EXECUTIVE CHAMBERS

HONOLULU

BENJAMIN J. CAYETANO
GOVERNOR

November 27, 2002

TO: The Honorable Raynard C. Soon, Chairman
Hawaiian Homes Commission

SUBJECT: Acceptance of the Final Environmental Impact Statement for the Lalamilo Project

With this memorandum, I accept the Final Environmental Impact Statement for the Lalamilo Project, island of Hawai'i, as satisfactory fulfillment of the requirements of Chapter 343, Hawai'i Revised Statutes. The economic, social, cultural, 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 policy makers 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 discussed in the environmental impact statement will minimize the negative impacts of the project. Therefore, if this project is implemented, the Department of Hawaiian Homelands 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.

/s/ Benjamin J. Cayetano

BENJAMIN J. CAYETANO

Attachment

c: Honorable Bruce S. Anderson, Ph.D., M.P.H.
Office of Environmental Quality Control

2002 FEIS HAWAII
LALAMILO RESIDENTIAL LOTS & COMMERCIAL INDUSTRIAL MIXED USES

DEC 8 2002
PLANNER

DEPARTMENT OF HAWAIIAN HOME LANDS

Lālāmilo
PROJECT

Lālāmilo • South Kohala • Island of Hawai'i

Final Environmental Impact Statement

Department of Hawaiian Home Lands
November 2002

DEPARTMENT OF HAWAIIAN HOME LANDS

Lālāmilo

PROJECT

Lālāmilo • South Kohala • Island of Hawai'i

FINAL ENVIRONMENTAL IMPACT STATEMENT

This document is submitted pursuant to
Chapter 343, Hawai'i Revised Statutes

Prepared for State of Hawai'i
Department of Hawaiian Home Lands

Prepared by PBR HAWAII

This is to indicate that this statement and all ancillary documents were prepared under my direction or supervision and that the information submitted, to the best of my knowledge fully addresses document content requirements as set forth in sections 11-200-17 and 11-200-18, as appropriate.

Raynard C. Soon, Chairman
Hawaiian Homes Commission

November 18, 2002

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

EXECUTIVE SUMMARY

The State of Hawai'i Department of Hawaiian Home Lands proposes to develop Residential Lots at property at Lālāmilo, Waimea in South Kohala on the island of Hawai'i.

SUMMARY

Project Name:	Department of Hawaiian Home Lands Lālāmilo Project
Location:	Lālāmilo, Waimea, South Kohala, Hawai'i
Landowner:	State of Hawai'i Department of Hawaiian Home Lands State of Hawai'i Department of Land and Natural Resources
Applicant:	State of Hawai'i Department of Hawaiian Home Lands
Tax Map Key:	(3) 6-6-01: 54 & 77; (3) 6-6-04: 12 -17 / Total Area 248.8 acres
Project Area/ Ownership:	6-6-01:77 232 acres DHHL 6-6-01:54 9.8 acres DLNR 6-6-04:12-17 7.0 acres DLNR
Existing Uses:	Ranching; Vacant of any built structures
Proposed Uses:	Residential Homestead Lots
Land Use Designations:	*State Land Use:* Agricultural and Urban *General Plan LUPAG:* Urban Expansion, Low Density Urban, Flood Plain *Zoning:* A-5a (Parcel 77); RS-10 (Parcels 54 &12-17) *SMA:* Property is not within the SMA
Permits/Approvals Required:	Section 404, Clean Water Act, as required Floodways - LOMR / CLOMR Stream Channel Alteration Permit, as required Subdivision Permit Grading / Building permits NPDES Permit Underground Injection Control Water Resource Development approvals Wastewater Treatment Facilities approvals Access Roadway connections
Accepting Authority:	Governor, State of Hawai'i

PROJECT SUMMARY

The overall goal of the Lālāmilo Project is to develop and deliver residential homestead awards to the native Hawaiian beneficiaries on the DHHL wait-list who have identified their preference to reside in North Hawai'i.

Two residential density alternatives have been developed. These include the preferred Alternative A: 10,000 square feet lot size (442 units, includes 34 lots in the RS-10 zoned infill parcels and 408 units in the main parcel), and Alternative B: a combination of one-acre lot size (121 units) and 10,000 square feet lots in the RS-10 zoned parcels (34 units).

The construction is scheduled in two phases from 2003 - 2010. Infrastructure improvements include development of water, wastewater, and roadway facilities.

The common elements of both Alternative A and Alternative B include the following amenities: Community Center, Park, Preservation Areas, and Open Space Buffers. As part of the Phase 2 development of Parcel 77, an 8.8 acre active park and a 1.8 acre lot for a Community Center facility would be constructed. The combined approximately 10-acre recreational use area is planned to meet the County's standards.

A major change to the Project plans since the publication of the Draft EIS is the removal of the commercial and light industrial uses at the east property boundary. The area would remain in agricultural use for pasturing livestock.

SUMMARY OF IMPACTS AND PROPOSED MITIGATION MEASURES

The construction of the proposed project will alter the natural and social landscape, and thus, impact the environment and the community. For areas of environmental concern, appropriate mitigation measures have been planned as part of the project. For those areas of particular concern, the following summarizes the associated mitigation measures that are either recommended or planned to ensure that potential adverse impacts are minimized or mitigated.

Water Resources. Project phasing and the final decision on the two density alternatives (Alternatives A and B) will determine the need for water system facilities, including: 1) water supply requirements and source development, 2) storage capacity, and 3) transmission lines.

Water supply for the project would be provided by the DWS' Waimea system. All onsite water system infrastructure would be designed and built to DWS standards and dedicated to that agency. In addition, a number of offsite improvements to the system's source, storage, and transmission capacities will have to be made to serve this project. Coordination and cooperation between DHHL, DWS, and the Department of Land and Natural Resources, for source development of a DLNR well has been initiated by the agencies.

An analysis to measure the current flowrates within existing waterlines indicates that the proposed 34 units in Phase 1 are capable of being serviced by the existing DWS system.

Potable water requirements for Phase 2 residential development for Alternatives A and B are based on DWS' average use rate factors. Alternative A, with a total of 442 units in Phases 1 and 2, would

ultimately require an average supply of 215,100 GPD and Alternative B with larger lots with a combination of 1-acre and 10,000 square foot lots would require 96,600 GPD.

Wastewater. Approximately 70 percent of the Lālāmilo Project's projected residential water use will become wastewater to be collected, treated, and disposed in a manner acceptable to the State Department of Health. By DOH's regulations, projects with more than 50 residential units which have lot sizes less than 1-acre may not use individual wastewater treatment and disposal systems (i.e., septic tanks and leach fields).

Based on these criteria, some type of community treatment system will be required for Alternative A Phase 2 development consisting of 408 10,000 square feet lots. With the 1-acre (minimum) lot size of Alternative B, individual septic tank-leachfield systems would be allowed.

A wastewater treatment system for the preferred Alternative A will likely require the construction and operation of a new wastewater treatment plant. A package treatment plant capable of incremental expansion could be constructed beyond the makai end of the project site, enabling gravity delivery from the entire site to the treatment plant. The treatment plant would be far inland of DOH's Underground Injection Control line, thus restricting the use of injection wells for effluent disposal. Reuse for pasture irrigation on State land makai of the project site (TMK 6-6-01:1) would be the appropriate method of disposal. For such reuse on land beyond potential human contact, treatment to R-3 (primary) standards would be needed. DHHL shall take appropriate measures to acquire any additional land required for wastewater treatment. At this time, approximately 200-acres of additional land is needed to address a facility for treatment of wastewater and effluent disposal. An environmental assessment of the additional lands pursuant to Chapter 343, HRS would be undertaken prior to implementation.

Drainage and Flood Hazards. Areas subject to inundation by a 100-year flood were determined for Waikoloa, Keanu'i'omanō, and Lanikepu Streams. For Lanikepu and Keanu'i'omanō Streams, the areas subject to inundation by the 100-year flood are considerably narrower than shown on FEMA Panel 155166 0164D. Waikoloa Stream's inundated area, with the single exception where the flow splits into two channels, is also relatively narrow. The drainage analysis determined that the capacities of the stream channels are generally sufficient to contain most of the flood waters. Grading for residential lots are planned outside of floodway limits. Road crossings over the streams are at Lanikepu and Keanu'i'omanō to create the main spine roadway at the western area of the Project would impact the streams if bridging is not possible or feasible and culverts become necessary. Impacts which may affect water quality will include BMPs associated with State and Federal permits

Ordnance Issues. Lālāmilo lies within the former Waikoloa Maneuver Area, a sizeable area of land acquired by the U.S. Navy in December 1943 through a license agreement with Richard Smart of Parker Ranch. The training area extends from the ocean to the Pōhakuloa Training Area, and from the Waimea-Kawaihae Road to south of Waikoloa Road. The area was used for military exercises including the use of live ammunition and other explosives. Some areas of the formerly used defense site have the potential to contain unexploded ordnance (UXO). In the vicinity of the DHHL Project Site, two UXO were recovered on adjacent State land located to the south of Waikoloa Stream near the Project's western boundary. The Department of the Army has determined that the qualitative risk evaluation of the DHHL Lālāmilo Property area has a rating of "High".

Unmitigated, the presence of ordnance and explosives (OE), and specifically unexploded ordnance (UXO), presents a risk on the Property during the construction phases and over the long-term of homeowner occupation. Following recent meetings between the Corps of Engineers and DHHL staff, the Corps has informed DHHL that funding has been appropriated in Fiscal Year 2002 - 2003 for pre-construction site support including surface clearance of ordnance and explosives.

Flora and Fauna. Field surveys of the plant and wildlife species on the property were conducted to assess the existing conditions and to search for any plants and animals that are considered rare, threatened, or endangered. Due to the long history of cattle ranching on the property, species composition is primarily alien. Two vegetation types are recognized on the Lālāmilo site. Pasture scrub covers the majority of the site and consists of mixed grass pasture with scattered trees and shrubs. Rocky outcrops are occasional and usually support a somewhat denser cover of shrubs. Along the streams, which cross and border the site, there is a band or belt of vegetation varying in width from 50 to 100 feet. Because of the steady source of water, streamside vegetation is denser and supports a large number of species throughout the year. While some native plants occur, notably the koai'a trees which have been planted on the open spaces along Kawaihae Road, all others are considered to be common in the area. Thus, there is a lack of native plant communities to support native wildlife with the exception of Pacific golden plovers which are present. Plovers are capable of adapting to the new lawns within parks of the housing development. Thus, the lack of any significant impacts do not warrant any specific mitigation measures.

The lots bordering the streams will be landscaped/revegetated as quickly as possible to prevent soil erosion and discharge of sediments into the streams. Native plants would be used for landscaping common areas whenever possible. Subdivision residents would also be encouraged to plant native species including the 'ākia, 'a'ali'i, wiliwili, koai'a, 'ōhi'a lehua, and pua 'ākala which are attractive and easily cultivated as well as culturally relevant plants.

Streams. Two major streams, Waikoloa and Keanu'i'omanō Streams, border the Lālāmilo Project Site. Both of these streams, designated as intermittent on the USGS Waimea topographic map, were fully flowing during the December 20-22, 2001 biological assessment following a period of heavy rainfall. Waikoloa Stream originates above Pu'u Iki at approximately 4,000 ft and has numerous diversions and reservoirs upstream of Waimea Town. Stream habitat in both Waikoloa and Keanu'i'omanō Streams was fairly similar and quite uniform, with the mostly scoured, bedrock channels containing some moderately sized cobble in the upper reaches of the Project Area, with occasional large boulders.

No federally Threatened, Endangered, rare, or imminently threatened species of aquatic animals were found in or around the areas of Waikoloa and Keanu'i'omanō Streams assessed during the study, however, the native fish *Lentipes concolor*, have been noted in Waimea streams. Both streams contained very similar aquatic faunas, and during this study had similar flows and aquatic habitat characteristics. The complete lack of algae on the rocks on the dates of the survey, and no developed aquatic insect fauna indicated that section of stream examined within the Project Area are intermittent. The construction of culvert crossings at the streams would require State and Federal permits. Construction would follow all permit requirements.

Visual Character. Public views of the property are from portions of Kawaihae Road and from the South Kohala Distribution Road. In addition, the existing residences in adjacent Ka La Loa and Lālāmilo House Lots Subdivisions have enjoyed views of the plain and the distant mountains

through the vacant site. Farther from the Project, the Hawaii Preparatory Academy has a view of the DHHL property from its existing location and from their proposed Lower/Middle School campus site at Kawaihae Road. The development of the Project will change the visual character of the undeveloped lands from an open plain to a built environment. Concerns have been raised about the need to enforce and maintain design guidelines to avoid the situation of inconsistent housing quality in the Kawaihae homestead community.

It is DHHL's policy to offer turn-key homes and vacant lots for owner builder or self-help construction. All product types would be subject to conformance to conditions, covenants, and restriction (CCRs).

Educational Facilities and Services. The residents of the Lālāmilo Project would be served by the Department of Education's Waimea Elementary and Middle Schools for grades kindergarten through eight, and the Honoka'a High School for grades nine through twelve. Additionally, a public charter school, Kanu o ka 'Āina serves students from the broader South Kohala district.

