist you. Thank you for giving us an opportunity to review this document.

Sincerely,

Susan H. Pruchter
Acting NRCS Coordinator

Enclosure

MEMORANDUM FOR: Donna Wieting
Acting Director, Ecology and Conservation Office

FROM: Captain Louis A. Lapina, NOAA
Director, National Geodetic Survey

SUBJECT: DEIS-9703-05--Watershed Plan Waimanalo-Palolo Watershed County of Hawaii, Hawaii

The subject statement has been reviewed within the areas of the National Geodetic Survey's (NGS) responsibility and expertise and in terms of the impact of the proposed actions on NGS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in the subject area is contained on the NGS home page at the following Internet World Wide Web address: http://www.ngs.noaa.gov. After entering the NGS home page, please access the topic "Products and Services" and then access the menu item "Data sheet." This menu item will allow you to directly access geodetic control monument information from the NGS data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project includes the cost of any relocation(s) required.

For further information about these monuments, please contact John Spencer, ESQ, NOAA, N/CDS; 1315 East West Highway; Silver Spring, Maryland 20910; telephone: 301-713-5169; fax: 301-713-4175.
Susan B. Fochtner, Acting NEPA Coordinator
Department of Commerce
The Under Secretary for Oceans and Atmosphere
Washington, D.C. 20230

Dear Ms. Fochtner:

Subject: Draft Watershed Plan and Environmental Impact Statement for the
Waimea-Panola Watershed

Thank you for your letter dated April 28, 1997, with National Geodetic Survey comments
on the subject document. The horizontal and vertical control monuments in the project
area were identified through the NGS homepage on the World Wide Web. The
monuments are:

- Puakea 1867
- Puu Io west
- West Tank
- Kookiekuku west
- Waimea East Base
- Waimea West Base
- MUS AP Sta A
- Green Tank
- Hawaii West Base
- Pukui
- Parker Ranch Tank
- Hokuula
- Hokuula 2

None of the monuments above will be disturbed by the installation of the watershed
project.

Sincerely,

KENNETH M. KAMISHIRO
State Conservationist

The Natural Resources Conservation Service works hand in hand with the American people to conserve natural resources on private lands. AN EQUAL OPPORTUNITY EMPLOYER
April 30, 1997

Mr. Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
Hauula, Hawaii 96710-0050

Via Facsimile: (808) 541-1335

RE: Comments to Draft Watershed Plan and Environmental Impact Statement
Waima - Paiaula Watershed (February 1997)

We have reviewed this document and have the following comments:

1. Many of your exhibits indicate a "Lahiloli Ag Park Expansion" area within Parker Ranch property, in the vicinity of the Kamehameaha Commercial Village area. Although it is difficult to tell the exact location of this proposed expansion area, it is clear that a portion is within the Parker Ranch Town Center area which is currently zoned for residential and commercial development. This area is not available for expansion of the State Lahiloli Agricultural Park.

For your information, we have discussed a possible expansion of the Lahiloli Agricultural Park within Parker Ranch lands in the vicinity of the West Hawaii Concrete office near the Kamehameha Highway or possibly adjacent to the existing Lahiloli Ag Park. In our recent meeting with Paul Maskall and Albert Kawakami of the State Department of Agriculture, it was felt that agriculturally suitable lands can be found in these areas. We intend to continue these talks and hope for selection of an appropriate site.

2. Although it was not anticipated that Parker Ranch be a customer of the proposed irrigation/note watering distribution system, should the need arise, will Parker Ranch be able to obtain water for these purposes?

Riley H. Smith, P.E.
Project Manager

cc: Paul Maskall, Administrator/Chief Engineer (via fax: (808) 933-9467)
Albert Kawakami, Waima Irrigation District Manager (via fax: 885-7634)
John Ray, Councilman (via fax: 969-3261)
Steve Bowles, Waima Water Service (via fax: 885-7851)
Our People...Our Islands...In Harmony

July 8, 1997

Riley W. Smith, P.E.
Project Manager
Parker Ranch
P.O. Box 458
Kauai, Hawaii 96743

Dear Mr. Smith:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waima-Pauilo Watershed

Thank you for your letter of April 30, 1997 with comments on the subject document. We wish to respond to your comments.

**COMMENT:** Many of your displays indicate a "Lahainilo Ag Park Expansion" area within Parker Ranch property. This area is not available for expansion of the State Lahainilo Agricultural Park. Parker Ranch and the State Department of Agriculture have discussed alternative sites for the Agricultural Park expansion.

**RESPONSE:** The "Lahainilo Ag Park Expansion" is shown at its formerly-considered location mainly to indicate a desire by the State Department of Agriculture to expand commercial farming activity in the Waima area. As an alternate site for the Ag Park expansion had not yet been identified, the site near the Waima Town Center was used in the displays.

The FEIS will continue to display the Lahainilo Ag Park Expansion in the same location as in the DEIS with a note on the display that the expansion area will likely be located elsewhere. The FEIS narrative will also be changed to explicitly state that the Lahainilo Agricultural Park Expansion is not a component of the Waima-Puinuila Watershed Plan and is not covered by the present EIS.

**COMMENT:** Although it is not anticipated that Parker Ranch be a customer of the proposed irrigation/creek water distribution system, should the need arise, will Parker Ranch be able to obtain water for those purposes?

**RESPONSE:** The allocation of water from the WIS will be managed by the State Department of Agriculture with input from the user community. Water priority will be given to those service areas identified in this plan and sponsored by contributors. There is no prohibition by the federal funding source for distribution of water to other areas as long as the water is used for agricultural purposes.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist
May 2, 1997

Mr. Ken Kaneshiro
State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96820

Re: Waima-Pauilo Watershed Draft EIS

Dear Mr. Kaneshiro:

On September 27, 1994 and on June 4, 1996 our legal representative, Mr. Jerry Hira, sent you letters pertaining to the Environmental Impact Statement for the Waima-Pauilo Watershed. The letter of September 27th, 1994 was a formal request for the information on specific concerns of our organization to be included in both the draft EIS and in the final EIS. These concerns were listed in that letter. Neither of these letters are included in or even referred to in any way in the Draft EIS. As both were sent following the Scoping Meeting of September, 1994 and both relate directly to the Environmental Impact Statement, we request that reference be made to these letters and that they, along with letter be published as part of the final copy of the Environmental Impact Statement.

At the EIS presentation meeting held in Waima on Wednesday, April 22, Michael Kuhlman assured us your office had these letters on file.

Thank you for your consideration and the efforts of you and your staff in undertaking the completion of this EIS.

Sincerely,

Nancy Akira

Teresa Español

cc: Jerry Hira, Boys Deaver Hira Law Firm, Attorneys at Law

David Kanahele, Chair, Mauna Kea WPCD

United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96820

USDA

Our People...Our Islands...In Harmony

July 8, 1997

Residents to Relocate the Reservoir
To Nancy Wada
P.O. Box 2239
Kamuela, Hawaii 96743

Dear Madams and Sires:

Subject: Final Draft Environmental Impact Statement for the Waima-Pauilo Watershed

Thank you for your letter of May 2, 1997 with comments on the subject document. We wish to respond to the comments.

COMMENT: Letters of September 27, 1994 and June 4, 1996 with requests for information and specific concerns about the Waima-Pauilo project were not included in or referred to in the draft EIS. We request reference be made to these letters and that these letters with the May 2, 1997 letter be published in the final EIS.

RESPONSE: The three letters from the Residents to Relocate the Reservoir and NRCS response letters will be included in the final EIS.

Sincerely,

KINDRED M. KANEISHI
State Conservationist

The Natural Resources Conservation Service works hand in hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER
Mr. Ken Kaneshiro  
SCS State Conservationist  
300 Ala Moana Boulevard, Room 4319  
Honolulu, Hawaii 96814  

June 4, 1996

Re: Residents to Relocate the Reservoir vs.  
State of Hawaii, et al.

Dear Mr. Kaneshiro:

As you know, our firm represents the Residents for Relocating the Reservoir ("Residents to Relocate"), a group of community residents who are opposed to the current planned location of this proposed reservoir. As you also know, on September 29, 1994, we wrote to you with a list of factors to be considered in both the draft and final Environmental Impact Statements ("EIS") which are to be prepared for the project.

Please consider this letter as a demand by the Residents to Relocate that the State either abandon its plans for the reservoir or else choose another site where the reservoir's externality will have no negative impact. As mentioned in our letter dated September 27, 1994, a copy of which is attached for your convenience, we had advised that the proposed project is objectionable for numerous reasons. In the event that the EIS is accepted by the responsible State and Federal agencies, the Residents will appeal the Notice of Final Determination accepting the EIS pursuant to Haw. Rev. Stat. § 343-7(c) and Haw. Rev. Adm. Rules §§11-200-24. Given the obvious shortcomings and drawbacks of the proposed reservoir, no reasonable decision maker would accept or otherwise approve an EIS containing the information that an EIS on this project would contain.

As a result, the Residents will be seeking to enjoin construction of the project because of the severe and negative

1 On September 29, 1994, you wrote advising us that both the Federal and State EIS's would be forthcoming. To date, we have received neither a draft EIS nor a final EIS on the proposed project.

Mr. Ken Kaneshiro  
SCS State Conservationist  
June 4, 1996  

Page 2

impact the project will have on adjacent property owners and the subdivision as a whole. Certainly, any State action which directly, or indirectly, results in an impact such as the reservoir will have on the Residents to Relocate, constitutes a taking by way of inverse condemnation. See, e.g., Nabholz v. Monona Co., 467 U.S. 96 (1984); Devers v. A. Grain Co., Inc., 467 U.S. 96 (1984); Monhoff v. U.S., 455 U.S. 178 (1982); Farmers v. Topeka Irrigation Dist., 565 F.2d 632 (10th Cir., 1977). Specifically, a State funded or authorized project which is conducted under authority of the State and which has the effect of diminishing the value, or interfering with the use of private property constitutes a taking under the Fifth Amendment of the U.S. Constitution and under Article I, § 20 of the Hawaii State Constitution.

In our case, the State's plan to build a 135,000,000 gallon reservoir in a residential neighborhood will damage each property by substantially reducing its value. The mere plans for it have already had a substantial affect on real estate values. Expert witnesses will be called in any litigation to confirm this.

Additionally, the construction of a large reservoir is not compatible to a residential neighborhood and would certainly constitute a nuisance and raise a well-founded fear of reservoir leakage and/or flooding.

In light of the above, the Residents to Relocate have authorized us to take the following actions:

1. Upon acceptance of the final EIS, we will appeal the Notice of Final Determination and file a Complaint in the Third Circuit seeking injunctive relief and immediately move for a preliminary injunction to halt the project;

2. The Complaint will also seek a recovery of damages under a nuisance theory. As the owner of the property, the Department of Hawaiian Homelands will necessarily be named as a defendant; and

3. The Complaint will seek compensation from the State, under a theory of inverse condemnation, for the resulting diminution in value of each and every piece of property affected by the reservoir. If the project is not enjoined, which access, the proposing agency will be liable for millions of dollars in damages for all the properties affected by it.
Litigation in this matter can be avoided by the Department of Hawaiian Homelands and by the State of Hawaii by simply choosing another site for the reservoir which does not threaten to destroy a family oriented residential neighborhood. We therefore urge you to avoid years of costly litigation by reconsidering your decision to locate a reservoir in a residential neighborhood.

Should you have any questions or comments regarding the above, please do not hesitate to contact me.

Very truly yours,

Jerry M. Hiatt

cc: The Honorable Daniel Inouye
    The Honorable Daniel Akaka
    The Honorable Patsy Mink
    The Honorable Richard Matsui
    The Honorable Hilda Solomou
    The Honorable Dwight Takamine
    The Honorable Jerry Chang
    The Honorable Robert Byrnea
    The Honorable Virginia Isboll
    The Honorable Harvey Pajiri
    The Honorable Steven Yamashiro
    Councilman Takashi Domingo
    Councilman Brian J. Deloie
    Councilman James Y. Arakaki
    Councilman Robert F. Nishihili
    Councilwoman Helena H. Hale
    Councilwoman Keiku Bank-Aikens
    Councilman Keola Childe
    Councilman James M. Rath
    Charles and Helen Brosman
    Teresa Kepaniola
    Michael and Kealoha Neumann
    Robert and Nancy Walden

June 30, 1996

Jerry M. Hiatt
P.O. Box 56004
Honei, HI

Dear Mr. Hiatt:

Subject: Residents to Reconsider the Reservoir

We have received your letter of June 4, 1996, expressing your client's group's objection to the agricultural water reservoir proposed at the Waianae site.

In September 1994, we did state that a federal and state EIS would be forthcoming. We are still in the process of analyzing alternatives and completing the draft EIS. The EIS will discuss and compare the impacts of locating the reservoir at the Waianae site location and other potential reservoir sites. The draft EIS should be completed by September 1, 1995.

If you have further questions, please contact Michael Kolman, Assistant State Conservationist, at 808-541-2602.

Sincerely,

KENNETH M. KANEHIRO
State Conservationist

cc: Paul Murai, Department of Agriculture
    Daniel Kekoa, Department of Hawaiian Homelands
    Sand Araki, Chief, Waiheka SWCD
September 27, 1994

Ken Kanashiro,

SCE State Conservationist
300 Alii Naanaa Blvd., Room 4319
Hilo, HI 96720

Re: Ho'olaupoo Watershed Reservoir Two Site

Dear Mr. Kanashiro:

Our firm represents Residents for Relocating the Reservoir, a group of community residents who are opposed to the current location of this proposed reservoir. As you know the reservoir will hold 123 million gallons of agricultural water and is located directly above a residential subdivision in the town of Ho'olaupoo on the Big Island. We appeared at the meeting on September 21, 1994 at the Office of Hawaiian Homestead in Hilo, and voiced our objections to this project at the hearing. We also explained to those present that we would confirm those objections in writing. The purpose of this letter is to do that.

Please also accept these written comments as formal requests that each of the following matters be addressed in both the draft and final Environmental Impact Statement ("EIS") to be prepared for the project. Please also accept this as a formal request that a copy of the draft EIS be provided to me as the representative of this group, as soon as it is produced. I understand that it currently scheduled for February 1, 1995.

Finally, could you please also provide me with specific written notice of any further meetings scheduled to discuss this project, since we were advised at the meeting by both the facilitator for the meeting, Valerie Bright, and by Sam Arakaki, the chairman of the Kea Kea WSP, that further public meetings would be held to gather further input from the community on this project before proceeding with it.

The specific concerns which we have which we believe must be addressed in the EIS are as follows:

1. The reservoir is located over an existing fault line and very near a crowded residential subdivision. We believe this to be extremely hazardous planning and request that the EIS address relocating the reservoir so that it is not over a fault line, or near a subdivision. The EIS must identify (and locate on a map) and then discuss every potential alternative site for the project, including those sites previously rejected.

2. We also request that the EIS address the history of this particular fault line, the likelihood that it will be the location of future earthquakes and the anticipated severity of those potential earthquakes. In that regard we would note that our own research shows that the reservoir as currently designed can withstand only a 7.2 earthquake whose epicenter is 30 miles away. If there is a 10% safety factor it could withstand a 7.5 earthquake from the same distance. However, based on our interviews with the scientists at the Hawaii Volcano Observatory, the major earthquake in 1968 near this location may have been as high as 7.9 on the Richter Scale. Thus we believe the dam must be designed to withstand at least a 7.9 earthquake locally -- not one whose epicenter is 30 miles away.

3. This reservoir is built to be in close proximity to another existing 60,000 gallon reservoir. The EIS must evaluate the risk that both the new reservoir and the existing reservoir will fail at or near the same time. A leak in this reservoir may erode the bank of the second reservoir, causing a huge 60,000 gallon increase in the escaping water. This evaluation should also include the possibility that water from either, or both reservoirs, may back up, after the failure, because of deposits of earth, concrete or other debris in the mouth of the stream and that this will divert waters into the subdivision.

4. The EIS should address the fact that the earthquake analysis used as basis for the current engineering is the "static method" of analysis. That method is apparently out of date. All analysis of the earthquake risk should be redone using the dynamic method, as that is apparently...
5. The inundation maps currently proposed appear to us to be very inaccurate. In some places the inundation map follows straight lines, which appear to be property lines, or fence lines, rather than the natural flow of the terrain.

6. The inundation map analysis has not been revised to account for a reservoir failure which occurs after a period of heavy rain and when the existing stream bed is already swollen with water.