The Lālāmilo Project's Alternative A which would consist of 442 new homes with occupancy over a seven-year period (2004 - 2010) would contribute approximately between 180 - 288 students in all grades. DHHL recognizes the critical nature of the crowded schools. Thus, after confirmation of the project density, DHHL will make an appropriate contribution towards public school facilities. In addition, DHHL and Kanu o ka 'Āina have evaluated several DHHL properties for potential use for a permanent site for the charter school campus which has resulted in a lease award for 15 acres of land at Pu'ukapu across from Kūhiō Village.

Recreational Facilities. The County's Park Dedication Code (Chapter 8, Hawai'i County Code) provides standards for the dedication of land, facilities, or assessments of in lieu fees for recreational purposes upon the subdivision of land. The code requires a minimum ratio of 5 acres of land for park and playground purposes for every 1,000 persons in each district.

The Lālāmilo Project Alternative A consisting of 442 lots, would, at buildout, generate between approximately 1,300 to 1,500 residents. Thus, by the County's standards, approximately 7.5 acres of park and playground areas would be recommended. The Project plans provide approximately 10 acres for Park and Community Center facilities.

The Lālāmilo Project will include park facilities meeting the County's standards and will address the recreational needs of the community with provisions for playfields and courts. A community center facility is envisioned to include a multi-purpose hall capable of being utilized for meetings, gatherings, and other appropriate group activities.

DHHL will also accommodate the equestrian trailhead for the planned Waimea Trails and Greenways' trail system linking residential areas to Waimea's urban center on Parcel 10 (TMK: 6-6-01:10). Thus, in consideration of the County's and community's on-going planning, DHHL has withdrawn Parcel 10 from the project and will no longer be acquiring the property.

Police, Fire, and Health Services. The addition of new homes and people into the community will increase the demand on police, fire, and health care services. Measures will be undertaken to mitigate impacts on police protection services through security and design measures such as well-lit public areas and walkways and the establishment of neighborhood watch programs. The Project will

meet fireflow requirements. Roadways will be constructed to ensure proper tuning radiuses for emergency vehicles. Further, the individual residential units will meet Hawai'i County building code requirements to ensure public safety.

Social Impacts. As a State agency responsible for providing homes to native Hawaiian beneficiaries, DHHL is always challenged to meet their needs but also to become an accepted and integral part of the neighborhood and community. As of June 30, 2002 there are 19,302 applicants statewide on the DHHL wait list. Roughly 1,500 have indicated their preference to reside in North Hawai'i, therefore, this site, with appropriate County General Plan designation of Urban Expansion was selected as a priority tract for development. This designation of Urban Expansion has been in place for more than 10 years.

A direct result from development of the potential 442 new homes would be a population increase of 1,300 to 1,500. Many concerns were raised by community members on the potential impacts to the existing infrastructure of the Waimea community. These include schools, recreational facilities, roadways, water resources. The social impact assessment identifies the issues through personal interviews with community members and information from agencies and other resources. Mitigation measures to address the probable impacts have been addressed in discussions on schools, recreational facilities, roadways / traffic systems.

Archaeological and Historic Resources. The archaeological inventory survey identified 75 sites with 818 features. Subsurface testing was undertaken at 33 features at 24 sites. The features consist of 20 formal feature types including terraces, mounds, enclosures, field boundaries, stone walls, irrigation ditches, platforms, walled terraces, C-shapes, U-shapes, modified outcrops, surface hearths, L-shapes, cairns, pond fields, and several miscellaneous types. Feature function includes agriculture, permanent habitation, temporary habitation, burial, marker, military defensive position, historic foundation, storage, and quarry.

All 75 sites are assessed as significant under Criterion "d". The sites have yielded information important for understanding late prehistoric to historic land use in the project area. Nine sites are also assessed as culturally significant because probable Hawaiian burials are present. Four of these culturally significant sites and six sites are additionally assessed as significant under Criterion "c" as a well-preserved example site types including the agricultural field complex, an historic cemetery, a basalt quarry, and several permanent habitation sites. The Lālāmilo agricultural field complex (Site 22632) is also assessed as significant under Criterion "a" because it is associated with the broad pattern of traditional and early historic agricultural intensification in Hawai'i.

Specific preservation of significant sites include portions of the Agricultural Field System; a quarry site, and burials. These total approximately 20 acres of the Lālāmilo property.

Roadways and Traffic. Roadways in the vicinity of the project are Kawaihae Road and the South Kohala Distribution Road. The traffic in the vicinity of the proposed project is generally expected to increase by 3.83 percent per year to the Year 2012 without the proposed project. With the construction of the Project and the implementation of the recommended roadway improvements, the Levels of Service during the peak hours of traffic on Kawaihae Road are not expected to be affected by traffic generated by the proposed project. The peak hour v/c ratios are expected to increase as a result of the development of the proposed project. The proposed Kawaihae Bypass Road is a regional highway improvement proposed by DOT, which is expected to divert through traffic,

between Waimea and Kawaihae, around the vicinity of the Project. However, the bypass project is in the planning stage and the implementation schedule is unknown at this time; thus, the Lālāmilo traffic impact analysis does not take the Kawaihae Bypass Road into account.

With the addition of two additional access points from the Ka La Loa and Lālāmilo House Lots Subdivisions, the existing intersection of Kawaihae Road and Akulani Street is not expected to be adversely impacted by traffic generated by the proposed project.

Air Quality. Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts related to slow-moving construction equipment traveling to and from the project site and from a temporary increase in local traffic caused by commuting construction workers. State of Hawai'i Air Pollution Control Regulations prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phases is essential.

Several heavy industrial uses are located adjacent to the east boundary of the Lālāmilo Project. Of concern are the Hawai'i Electric Light Company Waimea Generating Station, the Waimea Solid Waste Transfer Station, and an old landfill. The Waimea Generating Station, which is located immediately to the east of the project, includes three diesel-fueled electric generating units. These units are in the prevailing upwind direction from the project, and the stacks that are used to exhaust the emissions are very short. Worst-case dispersion calculations indicate that exceedances of the air quality standards may occur at times over the project area. Increasing the stack heights to meet good engineering practice would substantially alleviate this potential problem. The Lālāmilo Project master plan is designed with a buffer of 600 feet to 800 feet between the adjacent heavy industrial uses and the closest residential lots near the eastern boundary. Construction of these lots would commence in 2006 with occupancy in 2007-2008. At that time HELCO would be required to renew its permit and it is expected that taller stacks to meet good engineering practices would be required by DOH considering the proximity of the residential lots at this project and the surrounding area.

Solid Waste. The Waimea Solid Waste Transfer Station is situated immediately to the east of the project area, making it upwind of the project site much of time and a potential source of odor nuisance. Waste is deposited at the transfer station into an enclosed container, and the container is removed from the site on a regular and frequent basis. Thus, it is not expected that any odors from the transfer station will significantly impact the proposed project.

SUMMARY OF ALTERNATIVES CONSIDERED

The DHHL objective is to provide land and homes to qualified native Hawaiian beneficiaries, and specifically to optimally develop Residential Lots on the Lālāmilo Property to serve the 1,500 beneficiaries who have identified North Hawai'i as their preferred location for a homestead award. Due to the high demand for homes in North Hawai'i and also the property's consistency with the County General Plan, Lālāmilo is designated as a "priority tract" for development in DHHL's *Hawai'i Island Plan.* Thus, in the analysis of the known feasible alternatives to allow the DHHL's objectives to be met, emphasis is placed on the Preferred Alternative A consisting of 442 10,000 square feet lots over Alternative B consisting of 408 1-acre lots and 34 10,000 square feet lots.

The No-Action Alternative would involve no changes to the existing Property for the foreseeable future. Ranching activities would cease in January 2003 when the General Lease is withdrawn and the property would remain vacant. The No-Action Alternative would not be consistent with stated governmental policies of establishing the property as an Urban Expansion area and would not create the overall positive benefit to DHHL beneficiaries. This alternative would deny the Hawaiian Home Lands native Hawaiian beneficiaries of the potential benefits associated with home ownership. The lack of new residential homesteads and potential revenue generation from this Property would further delay the placement of qualified native Hawaiians on the land.

DHHL considered other alternatives including various mixes of homestead types - Residential Lots (range of lot sizes no greater than 1 acre) and various Agricultural lots. Residential lots consistent with the neighboring subdivision would have to conform to RS-10 zoning; these lots could range in size from 10,000 square feet to one acre. A mix of lot sizes however, would yield fewer lots than the maximum under a uniform 10,000 square foot size. Moreover, awarding dis-similar lots would warrant different criteria and equity issues would arise. DHHL categorizes Agricultural Lots as Subsistence Lots (≤5 acres) and Supplemental Lots (≤40 acres). Under the Agricultural Lots alternative a broad range of lots could be developed, with a minimum of 6 Supplemental lots or 46 Subsistence Lots. A further type of Homestead is described by DHHL as Pastoral Lots consisting of up to 1,000 acres. Only one Pastoral Lot would be possible at the Property. These agricultural alternatives, however, would not meet the objective of providing Residential Lots to the beneficiaries who have identified North Hawai'i as a place of residence, and were thus, dismissed.

SUMMARY OF UNRESOLVED ISSUES

Density. The preferred Alternative A consisting of 442 residential lots is anticipated to be selected; however the final determination is unresolved at this time. This environmental document has based all studies on the higher density alternative.

Wastewater Treatment. The Project's ultimate density and lot size will determine the method of wastewater treatment. Alternative B, consisting of 121 1-acre lots (and 34 lots in the RS-10 zoned parcels) would qualify for individual septic/leachfield systems. Whereas, the preferred Alternative A would require a sewage treatment facility to treat and dispose its wastewater. The final determination on the Project's density will also determine the method of wastewater treatment. A wastewater treatment facility on adjacent land to be acquired by DHHL would require compliance to Chapter 343, HRS prior to construction.

Potable Water. The water resource study for the project has indicated that a high level groundwater source is available within the project region. Water commitments to meet the Alternative A potable water demand of 215,100 gallons per day will be pursued through the development of additional water resources in the area in coordination with the Department of Land and Natural Resources and the County Department of Water Supply. DHHL has initiated coordination with DLNR and the County in source development to meet the projected requirement; however, final resolution will require time and the issue remains unresolved at the present time. The project schedule designates the period from 2003-2006 for water facilities development, including construction of water source and transmission system development.

Public School System. Upon selection of density alternative (Alternatives A or B); DHHL and DOE will finalize the projected student enrollment numbers and DHHL will provide a contribution to mitigate its impacts on the public education system.

Site Preservation Measures. A complete archaeological inventory survey has been conducted for the 248.9- acre property. Based on the field survey, limited data recovery and subsurface testing, initial significance determinations and treatment recommendations were provided. The survey report has been submitted to DLNR State Historic Preservation Division (SHPD) for review and approval. Although the property has been thoroughly surveyed for the presence of archaeological sites, and evaluated for their potential historic or cultural significance, the specific measures for site preservation and appropriate buffer treatment will be determined through discussions with the Historic Preservation Division and the Hawai'i Island Burial Council. DHHL will continue to work closely with the Historic Preservation Division, in gaining full appreciation of the archaeological sites and preparing a comprehensive plan for site protection and preservation.

SUMMARY OF COMPATIBILITY WITH LAND USE PLANS AND POLICIES

The Lālāmilo Project is generally consistent with the plans and policies of State and County land use plans, including the Hawaiian Homes Commission Act, Hawai'i State Plan, Hawai'i State Law, The County General Plan and LUPAG map, and County Zoning ordinance.

REQUIRED APPROVALS AND PERMITS

The Department of Hawaiian Home Lands is not subject to state and local land use permitting requirements pursuant to the Legal Memorandum dated May 6, 1994 by the State Attorney General; however, the existing State and County of Hawai'i designations for the property generally conform to the Project's proposed Residential Lots.

Stream related permits for road crossings over the Lanikepu and Keanu'i'omanō Streams will be required at the western end of the Property to allow access from Kawaihae Road. The Development Plan design phase of the Project will evaluate two options, including bridging over the streams and in-stream culverts. In-stream culverts would require State and Federal permits to allow the alteration of the streambed. The design of the culvert is subject to the findings of a flood study which would be prepared prior to site specific engineering design.

Other permits will be requested, including, but not necessarily limited to, approvals such as subdivision, grading, building, and other construction permits, NPDES, water resource development, wastewater treatment and disposal, roadway connections, underground injection control permit, and floodway Letter of Map Revisions (LOMR) and Conditional Letter of Map Revisions (CLOMR).

PREPARERS AND CONTRIBUTORS TO THE EIS

The Environmental Impact Statement has been prepared by PBR HAWAII staff located in Hilo and Honolulu, with project management through the Hilo office located at Hilo Lagoon Center, Suite 310, 101 Aupuni Street, Hilo, Hawai'i 96720. The EIS has also been supported by technical experts including a civil engineer, traffic engineer, social scientist, meteorologist, archaeologist, botanist, and stream and wildlife biologists.

1 Introduction

Lālāmilo PROJECT

1.0 INTRODUCTION

The State of Hawai'i Department of Hawaiian Home Lands proposes to develop Residential Lots at property at Lālāmilo, Waimea, in South Kohala on the island of Hawai'i.

1.1 SUMMARY

Project Name:	Department of Hawaiian Home Lands Lālāmilo Project		
Location:	Lālāmilo, Waimea, South Kohala, Hawai'i		
Landowner:	State of Hawai'i Department of Hawaiian Home Lands State of Hawai'i Department of Land and Natural Resources		
Applicant:	State of Hawai'i Department of Hawaiian Home Lands		
Tax Map Key:	(3) 6-6-01: 54 & 77; (3) 6-6-04: 12 -17 / Total Area 248.8 acres		
Project Area/ Ownership:	6-6-01:77	232 acres	DHHL
	6-6-01:54	9.8 acres	DLNR
	6-6-04:12-17	7.0 acres	DLNR
Existing Uses:	Ranching; Vacant of any built structures		
Proposed Uses:	Residential Homestead Lots		
Land Use Designations:	*State Land Use*: Agricultural and Urban *General Plan LUPAG*: Urban Expansion, Low Density Urban, Flood Plain *Zoning*: A-5a (Parcel 77); RS-10 (Parcels 54 &12-17) *SMA*: Property is not within the SMA		
Permits/Approvals Required:	Section 404, Clean Water Act, as required LOMR and CLOMR Stream Channel Alteration Permit, as required Subdivision Permit Grading / Building permits NPDES Permit Underground Injection Control Water Resource Development approvals Wastewater Treatment Facilities approvals Access Roadway connections		
Accepting Authority:	Governor, State of Hawai'i		

1.2 COMPLIANCE WITH STATE OF HAWAI'I AND COUNTY OF HAWAI'I ENVIRONMENTAL LAWS

This document has been prepared in accordance with the provisions of Chapter 343, *Hawai'i Revised Statutes* (HRS) and Hawai'i Administrative Rules (HAR) Title 11, Department of Health, Chapter 200, Environmental Impact Rules. Section 343-5, HRS, establishes eight "triggers" that require an environmental assessment. The triggers applicable to the Project include the use of State lands and the use of State funds.

An Environmental Assessment (PBR Hawaii November 2001) which served as an Environmental Impact Statement Preparation Notice (EISPN) was published in the December 23, 2001 OEQC *Environmental Notice*. The comment period during December 23, 2001 to January 22, 2002 generated 35 comment letters (see Section 12). The Draft Environmental Impact Statement (DEIS) was published on August 23, 2002 with a comment period extending from August 23 to October 7, 2002. A total of 24 comment letters were received; these letters and the Applicant's responses are included in Section 13.

Community consultation: Presentations in the Waimea community were made on January 8, 2002 and June 6, 2002. The following summarizes the issues identified:

South Kohala Traffic Safety Committee (SKTSC) – January 8th

A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. The project, as described in the EISPN, was presented (prior to completion of technical studies). In attendance were members of SKTSC and representatives of the following agencies and organizations: Waimea Hawaiian Homesteaders' Association, Hui Kako'o 'Āina Ho'opulapula, Waimea Community Association, Waimea Community Association Design Committee, Waimea Outdoor Circle, Waimea Preservation Association, Waimea Trails & Greenways, Waimea School Parent Teachers Students Association, Kanu o ka 'Āina (Principal), Waimea Middle School (Principal), Parker Ranch, Mayor's Office, and County of Hawai'i Department of Public Works.

Traffic issues raised included the following: Existing congested conditions on all roadways, alternative access routes, relocation of the DHHL project site.

Waimea Community Association, Planning and Design Committee – January 8th

A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. The project, as described in the EISPN, was presented (prior to completion of technical studies). In attendance were members of The Waimea Community Association, Planning and Design Committee and representatives of the following agencies and organizations: Waimea Hawaiian Homesteaders' Association, Hui Kako'o 'Āina Ho'opulapula, Waimea Community Association, Waimea Community Association Design Committee, SKTSC, Waimea Outdoor Circle, Waimea Preservation Association, Waimea Trails & Greenways, Waimea School Parent Teachers Students Association, Kanu o ka 'Āina (Principal), Waimea Middle School (Principal), Parker Ranch, Mayor's Office.

Relevant issues which were raised included the following: crowded school conditions, limited water resources, wastewater concerns, project density and schedule, and social issues resulting from 400 new Homesteads including social integration of newcomers into the community and crowded school conditions.

DHHL agreed to return to the community following the completion of technical studies but before the completion of the Draft EIS.

Waimea Community Association Town Meeting – June 6th

The Town Meeting was held at Kahilu Hall and attended by several hundred people from the Waimea community, including a few residents who are also on the beneficiary wait-list for a North Hawai'i homestead award.

A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. Technical consultants in attendance included the traffic engineer, project engineer, social impact consultant, and archaeologist.

The Alternatives A and B were depicted in power point slides and technical findings were summarized, including public infrastructure impacts, the natural and cultural environment.

Issues raised included the following: water resource availability, density alternatives, whether 'ohana dwellings would be permitted, traffic congestion, crowded school conditions.

1.3 MAJOR CHANGES TO THE MASTER PLAN

1.3.1 Changes Following the Draft EIS

DHHL has removed the commercial and light industrial uses from the project due to community concerns which were raised during the review of the Draft EIS. The 16.0 acres of the prior proposed commercial (3.7 acres) and industrial (12.6 acres) will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

1.3.2 Changes Following the EIS Preparation Notice (EISPN)

Following the publication of the EA/EISPN, changes were made to the overall project after our discussions with the community and completion of the EIS technical studies. The project is now named Department of Hawaiian Home Lands Lālāmilo Project (DHHL Lālāmilo Project). The components remain the same and consist of residential lots and a reduced area in commercial and light industrial uses. *[Note: However, as noted in Section 1.3.1 - the Lālāmilo Project has removed all commercial and light industrial uses.]*

Existing opportunities for water resource and wastewater treatment facilities are recognized as constraints toward development, and would require major facilities development to allow the development of the Lālāmilo Project. Thus, two alternative plans have been developed as options for the Lālāmilo site. The alternatives include two lot sizes - 10,000 square feet and 1-acre - which would result in different densities. The preferred alternative is the 10,000 square feet scenario to serve the greatest number of beneficiary applicants. In the revisions to the master plan the number

of lots have varied from 400 lots (as shown in the EISPN) to 382 lots (as presented at a June 6, 2002 community meeting) to 442 lots as described herein. The number of lots in the 1-acre scenario include 121 1-acre lots and 34 10,000 square feet lots.

The ultimate decision on the project density will be based on the cost to implement major offsite water development and wastewater treatment infrastructure when weighed against the need to serve beneficiaries.

A second major change to the project is the removal of TMK: 6-6-04:10 (16.588 acres) from the project. In deference to the County of Hawai'i and Waimea community Trails and Greenways' desire to utilize portions of this parcel for a trailhead for a proposed linear park system, DHHL will not be acquiring Parcel 10. This document, therefore no longer describes Parcel 10.

Other changes to the project plans allow for topographical, floodway, and archaeological site constraints. Approximately 19 to 20 acres will be preserved to protect the Lālāmilo agricultural field complex and other historic sites and roadway alignments will minimize impacts to the drainages on the property.

1.4 LOCATION

The DHHL Lālāmilo Project Site ("Project Site", "Project Area", or "Property") is in Waimea within the judicial district of South Kohala in the County of Hawai'i (Figure 1). The linear property is located proximate to Kawaihae Road (Highway 19), the South Kohala Distribution Road, and nearby the Kohala Mountain Road (Highway 250).

1.5 LAND OWNERSHIP

The Project Area consists of several parcels which are identified as Tax Map Key: 6-6-01: 54 & 77; and 6-6-04: 12 -17 (Figure 2) and is summarized in Table 1. DHHL acquired the 232-acre Parcel 77 in October 1999 from the State of Hawai'i as part of the 1994 settlement to restore the Hawaiian Home Lands Trust.

The additional Parcels 6-6-01: 54 and 6-6-04:12-17 are Department of Land and Natural Resources (DLNR) remnant parcels which are being acquired by DHHL. These parcels were formerly zoned and subdivided by the State as part of the Ka La Loa and Lālāmilo subdivisions.

Table 1. Summary of Parcels in the Project Area

TMK Parcel Number	Area (in Acres)	Current Ownership	Land Use Status
6-6-01:77	232	DHHL	Acquired from State of Hawai'i in 1999 General Lease to Palekoki Ranch, Inc.; withdrawal of General Lease effective January 1, 2003
6-6-01:54	9.8	DLNR	Vacant of any uses
6-6-04:12 - 17	7	DLNR	Current use: Horse stable - Revocable Permit to Richard Ednie
TOTAL	**248.8**		