7. We understand that the existing reservoir is new “piping”. This is a condition where water in the reservoir is tunneling its own way through the embankment and is a prelude to possible failure of the reservoir. The EIS must discuss the risk that the new reservoir will “pipe” and fail also.

8. The EIS should also address whether, if the reservoir leaks it will create a bog or other drainage problems. Will that bog or drainage area encroach onto my clients’ properties? What steps will be taken to prevent that from occurring?

9. The existing analysis is based on failure of the proposed reservoir only at the mouth of the reservoir. All analysis of the inundation maps, etc., is based upon this single point of failure. This approach appears to us to be reckless and the EIS should consider the risk that the reservoir might fail along the fault line or at any other point in its perimeter. Separate and alternative inundation maps should be developed for each such potential failure, indicating where the water would go if there was a failure at that point.

10. The EIS should specifically state the proposed cost to build the reservoir as designed and it should then evaluate the additional costs which would be imposed on the community given each of the following scenarios.

11. The EIS should evaluate the affects on taro production during low flow periods in Wai`oli Valley.

12. The EIS should evaluate the affects of diversion of water on all native species in Wai`oli Valley.

13. The EIS should evaluate the affects on the social infrastructure of taro farmers in Wai`oli Valley who apparently already have conflicts over the available water. That water would apparently be diverted to fill this reservoir.

14. The EIS should evaluate the accuracy of the rainfall estimates in the area of the reservoir.
which were used as a basis for the current design. Apparently the current engineering is based on rainfall estimates of 75-80 inches per year. However, the reported actual average is 132.4 inches per year with a maximum rainfall of 216.8 inches per year.

15. The EIS should contain a complete discussion of the safety engineering of the reservoir proposal. This should include discussion and discussion of the lining products, their estimated length of life and their susceptibility to failure. A similar discussion should be included for each major component of the reservoir system.

16. The EIS should state the period of construction for the proposed reservoir and evaluate the effects of construction on the daily life of the surrounding residents.

17. The EIS should disclose the proposed access roads for ingress and egress for the construction and the effect on that using such roads will have on surrounding residents as well as the steps that will be taken to mitigate noise, dust and other pollution and hazards to children in the neighborhood during construction.

18. Last year, for a period of several months, trucks and light machinery traveled up and down Lindsey subdivision road to access the repair work being done on the keeshus ditch. During this period, most residents incurred damage to their property and homes. The vibration of the trucks and equipment rumbling past the homes was perhaps intensified by the soil, which is constantly saturated by the rain. The damage was caused by the earth sinking and settling in various places on each lot. In some cases homes began slipping off their pilings, floors began to slant, walls and ceilings cracked, cesspools sank and began caving in, etc.

It is certain that, with construction vehicles accessing the proposed reservoir site over a period of years, most of the homes on the access roads will sustain major damage. The EIS must address ways of compensating residents for this damage by evaluating the nearby homes before, during, and after construction. Any damage to homes and property must be assessed and paid for by the sponsor of the reservoir project. The estimated cost of repairs should be reflected in the project's budget.

19. Since the Lindsey subdivision road is a one lane road, cars must pass each other by pulling onto the shoulder of the road. During and after heavy rains, there are various places in Lindsey subdivision where the road floods. Mud on the shoulder of the road is several feet deep in places. Certainly this situation will be worsened by construction equipment. What steps will be taken to ensure that the road will be maintained on a consistent basis and that residents will always be able to drive in and out of their homes? Also what steps will be taken to repair the road at the completion of the project. These issues should also be reflected in the project budget and discussed in the EIS.

20. The EIS should discuss whether there is any legal right to divert water from its current uses to the reservoir and on what basis that legal right exists.

21. The EIS should discuss whether and how children are going to be protected from the reservoir since it is an attractive nuisance to children in the subdivision who will be living less than 100 yards away. Will it be fenced or will access otherwise be discouraged? What costs will that add to the project?

22. The EIS should discuss an evacuation plan if the reservoir is breached. Will there be a warning system to signal a breach? What will that system cost? How reliable will it be? How will it function? Will existing roads be sufficient to accommodate a rapid departure of the local population? How much warning would be available in the event of a breach? Is the reservoir...
located too close to the residential area to provide any sort of realistic warning of a breach which would allow a timely evacuation.

This is an initial list of our concerns, but we have just begun to have our consultants and engineers look at the current plan. We will provide you with updates as more concerns are identified.

At this point in time we do believe that sufficient concerns, including those listed above, have already been identified about the current site to show that it is the height of folly to proceed with a reservoir at this location. The use of the federal, state or county tax dollars, which will be spent for further planning at this site could be much better spent in identifying another location which is distant from a densely populated residential subdivision and where a failure, if it occurred, would not affect adjoining property with tragic consequences.

It does appear that the ranchers and farmers who were present at the meeting on September 21, 1994 share this view. I would like to stress that no member of the public in this community will be served if the reservoir is built, at huge additional cost, to a much higher degree of safety than would be required, if it were located in a more rural location.

For all these reasons we respectfully request that the current site for the reservoir be abandoned immediately. Copies of the letter are being provided to Senator Inouye, Senator Akaka, Congresswoman Hink, Senator Matsui, Senator Malama Solomon, Representative Larry Tanimoto, Representative Dwight Takamine, Representative Jerry Chang, Representative Robert Jardine, Representative Virginie Isbell, Representative Harvey Fajiri, Mayor Yamasaki and each of the members of the Hawaii County Council so that they will all be aware of the strong opposition to this project in this location.

Congresswoman Hink has already been very helpful in noting that an EIS should be done for this project and my clients are grateful for that assistance. My clients also respectfully request that their other elected representatives look into this situation as well. If any of these representatives have comments, suggestions or questions, I would be glad to respond. We also invite each of them to visit this proposed site, to see for themselves how dangerous this project appears to be.

I would like to thank you and the representatives for all of your assistance. My clients do support the need for greater agricultural water in this community. They are confident that this need can be met with another appropriate site.

Thank you for your assistance.

Very truly yours,

Jerry M. Hink

cc: The Honorable Daniel Inouye
The Honorable Daniel Akaka
The Honorable Patsey Mink
The Honorable Richard Matsui
The Honorable Malama Solomon
The Honorable Larry Tanimoto
The Honorable Dwight Takamine
The Honorable Jerry Chang
The Honorable Robert Jardine
The Honorable Virginia Isbell
The Honorable Harvey Fajiri
The Honorable Steve Yamasaki
Councilman Spencer Malam Ghetti
Councilman Takashi Domingo
Councilman Brian J. De Lima
Councilman James V. Arahata
Councilman Robert F. Nosehii
Councilman Malama H. Hana
Councilman Kalgo Dardov-Ahremfon
Councilman Keola Childs
Councilman James H. Rath
Charles Boteau
Honey Halden
Teresa Espinosa
September 29, 1994

Jerry Hiatt
Parker Square, Suite 204
P.O. Box 7049
Kamuela, HI 96743

Dear Mr. Hiatt:

This is to acknowledge receipt of your letter of September 27, 1994 regarding the Waiau-Puaulu Watershed Reservoir. The letter is very well written and will be useful in preparation of the EIS. We expect to begin work on the EIS within the next couple of months.

Your office had also made an inquiry as to whether a State EIS will be done. Yes, we will be complying with the State process as required by the Office of Environmental Quality Control.

Thank you for your interest in this important project.

Sincerely,

Kenneth M. Kanehira
State Conservationist
Mr. Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 59004
380 Ala Moana Blvd., Room 4116
Hilo, Hawaii 96720-0004

Dear Mr. Kaneshiro:

SUBJECT: Water Supply Pipeline and Environmental Impact Statement

Thank you for your letter of March 20, 1997, and the opportunity to review and comment on the Draft Watershed Plan and Environmental Impact Statement for the proposed Waiola-Paauilo Watershed Project.

Based on the information provided in the Draft Watershed Plan and Environmental Impact Statement, supporting documents, and other information on file in our office, we believe that the Water Supply Pipeline and Kawai Reserve improvements of the "Selected Plan" (Alternative 5) will have "no effect" on significant historic sites.

The other proposed improvements of the "Selected Plan," including the Irrigation Water Distribution System, Stockwater Distribution System, and Lahaina Agricultural Park Expansion, may have an "adverse effect" on what is sometimes loosely called the Waiola Agricultural System. This field system contains ruins of fields and associated sites (habitations, burial, etc.). It is clearly eligible for inclusion on the National Register of Historic Places under nearly all of its criteria. The Draft Watershed Plan and Environmental Impact Statement states that the Irrigation Water Distribution System and Lahaina Agricultural Park Expansion have both been designed to avoid this archaeological site complex. This clearly does not seem to be the case for the Lahaina Agricultural Park Expansion, which is placed across part of the archaeological field system complex, as best as we can tell at this point. Parts of this field system have undergone archaeological data recovery work (SHARP) and preservation for the Waiola Town Center.

In summary, we believe that some components of the "Selected Plan" will have "no effect" on significant historic sites, while other components will very likely have an "adverse effect." To comply with the National Historic Preservation Act of 1966 as amended in 1990 and 1992. Until the consultation process has been concluded, we cannot agree that all significant historic sites in the project area have been identified.

If you should have any questions about our review comments, please contact our Hawaii Island archaeologist, Patrick McCoy (587-0000).

Aloha,

MICHAEL D. WILSON
Division Chief
State Historic Preservation Officer
P.O. Box 16

K. Kaneshiro

project of Parker Ranch. That project also found that the field system extended further south toward and beyond the airport. Thus, clearly for the Ag Park Expansion, archaeological analysis and possible archaeological survey is needed to establish if the field system spreads into the project area, the specific significance of the remains need be evaluated (if remains are present), and if significant sites are present, then acceptable mitigation plans need to be worked out. For the Irrigation Water Distribution System, a similar situation exists. It appears that the southern section of the Stockwater Distribution System area has been surveyed and it may be within the field system. No survey has been conducted in the southern portion of the area selected for these improvements, east and south of the airport. Recent surveys indicate the high probability of significant historic sites in this general area, thus leading to our conclusion that these improvements will probably have an "adverse effect."

In summary, we believe that some components of the "Selected Plan" will have "no effect" on significant historic sites, while other components will very likely have an "adverse effect." To comply with the National Historic Preservation Act of 1966 as amended in 1990 and 1992. Until the consultation process has been concluded, we cannot agree that all significant historic sites in the project area have been identified.

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MICHAEL D. WILSON
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K. Kaneshiro

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In summary, we believe that some components of the "Selected Plan" will have "no effect" on significant historic sites, while other components will very likely have an "adverse effect." To comply with the National Historic Preservation Act of 1966 as amended in 1990 and 1992. Until the consultation process has been concluded, we cannot agree that all significant historic sites in the project area have been identified.

If you should have any questions about our review comments, please contact our Hawaii Island archaeologist, Patrick McCoy (587-0000).

Aloha,
Our People...Our Islands...In Harmony

July 8, 1997

Michael D. Wiltson, Chairperson and Historic Preservation Officer
Board of Land and Natural Resources
State Historic Preservation Division
35 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Wiltson:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waiawa-Paauilo Watershed

Thank you for your letter of May 6, 1997 with State Historic Preservation Division's comments on the subject document. We wish to respond to your comments.

COMMENT: The Irrigation Water Distribution System, Stockwater Distribution System, and the Laiamino Agricultural Park Expansion may have an adverse effect on the Waiawa Agricultural System, which is clearly eligible for inclusion on the National Register of Historic Places. The DEIS states that the Irrigation Water Distribution System and the Laiamino Agricultural Park Expansion are designed to avoid this agricultural site complex. This is clearly contrary to the case for the Laiamino Agricultural Park Expansion, which is placed across part of the agricultural site complex.

RESPONSE: There is no confusion that the Laiamino Agricultural Park Expansion is a part of the Waiawa-Paauilo Watershed project. The DEIS states explicitly that the Laiamino Agricultural Park Expansion is not an element of this project or covered by this DEIS. The Laiamino Agricultural Park Expansion is a proposal by the Hawaii State Department of Agriculture (DOA) to expand commercial agricultural activity in Waiawa. If the DOA is able to obtain land from Parker Ranch, the DOA will conduct the required environmental and archaeological investigations and consultations to develop the agricultural park expansion.

The DEIS wrongly states that the Laiamino Agricultural Park Expansion had been designed to avoid the Waiawa Agricultural System complex. (DEIS, page 97) The statement should have said that the irrigation pipeline for the Laiamino Agricultural Park expansion had been realigned to avoid archaeological impacts. In 1988, during archaeological consultation with the Historic Preservation Division for the Irrigation water distribution pipeline alignments, the lateral distribution pipeline for the agricultural park expansion was moved 2,000 feet to the east to avoid impacts to the Agricultural Site Complex. We understand that more recent investigations of the Agricultural Site Complex expands the extent of the complex.

The irrigation water distribution pipeline to service the agricultural park expansion will be installed only if the DOA acquires the appropriate approvals and develops the Laiamino Agricultural Park Expansion. Presently, land acquisition difficulties and the recently broadened archaeological concerns appear to dim the prospects of the development of the Laiamino Agricultural Park Expansion at the location east of the airport.

The livestock drinking water pipeline will terminate approximately 4,000 feet due east of the north end of the Kaneohe Airport runway. The pipeline will be installed within the confines of the east-west aligned road that is presently being constructed by the Department of Hawaiian Home Lands (DHHL) and should have no adverse effect on archaeological sites.

COMMENT: We want to remind you of the need to also consult Native Hawaiian organizations and individuals to determine the presence or absence of traditional cultural properties in the project area. As a federal undertaking, consultation is needed to fulfill the requirements of Section 106 of the Historic Preservation Act of 1966 as amended in 1990 and 1992. Until the consultation process has been completed we cannot agree that all significant historic sites in the project area have been identified.

RESPONSE: No cultural resource not already identified by the Historic Preservation Division has been revealed through the project consultations which have included ongoing planning coordination with the Department of Hawaiian Home Lands, a project sponsor; numerous public meetings in the project area attended by Hawaiian Home Lands leasees and others from the Waiawa community; meetings with the Waiawa Hawaiian Homesteaders Association and the Stockwater Committee comprised of Hawaiian Home Lands ranchers; and project review by native Hawaiian groups including the Office of Hawaiian Affairs and the Native Hawaiian Legal Corporation. Additional consultation, specifically to address this comment, is being undertaken with Hawaiian groups, including Hawaiian Civic Clubs, Office of Hawaiian Affairs, and other Hawaiian organizations.

RECENT CONSULTATION: Following receipt of the SHPO comments, planners for the project took the opportunity to meet with Patrick McCoy, SHPO Hawaii Island archaeologist, to discuss the concerns included in the comments letter and other issues related to the archaeological consultation process and compliance with the provisions of Section 106, 19 A. The following actions, in addition to that directed above, will be taken by NRC and the sponsors to comply with the intent of the historic preservation law and policy.

Archaeological surveys previously done in the project area found no significant cultural surface remains. Most of the project area has been in pasture for over one hundred and fifty years. Most of the pipelines will be placed in existing roadways. The most recent work (Erkens, 1997) has uncovered buried archaeological remains just under the grass mat. These remains tend to be in the toe areas of hilltops rather than in the flat plains. A
brief discussion of the Ericczen report will be included in the FEIS in the section discussing the Lalamilo Agricultural Park Extension.

While the approximate alignments for the livestock drinking water distribution system that are not located on the disturbed road rights-of-way in the Puakea and Niihau areas have been surveyed for archaeological concerns, an additional archaeological reconnaissance survey will be conducted and report prepared when the engineering survey for the pipeline is undertaken. The lowland areas of hilly features that may have provided shelter and other formations that SHPD feels have a strong likelihood of yielding cultural deposits will be given particular attention based on recent archaeological finds. Archaeological monitoring during pipeline and reservoir construction will be utilized at such locations. The additional survey and monitoring actions will be included in the FEIS.

We ask for your concurrence that the explanations above and the proposed actions satisfy the SHPD concerns related to the DEIS and will fulfill the requirements of Section 106 of the Historic Preservation Act.

If you should have need for additional information please contact Carol Kawashiri, Cultural Resources Specialist, at (808)322-2484 or Dudley Koho, Planning Engineer, at (808)341-2612.

Sincerely,

Kenneth M. Kaneshiro
State Conservationist
Dear Sir:

This letter is a complaint in response to the proposed Women-Pamilo watershed reservoir that is to be paid for with federal and state tax revenue. Several points of argument opposing the watershed project will be outlined in the statement to follow:

(1) Why is a 131 million gallon reservoir pipeline and water distribution system (pg. 10-0615) being paid for with taxpayer money for special interest groups usage (nearby ranchers, farmers, and DNR)?

My own family has DNR land, but we do not feel that the public is responsible to pay into a fund to provide water only for a limited population (ranches & farms of Women, etc.) to benefit from this project. Ranching and farming has always been a risk-oriented business and it is not up to the public to provide a safety net for only a select few. Also, this would be the case, then that is clearly discriminatory and un-American and all businesses ventures could receive the same benefits (like the Women farmers, etc.), but of course, this would probably bankrupt both federal and state governments yearly budget allotments. The watershed project should be paid for by those receiving benefit from the reservoir and payments could be done by implementing a plan that allows farmers and ranchers to pay off their costs with an endowment, as paid for.

In this manner, the project pays for itself and the farmers could deduct their payments as the cost of doing business. This should also burden the taxpayer with a give big, $7,375,000 dollars of debt when the state and federal governments are already in debt as it is.

(2) Is the impact or streamflow of Lakebile Stream by 5% (pg. 10-064)? How can this percentage be denied? What is 5% in terms of MGD? Isn't Lakebile Stream already impaired by a ditch that takes water to the Hemlock Ditch (pg. 10-061) and further impairs water flow to Hilawu Falls (that supplies water to Wajig and the two farmers of Wajig Valley)?

It is further stated (pg. 10-064) that "A compensating factor is the determination by USGS that much of the data collected in the 1992 to 1994 period in unimproved areas is poor in quality." If USGS is making this statement, then could it be further hypothesized that 5% of Lakebile Stream would be adversely affected in years of inadequate rainfall in about the 5% have a figure up to 10%? It's 25% to 20% more because as streamflow diminishes, the 5% figure is extrapolated to a ridiculous impact on the stream (lakebile)? Again, what about the water flow and its effects on Hilawu Falls?

(3) Regarding costs of the project, on pg. 14, it is stated that because $385-566 cannot be implemented, construction cost must be totally funded by local sponsors, meaning DMR and DNR.
This means that draft agreements and DNRs, both supported by Federal and State funding, will be responsible for determining the water rights improvements ([DEIS], 1993). Otherwise, the taxpayer would be required to pay for a special-interest project as stated in statement 21 of this letter.

4. Property acquisition and relocation due to DNR acquiring land rights for the Waterless project ([DEIS], 1993) are not addressed in the cost of the project. How much, if anything, will it cost to acquire lands that may be needed to complete this project?

5. The Hawaiian Burial Council needs to be involved if any historic site [with human remains] may be found ([DEIS], 1993). Furthermore, [name removed], [archaeologist for DNR], not being involved ([DEIS], 1993) and who is [name removed] to state that "they found nothing of archaeological significance within the boundary of the three potential reservoir sites in the 500 acres potential new reservoir area" ([DEIS], 1993). And, how in the field complex that borders the Kalihi, going to be preserved and protected will not be a victim of a cultural good and destruction of yet another Western Hawaiian cultural place - the Waterless project ([DEIS], 1993).

The letter would continue to present issues in the DEIS but that can come later. In summary, to work to hold that due to increased fertilizer and chemical use, how will it affect groundwater supplies ([DEIS], 1993)? And, [name removed] say that the impact in the Kalihi streams and adjacent streams in the Waipio Valley area will not adversely affect water supply in the Palolo-Valley-Waipio area, creating more negative effects on streams that help those of us growing food in the Kalihi, Palolo, Waipio and Koolau land districts? Can any hydrologist guarantee that this project will not negatively impact Waipio Valley, Palolo, and other stream systems interconnected within the Waianae-Nu’uanu watershed? Or, is it another way that the state intends to destroy our culture (forever losing these resources) to benefit a special interest group already decades and forever it Waianae? Why isn’t another plan be implemented that benefits all parties involved, especially the few farmers who are most dependent on an untroubled water system that was in place for over 500 years. Who are these farmers to change what was already in place?

Thank you,

[Signature]

[Name]

[Address]

[Phone]

[Signature]

[Name]

[Address]
July 8, 1997

Anakorol Anjo
P.O. Box 61871
Honolulu, Hawaii 96829

Dear Mr. Anjo:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimea-Pauoa Watershed

Thank you for your letter of May 7, 1997 to the Office of Environmental Quality Control with your comments on the subject document. We wish to respond to your comments.

**COMMENT:** Why is the project being paid for with taxpayers' money for “special interest groups’ usage (family ranchers, farmers, and DIIH)?” The project should be funded by groups benefiting.

**RESPONSE:** Government agencies, such as the Natural Resources Conservation Service, State Department of Agriculture, and the Department of Hawaiian Home Lands, are charged with providing improvements, such as this project, that communities or groups would be unable to develop on their own. This project is a social and economic investment designed to generate a positive economic return on an investment as demonstrated by the positive benefits to cost ratios. This project will compete with other public improvement projects for limited government funds. While the direct economic benefits will be felt mainly by farmers and ranchers in Waimea, indirect benefits such as increased produce availability, increased tax revenue, creation of jobs, and increased spending will affect everyone.

**COMMENT:** How was the five percent impact to Lalakai Stream derived? Isn’t Lalakai Stream impacted by a ditch that takes water to Hamakua District? Does the poor condition of the USGS streamflow record between 1975 and 1990 mean that the five percent impact could be even higher than 20 percent? What are the effects on streamflow and Hillawe Falls?

**RESPONSE:** The five percent reduction in average annual streamflow in Lalakai Stream at Hillawe Falls was derived by comparing the natural runoff from the 3.05 square mile drainage area plus the overflow from the Upper Hamakua Ditch (6,703 MGD) with the project installed runoff from the natural drainage area plus the overflow from the Upper Hamakua Ditch without the installation of the project (7,051 MGD). While the contribution of the overflow from the ditch will be reduced by nearly one-third, when combined with the natural runoff from the Lalakai watershed the annual effect will be five percent.

Water from Lalakai Stream is not diverted by either the Upper Hamakua or Lower Hamakua Ditches. The Lalakai Ditch, which is outside of the project area as is the Lower Hamakua Ditch, was developed and used by Hamakua Sugar Company but is presently abandoned.

While the poor condition of the USGS records may introduce additional uncertainty into these projections, the variability will not be as great as reducing the Lalakai streamflow by 20 percent. The complete cessation of overflow from the Upper Hamakua Ditch will decrease Lalakai streamflow by 17 percent. The worst of the records for the Upper Hamakua Ditch above Waimalu Reservoir, from 1984-1990, which were deemed unusable by the USGS, were not used in our analysis.

The five percent in flow in Lalakai Stream and over Hillawe Falls will have no significant effect on the overflow reduction is spread over the year and the natural Lalakai watershed runoff function is uninhibited by this project.

**COMMENT:** Because the livestock drinking water component cannot be implemented under FLD3-506, the DOA and DIIH will be responsible for the funding. Again the taxpayer gets the bill for a special interest project.

**RESPONSE:** The livestock drinking water component was shown to derive less economic benefits than costs. Therefore, the federal program could not participate in its funding. However, the State of Hawaii determined that the social benefits of such a system outweighed the economic cost of providing livestock distribution. Furthermore, the stockwater is needed for pest control to keep the area more productive use of their land, consistent with the trust responsibility created by the Hawaiian Homes Commission Act.

**COMMENT:** Property acquisition and relocation costs are not addressed in the costs of the project. How much extra will it cost to acquire the lands needed?

**RESPONSE:** The cost for land acquisition is shown as Land Rights on Table 2 - Estimated Cost Distribution on page 83 of the DSS. Approximately $380,000 in land value for land currently owned by the state and DIIH will be converted to project use. Legal survey and conveyance costs are included in the figure above. No business or residential relocations will be required.

**COMMENT:** The Hawaiian Island Council needs to be involved. Why isn’t Martha Yest, archaeologist for DLNR, being utilized? Who is Dr. William Bank? How will Field Complex X, bordering the proposed Agricultural Park, be preserved or protected?

**RESPONSE:** The Hawaiian Island Council will be notified and consulted upon discovery of probable graves. No probable grave sites were indicated by the archaeological surveys or during consultation with the State Historic Preservation Division.

Martha Yest is an archaeologist with the Division of State Parks, DLNR. No State Park land is involved in the Waimea-Pauoa Watershed project.
William Bask, retired Professor of Anthropology, UI-Illinois, trained with Drs. Emary and Simons of the Bishop Museum.

The Lalumalu Agricultural Park Expansion is not a component of this project or covered by this EIS. The final location of this State Department of Agriculture project is still uncertain due to land acquisition and archaeological concerns. When a final location is identified, the site will be surveyed for impacts to archaeological and biotic sites by the State Department of Agriculture.

COMMENT: How will increased fertilizer and chemical usage affect groundwater supplies? Can any hydrologist guarantee that this project will not negatively impact Waipio Valley, Pololu, and other stream systems? Why can't another plan be implemented that benefits all parties, including Waipio Valley taro growers?

RESPONSE: Installation of the watershed project should have no effect on groundwater and stream quantity or quality, except for the reduction in overflow from the Upper Hanakaa Ditch to Lalakesa Stream discussed earlier. The issue of groundwater quantity and quality is discussed on pages 103-105 of the DEIS. The issue of streamflow quantity is discussed on pages 106-107 of the DEIS.

While this project does not provide a direct benefit to Waipio Valley taro growers, no adverse impacts to Waipio Valley taro growers are expected by installation of the project.

Sincerely,

KENNETH M. KANEHIRO
State Conservationist

cc: Gary Gill, Director, GEQC
May 7, 1997

The Honorable James J. Nakatani, Chairperson
Board of Agriculture, State of Hawaii
P.O. Box 22159
Honolulu, Hawaii 96823-2159

ATTENTION: Mr. Paul Minao

Dear Mr. Minao:

The Office of Environmental Quality Control submits the following comments on the Draft Watershed Plan and Environmental Impact Statement (DEIS), Waimea-Paauilo Watershed Project Statements Harunaka/South Kohala District, THUR 3rd Division: 4-4, 4-4, 4-9, 4-9, 5-3, 5-4, 5-4, 6-4, 6-7.

CLERICAL ERROR: Page 9, Table C, identify landowners. Please consult with the Office of Hawaiian Affairs and disclose what, if any, of the lands identified in Table C are ceded lands under Section 5 of the Admission Act.

RARE OR UNIQUE ENVIRONMENTAL RESOURCES: In the section on project setting, please include a discussion of rare or unique environmental resources (including natural or man-made resources of historic, archaeological or aesthetic significance) within the project boundaries (see, Sections 11-200-17(g), EIS Rules). If these items are discussed elsewhere in the text (such as the discussion of historic resources on pps. 9, 10), please make appropriate reference to them.

POTENTIAL INDIRECT VISUAL EFFECTS TO LALAKAIA STREAM AT HILWAVE FALLS: HILWAVE Falls is considered by many to be an important historic/natural resource. The diversion of stream water into both upper- and lower-Hilakia drains the past but significantly reduced the volume at HILWAVE.
- Please describe the natural flow levels at HILWAVE Falls during times of negligible stream diversion.
- Please compare these habitual flows with the streamflows presented in Table 1 on page 102.
- Please discuss any visual impacts that would result from reducing streamflow at HILWAVE Falls.

Thank you for the opportunity to comment. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist at 808-488-3

Sincerely,

GARY GILL
Director of Environmental Quality Control

Mr. Kenneth M. Kachirko, State Conservationist, U.S. Department of Agriculture, National Resources Conservation Service
natural resources and shoreline, housing, public facilities, public utilities, recreation, transportation, and land use resources and controls of the nine districts of the island of Hawaii, including South Kohala.

The Waimea region is associated with cattle ranching, conjuring images of paians, horses, and cows. While there are other areas of the state where ranching takes place, the predominance of the Parker Ranch, the long history of cattle ranching in the area, and the wide-open upland of the Waimea Plain have created a strong association of cattle ranching with Waimea.

Waimea is one of the most productive areas for vegetable crops in the state. Many cool-weather crops that cannot be grown elsewhere in Hawaii are grown, including cabbage, celery, and lettuce.

The nearby laniunaa that are culturally important are the Kohala Mountains, Mauna Kea, and Waipio Valley. The cinder cone hills, especially Pua Lohe, Pua Hokuuli, and Puki, have significant cultural beauty.

For significant archaeological resources see Section 6.3.4 Cultural Resources. For significant unique or rare plant and wildlife resources see Section 6.3.13 Threatened and Endangered Species.

**COMMENT**: Hiiilawe Falls is considered by many to be an important historical/cultural resource. The diversion of stream water into both upper and lower Hamakua Ditches in the past had significantly reduced the volume at Hiiilawe. Please describe historical flow levels at Hiiilawe Falls during times of maximum diversion. Please compare these historical flows with the streamflows presented in Table T on page 107. Please discuss any visual impacts that would result from reducing streamflow to Hiiilawe Falls.

**RESPONSE**: None of the streams that contribute flow to Hiiilawe Falls is diverted by either the Upper Hamakua or Lower Hamakua Ditches. The Laakea Ditch, with a diversion on Laakea Stream approximately 3,000 feet upstream of Hiiilawe Falls, is the only diversion above Hiiilawe Falls. The Laakea Ditch, once operated by Hamakua Sugar Company, is currently abandoned.

Overflow from the Upper Hamakua Ditch splits into the Laakea Stream drainage area. The amount of overflow will be reduced by implementation of this project. The natural runoff from the drainage area at Hiiilawe Falls is not affected by this project.

The cultural and visual importance of Hiiilawe Falls derives largely from its pairing with Laakea Falls immediately to the east. The twin falls structure has been disrupted since 1989 when an emergency diversion of Laakea Stream was made to protect a temporary repair to the Lower Hamakua Ditch tunnel. Reinstallation of Laakea Falls is being addressed by other efforts and is not affected by this project.

No stream record exists for Hiiilawe Falls or Laakea Stream. An estimate of the average monthly flow in Laakea Stream, that is shown in Table T, was made through an analysis using seven gaged streams in the Hilo-Hamakua Kohala region and the monthly rainfall distribution at the Laakea rain gage (202.00). Laakea Ditch diversion was not included in the analysis.

Sincerely,

KENNETH M. KANEISHIRO
State Conservationist
The Environmental Protection Agency (EPA) has reviewed the Draft Watershed Plan and Environmental Impact Statement (DEIS) for the project entitled Waima-Palolo Watershed. Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The DEIS evaluates five alternatives for managing the distribution of water for agricultural and livestock uses in the project area, including no action alternative. The four action alternatives outline various proposals for water management, including plans to construct a reservoir, an irrigation distribution system, and a stockwater distribution system. The preferred alternative, Alternative 5, proposes to construct a reservoir at the Waima site.

EPA rates this DEIS as category B/C-2, Environmental Concerns-Inadequate Information. For an explanation of EPA's rating system, please see the attached "Summary of the EPA Rating System." EPA's primary concern is the lack of economic and environmental justification for the proposed stockwater distribution system outlined in various management alternatives, including the preferred alternative. 40 CFR 1502.13 states that an EIS "shall briefly specify the underlying purpose and need to which the agency is responding in preparing the alternatives including the proposed action." This EIS fails to adequately develop the purpose and need for the stockwater distribution system. Although we recognize that construction of a stockwater distribution would potentially increase the productivity of grazing land in the watershed, thereby reducing future economic losses resulting from ranching within the watershed, we note that the DEIS states that "installation of the Waimea Reservoir and a stockwater distribution system will not improve the range or pasture." (DEIS Page 90) Furthermore, the economic figures included in the DEIS indicate that the stockwater distribution components of the preferred alternative would operate at a net loss.

In addition, EPA finds the "rational for plan selection" paragraph at Page 69 particularly misleading. This paragraph states that Alternative 5 is preferred over Alternative 2 because it "addresses the project purpose of alleviating agricultural water shortage problems, with less potential adverse effects on properties surrounding the proposed reservoirs." Although this statement provides the rationale for selecting the Waimea reservoir location over the Waima reservoir location, it fails to address cost/benefit issues related to the stockwater distribution system.