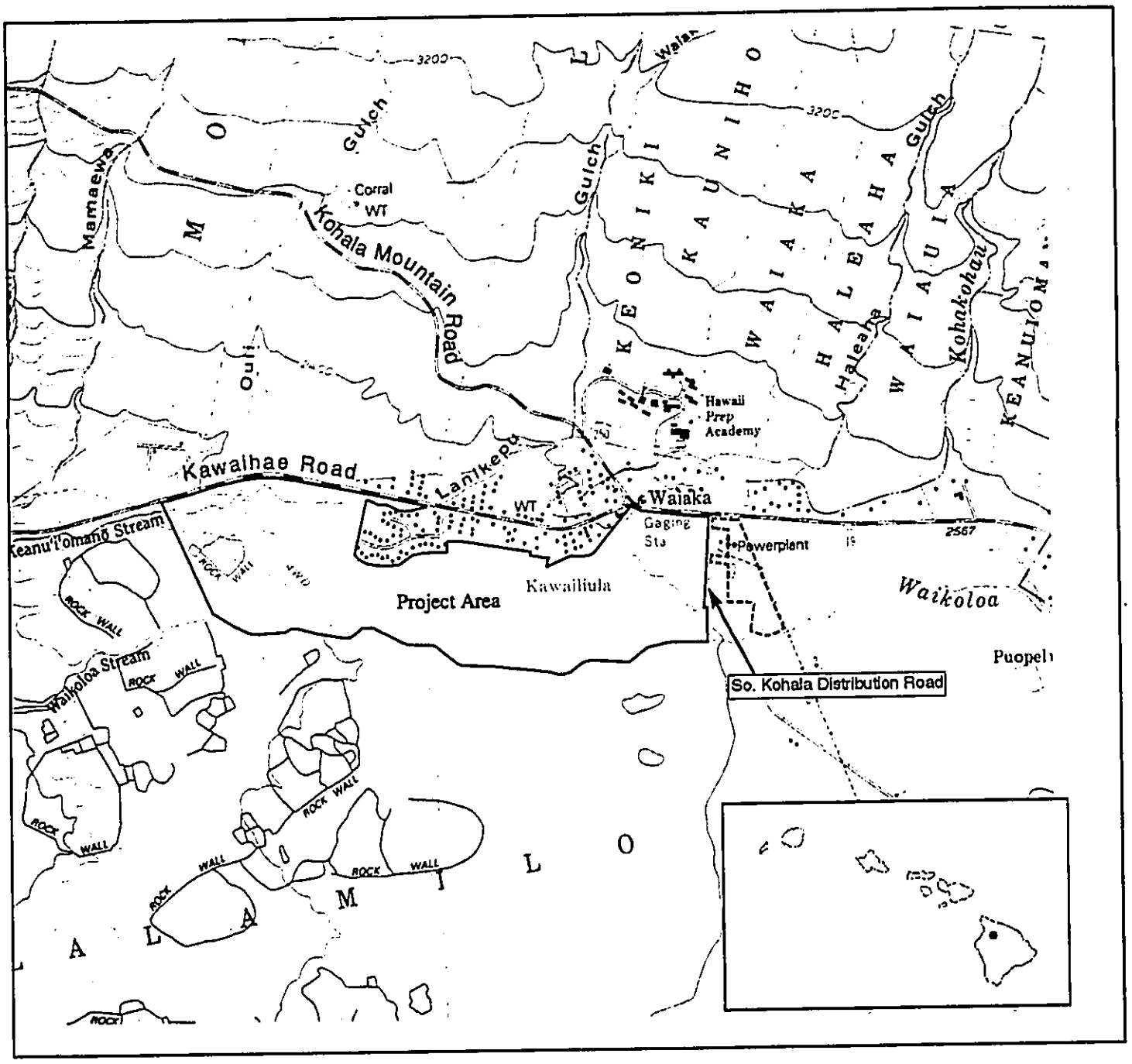


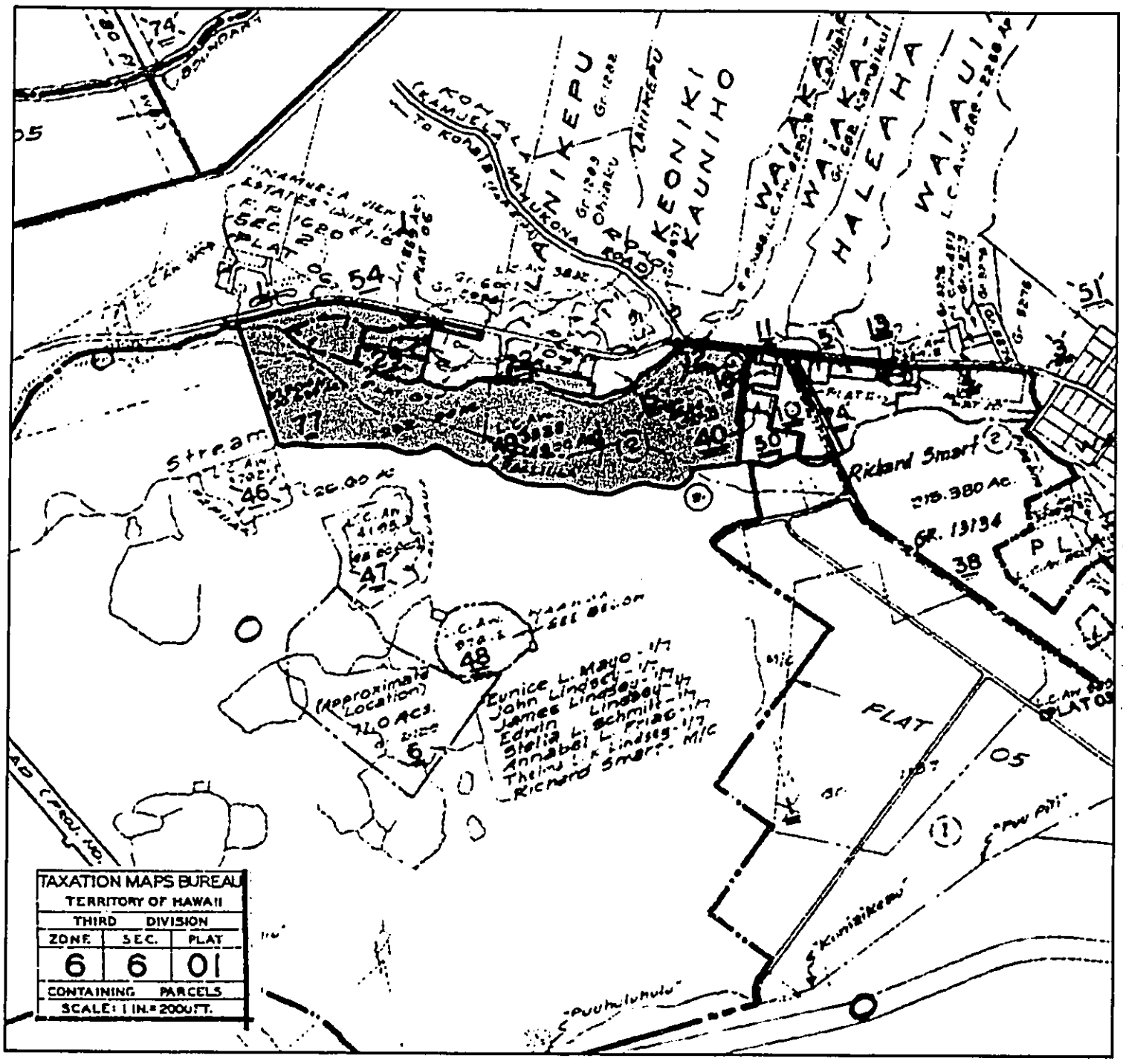
FIGURE 1
Location Map

Lālāmilo PROJECT

0 1000 2000
FEET

Source: USGS Topographical Map, Kamuela, Hawai'i

RECEIVED AS FOLLOWS



LEGEND

Project Area

10 Parcel 10 (Removed from Project)

Source: Tax Map Key

FIGURE 2

Tax Map Key / Land Ownership Map

Lālāmilo PROJECT

0 1000 2000 FEET

Parcel 77 is classified as "available lands" and "Hawaiian home lands" as specified in the Hawaiian Homes Commission Act (HCCA), sections 201A-5, 203, and 204. Available lands is defined as land not already under homesteading or commercial/industrial long-term dispositions. The transaction to transfer the DLNR parcels (Parcels 54 and 12-17) to DHHL is anticipated to be completed by the end of 2002. Further discussion on DHHL, its present and future landholdings, and its overall mission is described in Section 1.6 below.

1.6 IDENTIFICATION OF THE APPLICANT

The applicant is the State of Hawai'i Department of Hawaiian Home Lands, as represented by Mr. Raynard C. Soon, Chairman, Hawaiian Homes Commission.

The Department of Hawaiian Home Lands is one of the 18 agencies of the Executive Branch of the State of Hawai'i. The legal basis for the Department's existence is the Hawaiian Homes Commission Act ("HHCA"), 1920, as amended, which was passed by the U.S. Congress and signed into law by President Harding on July 9, 1921.

The Department's mission is to manage the Hawaiian Homes Lands trust effectively, and to develop and deliver land to native Hawaiians. Native Hawaiians are defined by DHHL as individuals of at least 50 percent Hawaiian blood. The DHHL land trust consists of more than 203,500 acres of land on Hawai'i, Maui, Moloka'i, O'ahu, and Kaua'i.

Two major actions have provided DHHL with the necessary funding to address the issue of its lengthy applicant list for Hawaiian Home Lands ("HHL") homestead awards: 1) the 1994 settlement between the State and the DHHL which provided 16,518 acres to DHHL to restore the Hawaiian Home Lands Trust, and 2) the 1995 State Legislature approval of $30 million per year for 20 years for a total of $600 million. The lands identified by this project, in part, satisfies the State's 16,518-acre commitment to DHHL. It is DHHL's goal to construct 500 homes per year statewide for the next 20 years to provide residential lots for the 19,302 on the DHHL beneficiary list who have submitted 31,318 applications for Homestead Awards (DHHL Annual Report: FY 1999-2000)

DHHL provides direct benefits to native Hawaiians through 99-year homestead leases at an annual rental of $1 for residential, agricultural, or pastoral purposes. The intent of the homesteading program is to promote economic self-sufficiency.

Other benefits provided by the HHCA include financial assistance through direct loans or loan guarantees for home construction, home replacement or repair, and for the development of farms and ranches; technical assistance to farmers and ranchers; and the operation of water systems.

In addition to administering the homesteading program, DHHL is also authorized through the HHCA and the Hawai'i Administrative Rules to dispense lease lands and issue revocable permits, licenses, and rights-of-entry for lands not in homestead use. It is the policy of the Department to allocate revenues from lands in commercial, industrial, and other income producing uses towards the support of homestead development activities.

1.7 IDENTIFICATION OF ACCEPTING AUTHORITY

In accordance with Chapter 343, HRS, and Hawai'i Administrative Rules (HAR), Title 200, Section 11-200-4, whenever a State agency proposes an action, the final authority to accept a statement shall rest with the Governor, or an authorized representative, whenever an action proposes the use of state lands or the use of state funds. Therefore, the Governor is the Accepting Authority for the Final EIS.

1.8 DHHL PLANNING PROCESS

DHHL implements a multi-tiered planning process. A statewide 20-year DHHL General Plan guides the entire program from the first tier. More specific statewide three to six year Strategic Program Plans work in conjunction with 20-year Island Plans to guide DHHL actions from the second tier. The third tier of planning is comprised of yet more specific ten-year Development Plans that guide the activities in undeveloped areas, and finally Homestead Community Plans that guide planning in existing communities, also over ten-year periods.

The recently adopted *DHHL Hawai'i Island Plan* identifies Residential development at Lālāmilo as a Priority Tract for North Hawai'i . Priority Tracts are those areas that appear more favorable for early project development; these assessments (for the Lālāmilo Property and all other identified priority tracts) are based on rigorous planning studies consisting of the following facets: 1) local and regional physical environmental conditions, 2) infrastructure and utility conditions, 3) land use regulations for the specific parcel and surrounding areas, 4) status of potable and non-potable water resources, and 5) condition of other natural resources that may be available. For the Lālāmilo Property, the collective assessment has indicated a cost effective developable parcel, details of which are described in remaining sections of this document.

1.9 JUSTIFICATION AND NEED FOR THE PROJECT

Since the inception of the Hawaiian Homes Commission Act, the DHHL has served 7,260 native Hawaiian beneficiaries within the State of Hawai'i through homestead awards. Today there are 31,318 applicants for Homestead awards statewide. For the Island of Hawai'i, 2,054 beneficiaries have been awarded homesteads with an additional number of 7,883 applicants who have submitted 11,755 applications still waiting for Homestead awards (DHHL November 2000 in SMS 2001). The Act allows a qualified native Hawaiian to submit an application for a Residential award and a second application for an Agricultural or Pastoral award.

The types of Homestead awards which have been considered for the Lālāmilo project are described in Table 2. Residential use is prioritized based on the *Hawai'i Island Plan.* Large scale agricultural and pastoral uses have been prioritized for other areas of North Hawai'i ; and are therefore rejected at Lālāmilo. Commercial and industrial uses, although previously planned at Lālāmilo, are no longer proposed. Instead, the land area (16 acres) is now designated as General Agriculture and may be left vacant or leased for small-scale agricultural purposes (e.g. pasturing livestock).

Table 2. Types of Homestead Awards and Land Use Designations*

Award Type	Land Use	Area
Residential	Residential home	≤ 1 acre**
Agriculture • Subsistence • Supplemental • General***	 - Home use agriculture - Commercial use agriculture to supplement household income - Farming or ranching operations other than homestead leases	 - ≤ 5 - Up to 40 acres - Not specified
Community Use	Community uses and facilities	Area to be determined during Development Plan phase****
Pastoral	Ranching use	Up to 1,000 acres
Commercial*****	Retail, business, and other commercial activities (similar to uses allowed under county land use ordinances)	Not specified.
Industrial*****	Areas for processing, warehousing, manufacturing, construction, wholesaling and other activities (similar to uses allowed under county land use ordinances)	Not specified.

* As approved by the HHC on October 22, 2002
** Lālāmilo Project Residential lot sizes are proposed as 10,000 SF or 1-acre lots.
*** General Agriculture designation is applied to 16 acres formerly planned for commercial and industrial uses.
**** Approximately 10 acres of Park and Community Center facilities are planned at the Lālāmilo Project.
** *** Commercial and Industrial uses are no longer proposed for the Lālāmilo Project.

The *Hawai'i Island Plan* designates Lālāmilo as a priority tract for Residential uses to serve the beneficiary applicants identifying North Hawai'i as their preferred locale. A survey of beneficiaries (SMS February 2001) was conducted with the objective to gather information from DHHL applicants and current lessees for the *Hawai'i Island Plan.* The survey results indicated approximately 38 to 42 percent of all applications were for Residential Lots with approximately 1,624 applicants desiring DHHL-built homes. The choice of geographical locations on the island of Hawai'i included North, East, South, West, and Central Hawai'i. The subject Project lands at Lālāmilo is in North Hawai'i.

The survey of all applicants in November 2000 (SMS February 2001) attempted to measure preference by geographic region. The 567 applicants identified in the EISPN selected the North Region as their "first and only" choice; but there were 958 other people who had North Hawai'i as their first choice, but would be willing to switch to another location if awards are limited. Thus the true number of applicants who have identified North Hawai'i as a first choice for a Residential Lot is 1,525. Therefore, need for the homes as proposed in this development at Lālāmilo represents a clear pent-up demand and is recommended in DHHL's *Hawai'i Island Plan* Final Report as a Phase 1 priority tract project to consist of approximately 400 lots.

The Lālāmilo Project homes would be marketed to beneficiary applicants who are on the Hawai'i Island residential awards wait-list. The applicants are from Hawai'i County, other counties in the State of Hawai'i, and from out-of-state. DHHL records indicate that Hawai'i Island residents account for 58 percent of all applicants, 29 percent reside elsewhere in the State, and 13 percent reside out-of-state. An assumption is made that some of the applicants from off-island may have ties (e.g. family) to the island.

2 Project Description

Lālāmilo PROJECT

2.0 PROJECT DESCRIPTION

The project alternatives and a phasing schedule are described below along with supporting background information.

2.1 BACKGROUND INFORMATION

2.1.1 Location and Surrounding Uses

The Waimea community (also known as Kamuela in honor of Samuel Parker) is set on the broad plateau formed by the Kohala Mountains and Mauna Kea. The Project Site is within the mauka portion of the Lālāmilo tract at the base of the Kohala Mountains. The linear property has an east - west orientation with adjacency to Kawaihae Road (Highway 19) and the South Kohala Distribution Road. Kohala Mountain Road (Highway 250) is also proximate to the area. Three streams - Keanu'i'omanō, Lanikepu, and Waikoloa - form the north and south boundaries of the Property.

The Property is contiguous and adjacent to South Kohala Distribution Road, the HELCO Waimea Generation Plant, the County Solid Waste Division Waimea Baseyard, and County Solid Waste Transfer Station. The old Waimea quarry and landfill ("old landfill", now covered) is also adjacent to the Project.

Existing residential subdivisions and landmarks immediately adjacent to the Project include the Ka La Loa and Lālāmilo House Lots Subdivisions (1st and 2nd Series), and the Kamuela Museum. The Property is surrounded by other State of Hawai'i lands at the west boundary and across the Waikoloa Stream to the south.

Other land uses in the vicinity include the Kamuela View Estates residential subdivision to the north of Kawaihae Road and Hawai'i Preparatory Academy campus to the east of Kohala Mountain Road. Parker Ranch lands and other land parcels used for ranching are scattered throughout the community. The center of Waimea Town is approximately two miles to the east, Waimea Airport two and a half miles to the southeast, and Queen Ka'ahumanu Highway and Kawaihae Harbor about 7 miles to the west.

The Hawaii Preparatory Academy owns some property immediately across Kawaihae Road and shares adjacency with DHHL along a length of approximately 500 feet near the east boundary of the DHHL Property. The total length of the DHHL property is approximately 7,000 feet (east west direction). HPA recently purchased this property with the intention of relocating its Lower and Middle Schools to this location.