NEPA requires that federal agencies "rigorously explore and objectively evaluate all reasonable alternatives" in an EIS. (40 CFR 1502.14(a)) In order to draw a fair comparison between alternatives, NEPA should evaluate an alternative which includes the Waimea reservoir and irrigation distribution system outlined in Alternative 5, but omits the stockwater distribution system. EPA recommends that NEPA evaluate this alternative and include it in future iterations of the EIS prepared for this project.

We appreciate the opportunity to review this DEIS. Please send a copy of the Supplemental DEIS or Final EIS to this office at the same time it is filed with our Washington, D.C. office. If you have questions, please call Leonidas Payne of my staff at (415) 744-1371.

Sincerely,

David J. Farrel, Chief
Federal Activities Office
SUMMARY OF DATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

The EPA review has identified significant environmental impacts that must be avoided in order to fully protect the environment. Corrective measures may require substantial changes to the proposed alternative or application of mitigation measures that would reduce the environmental impact. EPA believes that the proposed alternative is preferable in that it reduces the environmental impact to a negligible degree.

Adaptation of the Impact Statement

EPA believes that the draft EIS adequately sets forth the environmental impacts of the proposed alternative and that the Federal agency is responsible for the project in action. The draft EIS analysis of data collection is necessary, but the review may require the addition of additional data or information.

EPA believes that the draft EIS adequately sets forth the environmental impacts of the proposed alternative and that the Federal agency is responsible for the project in action. The draft EIS analysis of data collection is necessary, but the review may require the addition of additional data or information.

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, as the EPA review provided new, additional information concerning the location of the proposed alternative and the identification of additional data collection needed to assess the potential environmental impacts. EPA believes that the draft EIS analysis of data collection is necessary, but the review may require the addition of additional data or information.

EPA believes that the draft EIS adequately sets forth the environmental impacts of the proposed alternative and that the Federal agency is responsible for the project in action. The draft EIS analysis of data collection is necessary, but the review may require the addition of additional data or information.

EPA believes that the draft EIS adequately sets forth the environmental impacts of the proposed alternative and that the Federal agency is responsible for the project in action. The draft EIS analysis of data collection is necessary, but the review may require the addition of additional data or information.
An discussion of the trust responsibility of the state and federal governments to the native Hawaiian people created by the Hawaiian Homelands Commission Act is included in Section 2.9. An expanded discussion of the purposes for which "ceded lands", including DIHIL parcels, can be used is included in Section 6, 10. Discussion of the effect of the livestock drinking water component on fulfillment of the trust responsibility will be included in the description and comparison of alternatives.

No direct or indirect adverse effect to the environment, except for usual impacts that can be expected during installation, were identified during planning of the project.

COMMENT: In order to demonstrate the beneficial impacts of the system of Alternative 5, an alternative should be evaluated which includes the Kualii Reservoir and irrigation distribution system included in Alternative 5, but omits the livestock drinking water distribution system.

RESPONSE: An Alternative 6 will be developed which will omit the livestock drinking water distribution system from the Selected Alternative.

A Final EIS will be filed with your office at the same time it is filed with the Washington, D.C. EPA office.

Sincerely,

KENNETH M. KANEHITO
State Conservationist
May 9, 1997

Kenneth Kaneshiro
USDA, Natural Resources Conservation Service
P.O. Box 50004
Honolulu, HI 96850-0004

RE: WAIMEA PAAPULO WATERSHED PROJECT
COMMENTS ON THE DRAFT EIS

Dear Mr. Kaneshiro:

The Waimea Water Roundtable (WWR) was created and endorsed by Resolution's in the State House of Representatives and the Hawaii County Council. The mission of the Roundtable was to gather a diverse and experienced group to examine the development and utilization of Waimea's water resources. It was Representative David Tavares' and Councilman John Ray's hope that this team effort would bring a cooperative understanding of the challenges we face and a unified approach to overcoming these challenges. For the past year, WWR has been meeting to fulfill that mission and has made great progress in bringing together the various individuals and agencies that deal with water issues in the Waimea area. As you see from the attached member list, the WWR is made up of a diverse and experienced group of individuals and agencies.

At our last meeting, we reviewed and discussed the draft Environmental Impact Statement (EIS) for the Waimea Paapulo Watershed Project at great length. After thoughtful discussion and analysis, the group developed a list of questions that should be considered when evaluating the draft EIS. Please find attached these questions that we would like to submit as comments for consideration.

Thank you for your assistance in this matter. If you have any questions, please feel free to contact me.

Sincerely,

John Ray, Councilman
County of Hawaii

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WAIMEA WATER ROUNDTABLE
COMMENTS ON THE WAIMEA PAAPULO WATERSHED PROJECT EIS

A. Funding
How soon can funding be expected for each phase of construction?
What is the likelihood of State and Federal contributions actually being available?

B. Stockwater system
Will the homesteaders be drinking the water? If likely, or yes, shouldn't improvements of the existing DWS system be considered as an alternative?
Does the proposed system depend on construction of the irrigation component, i.e. the large diameter pipelines and reservoirs?
How are the livestock in AU determined?
Can the carrying capacities listed be demonstrated in fact?

C. Irrigation system
Has the State acquired or discussed acquiring the lands shown for ag park expansion?
How much will the capital investment per new irrigated acre be?
What will the per acre service charge be for irrigated land?

D. Losses
How are the estimated crop losses determined and verified?
Are the farmers making crop loss claims?

E. Surface water
Are the preps aware that the stream flow reporting was inaccurate?

F. Ground water
What was the alternative of wells in the high level newly defined aquifer seriously and adequately considered as a substitute to storage?
Were the 1995 HELCO power rate changes studied in evaluating pumping?
Why weren't recent (since 1985) DLNR and USGS publications referring to ground water in the source area of Waimea cited as reference?
What were the actual operating costs of the Pukapu well in 1996 drought?
Are the alternatives considered in the Draft EIS timely in view of the 18-year life of the planning period?
F. Groundwater (continued)

Was any consideration given to reallocation of water resources in view of the recent (1990s) discovery of high level ground water?

How would this project fit into the larger picture as it relates to the State's Water Plan?

G. Irrigated crop lands

When designing the crop land options, was consideration given to utilizing adequate crop lands adjacent to the irrigation system for the future expansion needed in the next century?

What are the limits of high elevation crop lands throughout the State?

Are the present lands adjacent to the existing pipeline fully utilized in crop production?

That is, might land trade be more effective as an alternative to building new irrigation systems?

Are modern irrigation techniques considered in calculating agricultural water needs? If not, why?

H. Environmental impacts

Have the potential impacts to ground water or stream contamination been thoroughly addressed in regard to the ag for expansion and nutrient management?

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WAIMEA WATER ROUNDTABLE
MEMBER LIST

<table>
<thead>
<tr>
<th>NAME</th>
<th>ORGANIZATION</th>
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<tbody>
<tr>
<td>Smu Aniki</td>
<td>Mauna Kea Soil &amp; Water Conservation District</td>
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<tr>
<td>Kenneth Beche</td>
<td>Community Member</td>
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<tr>
<td>Steve Bowles</td>
<td>Waimea Water Services</td>
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<tr>
<td>Jim Dupont</td>
<td>Department of Hawaiian Home Lands</td>
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<tr>
<td>Charlie Ewart</td>
<td>United States Geological Survey</td>
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<tr>
<td>Murray Gardner</td>
<td>Community Member</td>
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<tr>
<td>Roy Hardy</td>
<td>DLNR - State Commission on Water Resource Management</td>
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<td>Harold Hart</td>
<td>Department of Water Supply</td>
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<tr>
<td>Gary Kan</td>
<td>Natural Resources Conservation Service</td>
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<tr>
<td>Dan Kanilo Jr.</td>
<td>Waimea Hawaiian Homestead Association</td>
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<tr>
<td>Albert Kawabata</td>
<td>Department of Agriculture - Waimea Irrigation System</td>
</tr>
<tr>
<td>Paul Matsuo</td>
<td>Department of Agriculture</td>
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<tr>
<td>David Oshiro</td>
<td>Kohala County Farm Bureau</td>
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<tr>
<td>Milton Pavao</td>
<td>Department of Water Supply</td>
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<tr>
<td>John Ray</td>
<td>County of Hawaii</td>
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<tr>
<td>Riley Smith</td>
<td>Parker Ranch</td>
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<tr>
<td>David Tamas</td>
<td>State of Hawaii House of Representatives</td>
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<tr>
<td>Peter Young</td>
<td>Waimea Community Association</td>
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Our People...Our Islands...In Harmony

July 8, 1997

Waimea Water Roundtable

c/o John Ray, Councilman
County of Hawaii
25 August Street
Hilo, Hawaii 96720

Dear Councilman Ray:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimea-Paauilo Watershed

Thank you for the letter of May 9, 1997 with the comments of the Waimea Water Roundtable on the subject document. We wish to respond to your comments and questions.

COMMENT: How soon can funding be expected for each phase of construction?

RESPONSE: Funds must be acquired before construction of each component of the project. An estimated installation schedule over a period of years is shown in Table N in the DEIS. The most optimistic date for start of construction would be Fall 1998. This assumes completion of the final EIS, acquisition of needed permits and land-rights, and completion of technical investigations and design. Funding for this Increment will be requested from the state legislature and NRCS once the final EIS is completed and Watershed Agreement signed.

COMMENT: What is the likelihood of state and federal contributions actually being available?

RESPONSE: With the cutbacks in both state and federal budgets, the likelihood of immediate funding of the Waimea-Paauilo Watershed has diminished. However, limited funds are currently still available and restoration of buffer funding of state and federal water resources programs is a distinct possibility with recovery of the state and national economies. Implementation of the irrigation water component will provide a positive return on construction investment to the state economy.

COMMENT: Will the homesteaders be drinking the water? If likely, or yes, shouldn't improvements of the existing DWS system be considered as an alternative?

RESPONSE: The water provided by the WIS through this project will not be tested. Homesteaders and others will be warned against human consumption of the agricultural water. Many farm and ranchlots will have both DWS and WIS service. Educational efforts to prevent cross-contamination of the systems and consumption of untreated agricultural water will be conducted.

The decision to provide livestock drinking water from the agricultural system rather than expand the DWS system was based primarily on the low priority of livestock drinking water on the DWS system. During drought periods, the likelihood of the availability of livestock drinking water is greater on the expanded WIS than from the DWS. The cost to expand the DWS is serve all of the ranchlots that were identified for a connection by this project has not been calculated.

COMMENT: Does the proposed [livestock drinking water] system depend on construction of the irrigation component, i.e., the large diameter pipeline and reservoir?

RESPONSE: Yes, transmission and storage capability is needed to be able to provide water through dry periods when flow in the Upper Hanamaulu ditch diminishes below the daily demand for both livestock drinking water and irrigation. The implementation of transmission and storage infrastructure dedicated just to livestock drinking water would be more costly than as a part of the expanded WIS.

COMMENT: How are the livestock in AU (animal units) determined?

RESPONSE: The NRCS National Range Handbook defines an animal unit (AU) as "a mature cow or approximately 1,000 pounds and a calf or as old as six months of age or their equivalent." As a guide, a mature bull is 1.25 AU equivalents, while one-year-old calves are 0.60 AU equivalents.

The average stocking rate for conventional grazing methods was determined to be 2.3 acres per AU, through interviews with ranchers, including Parker Ranch Farm, in the mid-1980s.

COMMENT: Can the carrying capacity list be demonstrated in fact?

RESPONSE: The carrying capacities listed are estimates of the full production potential based on interviews with area ranchers. The increase assumes that intensive grazing systems will be used. A 1984 report entitled "Economics of Intensive Grazing: A Case in Hawaii" by Leung and Smith recorded a three-fold production increase from 290 pound of beef per acre under conventional methods to 725 pounds per acre with intensive grazing. This increase was achieved without fertilization of pastures, with very little legume in the paddocks, and during four months of drought in the study year.

COMMENT: Has the state acquired or discussed acquiring the lands shown for Ag Park expansion?
RESPONSE: No, the land shown in the display is the Lalamilo Ag Park Expansion and has not been acquired by the state. Since the late 1980s, the state has been discussing the acquisition of the land with the owner, Parker Ranch. Parker Ranch is opposed to relinquishing that area for agricultural park development but is willing to make available alternate sites for the Ag Park expansion. The Department of Agriculture continues to negotiate with Parker Ranch for alternate sites for the agricultural park.

The Lalamilo Agricultural Park Expansion is not a component of this project and is not covered by this EIS.

COMMENT: How much will the capital investment per new irrigated acre be?

RESPONSE: The "new irrigated areas" are assumed to be the 1.15 acres of irrigated cropland in the proposed 270-acre Ag Park. The capital investment will be the installation cost of the lateral distribution pipeline for the Ag Park and the proportion of the reservoir and pipeline costs attributable to the Ag Park expansion. The total irrigated acreage project area, with project installation, is 980 acres.

The cost of the lateral distribution system is $493,400 and the proportional cost of the reservoir and other pipeline improvements is $1,392,000, for a total capital investment cost of $2,885,400. For 115 acres of irrigated cropland, the cost per acre to provide irrigation water to the parcel boundary is $16,400.

COMMENT: What will be the per acre service charge for irrigated land?

RESPONSE: The current service charge for the WIS, which is charged in addition to $0.16 per 1,000 gallons of water, is $2.25 per acre per month. While the service charge is not expected to increase, the Department of Agriculture is in the process of securing a rate increase for the following charge.

COMMENT: How are the estimated crop losses determined and verified?

RESPONSE: NRCS procedures for determining crop losses and benefits based on the federal Water Resource Council's "Economic and Environmental Principles and Guidelines for Water and Rangeland Resources Implementation Studies" were followed. Crop losses, which are cost estimates for crops commonly grown in the area, were prepared. Benefits, which are increases in net income, were estimated for differing levels of irrigation water availability. The ability of various combinations of improvements to the WIS to consistently provide water to users was evaluated using existing runoff records to determine the water supply reliability of each alternative. The calculated net income to farmers for the existing condition, for conditions with 100 percent reliability of water supply, and for conditions with implementation of the project alternatives were compared. Estimated crop losses in the difference in net income between the existing condition and that with 100 percent reliability of irrigation water supply.

Verification of estimated crop losses relies on interviews with area farmers. No financial records were requested for verification of past crop losses as NRCS policy.

COMMENT: Are the farmers making crop loss claims?

RESPONSE: The evaluation for the project estimates that an average of nearly $6 million in net income is lost yearly on existing cropland due to inconsistent and inadequate water supply. Losses include crop failures during prolonged droughts, as well as, decreased number of planting cycles due to uncertainty of water supply, reduced produce quality and quantity due to fluctuations in water supply, and increased effort and cost, such as for night irrigation.

While newspaper clippings indicate that state and federal programs to provide disaster relief have been utilized by Waima farmers' during droughts, the need for a declaration of emergency by the government and program restrictions, especially in the federal program excluding much of the types of farming activity taking place in Hawaii, make crop loss claims a poor source of data about water shortage losses suffered by Waima farmers.

COMMENT: Are the preparers aware that the streamflow reporting was inaccurate?

RESPONSE: Yes. The U.S. Geological Survey streamflow data has been used judiciously. Data that was deemed unreliable by the USGS, such as the 1984-1990 for the Upper Hamakua Ditch above Waima Reservoir, was not used.

COMMENT: Was the alternative of wells in the high level newly defined aquifer seriously and adequately considered as a substitute to storage?

RESPONSE: The use of wells, such as the existing 1,000-gpm, 1,200-foot deep Paukauhi Well, to augment the Waima Reservoir supply for expansion of the WIS was considered, but not in great detail. A principal test of the Waima-Pamelio Watershed project and other agricultural water projects undertaken by the then Department of Agriculture and NRCS is to reserve groundwater resources for domestic supply and to protect and make more efficient use of the already developed surface water sources. Wells are used only as a backup to surface sources. To this end, the suggestion of acquiring the DWR's surface water sources and storage in exchange for financial assistance to develop domestic supply wells was pursued by project planners.

COMMENT: Were the 1995 HELCO power rates changes studied in evaluating pumping?

RESPONSE: The rate change referred to is assumed to be the Night Rate offered at $0.035 per kWh between 9:00 PM and 7:00 AM plus a $200 monthly fee. Power usage must only be during this period.
The Night Rate was not considered in detail for well operation due to the tenet that groundwater should be reserved for domestic supplies. While the Night Rate would considerably reduce operating costs for wells, reliance on the rate would require the installation of 1.4 additional wells to provide the same volume of water as one well operating continuously.