2.1.2 Description of the Property

The main DHHL parcel (Parcel 77) which consists of 232 acres is adjoined across the Keanu'i'omanō Stream by remnant DLNR parcels (Parcels 54, 12-17) in the adjacent Ka La Loa and Lālāmilo House Lots Subdivisions to form a 248.8-acre site located west of the South Kohala Distribution Road ("Distribution Road"). The collective Property is referred to as the "Project Site" or "Project Area". Presently, there are no improved access roads to and through the Property. Primary existing access to Parcel 77 is through the Palekoki Ranch gate on the Distribution Road and access to the remnant Parcels 54 and 12-17 is from Alaneo and Akulani Streets in the Ka La Loa

and Lālāmilo Subdivisions.

The linear property is approximately 7,000 feet long and is oriented in an east-west direction with a width of 900 feet to 2,000 feet (averages roughly 1,500 feet wide). The property boundary is defined by the streams that border it - Keanu'i'omanō and Lanikepu, which form portions of the north boundary, and Waikoloa which forms the entire south boundary. The Property is on a plateau at the base of the Kohala Mountains to the north with vistas of Mauna Kea to the southeast and Hualālai to the southwest. Elevations on the Property range from 2,225 to 2,404 feet above mean sea level (AMSL). Each of the parcels is vacant of any building structures, and although bordered by improved roadways, has no access improvements onsite except for dirt roads. Future access to the Property would be from Kawaihae Road.

Cattle ranching and pasture uses have been associated with the various parcels and these uses continue on other State lands adjacent to the Project Area.

Parcels 54 and 12 - 17 are remnant or "infill" parcels within the existing State of Hawai'i developed Ka La Loa and Lālāmilo Houselots subdivisions. These two subject parcels are not contiguous but are accessed from Akulani Street (off of Kawaihae Road) through Alaneo Street. The western Parcel 54 consists of 9.8 acres and central Parcels 12 - 17 consist of 7.0 acres; these parcels are zoned for single family residential use (RS-10).

2.2 PROJECT GOAL AND GENERAL SUMMARY DESCRIPTION[1]

2.2.1 Project Goal

The *Hawai'i Island Plan* identifies Lālāmilo as a Priority Tract for development. The overall goal of the Project is to develop and deliver Residential homestead awards to the native Hawaiian beneficiaries who have identified their preference to reside in North Hawai'i and to fill a much needed demand for homes, as identified by the DHHL long standing wait list.

2.2.2 Presentation of Two Alternatives for Parcel 77

In order to establish study parameters for the EIS, two residential density alternatives have been prepared. Alternative A (Figure 3) establishes the *maximum* number of lots based on a minimum lot size of 10,000 square feet for consistency with the County's RS-10 residential zoning district. Alternative B (Figure 4) establishes a *minimum* number of lots for the largest residential lot size of 1 acre. The standard of the 1-acre maximum lot size is derived from DHHL's types of homestead awards and land use designations.

It is important to note that these plans are conceptual and will be refined in the subsequent Development Plan design phase. Equally important is that the total number of residential lots in either alternative will not exceed the numbers described in the EIS.

[1] This section and the following sections have been revised to exclude any descriptions of the previously planned and now discontinued commercial and industrial uses, except to illustrate any contrasts or to describe DHHL's response to the community's concerns about these uses.

Land Use Summary

	Residential (442 Lots)	160.6 Acs.
	Community Center	1.7 Acs.
	Parks	8.3 Acs.
	Preservation Area	19.1 Acs.
	Open Space	43.1 Acs.
	General Agriculture	16.0 Acs.
	Total:	248.8 Acs.

FIGURE 3
10,000 S.F. Subdivision Plan
Lālāmilo Project

Land Use Summary

	Residential	150.2 Acs.
	(1 Acre: 121 Lots, 10,000 SF: 34 Lots)	
	Community Center	1.8 Acs.
	Parks	7.3 Acs.
	Preservation Area	19.7 Acs.
	Open Space	53.8 Acs.
	General Agriculture	16.0 Acs.
	Total:	248.8 Acs.

FIGURE 4
One Acre Subdivision Plan
Lālāmilo Project

Thus, to accomplish the project's goal to develop and deliver Residential homestead awards to native Hawaiian beneficiaries, two density alternatives for Parcel 77 have been developed. Parcel 77 consists of 232 acres and is separated from the remnant in-fill Parcels 54 and 12-17 by the Keanu'i'omanō Stream.

These include Alternative A: 10,000 square feet lots (442 units, includes 34 lots in the RS-10 zoned infill parcels and 408 units on the main parcel), and Alternative B: a combination of one-acre lots (121 units) and 10,000 square feet lots in the RS-10 zoned parcels (34 units). Alternative A is the preferred alternative to meet native Hawaiian applicant preferences for North Hawai'i. Descriptions of the residential alternatives are in Sections 2.3 and 2.4 below. The sixteen acres located at the east boundary and previously planned for commercial and industrial uses are designated as General Agriculture lands and described in Section 2.6.

2.2.3 Project Phasing

Project phasing is designed to meet the pent-up demand for residential homestead lots in North Hawai'i as evidenced by the approximately 1,525 applicants identified in the beneficiary survey (SMS 2000).

Phase 1 (2003 - 2005) Residential Lots (Figures 5 and 6) consists of 34 units (in both Alternatives A and B) on the RS-10 zoned remnant lots. Phase 2 (2006 - 2010) Residential Lot development would occur after water and wastewater infrastructure systems are in place. Thus, Project phasing will keep pace with reasonable infrastructure development in the region.

2.2.4 Project Design

Current Hawaiian Homes Commission policy is toward development of residential lot projects as developer-built turn-key homes and owner builder or self-help homes[2] in approximately equal proportions. DHHL's policy for all new residential development include "Design Guidelines" for both turn-key, owner builder, or self help products (or housing type) which would be enforced through conditions, covenants, and restrictions (CCRs). These policies would be applicable to each of the proposed alternatives.

DHHL will be developing rural design standards as design guidelines for the request for proposals (RFP) process for the Lālāmilo Project. These rural standards will be reviewed and approved by the County prior to the RFP process.

The RFP process entails DHHL selection of a developer for each phase of development in accordance with State of Hawai'i Administrative Rules. Requirements for proposals will include but not be limited to the submittal of a development site plan, subdivision plan, housing plan details, development schedule, and project budget. The proposals would also include sales and marketing plan information.

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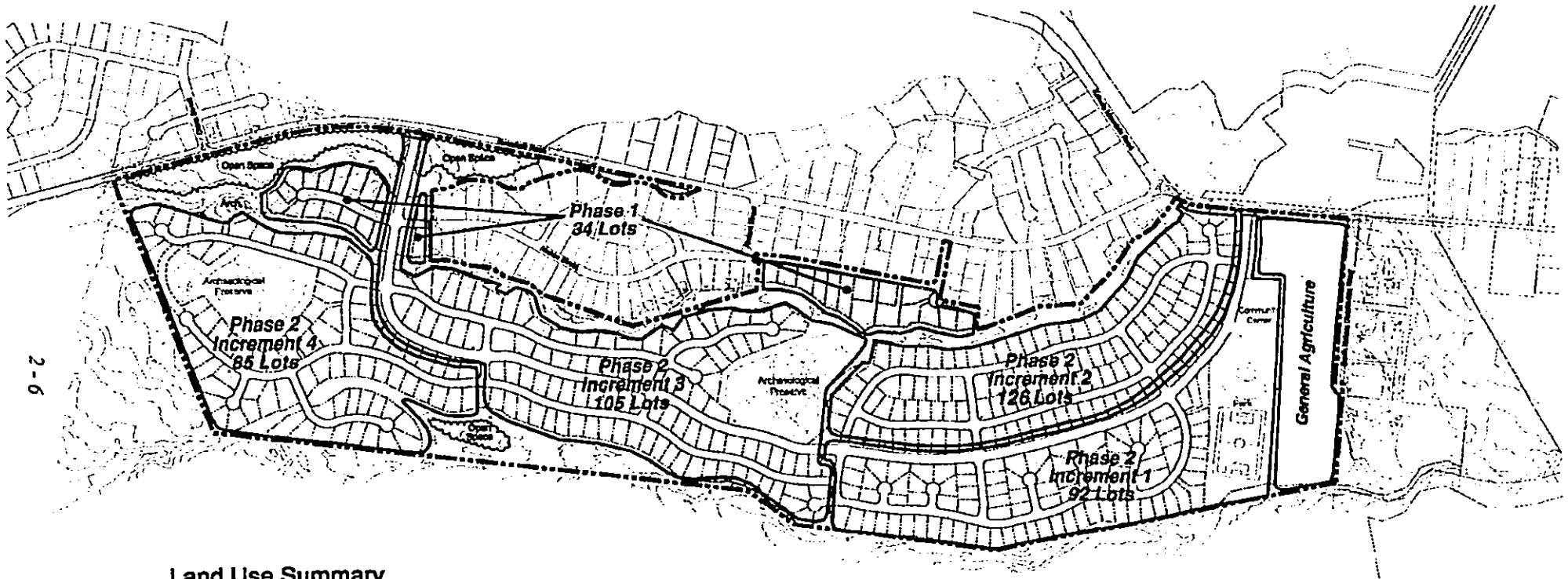
[2] *Turn-key* refers to a contractor built home which would be ready for occupancy upon completion; *owner builder* refers to an owner serving as contractor in the construction of his home he may either hire a contractor or do the construction himself); and *self-help* generally means a group process of building whereby families invest sweat equity in building their own and each others homes equitably.



Land Use Summary

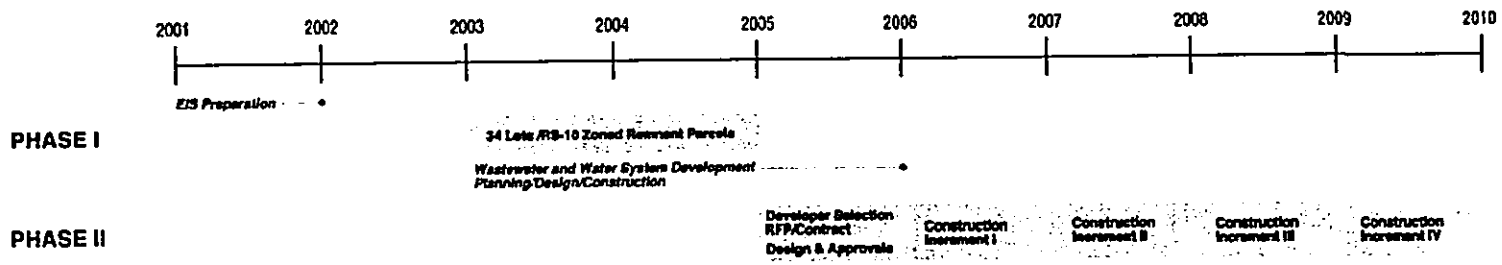
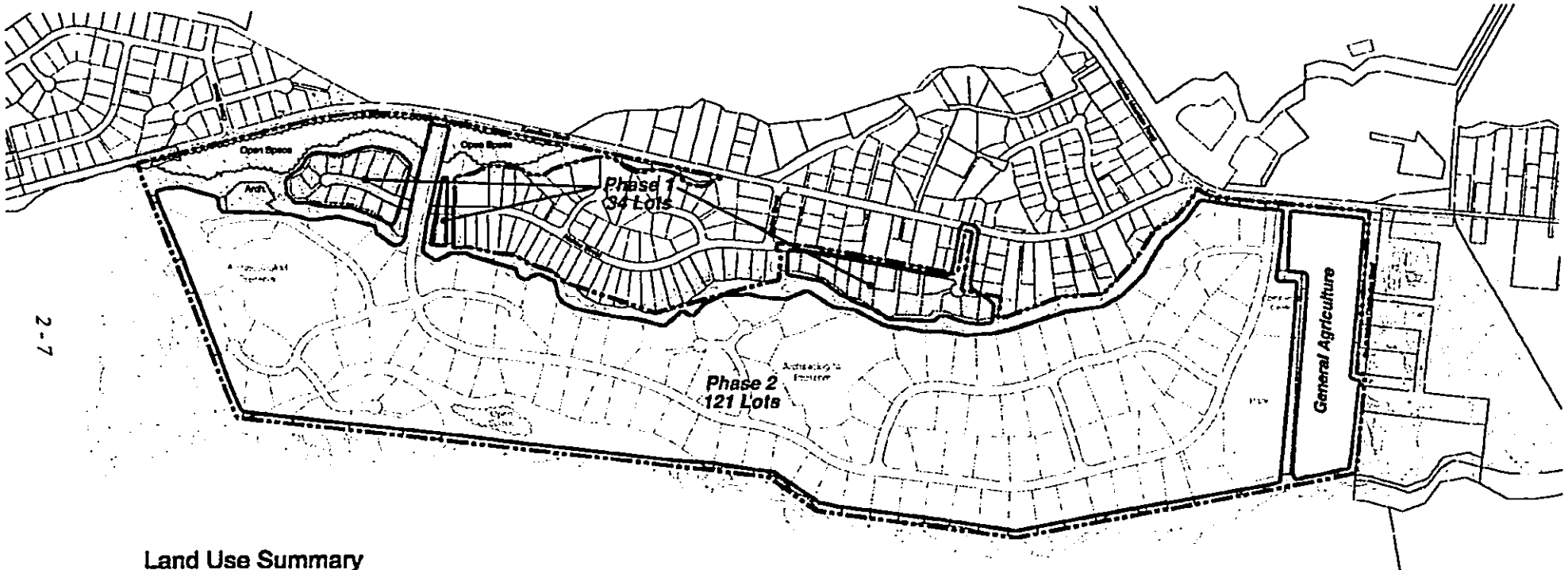


FIGURE 5
Altenative A - Phasing Plan
10,000 S.F. Subdivision Plan
Lālāmilo Project



Land Use Summary

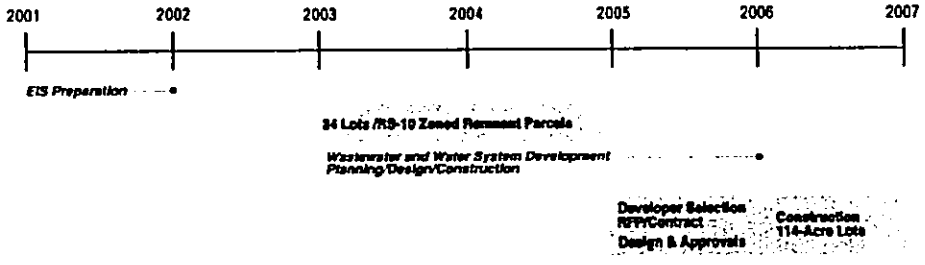


FIGURE 6
Altenative B
One Acre Subdivision Plan
Lālāmilo Project

DHHL's criteria for the selection of a developer, will include but not be limited to cost effectiveness and design parameters appropriate for the Waimea rural character. Recommended guidance documents would include the Waimea Design Plan and the OEQC Guidelines for Sustainable Building Design in Hawai'i . Upon evaluation of all proposals, selection of the developer will be made by the Hawaiian Homes Commission.

2.3 PHASE 1 (2003 - 2005): PARCELS 54 AND 12-17 – INFILL UNITS

Phase 1 (2003-2005) (of both density alternatives) includes 16.8 acres of land in the prior approved State of Hawai'i developed Ka La Loa and Lālāmilo Houselots subdivisions. These remnant "in-fill" parcels (Parcels 54 and 12-17) are zoned for single family residential (RS-10) development.

DHHL's 34 units would conform to the RS-10 zoning district and be consistent with the existing neighboring homes of the subdivisions. These parcels would be accessed from extensions of existing roadways and would be served by existing County water system infrastructure stub-outs within the roadways. Independent wastewater septic systems would conform to the State Department of Health (DOH) requirements for lots of this size.

Parcel 54: Proposed for the 9.8-acre Parcel 54 are 19 Residential Lots, each approximately 10,000 square feet in size. Parcel 54 is contiguous with the west boundary of Ka La Loa Subdivision and would be accessed from a new access road at Kawaihae Road as well as an extension of Alaneo Street in the existing subdivision. Alaneo Street currently terminates at a fence at the Parcel 54 boundary. The new access at Kawaihae Road would also serve the existing Ka La Loa Subdivision.

Parcels 12-17: Proposed for the 7.0-acre Parcels 12-17 are 15 Residential Lots, each approximately 10,000 square feet in size. Parcels 12-17 are located at the east end of the State developed Lālāmilo Houselots Subdivision and would be accessed from an eastern extension of Alaneo Street. Alaneo Street currently terminates at the edge of the subject parcels and is fenced for horse pasture usage. Alaneo Street would be extended approximately 1,200 feet and then connect to Kawaihae Road via a new road. These roadway improvements would serve the 15 DHHL lots as well as the existing residences in the subdivision.

2.4 PHASE 2 (2006 - 2010): PARCEL 77 - ALTERNATIVES A AND B

Residential Lot development on Parcel 77 would be contingent on roadway, water, and wastewater system improvements. The preferred Alternative A consisting of 10,000 square feet lots assumes that a Wastewater Treatment Plant (WWTP) is constructed as part of the project. The 1-acre lot size described in Alternative B assumes that a WWTP would not be built and septic systems would be allowed on the large lots. Either Alternative A or B would require DHHL's participation with the County and State DLNR to develop an offsite water source and transmission system improvements.

Roadways. The access roadway would connect to Kawaihae Road at an appropriate location between the South Kohala Distribution Road and the Waiaka Bridge Kawaihae Road/Kohala Mountain Road intersection. DHHL will coordinate the location of its access road with State Department of Transportation and Hawaii Preparatory Academy.

2.4.1 Alternative A: 10,000 Square Feet Lots (Preferred Alternative)

2.4.1.1 Alternative A: Land Use Summary

Alternative A would generate a total of 442 lots, including 34 in Phase 1 (as described above in Section 2.3) and 408 in Phase 2, over a period of seven years from 2003 to 2010. Lot sizes will be approximately 10,000 square feet in area (and no less than 10,000 square feet).

The preferred Alternative A is shown in Figure 3 and its land uses are summarized in Table 3 below.

Table 3. Alternative A: 442 Residential Lots
10,000 Square Feet Lots
Land Use Summary*

Land Use	Area (Acres)
Phase 1 Residential Lots: 34 Units / RS-10 Zoned Parcels	16.8
Phase 2 Residential Lots: 408 Units / Parcel 77	143.8
Community Center	1.7
Park	8.3
Preservation Areas	19.1
Open Space Buffers	43.1
General Agriculture	16
TOTAL AREA	248.8

* Land use summary is conceptual and subject to change.

All lots would be served by improved roads and provided with basic hookups to water, sewer, and electrical and communications systems. Construction would be subject to Design Guidelines for all housing types.

The amenities which are common to both alternatives including the Community Center, Parks, and Preservation and Buffer Areas, are described in Section 2.5 below.

2.4.1.2 Alternative A: Preliminary Phasing Schedule

The Phase 2 development of 408 Residential Lots would be in four increments estimated from 2006 to 2010. An average of 102 homes would be built in each increment (Figure 5). Home occupation would be phased in with development of off-site water and wastewater systems during 2003 - 2006 and appropriate onsite improvements.

The Community Center and Park are proposed for development at completion of the Increment I development. Table 4 summarizes the conceptual development phasing.

Table 4. Alternative A: 10,000 Square Feet Residential Lots Development Phasing Schedule*

Phase	Schedule
• **Phase I: 34 Lots** / RS-10 Zoned Parcels	2003-2005
• **Wastewater and Water Systems Development**	2003 - 2006
• **Phase II: 408 Lots** / Parcel 77	
Construction Increment I (92 Lots)	2006 - 2007
Construction Increment II (126 Lots)	2007 - 2008
Construction Increment III (105 Lots)	2008 - 2009
Construction Increment IV (85 Lots)	2009 - 2010

* Schedule is conceptual and subject to change.

2.4.2 Alternative B: 1-Acre Lots

2.4.2.1 Alternative B: Land Use Summary

Alternative B would generate a total of 155 lots, including 34 10,000 S.F. lots in Phase 1 (as described in Section 2.3) and 121 one-acre units in Phase 2. Construction would occur over a period of five years from 2003 to 2008.

Alternative B is shown in Figure 5 and its land uses are summarized in Table 5 below.

Table 5. Alternative B: 155 Residential Lots 1-Acre Lots (121 Units) and 10,000 Square Feet Residential Lots (34 Units) Land Use Summary*

Land Use	Area (Acres)
Phase 1 Residential Lots: 34 Units / RS-10 Zoned Parcels	16.8
Phase 2 Residential Lots: 121 1-acre Units / Parcel 77	133.4
Community Center	1.8
Park	7.3
Preservation Areas	19.7
Open Space Buffers	53.8
General Agriculture	16
TOTAL AREA	248.8

* Land use summary is conceptual and subject to change.

All lots would be served by improved roads and provided with basic hookups to water, and electrical and communications systems. Sewer systems will consist of septic/leachfield systems. Construction would be subject to Design Guidelines for all housing types.

Similar to Alternative A, the amenities include the Community Center, Parks, and Preservation and Buffer Areas which are described in Section 2.5 below.

2.4.2.2 Alternative B: Preliminary Phasing Schedule

The Phase 2 development of 121 1-acre Residential Lots would be from 2006 to 2008. Home occupation would be after the development of water system improvements (during 2003 - 2006).

Table 6. Alternative B: 1-Acre Lots and In-Fill 10,000 Square Feet Residential Lots Development Phasing and Schedule*

Phase	Schedule
• **Phase I: 34 Lots** / RS-10 Zoned Parcels)	2003-2005
• ***Water System Development***	2003 - 2006
• **Phase II: 121 Lots** / Parcel 77	2006 - 2008

* Schedule is conceptual and subject to change.

2.5 COMMON AMENITIES OF THE TWO ALTERNATIVES

The common elements of both Alternative A and Alternative B include the following amenities: Community Center, Park, Preservation Areas, and Open Space Buffers.

2.5.1 Recreational Amenities: Community Center and Park

As part of the Phase 2 development of Parcel 77, an 8.3 acre active park (for Alternative A) and a 1.7 acre lot for a Community Center facility would be constructed. The combined approximately 10-acre recreational use area is planned to meet the County's standards and will address the recreational needs of the community with provisions for playfields and courts.

Also to serve the needs of the project community, a Community Center building is planned. This facility is envisioned to include a multi-purpose hall capable of being used for meetings, gatherings, and other appropriate group activities. Additional accessory facilities of the Community Center may include other culturally appropriate and desirable amenities. Site specific planning and design of facilities for the Community Center and Park facilities would occur in the Development Plan design phase of the project.

In addition to the active Park spaces and Community Center facility, preservation areas and open space areas will allow passive park uses.

The location of the recreational facilities has been sited at the east end of the Property for several important reasons: 1) together with the General Agriculture uses, the Park and Community Center land area would provide a buffer of about 600 to 800 feet between the adjacent industrial uses (e.g. HELCO generating plant, transfer station, old landfill) and the nearest new residential lots, and 2) limit public vehicular traffic flow through and within the new residential areas.

A public safety Civil Defense siren to serve the Lālāmilo Project and the surrounding neighborhoods is also planned within the Park; a specific location will be coordinated with the State Civil Defense during the Development Plan design phase.

2.5.2 Preservation Areas

Portions of the Lālāmilo Agricultural Fields Complex (Historic Site 22623) are distributed on the Project Site as well as on other lands to the west and south of the Project Site. On the Project Site, two areas of Site 22623 and an adze quarry site (No. 22624)which total approximately 19 to 20 acres will be protected as Preservation Areas. The Preservation Areas include components of the agricultural fields but also habitations and burial sites. Other burials on the property will be preserved in situ with appropriate buffers. These matters will be coordinated with the SHPD and the Hawai'i Island Burial Council.

The State Historic Preservation Division (SHPD), recognizing the significance of this complex, has a preliminary plan to preserve approximately 200-300 acres of Site 22623 to the south of Waikoloa Stream on adjacent State lands.

2.5.3 Open Space

Approximately 40+ acres (Alternative A) to 50+ acres (Alternative B) of Open Space areas are planned. One of the Open Space areas incorporates a three-quarters of a mile landscaped greenbelt along the western boundary adjacent to Kawaihae Road to provide a visual screen of the Project. Native plantings may include trees (i.e., koai'a, milo, naio, wiliwili, noni) and shrubs ('a'ali'i, alahe'e, maiapilo) and other culturally relevant plants (ti, plumeria, puakenikeni, etc.). An additional Open Space area is in the area of Waikoloa Stream along the drainage boundary.

2.5.4 Summary of Amenities

The Residential Lots will be supported by recreational amenities (e.g. Community Center, Park) and preservation and open space areas. Land area of approximately 29 to 33 percent in Alternatives A and B will be dedicated to the uses shown in Table 7.

Table 7. Area Summary of Amenities for Alternatives A and B

	Community Center (Acres)	Park (Acres)	Preservation Areas (Acres)	Open Space (Acres)	Total Area (Acres)	Percent of Project Area
Alternative A	1.7	8.3	19.1	43.1	72.2	29
Alternative B	1.8	7.3	19.7	53.8	82.6	33

2.6 GENERAL AGRICULTURE USES[3]

General Agriculture use of approximately 16.0 acres is planned at the Project's eastern boundary adjacent to the South Kohala Distribution Road. Existing industrial uses along the Distribution Road and directly across the Project include the HELCO electrical generation plant, County Solid Waste Baseyard and Waste Transfer Station, and Old Landfill.

The future access to this lot would be from the Project's East Access Road. The lot would remain unimproved and may include uses such as pasturing of sheep, horses, or cattle. Any future permit or license would require the lessee to appropriately fence the lot.

The agricultural use of this lot is not considered to be "development" and is therefore, not phased into the Lālāmilo Project. DHHL has the authority under it's rules to award agricultural lands.

An issue which faces site specific planning for this lot is the State Department of Transportation's proposed realignment of Kawaihae Road at this location in the approximate area of Waiaka Bridge to the South Kohala Distribution Road. DHHL would cooperate with the DOT to set an appropriate alignment. An additional unresolved issue is the Hawaii Preparatory Academy main access road to its proposed relocated Lower/Middle School campus to the area north of this agricultural lot. In the preparation of the Lālāmilo Project Development Plan, DHHL would initiate a planning meeting with the DOT and HPA to coordinate the location of the intersection.

2.7 OFF-SITE INFRASTRUCTURE DEVELOPMENT REQUIREMENTS

The Project requirements for water, sewer, and roadways will necessitate the development of off-site improvements including water resource, storage, and transmission facilities during the various phases of the project, as well as a wastewater treatment system. These matters are described in detail in Section 5.