The small sizes of the booster pumps in the distribution systems, mostly 5-hp, make the Night Rate, with its $200 monthly fee, often more expensive than the General Service Rate at $0.17 per Kwh and $45 (three-phase) monthly fee. A distinct disadvantage of the Night Rate would be the requirement to pump only during night hours requiring considerable storage facilities rather than pumping "on demand."

**COMMENT:** Why weren't recent (since 1985) DLNR and USGS publications referring to groundwater in the source area of Waimana cited as references?

**RESPONSE:** Here, again, the focus was on better utilization of the surface water sources. DLNR Circular C-116 (Nance and Bowels, 1983) discusses groundwater drilling sites in the Kohala Mountains above Waimana for possible water bodies at a depth on the order of 1,000 feet. The work makes a strong case for the wells as an alternative to large reservoir projects. USGS Water Resources Investigations Reports 85-4113 (Underwood, Meyer, and Siva, 1993) discusses seasonal groundwater availability from the Waiakea-Palani watershed. USGS Water Resources Investigations Report 85-4114 (Shade, 1993) discusses a general water budget for the Kohala area and shows that the highest percentage of rainfall goes to aquifer recharge.

**COMMENT:** What were the actual operating costs of the Pa'auhau well in the 1996 drought?

**RESPONSE:** The Pa'auhau well was not utilized by the Department of Agriculture during the 1996 drought.

**COMMENT:** Are the alternatives considered in the Draft EIS timely in view of the 18-year life of the planning period?

**RESPONSE:** Yes, the improvements to the WIS water storage and distribution capabilities are presently needed due to the steady growth of agricultural activity, extension of the WIS system into the DIHIL, Pa'auhau farmers, and desire for ranchers to establish productive economic units. The WCDL project authority allows considerable flexibility as to agricultural use of the improvements, thereby, allowing the project to meet the needs of farmers and ranchers in Waimana.

**COMMENT:** Was any consideration given to reallocation of water resources in view of the recent (1990s) discovery of high level ground water?

**RESPONSE:** No. The only reallocation of water that was considered is light of the groundwater situation was the exchange of the DWS surface sources and reservoirs for financial assistance to develop wells sources for domestic supply.

**COMMENT:** How would this project fit into the larger picture as it relates to the State's Water Code?

**RESPONSE:** This project complies with the policy stated in the State Water Code (Section 174C-2(c)3) that maximum beneficial use of the water for purposes, including irrigation and other agricultural uses, should be made while protecting environmental and cultural values. The Waimea Palani Watershed project expands use of an already developed surface water source, which is not desirable for potable water supply, for agricultural purposes without applying adverse environmental or cultural impacts.

The Hawaii County Water Use and Development Plan (1992), which is required of all county by the State Water Code, anticipates the installation of this project to meet the water needs of Waimana's farmers and ranchers.

**COMMENT:** When designing the leopland options, was consideration given to setting aside adequate cropland adjacent to the irrigation system for future expansion need in the next century?

**RESPONSE:** No. Nearly all of the land adjacent to the irrigation system is presently designated for agricultural use, as shown on Figure B - County Landuse Districts. An abundance of land for expansion of irrigated crops exists in the project area.

**COMMENT:** What are the limits of high elevation croplands throughout the state?

**RESPONSE:** The two main regions for high elevation crops in Hawaii are Waimana, Hawaii and Kula, Maui. Both regions have the land area to allow for expansion of cropland if conditions for profitable agricultural activity, such as adequate and consistent water supply, are provided.

**COMMENT:** Are the present lands adjacent to the existing pipeline fully utilized in crop production?

**RESPONSE:** No. While high rates of crop utilization exist in the La'auwili and Pa'auhau-Palani areas, the DIHIL Pa'auhau farmers are still being developed.

**COMMENT:** That is, might trade be more effective as an alternative to building new irrigation systems?

**RESPONSE:** The location of the Agricultural Park proposed by the DOA is still uncertain. For display purposes, the La'auwili Ag Park expansion was shown in its initially proposed location, just east of the Kamehamea Airport. Other locations will also be...
evaluated by the DOA as locations to develop the Agricultural Park. It is unlikely that lands adjacent to the existing distribution system can be acquired due to the many smaller, individually-held land parcels and higher land costs nearer the Waimea Town core.

COMMENT: Are modern irrigation techniques considered in calculating agricultural water needs? If not, why?

RESPONSE: Yes, irrigation water use efficiencies reflecting widespread use of drip/trickle irrigation methods was used to determine future irrigation water needs. The natural resource conservation program administered by the Mauna Kea SWCD and the NRCS will encourage and assist farmers to implement water-conserving irrigation methods.

COMMENT: Have the potential impacts to ground water or stream contamination been thoroughly addressed in regard to the agricultural lot expansion and nutrient management?

RESPONSE: A discussion of potential impacts of increased agricultural chemical use is included in Section 6.4.8 Groundwater in the DEIS. Impacts to stream systems by major projects in the Puukupa and Lalamilo upland areas are not.

Sincerely,

[Signature]
KENNETH M. KANESHIRO
State Conservationist
May 12, 1997

Mr. Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, HI 96850-0004

Dear Mr. Kaneshiro:

Draft Watershed Plan and Environmental Impact Statement for the Waimea-Pauuilo Watershed Project
Hauula and South Kohala Districts, Island of Hawaii

Thank you for your letter dated March 20, 1997, requesting our review and comment of the above-described document.

Our only comment is that Section 6.6 Relationship to Other Plans, Policies, and Controls should include a discussion on county zoning requirements. The Selected Plan identifies the construction of the proposed Kualii Reservoir on lands designated Agricultural-40 acres (A-40a) by the County Zoning Code. Section 25-4-11(a) and (c) of the Zoning Code states that "Communication, transmission, and power lines of public and private utilities and governmental agencies are permitted uses within any district and that "Public users, structures and buildings and community buildings are permitted uses in any district; ..., respectively.

We appreciate the opportunity to be included in the review of this document. We look forward to reviewing the Final Environmental Impact Statement. Please contact Daryn Aral of this office should you have any questions.

Sincerely,

VIRGINIA GOLSTEIN
Planning Director

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER
May 12, 1997

Mr. Kenneth M. Kaneshiro, State Conservationist
Natural Resources Conservation Service
United States Department of Agriculture
P. O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, Hawaii 96850-0000

Dear Mr. Kaneshiro:

Subject: Waimanu-Pauulu Watershed
Hanakua/South Kohala Districts
Draft Plan and EIS

Thank you for the opportunity to review the subject docu-
ments. The proposed project will have no impact on our facili-
ties. Therefore, we have no comments to offer.

If there are any questions, please have your staff contact
Mr. Ronald Ching of the Planning Branch at 586-0490.

Very truly yours,

GORDON MATSUOKA
State Conservationist

Cc: Mr. James J. Nakatani
OGQC

Gordon Matsuoka, State Public Works Engineer
Department of Accounting and General Services
State of Hawaii
P.O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Matsuoka:

Subject: Draft Watershed Plan and Environmental Impact Statement for the
Waimanu-Pauulu Watershed

Thank you for your letter of May 12, 1997 stating that the Department of Accounting and
General Services has no comments on the subject document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist
May 12, 1997

R and S Farms
Spencer Akana
Box 1988
Komuali, Ill., 96743

Kenneth M. Kanehiro
State Conservationist,
Natural Resource Conservation Service
Box 58004, Honolulu, Ill. 96850

Dear Sir,

I attended the April 23, 1997 public meeting regarding the Waimea-Palolo Watershed Project. I represent a committee developing a proposal for irrigation of a portion of pastoral land located within Paukupu Pastoral Lots Phase II.

The recent improvements, location, and availability of these lots provide a unique opportunity to develop a Community Resource Center for cattle marketing from the Oahu lands in the Pali area.

Unfortunately, the Draft EIS recommends against pasture irrigation. Further review indicated the reasoning was the annual net return failed to yield an acceptable cost to benefit ratio. The value was stated on page 91 of the Draft as $287,700.00 for 819 animal units or $25.00 per head per year. These figures were explained as, "the net return for livestock production (after costs for production were subtracted)."

These numbers were developed in 1989. The industry has not been static for the last 8 years and in fairness to the 200 plus ranchers who will be affected by this report, perhaps a current review of the cattle market is required.

A recent program sponsored by the academic segment of the industry called Forage Field Days, featured Grass Finished Beef and the product was well received. Encouraging progress has been made in the "niche" market with Hawaii Natural Meats opening for business in January of this year. A high value, naturally produced, alternative to imported beef is a reality and current data should be available to provide a more timely assessment of our livestock's value.
The committee's proposal seeks to develop two 100 acre pastoral lots into an intensively managed production facility. The lots are numbers 21 and 22, located in Puukapu Pastoral Lots Phase 11, (map included).

These lots are currently available. They are unique among pastoral lots because one has access to utilities (UWS, WIS, UELCO) and paved roads. The proposal incorporates irrigation of a centralized, high protein, feed bunk, around which the animals will rotate. The current availability of WIS water allows the proposal to commence immediately. The Kauahi Reservoir is not required for the proposal.

The benefit to the DLH ranching community is the coordination of assets in a unified approach to the market. The facility would centralize the development and marketing of DLH herds in the area and provide consistency to the marketplace. The proposal is intended to serve as a working model for current and future lessees. We are in competition with large operations and need to coordinate our resources.

We appreciate the effort the WIS has consumed to date and we are in support of a reliable watersource for agriculture in this area. We believe that cattle have a place in the long term development of agriculture and seek support for the proposal described above to facilitate that goal. The proposal seeks to demonstrate that increased value can be derived from our production with irrigation and modern management. The unique opportunity afforded by these lots and their amenities should be given careful consideration before recommending against pasture irrigation.

The highest value priority for water development is good policy. Our position is that the cattle industry should not suffer the indignity of having our water shut off during times of stress but allow vegetables and flowers to be irrigated. I don't propose to challenge the farmer for his water but rather to assign a fair value to our "crop" to justify our share. I believe the process will be beneficial to all agricultural interests in the area.
We have received support from the DLHIL community for the concept, and enlisted the services of Dr. Durl Smith to help with the development of a reliable business plan. Education of current and prospective lessees provided by this proposal should shorten the interval from start-up to production and assist currently operating farms with direction. The industry is changing constantly and good opportunities are available for our product today that did not exist yesterday. The visitor industry is less than 20 miles away from this production center and the Global nature of that industry can positively influence the value of our herds.

I would appreciate an opportunity to discuss the matter with your staff. We have discussed the proposal with Jerry Williams and Gary Kam of the Kamuela DLHIL field office and are anticipating assistance with planning and education as the proposal moves forward. Thank you for your time and consideration in this matter.

Sincerely,

[Signature]
Spencer N. Ikana
July 8, 1997

Spencer Akana
A and S Farms
P.O. Box 1988
Kamuela, Hawaii 96743

Dear Mr. Akana:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waima-Paauilo Watershed

Thank you for your letter of May 12, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: A committee has been formed to develop a proposal for irrigation of portions of lots 31 and 22 of the Puako Paniolo Lot Plan II as an intensively managed production facility. The facility would coordinate the DIHIL ranching resources, provide a unified approach to marketing, and serve as a working model for DIHIL ranchers.

RESPONSE: The committee is committed to the efforts to develop a technically-advanced, business-oriented ranching enterprise that can be a model for other ranchers.

COMMENT: The draft EIS recommends against pasture irrigation due to annual net return falling to exceed annual net cost) and yielding an unacceptable benefit to cost ratio.

RESPONSE: As a clarification, the draft plan EIS stated that federal funds could not be used for construction of the livestock drinking water system due to average annual costs exceeding annual benefits. Irrigation of pastures was not considered or recommended due to the high water requirement. The manager of the WIP will need to develop a policy addressing water supply for pasture irrigation.

COMMENT: The values for cattle developed in 1989 may not reflect the current value of cattle. A current review of the cattle market is required.

RESPONSE: The 1989 value of cattle was updated to current prices to estimate the economic benefits of the project for the DIHIL. The issue of current economic return to Waima cattle ranches was discussed with Dr. Jack Smith in 1996. It appears, from that conversation, that the market for Waima cattle is more tenacious than it had been in 1989. While lucrative "niche" markets may exist for some beef cattle in Waima, the majority of the Waima herd will still need to be shipped to distant finishing facilities.

Thank you for your interest in the watershed project. A meeting with project planners can be arranged through Gary Kam, District Conservationist, NRCS Kamuela Field Office, telephone (808) 885-6622.

We also recommend that you contact Ron Haben, NRCS Grazing Land Specialist, who may be able to provide technical assistance to your project. Ron can also be reached at the NRCS Kamuela Field Office, telephone (808) 885-6622.

Sincerely,

[Signature]

KENNETH M. KANEHiro
State Conservationist
RE: Draft Watershed Plan and Environmental Impact Statement

Dear Mr. Kaneshin,

We support improvements to the Waima-Paulei Watershed Plan. We recommend that the Environmental Impact Statement address the following concerns:

1. We anticipate a change of classification of lands designated as pastoral to farmland or farm (pastoral) areas of 5, 10, 15, 20, 100, and 200 acres, none of which are urbanized areas. Therefore, the 10 gallons per acre the Department of Agriculture assumes we may need is inadequate and grossly incorrect.

2. We would like to stipulate that the bid proposal for the general contractor include provisions for sub-contractors of Hawaiian ancestry. We appreciate the opportunity to participate in this process.

Sincerely,

[Signature]

M. Kanehisa
President

United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 5004
Kauai, Hawaii 96743

July 8, 1997

M. Kanehisa, President
Waima Hawaiian Homesteaders’ Association, Inc.
P.O. Box 6753
Kamuela, Hawaii 96743

Dear Mr. Kaneshin:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waima-Paulei Watershed

Thank you for your letter of May 13, 1997 with comments on the draft Waima-Paulei Watershed Plan and Environmental Impact Statement. We appreciate your support for the project. We offer the following responses to your other comments.

COMMENT: We anticipate a change of classification of lands designated as pastoral to farmland or farm (pastoral) or farm.

RESPONSE: DHIE TITLE 10 Administrative Rules, Section 10-3-37(b) states:

"Leases with pastoral lots may raise crops for feeding to be used only for animals on the lot. A portion of such lot may be utilized to raise vegetables or fruit crops for consumption by lessee's immediate family."

Homestead pastoral leases permit certain uses to increase the carrying capacity of your lot and expand into subsistence farming. This can be accomplished without a change in the classification of your homestead pastoral lease. Issues of future water allocation changes will be addressed by the management of the Waima Irrigation System.

COMMENT: We would like to stipulate that the bid proposal for the general contractor include provisions for sub-contractors of Hawaiian ancestry.

RESPONSE: While the federal government's contracting regulations do not allow the stipulation for contractors of a specific ethnic group, a provision for the employment of small and minority contractors may be used advantageously by contractors of Hawaiian ancestry. The construction of the livestock drinking water pipeline system will be wholly financed by the State of Hawaii. The stipulation for contractors of Hawaiian ancestry
May 15, 1997

Mr. Kenneth Kanehiro
State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50004
300 Ala Moana Blvd., Room 4316
Honolulu, Hawaii 96813-5004

Dear Mr. Kanehiro:

Re: Draft Watershed Plan and Environmental Impact Statement
Wai'anae-Punahou Watershed
County of Hawaii, Hawaii

I have reviewed the draft EIS for the subject project and have numerous concerns and matters that I recommend be addressed in the final EIS.

As you know, environmental effects associated with any type of reservoir development have potentially adverse impacts. Specifically—and within the context of this project—a number of factors concerning land use, stream flow, endangered species and wetlands require a more thorough discussion to assess indirect and cumulative impacts. Also, the use of flow charts to demonstrate the technical processes of the project would be helpful.

To begin with, your agency states that when stockwater becomes available for cattle consumption ranchers can increase their livestock herd, in turn, pursuing more intensive grazing methods. Please describe in greater detail the grazing methods that will be employed, including the potential for increases in soil erosion. Furthermore, within the cost: benefit ratio listed for cattle ranching please factor in the costs associated with importing beef from the mainland (i.e., following the shipment of cattle to the mainland for finishing). How do the costs of subsidized water and grain and beef importation prices compare to those of maintaining and expanding ranching operations?