2.8 DEVELOPMENT COSTS

Preliminary evaluation of costs for infrastructure development including water source and transmission and wastewater treatment have been estimated at $28 million (DHHL 2002). Development cost estimates for infrastructure will be refined upon completion of engineering analysis for water and wastewater treatment systems. Actual costs to develop other supporting infrastructure such as roadway, electrical and communications systems improvements will be determined upon receipt of developer proposals.

[3] The General Agriculture use replaces the previously planned commercial and industrial uses on the same area of approximately 16.0 acres. The change in land use is DHHL's direct response to Hawaii Preparatory Academy's concerns about commercial and industrial uses at this location across from their property where they propose to construct a new campus to relocate their Lower and Middle Schools.

3 Land Use Conformance

Lālāmilo PROJECT

3.0 LAND USE CONFORMANCE

The land use conformance of the planned uses and the DHHL development review and permitting process is described below. This includes the State and County of Hawai'i designations for the property as well as any Federal, State, and local government requirements for stream crossings, grading and construction, subdivision, roadway connections, etc. Full discussion of the Project's relationship to the plans, policies, etc. for the area is provided in Section 7.

3.1 STATE OF HAWAI'I

3.1.1 Chapter 343, Hawai'i Revised Statutes

Compliance with Chapter 343, HRS is triggered by the use of State lands and funds.

At this time there is no Federal action (including use of Federal funds) associated with the Lālāmilo Project, thus, compliance with the National Environmental Policy Act (NEPA) is not required.

3.1.2 Chapter 205, Hawai'i Revised Statutes

The State Land Use Law (Chapter 205, HRS), establishes the State Land Use Commission (LUC) and gives this body the authority to designate all lands in the State into one of four districts: Urban, Rural, Agricultural, or Conservation. The majority of the Project Site is within the State Agricultural District (Parcel 77) and portions are in the Urban District (Parcels 54 and 12-17) (Figure 7).

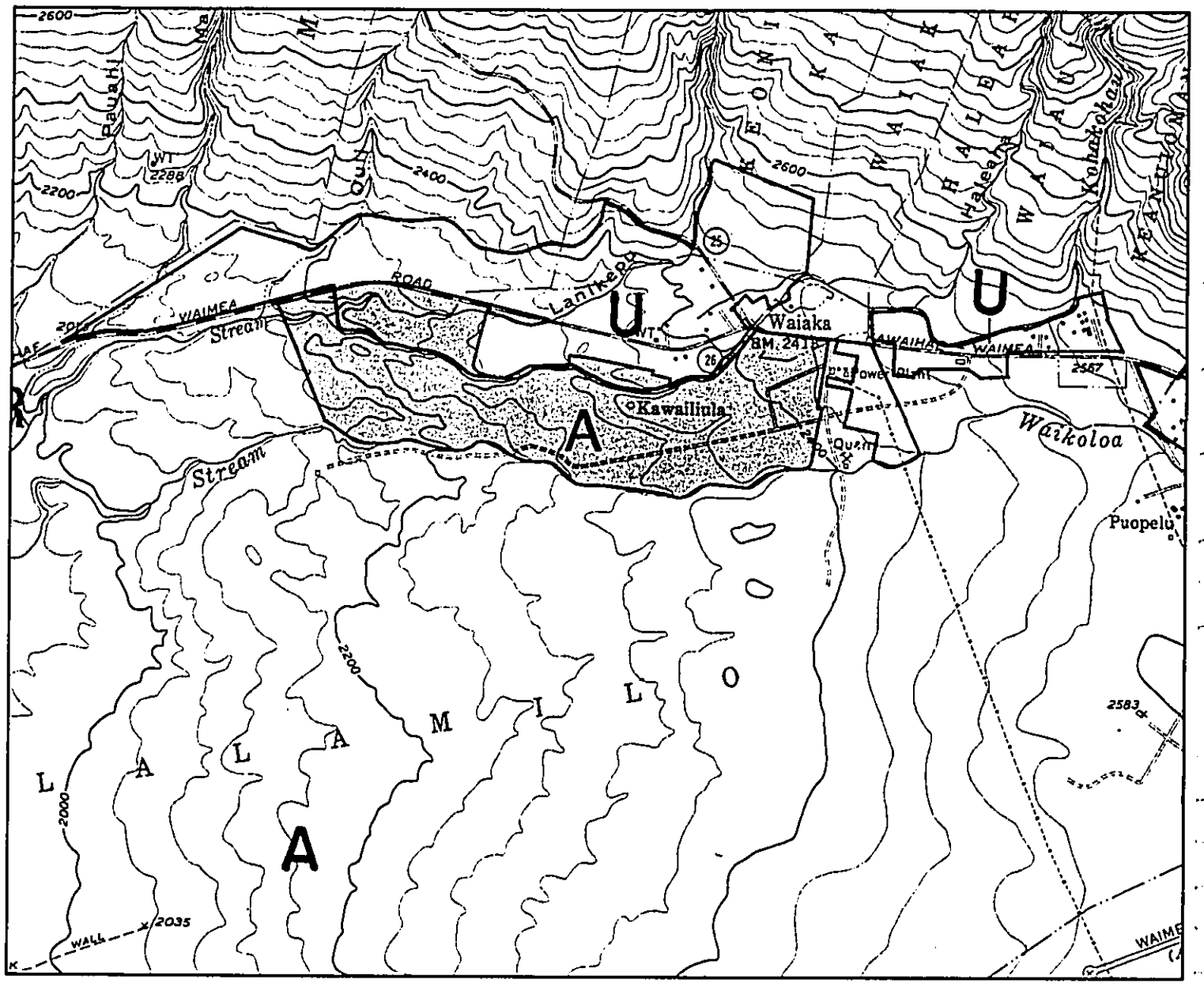
3.2 COUNTY OF HAWAI'I

Relevant land use regulatory policy documents and guidance plans of the County of Hawai'i which pertain to the Project Area include the *General Plan* and General Plan Land Use Pattern Allocation Guide (LUPAG) map, and the *Hawai'i County Code.* The Project is not in the Special Management Area.

3.2.1 General Plan

The *Hawai'i County General Plan* (County of Hawai'i 1989) is the policy document for the long-range development of the Island of Hawai'i. The General Plan provides direction for balanced growth in the County. The plan contains goals, policies and standards concerning thirteen functional areas as well as a series of land use maps referred to as the Land Use Pattern Allocation Guide (LUPAG) map. The County is presently in the process of updating the *General Plan* and LUPAG map as required by the Hawai'i County Charter.

The current LUPAG map (1989) designation for the Project Site is Urban Expansion, Low Density Urban, and Flood Plain along the Keanu'i'omanō and Waikoloa Streams (Figure 8). The County's proposed General Plan revisions designates a change of a small portion of the area encompassing Parcels 12-17 from Urban Expansion to Low Density Urban (County of Hawai'i lupag (11/15/01)).



LEGEND

- Project Area
- U — Urban
- A — Agricultural
- R — Rural
- C — Conservation

Source: State Land Use Commission

FIGURE 7

State Land Use District Boundary Map

Lālāmilo PROJECT

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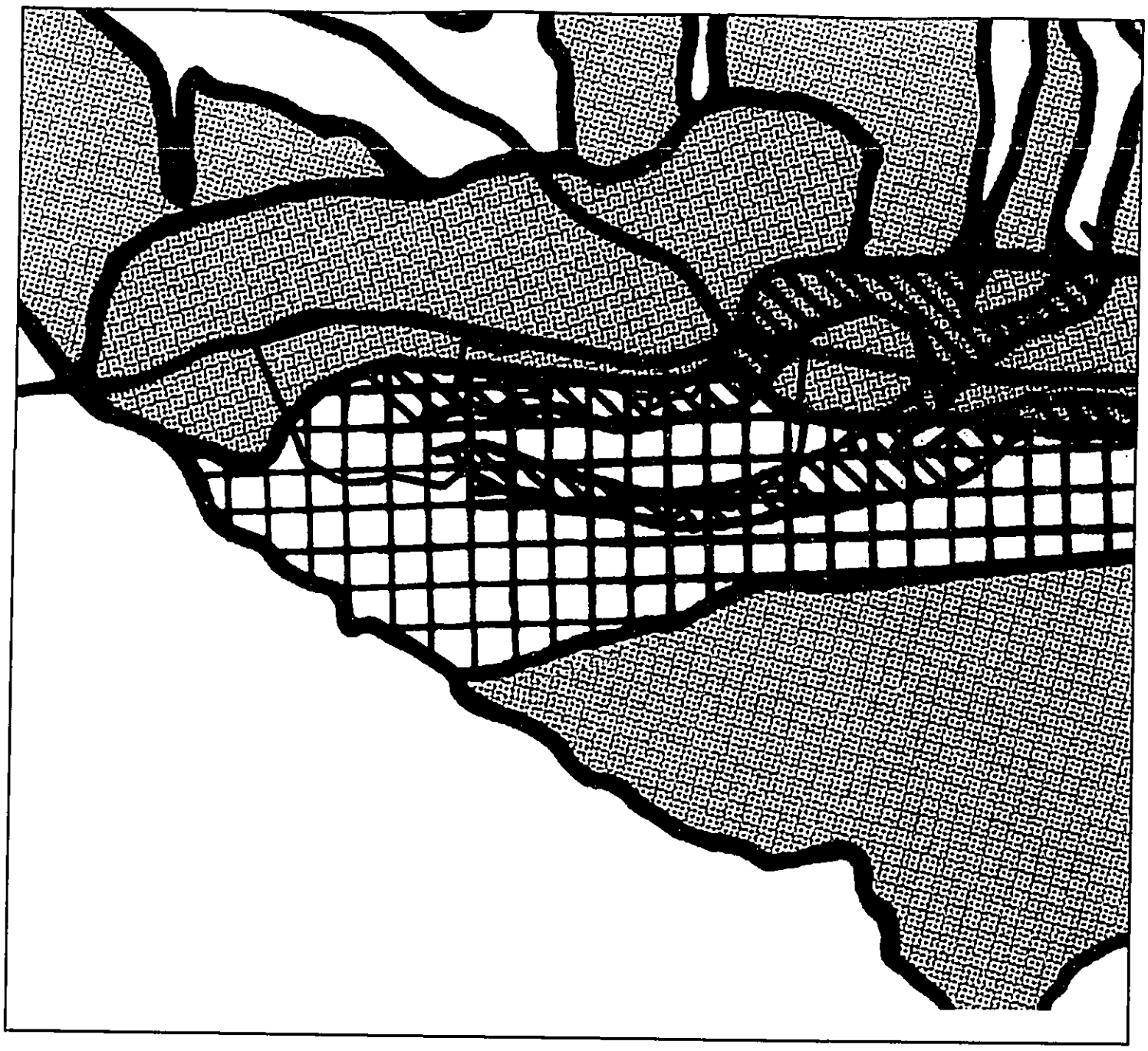

LEGEND

- Project Area
- High Density Urban Development
- Medium Density
- Low Density
- Industrial
- Intensive Agricultural
- Extensive Agricultural
- Orchards
- Resort
- Open Area
- Conservation
- Flood Plain
- Urban Expansion
- University Use

Source: Hawaii County General Plan

FIGURE 8

General Plan Land Use Pattern Allocation Guide (LUPAG) Map

Lālāmilo PROJECT

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The Lālāmilo Project area relevant *General Plan* designations include the following designations:

- Urban and Rural Designations

  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.

- Agricultural Designations

  Intensive Agricultural: Sugar, orchard, diversified agriculture, and floriculture.
  High: Fertile soil.
  Low: Less fertile soil.

  Extensive Agricultural: Pasturage and range lands.

3.2.2 County Zoning

The main Parcel 77 consisting of 232 acres is in the Agricultural District (A-5a). The remnant in-fill Parcels 54 (9.8 acres) and 12-17 (7.0 acres) are zoned Residential District (RS-10) (Figure 9).