Additionally, while the reservoir project does call for direct increases in existing water collections, the water budget will indeed be altered by an additional reservoir and collection system. Important and possible indirect and cumulative impacts that need greater analysis include: reduced flow to the La'akea, Kiiwaiwa and Waiau streams—the last of which flows into Waipio Valley, in turn, potentially impacting taro farmers; decreases in native stream biota and riparian vegetation; reduced overflow from UID to La'akea Stream which would help alleviate future impacts from diversion of water by La'akea Kula and wetlands associated with the four small drainageways. Likewise, please note that a buffer zone, documentating the wetland areas, is needed to minimize impacts associated with the installation of the 1st pipeline. To trench and bury the pipeline within the ditch corridors and wetland areas (described as the best alternative) implies a major amount of disturbance, and will necessitate restoration of the area after construction is completed. Also, the affected streams should be assessed for qualification as historic or candidate streams.

Lastly, regarding cultural resources and endangered/threatened (EUT) species, several matters need clarification. Please state whether subsurface trench lines were conducted for the reservoir supply pipeline. Concerning EUT species surveys, the project is an important part of assessing the presence of such species. Thus, my question is how often and when were these surveys performed for both forest birds and the "Jo and Joe?" The same can be said for the lack of night surveys for the Hawaiian honey bee—which need to be conducted by the USDA prior to the commencement of this project. Similarly, the fact that the UID provides minimal habitat for the Hawaiian duck does not preclude this waterbird's presence. It is precisely because of diminishing habitat that one finds EUT species existing within marginal habitat types. The presence of the Kololo and possible impacts to it requires a more thorough assessment. Furthermore, buffer zones should be implemented for all sensitive areas which afford habitat for significant resources located in sections 1-3 of the former project area, as identified by Stennis's and Jacobson's 1987 survey.

Thank-you for the opportunity to review this document. Should you have any questions, please contact me at 733-4265.

Sincerely,

[Signature]

[Stamp]

Mr. Kenneth Kanehiro
Page 2
July 8, 1997

Hely Hager
P.O. Box 61652
Honolulu, Hawaii 96820

Dear Ms. Hager:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimanalo-Pelu Island Watershed

Thank you for your letter of May 15, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: The DEIS states that when stockwater becomes available ranchers can pursue more intensive grazing methods. Describe in greater depth the grazing methods and the potential for increased soil erosion.

RESPONSE: Section 2.5.2 Cattle Ranching will be expanded to include a discussion of management methods to increase herd size while protecting productivity of grazing land.

Intensive grazing methods are based on proper distribution of animals in pastures. Through management techniques and practices to optimize the production of forage plants, and assure full utilization of the forage, ranchers can increase their herd size during most periods. Management practices will be included in the Conservation Plans prepared for each ranch.

Practices that will be recommended to improve distribution of livestock for efficient forage use include the following. Fencing to reduce pasture size allowing a concentration of animals to graze for short periods between long rest periods. Concentrated grazing will allow full and uniform utilization of the forage. Installation of livestock water facilities in locations distributed to optimum travel distances from pasture to water are not exceeded. Soil erosion from grazing land will be reduced as a result of improved vegetative cover.

COMMENT: Faster the costs associated with importing beef from the mainland into the benefit to cost analysis. How do the costs of subsidized water and grain and beef importation prices compare to those of maintaining and expanding ranching operations?

RESPONSE: The benefit to cost analysis for beef cattle production in the Waimanalo area completed for the 1993 plan environmental assessment demonstrated the low profitability of ranching in the watershed. A recent update of production costs shows that the situation has not changed. While costs of importation of mainland beef may be high, the high. A factor making island beef even less competitive on the local market is the importation of inexpensive beef from Australia and New Zealand.

While the federal program is unable to provide construction funding for the livestock drinking water distribution system due to the low benefit to cost ratio, the Department of Hawaii has already approved the construction of the livestock drinking water system to fulfill their trust responsibility and to provide social benefits to native Hawaiians.

COMMENT: Greater sensitivity and cumulative impact of reduced flow to Lahaina, Kula, and Wailuku Streams is needed. The affected streams should be assessed for qualification as Heritage or Candidate Streams.

RESPONSE: The only direct effect on streamflow due to installation of this project is the reduction of the overflow of the Upper Hamakua Ditch into the Lahaina Stream system which is displayed in table and graph forms in the DEIS on page 107. There are no indirect or cumulative effects on the collection capacity of the Upper Hamakua Ditch as a result of the installation of this project.

The change in flow rate in Wailuku Stream, on the floor of Wai'pio Valley, will be very near the five percent reduction projected for its major contributor, Lahaina Stream. Table 5 will be expanded to include the change in flow rate in Wailuku Stream using the average flow rate from 504 to 1999 in a grid site approximately 2.5 miles inland, well above the confluence of Wailuku Stream. The average discharge during that period was 305 cfs or 48.1 million gallons per day and 17,574 million gallons per year. The change in flow rate from the Upper Hamakua Ditch will reduce the calculated average annual streamflow at the confluence from 24,654 million gallons per year to 24,277 million gallons per year, a 1.5 percent reduction.

Both Lahaina and Wailuku Streams are included in the Hawaii Stream Assessment (1990) as Candidate Streams for Protection. Lahaina Stream may meet the criteria for designation as a Heritage Stream when the program is implemented. The installation of the Waimanalo-Pelu Island Watershed project will have no effect on the stream resources considered by either designation.

COMMENT: A buffer zone, incorporating the wetland areas, is needed to minimize impacts associated with the installation of the 1 inch pipeline.

RESPONSE: The one inch diameter pipeline will traverse small wetlands and wetland areas. Where practicable, these areas will be avoided by routing around them (leaving a buffer of at least 20 feet) or, where avoidance is not possible, the pipeline will be elevated over these areas. In some areas, because of the gentle slopes, bridging will not be
possible and all impacts will be minimized by following the conditions in the Army Corps permit.

COMMENT: To trench and bury the pipeline within the gulch corridors and wetland areas implies a major amount of disturbance, and will necessitate restoration of the area after construction is needed.

RESPONSE: When unavoidable, the trench for the 1 inch pipeline will be approximately one foot wide by 3 feet deep, which we do not envision creating a "major amount" of disturbance. During construction, we plan to follow the Corps permit conditions in compliance with water quality standards, and appropriate erosion and siltation controls will be used and monitored in effective operating condition. We agree with your recommendation that the area be restored after construction. Per the Army Corps permit, we will be restoring the site to pre-construction contours. If necessary, any exposed streambanks and upland areas will be revegetated to minimize erosion and control siltation.

COMMENT: Concerning EFT species surveys, there seems to be a number of discrepancies. The Elipelo and Appone are endangered (not alien), implying that USFWS surveys did identify them within the project boundaries. How alien and when were these surveys performed for both forest birds and the "to and Mehe?"

RESPONSE: First, we did not mean to imply that the Elipelo and Appone are alien. They are native and very important species. They are listed on the most recent EFT list (March 1, 1996, USFWS), although the Elipelo is a "candidate" for listing. Second, the USFWS surveys were done for an area much larger than the project site, and detailed information about the exact locations of sightings was not given in their reports. Therefore, we listed them in the EIS although it is highly unlikely that they would use the project site. The project will not impact Mamane, Koa, or Ohia's Forests where these birds are likely to be found. The majority of the project site is grazed, non-native pasture land.

The threatened and endangered forest bird surveys were conducted in mid-1980s, primarily by the U.S. Fish and Wildlife Service. The results of the surveys were summarized in the 1987 Biological Assessment for the Waima-Pauilo Environmental Assessment. Since that time, improvement elements on segments of the Upper Hamakua Ditch in sensitive forest areas have been eliminated from the project and no new information increasing the area extent or species of threatened or endangered forest birds in the project area has been brought forth during consultations with the USFWS and others. When design of the pipeline and Upper Hamakua Ditch inlet begins, NRCS will again consult with the USFWS and consider their recommendations.

The survey dates for the Mehe and "to are uncertain. When design of the pipeline and Upper Hamakua Ditch inlet begins, NRCS will again consult with the USFWS and consider their recommendations.

COMMENT: The same can be said for the lack of night surveys for the Hawaiian hoary bat — which need to be conducted by the USFWS prior to the commencement of this project.

RESPONSE: When we discussed with USFWS the potential impacts of the project on the bat, we were told that the bat may be in the gulch areas, but that this pipeline project will likely have minimal impacts on them. The trenching will be conducted during the day and will be short-term. Regarding your suggestion about conducting night surveys, we will consult with USFWS during the design phase and consider their recommendation.

COMMENT: The presence of the Kolua and possible impacts to it requires a more thorough assessment.

RESPONSE: As we mentioned above, no Kolua or any other TII species were observed during the recent vegetation surveys. However, the duck may occasionally use the waterways. As with potential impacts to the bat, temporary disturbance during construction should have minimal impact on the Kolua. We will consult with USFWS to ensure all appropriate measures are taken prior to construction, including possibly further surveys, if necessary.

COMMENT: Were subsurface trench lines conducted for the archeological survey for the reservoir supply pipeline?

RESPONSE: No features warranting subsurface trenching were identified during the cultural resources survey for the reservoir supply pipeline. An additional archeological evaluation of the pipeline alignments will be made once the designs are completed and the alignments are laid out on the ground. Archeological monitoring at potentially sensitive sites will be conducted during excavation and pipeline installation.

Sincerely,

KENDRICK H. KANESHIRO
State Conservationist
TO: THE HONORABLE JAMES J. NAKATANI, CHAIRPERSON
       BOARD OF AGRICULTURE
       DEPARTMENT OF AGRICULTURE

FROM: KAZU HAYASHIDA
       DIRECTOR OF TRANSPORTATION

SUBJECT: DRAFT WATERSHED PLAN AND DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)
          TMK: 4-4, 4-6, 4-9, 6-3, 6-4, 6-5, 6-6, 6-7

[Paragraphs]

Thank you for your transmittal of March 20, 1997, requesting review of the subject document.

As noted in the Draft DEIS, the proposed development may conflict with two of the four alternative alignments identified in the Waimea Bypass project route study. Please coordinate the implementation of the development with our Highways Division.

We appreciate the opportunity to provide comments.

Sincerely,

[Signature]

KENNETH M. KANEHIKO
State Conservationist

cc: James Nakatani, Chairperson, State of Hawaii Department of Agriculture
May 8, 1997
ER 970175

James J. Nakatani, Chairperson
Board of Agriculture
State of Hawaii, Department of Agriculture
P.O. Box 22159
Honolulu, Hawaii 96823-2159

Dear Mr. Nakatani:

The Department of the Interior (Department) has reviewed the Draft Watershed Plan and
Draft Environmental Impact Statement (DEIS) for the Waimea-Pauuia Watershed, County of
Kauai, Hawaii. The following comments are provided for your use and information when
preparing the Final Environmental Impact Statement (FEIS).

GENERAL COMMENTS

The DEIS provides limited discussion on the water availability that would supply the new
reservoir and the existing Waimea reservoir. According to the U.S. Geological Survey
(USGS), the discussion on page 40, 4.3.1 briefly discusses: 1) the problem of short record
periods and long term hydrometeorological cycles and 2) states that much of the data collected
between 1972-1990 is poor or unusable. Thus, the FEIS needs to provide a hydrologic
analysis, based on the best available data, to evaluate the availability of surface water for the
project. Analyses on water availability and cited references should also be included.

The Department suggests that a simple monthly mass balance for the system should be
prepared, using the best available data. This will show inflow, draft, direct rainfall on
the reservoirs, and losses from evaporation. According to USGS records, 25 percent of the
130 months of record had a flow substantially less than the desired draft of 4 million gallons
per day.

The proposed project would increase the reliability of the water supply from 68 percent with
no project to 78 percent with the project. We suggest this 10 percent difference in reliability
may possibly be made up by the use of groundwater. The alternative for using groundwater
should be explored in the FEIS.

SPECIFIC COMMENTS

Page 107, Tables S and T: The FEIS should reference to the streamflow data used to prepare
Tables S and T, and include information on the length accuracy of the records used.

We appreciate the opportunity to comment.

Sincerely,

Patricia Sanderson Post
Regional Environmental Officer

cc: Director, OEPC,墙igonal Incomig
Regional Director, FWS, Region I
Chief, Environmental Affairs Program, USGS
July 8, 1997

Patricia Senderson Port, Regional Environmental Officer
U.S. Department of the Interior
Office of Environmental Policy and Compliance
600 Harrison Street, Suite 515
San Francisco, California 94107-1376

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimauku Watershed

Thank you for your letter of May 8, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: The FEIS needs to provide a hydrologic analysis, based on best available data, to estimate the availability of surface water for the project. Analysis on water availability and cited references should also be included.

RESPONSE: The ten years of reliable record from the USGS gaging station (Sta 16370000) on the Upper Hamakua Ditch adjacent to the inlet to the Waimauku Reservoir will be shown in a monthly format in Section 2.7 of the DEIS.

COMMENT: The Department suggests that a simple monthly mass balance for the system should be prepared. This will show inflow, draft, direct rainfall on the reservoirs and losses from evaporation.

RESPONSE: A table displaying the reservoir operation water budget in monthly increments will be included in Section 5.2.5.

COMMENT: The 10 percent difference in reliability provided by the project may possibly be made up by the use of groundwater. The alternative for using ground water should be explored in the FEIS.

RESPONSE: Groundwater has been evaluated as an additional source of agricultural water for the Waimauku Irrigation System. Discussion of the 1,200-foot deep Pumpki backup well is included in Sections 3.7.1 and 4.1.3. The 10 percent difference in reliability between the future without project and future with project conditions also includes water for an additional 115 irrigated acres and the stock water system. In rough figures, an additional 414 million gallons per year is required. At a cost of $7.55 per 1,000 gallons to pump water from the well, $310,000 per year in energy costs will be required. The water rate for irrigation use is $.16 per 1,000 gallons plus $.25 per acre per month, considerably less than the cost for pumping.

A principal tenet of the Waimauku Watershed project and other agricultural water projects undertaken by the State Department of Agriculture and NRCS is to reserve groundwater resources for domestic supply and to protect and make more efficient use of the already developed surface water sources.

COMMENT: The FEIS should reference the streamflow data used to prepare Tables S and T and include information on the length and accuracy of the records used.

RESPONSE: The references used to develop Tables S and T as well as a discussion of the length and accuracy of the records will be included in the FEIS.

Sincerely,

Kenneth M. Kaneshiro
State Conservationist
Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P. O. Box 50004
Honolulu, HI 96850-0004

Subject: Wai'anae-Pa'ia'a Watershed Project
Breach Inundation Map & Discussion and Draft Environmental Impact Statement

Dear Mr. Kaneshiro:

Approximately fifty percent of my 80 acre property (Tax ID: 4-62-83) is located in the proposed Breach Inundation Map prepared by the United States Department of Agriculture, Natural Resources Conservation Service. I am extremely concerned about several things mentioned in the Draft EIS and Breach Inundation Map and Discussion and request they be clarified to my satisfaction.

My property is currently included in the Flood Zone "X", the most flood prone of all the flood zones. I request clarification that this flood zone designation will not change now or in the future as a result of building the reservoir. A change in flood zone would have a severe negative economic impact upon me and request a satisfactory response to the request that would be reimbursed.

The Breach Inundation Map shows three elevation stations on my property and a fourth elevation station at my property boundary line. These are apparently used to calculate the depth of flood waters at these different elevations. Today I requested flood depth calculations of these four stations from the USGS Kauai Field Office and was informed, after they checked with the Oahu office, that only one of the stations shows on the map had actually been calculated. You would like these depth calculations as well as detailed survey and topographical maps of all my property in the proposed Flood Inundation Area, and a written explanation of the impact on my property. I would like written clarification that none of my improvements of any kind are in the Breach Inundation Area.

My property is located in Suisan Zone 3 which is currently in the process of being changed to Zone 4 by the 1997 edition of the Uniform Building Code for Hawaii County has adopted Zone 4 requirements. There are four suisan zones on the Big Island, ranging from Zones 1 to 4. Zone 4 is the greatest suisan hazard level assigned. Quoting from the "Kauai Flood Map Breach Discussion": page 1: "The Kauai Reservoir Dam breach inundation will be conservatively estimated as a moderate flood causing the Kauai's future would result in loss of life and appreciable property damage." Has the change in Suisan Zone been taken into consideration? Please provide me with a complete current study of earthquake as they relate to this project. Given the two statements above and since fifty percent of my property is in the proposed Breach Inundation area, how would the negative financial and emotional impacts be mitigated? What financial responsibility in the event of a breach and how do you propose to compensate for the possible loss of life and appreciable property damage?

There are other concerns I will comment upon at a future date as my research is incomplete.

Please direct all correspondence to:

Dinika Feeney
P. O. Box 1116
Kaneohe, Hawaii 96743

Sincerely,

Dinika Feeney

cc: Office of Environmental Quality Control
Flavian Travis, Esq., Carlson Ball Wichman Case & Leoni

May 13, 1997

United States
Department of
Agriculture
Natural
Resources
Conservation
Service
P.O. Box 5004
Honolulu, HI 96850

July 8, 1997

USDA

Our People...Our Islands...In Harmony

Dinika Feeney
P.O. Box 1116
Kaneohe, Hawaii 96743

Dear Ms. Feeney:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Wai'anae-Pa'ia'a Watershed

Thank you for your letter of May 13, 1997 with comments on the subject document. We wish to respond to your comments.

COMMENT: My property is located in the Breach Inundation Area for the proposed Kualii Reservoir. My property is currently in Flood Zone "X", with no flood insurance required. I request clarification that this flood designation will not change as a result of installation of the reservoir. A change in flood zone will have a severe negative economic impact on me.

RESPONSE: The National Flood Insurance Program, as well as the State of Hawaii floodplain management program, uses the "100-year" flood standard to delineate special flood hazard areas, which includes Zones A, AO, AH, AL, or VE. Zone X is outside of the "special flood hazard" area, within which mortgage lenders require flood insurance. A review of the National Flood Insurance Program regulations (44 CFR, Parts 50-77) and an inquiry with the State of Hawaii Flood Control and Dam Safety manager at DLNR produced no indication that delineation of a dam breach inundation area would have any effect on Flood Insurance Map zoning. The construction of the Kualii Reservoir will have no effect on the 100-year floodplain. No revision of the existing Flood Insurance Rating Map will be required and the flood insurance status of your property will remain unchanged.

COMMENT: The Breach Inundation Map shows three elevation stations on my property and a fourth at my property boundary line. I requested water depth calculations at these four stations and was told that only one of these stations had actually been calculated. I would like these water depth calculations as well as detailed survey and topographical maps of all my property in the proposed Breach Inundation Area and a written explanation of their impact on my property. I would like written clarification that none of my improvements of any kind are in the Breach Inundation Area.

The Natural Resources Conservation Service works to help our American public conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER
Mr. Kaneshiro:

SUBJECT: Draft Watershed Plan and Environmental Impact Statement, Haima-Pauilo Watershed Project, Hauula/ I. Kohala Districts

We have reviewed the subject application and would like to offer the following comments:

1. Engineering Branch:

A dam construction permit is required to construct the proposed Kaahal reservoir as part of the Haima-Pauilo project.

Thank you for the opportunity to review the subject application. We have no further comments to offer at this time. If you have any questions, please contact A1 Jodar of the Land Division at 587-0424.

HAWAI'I: Earth's Best!

Aloha,

MICHAEL D. WILSON

cc: James J. Hakuami, DOA
Gary Gil, ODUC
Hawaii Land Board Member
Hawaii District Land Office

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

FILE NO. 8164

Kenneth M. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P. O. Box 50006
300 Ala Moana Blvd., Room 4316
Honolulu, Hawaii 94650-0050

Dear Mr. Kaneshiro:

SUBJECT: Draft Watershed Plan and Environmental Impact Statement, Haima-Pauilo Watershed Project, Hauula/I. Kohala Districts

Tax Map Key 13rd/ 4-4, 4-5, 4-6, 4-7, 4-3, 4-6, 6-4, 6-5, 6-6, 6-7

Reference is made to our letter of May 14, 1997. We have the following additional comments to offer:

Acoustic Resources Division:

Although the proposed project will reduce flow into Laiha Stream by 8%, this reduction will be compensated by natural fluctuations. Our primary concern is the diversion on Laiha Stream, primarily designed as a temporary measure to divert water while repairing the ditch, this structure has yet to be removed. The final EIS should address this matter.

Thank you for the opportunity to review the subject application. We have no further comments to offer at this time. If you have any questions, please contact A1 Jodar of the Land Division at 587-0424.

HAWAI'I: Earth's Best!

Aloha,

MICHAEL D. WILSON

cc: Hawaii Land Board Member
Hawaii District Land Office
Honorable James J. Hakuami
Gary Gil

---
July 8, 1997

Michael D. Wilson, Director
Department of Land and Natural Resources
P.O. Box 621
Hilo, Hawaii 96720

Dear Mr. Wilson:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Wai`anae-Paana`aua Watershed

Thank you for the letters of May 14, 1997 and June 25, 1997 with DLNR comments on the subject document. We wish to respond to your comments.

COMMENT: A dam construction permit is required to construct the proposed Kauahi Reservoir as part of the Wai`anae-Paana`aua project.

RESPONSE: A Dam Permit will be acquired by the Department of Agriculture before construction of the Kauahi Reservoir. The requirement for a Dam Permit will be added to the permit list shown in Section 5.4.3 Permits and Compliance of the FEIS.

COMMENT: Although the project will reduce flow in Lolokua Stream by five percent, this reduction will be compensated by natural fluctuations.

RESPONSE: Thank you for commenting that the five percent reduction in Lolokua Stream flow due to the reduction in outflow from the Upper Hamakua Ditch is within the normal streamflow fluctuation.

COMMENT: Our primary concern is the diversion on Lolokua Stream, originally designed as a temporary measure to divert water while repairing the ditch. This structure has yet to be removed.

RESPONSE: The diversion on Lolokua Stream, constructed in 1989 by the Hamakua Sugar Company to protect temporary repairs to the Lower Hamakua Ditch, is outside of the Wai`anae-Paana`aua Watershed and will be unaffected by this project. Permanent repair of the Lower Hamakua Ditch and removal of the diversion on Lolokua Stream are included in the Lower Hamakua Ditch Watershed project which is also being planned by the State of Hawaii Department of Agriculture and the Natural Resources Conservation Service. A final EIS for the Lower Hamakua Ditch Watershed is currently being prepared.

Sincerely,

[Signature]
KENNETH M. KANESHIRO
State Conservationist
Dear Mr. Kaneshiro:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the Waianae-Paiauahonu Watershed, County of Hawaii, Hawaii. We are responding on behalf of the U.S. Public Health Service.

We believe this DEIS has generally addressed all of our potential concerns, with one exception. Our review did not reveal any discussion on any existing hazardous materials or hazardous waste sites within the project area. The final statement should address the presence or absence of hazardous waste materials identified on the project site that may need mitigation.

Thank you for the opportunity to review and comment on this DEIS. We would appreciate receiving a copy of the Final EIS, and any future environmental impact statements which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely,

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F23)
National Center for Environmental Health

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F23)
National Center for Environmental Health

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F23)
National Center for Environmental Health

Kenneth W. Holt, M.S.E.H.
Special Programs Group (F23)
National Center for Environmental Health
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
HAWAIIAN JUNES COMMISSION—LEASE OF IRRIGATED LANDS FOR GRAZING

Senate Report No. 1497, June 7, 1924 (In accompany H.R. 6553)


Republican Party 82d Congress 1st Session

PURPOSE OF THE BILL

The purpose of this bill is to provide the Hawaiian Home Commission, as a part of its program of making lands available for native Hawaiian, by lease or purchase, to irrigate lands suitable for grazing purposes. Under existing law, such lands may be leased to native Hawaiian, but the minimum term is ten years.

The bill provides for the lease of lands to native Hawaiian for periods of not less than ten years, with an option to renew for an additional ten years. The lease shall be for the purpose of irrigating lands for grazing purposes.

2022
EXCHANGE OF PUBLIC LAND

[Text of the act is not visible in the image provided.]
The United States Department of Agriculture Natural Resources Conservation Service Hawaii

Our People...Our Islands...In Harmony

July 8, 1977

Paul F. Lucas, Staff Attorney
Native Hawaiian Legal Corporation
164 Bishop Street, Suite 1205
Honolulu, Hawaii 96813

Dear Mr. Lucas:

Subject: Draft Watershed Plan and Environmental Impact Statement for the Waimea-Paliku Watershed

Thank you for your letter of May 16, 1977 with comments submitted on the behalf of Mr. James P. Akiona and the Aged Hawaiians. We wish to respond to the comments.

COMMENT: Mr. Akiona occupies a 100-acre pastoral homestead parcel in Puuakope and seeks to become economically self-sufficient by irrigating his pasture and conducting commercial ranching. The ESWS notes that only livestock drinking water will be provided and that irrigation water for pastures will not be provided

Under Section 207(a) of the Hawaiian Homes Commission Act, homesteaders are entitled to irrigate certain pastoral lands as set forth in the 1954 amendment to the HHCA. We would like the plan to reflect that homesteaders that have received 100 acres and who desire to become economically self-sufficient are not precluded from irrigating their pastoral lot.

RESPONSE: Section 207(a) has been amended since 1954 and the Hawaiian Homes Commission Act of 1920, as amended, now states in pertinent part:

"(3) The department shall be authorized to lease to native Hawaiians the right to use and occupy a tract of at least 100 acres of homestead lands within the following areas: (1) not more than one thousand acres of irrigated pastoral lands and not more than one thousand acres of other pastoral lands...".

It is our understanding that your client has a homestead pastoral lease without any commitment to provide water for the purpose of irrigating his pastoral land.

DHIL Title 10 Administrative Rules, Section 10-3-270(a) states:

"Lessee with pastoral lots may raise crops for feed or to be used for animals on the lot. A portion of such land may be utilized for raising vegetables or fruit crops for consumption by the lessee's immediate family."

The United States Department of Agriculture, Natural Resources Conservation Service works to help the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER
Homestead pastoral leases permit certain uses to increase the carrying capacity of the lot and expand into subsistence farming. Issues of future water allocation changes will be addressed by the management of the Waimea Irrigation System. Considerations will include the supply of water available, system capital and operating costs, and the rate structure.

Sincerely,

KENNETH M. KANEHiro
State Conservationist
Mr. Kenneth H. Kaneshiro, State Conservationist
USDA, Natural Resources Conservation Service
P.O. Box 50054
300 Ala Moana Blvd., Room 4316
Honolulu, HI 96807-0021

Dear Mr. Kaneshiro:

Subj: DRAFT WATERSHED PLAN AND ENVIRONMENTAL IMPACT STATEMENT
       (EIS) WAIMEA-PANUOLO WATERSHED OF FEBRUARY 1997

Thank you for the opportunity to review the Draft Watershed Plan
and EIS for the Waimea-Panuolo Watershed Project of February 1997.

The Navy has no comments to offer at this time and appreciates
the opportunity to participate in your review process.

The Navy's point of contact is Mr. Stanford Yuen at 434-0439.

Sincerely,

[Signature]

Copy to:
Mr. James J. Kubo, Chairperson
Board of Agriculture
State of Hawaii, Department of Agriculture
P.O. Box 22159
Honolulu, HI 96803-2159

Mr. Gary Gill, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 762
Honolulu, HI 96813

Stanford B. Yuen, P.E.
Department of the Navy
Commander, Naval Base Pearl Harbor
Box 110
Pearl Harbor, Hawaii 96860-5020

Dear Mr. Yuen:

Subject: Draft Watershed Plan and Environmental Impact Statement for the
         Waimea-Panuolo Watershed

Thank you for your letter of May 30, 1997 stating that the Navy has no comments on the
subject document at this time.

Sincerely,

[Signature]

KENNETH M. KANESHIRO
State Conservationist
**FACT SHEET**
(April 1997)

**Project Name/Location:** Waiola-Puna Watershed, Hawaii County, Hawaii

**Participating Agencies:**
- Maui Kea Soil and Water Conservation District
- State of Hawaii, Department of Agriculture
- State of Hawaii, Department of Hawaiian Home Lands
- USDA Natural Resources Conservation Service

**Project Description:** The project proposes a plan to alleviate the agricultural water shortage problems experienced by farmers and ranchers in the Waiola area by increasing the storage and distribution capacity of the Waiola Irrigation System.

**Proposed Improvements:**
1. 12,000-foot long supply pipeline from the Upper Hamakua Ditch to a new reservoir.
2. 151 million gallon reservoir located on the Kaaahi DIHLL parcel.
3. 13,000 feet of additional irrigation distribution pipeline and one booster pump to connect Kaaahi reservoir to the WIS and expand into the proposed Lululeo Agricultural Park.
4. 214,600 feet of pipeline and nine booster pumps for a livestock drinking water distribution system.

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<tr>
<th>Service Area</th>
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<tr>
<td>Lululeo Reservoir</td>
<td>610 acres</td>
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<tr>
<td>DIHLL, Phase I</td>
<td>15 acres</td>
</tr>
<tr>
<td>DIHLL, Phase II</td>
<td>22 acres</td>
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<tr>
<td>DIHLL, Phase III</td>
<td>71 acres</td>
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<tr>
<td>Total</td>
<td>812 acres</td>
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<td>$1,815,000</td>
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</tbody>
</table>

**Time Table:**
- Comments on draft Final EIS due by May 15, 1995
- Final Plan/EIS and Wetlands Agreement will be Dec. 1997
- Project initiation*: 1998-2000

* Dependent on availability of federal and state funding.

[Signature]
WILLIAM P. KALAWANAI
Kula, Maui 96743
Our People...Our Islands...In Harmony

July 22, 1997

William P. Kahiwaioulu
P.O. Box 233
Kaneohe, HI 96743

Dear Mr. Kahiwaioulu:

Subject: Dami Watershed Plan and Environmental Impact Statement for the
Waihe'e-Pa'auilo Watershed

Thank you for your comments at the Public Meeting held on April 23, 1997 and the
transmittal with Land Court Award recipients and numbers. We apologize for the delay in
responding to your concerns.

COMMENT: Some of the land is and adjacent to the DIIHL land served by the
wetlands project belongs to Hawaiians whose families were awarded the parcels during
the Māhele and Kulana Act periods.

RESPONSE: The issue of ownership claims to Hawaiian home lands was reviewed by
the DIIHL attorney who stated:

All information we have from reliable documents support State ownership of the
land which was designated for management by DIIHL. If you disagree with this
position, you may provide complete documentation to DIIHL for review.

Sincerely,

Kenneth M. Kaneshiro
State Conservationist

cc: Danell Yagodich, Planning Office, DIIHL, Honolulu, HI
PUBLIC MEETING NOTES
Waimea-Punahou Watershed Project
April 23, 1997, 6:30 PM
Kahuku Hilo, EHUU West Hawaii District Office
Manahuanu Highway, Waimea

A public meeting was held to discuss and comment on the draft Watershed Plan and Environmental Impact Statement (Plan-EIS) for the Waimea-Punahou Watershed. The meeting was publicized through articles in the Big Island newspapers and through a mailed announcement to nearly 600 addresses. The meeting was attended by approximately 50 persons.

BACKGROUND

The meeting was opened by Daniel Konohe, Chairman of the Waimea Kea Soil and Water Conservation District (SWCWD). Kaunaoa welcomed the attendees and introduced personnel from the other participating agencies - State of Hawaii Department of Agriculture (DOA), Department of Hawaiian Home Lands (DHHHL), and the USDA Natural Resources Conservation Service (NRCS).

Michael Kobayashi, NRCS, described the background of the project. The project was begun in the mid-1990s and a Plan and Environmental Assessment was completed in 1996. During the design of the Waimea II reservoir, which would be located next to the existing Waimea reservoir, concerns were expressed by adjacent residents about the construction of a new dam. Opposition to the Waimea II reservoir grew until 1994 when the sponsors of the project requested the NRCS to evaluate alternate reservoir locations. The NRCS determined that an Environmental Impact Statement would be prepared for the re-evaluation of the reservoir sites and for other improvements of the project.

The draft Watershed Plan and Environmental Impact Statement has been completed and is in the public review period which extends to May 15, 1997. This meeting is a part of the draft EIS review process to provide information about the plan and its effects to the community and to receive comments back from the community.

PROJECT DESCRIPTION

Dudley Kuno, NRCS, presented a description of the watershed plan's proposed improvements and the economic, social, and environmental effects of the project.

The purpose of the project is to provide adequate and consistent irrigation water to established farmers, provide water for expansion of farming, and provide livestock drinking water to area ranchers by expanding the capacity of the Waimea Irrigation System (WIS).

The existing WIS pipeline system serves farmers in the Pukapua and Lualilo areas with agricultural water. The water source is the Upper Hamakua Ditch. The two reservoirs used for storage are the 60-million gallon (MG) Waimea Reservoir and the 110 MG Pua Pulehu Reservoir. A 1.25-million gallon per day (MGD) deep well near the Waimea Reservoir is held in standby and has not yet been used to supplement the agricultural water supply.

Additional reservoir storage and expansion of the distribution pipeline systems could improve water reliability for existing users, provide opportunities for expansion of irrigated cropland, and provide livestock drinking water. A plan to expand the WIS is contained in the draft Plan-EIS.

The plan is only a plan. Structural and mechanical design of the improvements, acquisition of permits and approvals, acquisition of land rights, and acquisition of construction funding are still yet to be done. Details of the plan may change as the process moves toward construction.

There are four major components to the watershed plan - an additional reservoir, a supply pipeline from the Upper Hamakua Ditch, irrigation system improvements, and a livestock drinking water distribution system.

A number of potential reservoir sites were evaluated. The major considerations were elevation to provide gravity pressure, distance from the Upper Hamakua Ditch, and environmental and social impacts. Sites were discounted because of location in the forest reserve, the presence of wildlife, and the need to maintain access for the Upper Hamakua Ditch. A reservoir site at the intersection of Kawa Road and Mehalani Road was selected for the 110 MG reservoir. The reservoir will be located on the DHHHL parcel leased by Clarence Kawash and is referred to as the Kauahi Reservoir.

A 19,200-foot long, 30-inch diameter supply pipeline will transfer water from the inlet on the Upper Hamakua Ditch to the new reservoir. The course of the buried pipeline will run along the open ditch sections leading to Puu Pulehu Reservoir, cross Manahuanu Highway, then along Mehalani Road to the Kauahi Reservoir. The major consideration for the alignment is the use of existing ditch and road right-of-ways.

The improvements to the irrigation system consist of a 30-inch diameter connection pipeline from the supply pipeline where it crosses Manahuanu Highway to the existing distribution pipeline and additional lateral distribution pipeline at the proposed Lualilo Agricultural Park. The average daily use of irrigation water is expected to reach 3.8 MGD.

The livestock drinking water distribution system will consist of 45 miles of distribution pipelines and nine pumping stations to serve unirrigated livestock drinking water to 22,500 acres, most of which is DHHHL pasture land. The water will be provided from both Waimea and Kauahi Reservoirs. Average daily use of livestock drinking water is expected to be 0.2 million gallons.
The estimated installation costs of the improvements are: Kuaihi Reservoir, $6.1 million; supply pipeline, $3.1 million; irrigation system improvements, $1.7 million; and livestock water system, $4.5 million.

The DOA and NRCS will fund near equal shares of the reservoir and supply and irrigation system costs. Nearly all of the livestock drinking water improvement costs will be funded by DIHIL.

The annual costs for operating, maintaining, and repairing the improvements to the WIS is estimated to be nearly $200,000. Most of the costs are for operation of pumps.

The installation of the project will occur over several years. The most optimistic date for construction to start is within two years.

**EFFECTS OF THE PROJECT**

The environmental impact review process requires the disclosure of the economic, social, and environmental effects of the watershed project.

The major beneficiaries of the project are: reduction in crop damage and loss due to drought, opportunity to expand crop acreage, reduction in livestock losses due to drought, opportunity to expand livestock industry, and reduction in treatment cost for water used for livestock. The major adverse economic impact are the installation cost and the on-going operation and maintenance costs.

No effect to archaeological and historic sites is expected. Four archaeological surveys were conducted for the project.

No effect to threatened and endangered species is expected. All improvements, except for a portion of the supply pipeline, will be located outside of the forest reserve.

The sudden collapse of the dam at the proposed reservoir was evaluated. A preliminary dam breach inundation map was developed and shows one dwelling and two other structures on eight properties to be affected. Although a catastrophic breach of the Kuaihi Reservoir dam is highly unlikely, the dam will be designed to minimize the potential for failure and an Emergency Preparedness Plan complying with state guidelines will be developed and implemented.

The installation of the project will encourage the maintenance of prime and other important agricultural land in agricultural land use. However, more than 25 acres of pasture land will be needed for installation of the reservoir and pipelines.

Streamflow in Latake Stream, measured at Hiilawe Falls, will be reduced in volume by five percent by the reduction in overflow from the Upper Hanauma Ditch into Latake Stream. The project will not affect the natural drainage to Latake Stream.

The watershed project supports the goals of the Hawaii State Plan to provide water for agricultural use and to make the most productive use of the land best suited for agriculture.

The watershed project supports the Hawaii County Plan in its economic, land use, and public utility goals.

The watershed project implements the DIHIL goal of providing infrastructure to homestead farmers and ranchers.

The watershed project can be compatible with the State Department of Transportation’s Waimea bypass Highway alternatives.

The sponsors of the watershed project are aware of the many issues concerning water rights, including the trust obligations to native Hawaiians affirmed in the Hawaiian Homes Commission Act and the Statehood Admissions Act. The decisions regarding the water issues will be made by others and the impacts on the project are still unclear. The operating policies of the WIS developed by the DOA, with input from DIHIL and others, will be continually updated and will conform to changes in state water rights policies and laws.

**AGENCY RESPONSIBILITIES**

The NRCS will be responsible for funding of the federal cost-share, compliance with federal laws and policies, and design of improvements.

The DOA will be responsible for funding of the state cost-share; compliance with state environmental laws and policies; acquisition of permits and approvals; acquisition of land rights; administering contracts; accepting, operating and maintaining improvements, developing operating policy for WIS, including livestock drinking water; and developing maintaining, and implementing an Emergency Preparedness Plan for the reservoir dam.

DIHIL is responsible for funding livestock drinking water improvements for DIHIL ranchers, acquiring permits and approvals for livestock drinking water improvements on DIHIL land, acquiring lands/limits for livestock drinking water improvements on DIHIL land, contract administration for stock water improvements on DIHIL land, providing operation and maintenance funding for the DIHIL livestock drinking water component, and participating in developing operational policy for WIS.

The Maui Kea SWCD is responsible for ensuring public participation during implementation and participating in developing operating policy for WIS.

An agreement for interagency cooperation between DOA and DIHIL, covering installation and operation of the project improvements, is being developed and will be completed before construction.
The SWCD and NRCS will continue to develop conservation plans for soil and water conservation on individual farms and ranches.

**Questions and Comments by Attendees**

**Question:** What is the size of the pipeline along the Maunahana Highway that crosses Kahloa Street?

**Response:** The buried pipeline will be 30-inch diameter. It was mistakenly stated that the pipeline would be 24-inch diameter at the meeting.

**Question:** Why was Maunahana Road chosen as the route of 30-inch supply pipeline? As much as possible, improvements are located on existing rights-of-way, such as roads, and government land to minimize the amount of private or leased lands that need to be acquired for the rights-of-way.

**Response:** The DOA and the DHIL will be responsible for working with landowners to obtain land rights. They will try to come to a satisfactory agreement with the landowners. The possibility of moving pipelines and other structures can be investigated.

**Question:** Would you consider the use of eminent domain?

**Response:** That is an option available to the state agencies. Its use would depend on how successful less drastic means of acquiring the needed lands might be.

**Question:** Does DHIL have access road records? The concern is that land within and adjacent to the project area (eighty-six acres) to Hawaianu who received the land during the Mehan. (He transmitted a mailed meeting announcement and fee sheet on which he wrote the names of the pertinent Land Court Award recipients and numbers.)

**Response:** This question and comment has been referred to DHIL. DHIL will confer with the State Attorney General's office to judge the validity of the claim and determine its effects on the watershed project.

**Question:** Will installation of the 30-inch buried pipeline kill or affect trees along Mehan Road? What is the pressure in the pipeline?

**Response:** We are not able to know the pressure in the pipeline without affecting the trees. That will be determined during design and the land planning process. Forestry experts may be consulted. The maximum pressure in the pipeline will be approximately 70 psi.

**Question:** Page 18 of draft Plan-EIS says water for the grazing land service area will be for livestock drinking water only. Will project allow the water to be used for irrigating pasture? Ranchers can get more returns from increasing forage.

**Response:** Due to the limitations on water supply, priorities were established for competing users. Because of such priorities and federal guidelines for the project requiring the highest use of the water, the intent is for the project to provide irrigation water for truck crops and flower production and livestock drinking water. Irrigation water for pasture is not included. The project was planned and the pipelines were designed to provide livestock drinking water only.

**Comment:** The benefits for livestock are low as shown on page 87, Table 6. Selling price for cattle should make figure much higher.

**Response:** The benefits for livestock were based on net returns for livestock production, after the costs for production were subtracted, net gross returns or selling price.

**Question:** How was the increase in animal units with the project determined? The estimator felt that the carrying capacity in area per animal unit was too low. And that the project analysis was too optimistic in livestock increase.

**Response:** The increase in animal units was determined for the original 1989 Plan—Environmental Assessment document and was used unchanged. The rates were based on interviews with experienced ranchers and assume ranchers will implement intensive grazing methods.

**Question:** What effect does the Waiman-Pauuui Watershed project have on the Pauuui area?

**Response:** None. When the project began in the mid-1980s, providing water along the Haukua Coast to Pauuui for livestock drinking water and sugarcane irrigation was considered, thus the watershed project name "Waiman-Pauuui." However, with the shutdown of sugarcane production and the low economic feasibility of providing livestock drinking water, the project was scaled back to the Waimau area. The name of the project was not changed.

**Question:** Have easements through Parker Ranch been obtained for the livestock drinking water pipeline to Nienie?

**Response:** No. The pipeline from the reservoir to Nienie will be installed along the existing Manoa Road right-of-way. Easements from Parker Ranch for the booster pump locations will probably be required, however.

**Question:** Will DHIL be responsible for funding operating costs for the livestock drinking water system? What will the livestock drinking water cost be?

**Response:** DHIL will be primarily responsible for the operation and maintenance costs for the livestock drinking water distribution system. However, the DOA will be responsible for the entire WES. An operating agreement with details on the manner in which operating costs are shared and the rate schedules for livestock drinking water is currently being developed. Until its completion...
and acceptance, neither the operating costs to DHHL, or the water charge to DHHL, remains is known.

Question: What is the relationship between the Department of Water Supply (DWS) system and the WIST? Is the DWS aware of the project's plans?
Response: The DWS system and the WIST are completely separate from sources to final use. All water provided by DWS is treated to U.S. drinking water standards. The WIST provides untreated water that is not intended for human consumption. The DWS is aware of the watershed project and supports its implementation to remove livestock drinking water use from the treated system.

Comment: Many homesteaders want to maximize the economic potential of their land but will be unable to because of the restriction that water can only be used for livestock drinking. Was a benefits analysis done for livestock drinking water?
Response: A benefits analysis was conducted but showed that providing livestock drinking water was economically unattainable. However, these are social and cultural benefits that are not quantifiable; DHHL decided to fund the livestock drinking water system without federal cost-sharing assistance.

Question: Will the farmlands in Waipio Valley be affected by decreased streamflow caused by the project?
Response: No. The only effect to streamflow will be a five percent decrease in the flow of Lakaha Stream. Lakaha Stream enters Waipio Valley over Hillside Falls near the mouth to the ocean, although some taro is grown on Hillawa (Lakaha) Stream in Waipio Valley, most of the production takes place along Waipio Stream above the confluence of Hillawa Stream. The five percent reduction in Lakaha Stream should not be significant to the production.

Question: Does this project impact the Hillawa twin falls restoration project (Lower Hamakua Ditch Watershed Project)?
Response: In an engineering sense, the two projects are not connected. However, NRCS and the DOA are involved in both projects. Funding for both projects need to be sought from the same sources. The Waimea-Pauwalea Watershed project is much further advanced in the planning timeline.

Question: Who is responsible for the maintenance of the Upper Hamakua Ditch and the Lower Hamakua Ditch?
Response: Currently, the DOA is responsible for both systems. The State has had control of the Upper Hamakua Ditch since the late 1940s and has operated the ditch since the early 1940s. The DOA has had the primary responsibility to maintain the Lower Hamakua Ditch since the collapse of Hamakua Sugar in 1925. The DOA's operating agreement expires in October 1997.

Question: Does this plan mean that the Waimea II site is no longer considered?
Response: For the purposes of this project, the Kaauhi Reservoir is the preferred reservoir site. If the plan is accepted and approved by the sponsors and NRCS, then the Waimea II site will not be used for this project.

Question: Will the livestock drinking water supply have safeguards against contamination?
Response: The livestock drinking water system will take water from the upper Kohala Watershed where there is no human activity to introduce unnatural contaminants to the water. The water will not be filtered. Detention time in the reservoir will reduce suspended sediment. Some monitoring of the water will take place, although not as frequently and as thoroughly as for human consumption.

WHAT'S NEXT

Michael Kotman, NRCS, described the next steps toward implementation of the project. Responses will be prepared for written comments made on the draft Plan-EIS during the review period. Modifications and clarifications will be found in the final Plan-EIS. Written comments and responses and the notes from this public meeting will be reproduced in the final Plan-EIS.

The funding agencies will use the final Plan-EIS and the signed Watershed Agreement to secure funding. Final design and permit and land acquisition will be completed before any funds are obligated by signing of the Project Agreement for construction of each phase of the project.

Gary Kam, District Conservationist, NRCS Kamuela Field Office was introduced. He is the local point-of-contact for information about the project. He can be reached at 808-885-6602.

Written comments on the draft Plan-EIS should be sent to Kenneth M. Kauhiho, State Conservationist, Natural Resources Conservation Service, P.O. Box 50004, Honolulu, HI 96850, by May 15, 1991.

The meeting was closed by Dan Kamile at 8:15 PM.
Ms. Teddy Bell
Kamuela, HI 96743

Mr. David and Käri Kamataki
Kamuela, HI 96743

Geneva K. Bell
Kamuela, HI 96743

Ms. Jeanie Lum
Kamuela, HI 96743

Mr. Victor H. Forgotten
Kamuela, HI 96743

Mr. & Mrs. Lene & Jane Day
Kailua, HI 96721

Ms. Eihel Andrade
Kamuela, HI 96743

Mr. Larry Hikamoto
Kamuela, HI 96743

Kai K. Watan, Chairman
Hawaiian Homes Commission
Dep. of Hawaiian Home Lands
P.O. Box 1879
Honolulu, Hawaii 96805

Mr. William P. Kamataki
Kamuela, HI 96743

Ms. Joan Brown
Kamuela, HI 96743

Nancy Walden
Kamuela, HI 96743

Mr. Roger Hikake
Kamuela, HI 96743

Daniel Kanaka
Kamuela, HI 96743

Ms. Anuie Bell
Pukui, HI 96738

Mr. Paul T. Marus
Hi State Dept. of Agriculture
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Honolulu, HI 96814

Ms. Jennettegrhie
Hilo, HI 96720

Darrell Yasgurich
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C.K. Kauhi
Kamuela, HI 96743

Mr. Tim McCulough
Kamuela, HI 96743

Mr. Edgar Spencer
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Jim Dupont
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Ms. Lucille Ching
Hilo, HI 96721

Kahila Neumann
Kamuela, HI 96743

Mr. Richard Ehrle
Kamuela, HI 96743

Mr. Paul F. Nahon Lucas
Honolulu, HI 96813

Ms. Martha Whitman
Kamuela, HI 96743

Ms. Des Dickson
Kamuela, HI 96743

Mr. Roy Hol
Kamuela, HI 96743

Mr. Spencer Alana
Kamuela, HI 96719

Kealohi Arems
Kamuela, HI 96743

Ms. Diana Fennery
Kamuela, HI 96743

Mr. Horie Gonzales
Honokaa, HI 96727

Ruby & Michael Husco
Hauu, HI 96719

David & Anne Gomes
Kamuela, HI 96743

Mr. Jim Thong
Kanaloa, HI 96776

Mr. Conrad Kauhi
Kamuela, HI 96743

Mark & April Kealakila
Kamuela, HI 96743

Mr. Ken Meee
Kamuela, HI 96743

Mr. Sonny Kauhi
Kamuela, HI 96743

Mr. Mike Hanano
Kamuela, HI 96743