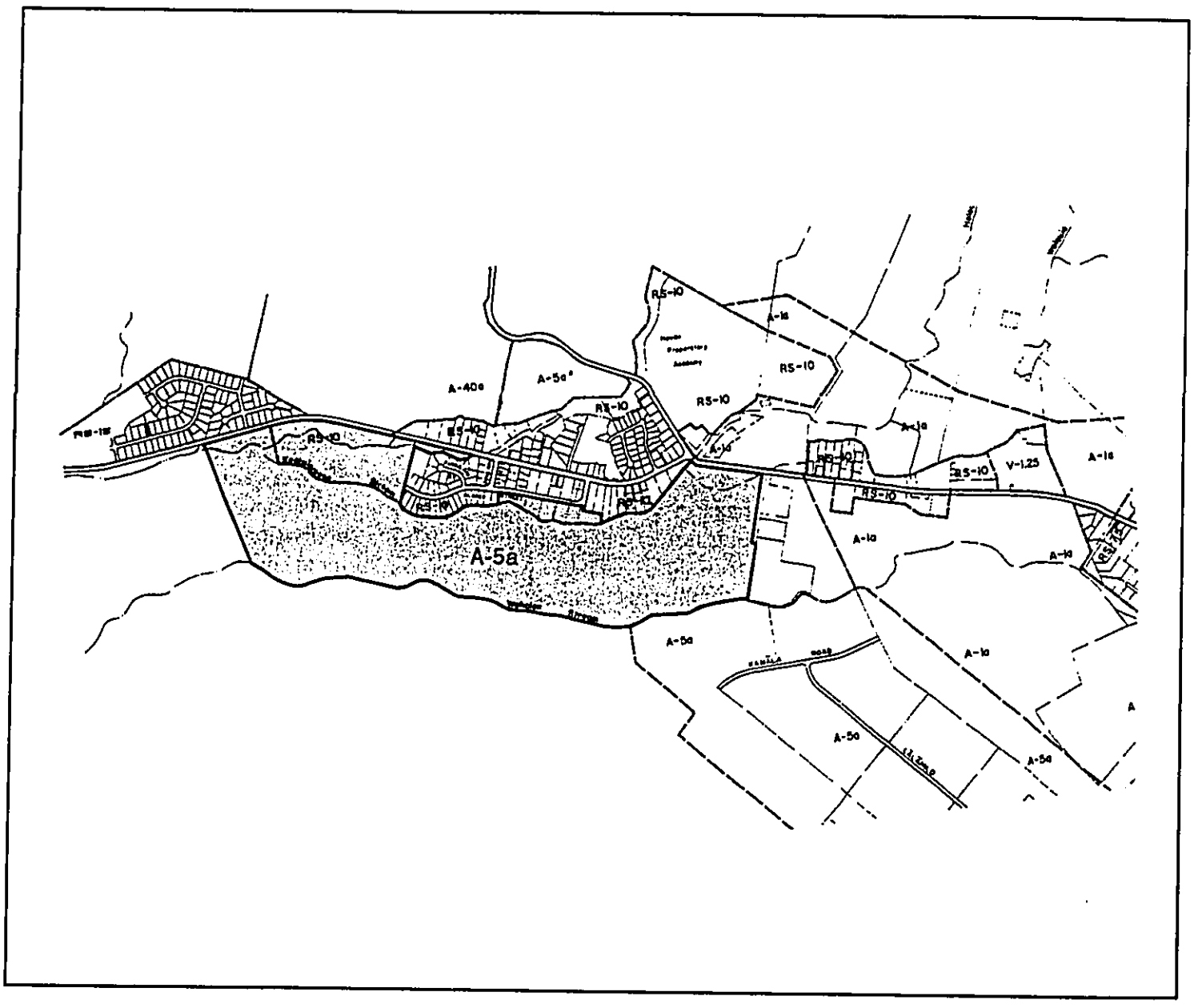
The A-5a designation is pursuant to the County Zoning Code Section 25-3-1(b), which states " ... any building site within the unplanned (U) district as of December 7, 1996, shall automatically be redesignated as an agricultural (A) district with a minimum lot size of five acres (A-5a)". Therefore, the previously Unplanned (U) lands are presently designated in the Agricultural district. Surrounding zoning includes Residential (RS-10) and Agricultural (A-5a and A-1a) zoned lands as well as other unplanned (U) lands.

The Residential homesteads in the preferred Alternative A are proposed to conform to the Residential (RS-10) zoning district. The General Agriculture uses would be consistent with the A-5a agricultural district.

3.3 STREAM RELATED REQUIREMENTS

Road crossings over the Lanikepu and Keanu'i'omanō Streams will be required at the western end of the Property to allow access from Kawaihae Road and at Waikoloa Stream on Parcel 77. The Development Plan design phase of the Project will evaluate two options, including bridging over the streams and in-stream culverts. In-stream culverts would require State and Federal permits to allow the alteration of the streambed, including stream channel alteration permit, Section 404, Clean Water Act, and changes to the flood insurance rate map, as described below.

For the purpose of the EIS, an EIS-level drainage assessment and a biological stream resource assessment are described in Section 4.



LEGEND

- Project Area
- RS-10, RS-15: Single Family Residential District
- A-1a, A-5a, A-40a: Agricultural District

Source: County of Hawai'i

FIGURE 9

County Zoning Map

Lālāmilo PROJECT

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3.3.1 Stream Channel Alteration Permit (SCAP)

The DLNR Commission on Water Resources Management has the authority to review and allow stream channel alterations pursuant to Chapter 174-71, HRS and Title 13, Chapter 169, Section 50. The culvert design would be coordinated with the State and Federal agencies, as appropriate.

3.3.2 Section 404, Clean Water Act - Road Crossing Nationwide Permit

The US Department of the Army Corps of Engineers has jurisdiction over "waters of the United States" under Section 404 of the Clean Water Act. The Corps' Nationwide Permit 14 for Road Crossing, allows an in-stream culvert and roadway subject to the receipt of two State of Hawai'i approvals - a Department of Health Section 401 Water Quality Certification and Coastal Zone Management Program Federal Consistency Review.

3.3.3 LOMR and CLOMR

During the subsequent development phases appropriate site-specific plans will be prepared including a detailed drainage plan. A letter of map revision (LOMR) or physical map revision will be obtained to reflect the changes on the flood insurance rate map (FIRM) and the subdivision plat map. In addition a conditional letter of map revision (CLOMR) will be obtained prior to construction of the stream crossings. Further, the plans will reflect no rise in the base flood elevation, in accordance with Chapter 27 of the Hawai'i County Code.

3.4 APPROVALS AND PERMITS

DHHL is exempt from state and local land use permitting requirements pursuant to the Hawaiian Homes Commission Act (HCCA) and the Legal Memorandum dated May 6, 1994 by the State Attorney General. To further clarify land use, design, and operations aspects for DHHL land development on the island of Hawai'i , the DHHL and the County are presently reviewing a Memorandum of Agreement (MOA) which will specify the responsibilities of DHHL and the County with regard to development matters on Hawaiian home lands.

A parcel specific description of the existing land use designations (State Land Use, County General Plan, and zoning), the planned uses, and the land use designations DHHL proposes to conform to are summarized in Table 8 and described further below.

Table 8. Planned Land Uses, Land Use Designations and Conformance

Parcel # (Acres)	Planned Land Use	Existing Land Use Designation	Land Use Conformance
12-17 (7.0)	Phase 1 In-fill residential (15 lots - 10,000 sf)	• SLU - Urban • GP - Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
54 (9.8)	Phase 1 In-fill residential (19 lots - 10,000 sf)	• SLU - Urban • GP - Low Density Residential and Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
77 (232.0)	Phase 2 Residential (408 lots - 10,000 sf or 121 1-acre lots)	• SLU - Agricultural • GP - Urban Expansion • Zoning - A-5a	- Will conform w/ SLU Urban - Complies with Urban Expansion - Residential will conform w/ RS-10 or RA-1a zoning.

State Land Use. Parcels 12-17 and 54 are designated within the State Urban district. With regard to Parcel 77, DHHL's exemption option from State land use zoning (e.g. Chapter 205, HRS) allows DHHL to conform to the State Urban district.

County General Plan LUPAG map. The GP LUPAG designation (existing and proposed) for the property of Low Density Residential and Urban Expansion are in conformance with the planned residential, community center, and park uses.

County Zoning Code. Parcels 12-17 and 54 (zoned RS-10) are in compliance with County zoning. The non-conformity of Parcel 77 (zoned A-5a) would be exempted from County zoning under the HHCA. Other related matters would be addressed through the MOA, which would serve as a binding guidance document between the DHHL and County. If approved by both parties, the agreement would allow the following:

- Based on its plans and DHHL land use designations, DHHL will determine the appropriate County zoning districts that would apply to the property in question. DHHL will communicate these zoning districts to the County.

  Parcel 77 would therefore be conformed to the appropriate zoning district for the residential alternative selected (RS-10 for the Alternative A 10,000 square feet lots, RA-1a for Alternative B lots which are 1-acre in size.

- All normal land use controls would be applied by Hawai'i County to DHHL property according to the zoning district selected by DHHL. Except as specifically provided in the MOA, DHHL would follow all normal land use procedures, regulations, and standards applicable to the zoning district.

- The standards of the various zoning districts selected will apply to DHHL property. DHHL and its lessees would go through normal County administrative variance procedures if they seek exemptions from standards. For uses allowed in the various zoning districts that require special permits or use permits, DHHL and its lessees would go through the applicable County permit

procedures until some time when DHHL may implement its own use permit procedure for Hawaiian home lands.

Table 9 below further describes the permits and approvals which would be required to construct the Lālāmilo Project. Moreover, as described in Sections 4 and 5 following, the identified significant effects of the project would be mitigated; such mitigative measures are intended to be implemented in the phase of development in which the impact would occur and in accordance with the overall development schedule.

During the implementation stages of the Project, DHHL will be working with the County, State, and Federal review agencies in the review and approval of Project plans and specifications. An approximate list of permits and approvals required for the proposed project is shown in Table 9.

Table 9. Required Permits and Approvals by Phases*

Permit/Approval	Responsible Agency
Chapter 343, HRS compliance - EISPN 12/23/01 - DEIS 08/23/02 - FEIS 11/2002	Governor, State of Hawai'i State Office of Environmental Quality Control
Phase 1 - In-Fill Residential Lots (2003 - 2005)	
Parcel Consolidation and Re-subdivision	County Department of Public Works
Grading/Building Permits	County Department of Public Works
NPDES Permit/ UIC (for drywells)**	State Department of Health
New roadway connection	State Department of Transportation
Water/Wastewater Development (2003 - 2006)	
Water Resources	State Department of Land and Natural Resources County Department of Water Supply
Sewer Facilities	State Department of Health
Phase 2 - Alternative A Residential Lots (2003 - 2006)	
LOMR/CLOMR ***	County Department of Public Works/FEMA
Road Culvert Crossing (Nationwide Permit 14) -Section 404, Clean Water Act -Section 401 Water Quality Certification -CZM Federal Consistency	US Department of the Army (Corps of Engineers) State Department of Health State Office of Planning
Stream Channel Alteration Permit	State DLNR, Commission on Water Resources Management
New roadway connection	State Department of Transportation
Compliance with Chapter 6E, HRS, as required	State DLNR Historic Preservation Division
Subdivision	County Department of Public Works
Grading/Building Permits	County Department of Public Works
NPDES Permit / UIC for Drywells**	State Department of Health
ADA Accessibility (Park, Community Center)***	Disability and Communication Access Board

* Schedule is tentative and is subject to change
** NPDES - National Pollutant Discharge Elimination System; UIC - Underground Injection Control
*** Letter of Map Revisions and Conditional Letter of Map Revision
**** Americans with Disabilities Act

If approved, the MOA also provides that the County will enforce land use codes and regulations on Hawaiian home lands in the same manner as with other land owners. DHHL will cooperate with the County in enforcing the terms of it lessees requiring conformity to applicable laws and regulations, including compliance with building code requirements.

4 Lālāmilo PROJECT

Assessment of the Affected Natural Environment,
Potential Impacts of the Proposed Action, and
Mitigative Measures

4.0 ASSESSMENT OF THE AFFECTED NATURAL ENVIRONMENT, POTENTIAL IMPACTS OF THE PROPOSED ACTION, AND MITIGATIVE MEASURES

Background information on the existing natural or physical environment is presented to evaluate the Project's potential to generate significant impacts. In addition, measures to minimize and mitigate any impacts are presented.

4.1 PHYSICAL CHARACTERISTICS

Existing Conditions

The 248.8-acre Project Site is located on the Waimea plateau formed by the surrounding high mountains. The linear property in aligned in an east-west direction and bordered by the Keanu'i'omanō and Lanikepu Streams to the north and Waikoloa Stream to the south (Figure 10).

The topographic elevations range from 2,225 to 2,405 feet above mean sea level (AMSL) from west to east over a length of 7,000 linear feet. The width of the Property varies from 900 to 2,000 feet with an average width of 1,500 feet. Some rocky outcrops occur within the property.

Over the past century, the Project Site has been utilized for cattle ranching. Dirt roads, fencing, paddocks, and portable containers are the only built structures. Other past uses of this Property and surrounding lands which have left a physical imprint is from agricultural practices by the early Hawaiians and by the United States military as an artillery and naval gun firing range in the 1950's. According to comments received on the Draft EIS, current on-going uses on the property include hunting, hiking, picnicking, visiting archaeology sites, gathering, dog training, and exercise (Vitousek/Hawaii Preparatory Academy October 7, 2002). These matters are described in Section 5.

The climate of the Project Area is affected by its higher elevation location and by the nearby mountains. The site, in the gap between Mauna Kea and the Kohala Mountains, makes it a fairly windy location. During tradewind conditions, winds are often gusty during the daytime and the wind direction is predominantly from the east. During the nighttime, drainage winds from the east or southeast are likely due to the nearby high terrain. Temperatures in the project area are generally very consistent and cool with average daily temperatures ranging from about 55°F to 75°F. The extreme minimum temperature recorded at Waimea is 34°F, while the extreme maximum temperature is 90°F. Rainfall is highly variable but probably averages about 40 to 50 inches per year.

Potential Impacts

The project plans (Alternatives A and B) incorporate primarily residential uses, a few general agricultural (pasturing for sheep, horses or cattle), and community center and park uses, which will require varying levels of site preparation. In areas with relatively level topography, minimal grading will result, however, areas of steeper slopes will require some cut and fill for construction. The development of the Project will require earthwork over approximately 68 percent of the Property during the 5 to 7 year buildout period. Approximately 32 percent of the Property will remain as natural open space of preserve areas, which require no grading.

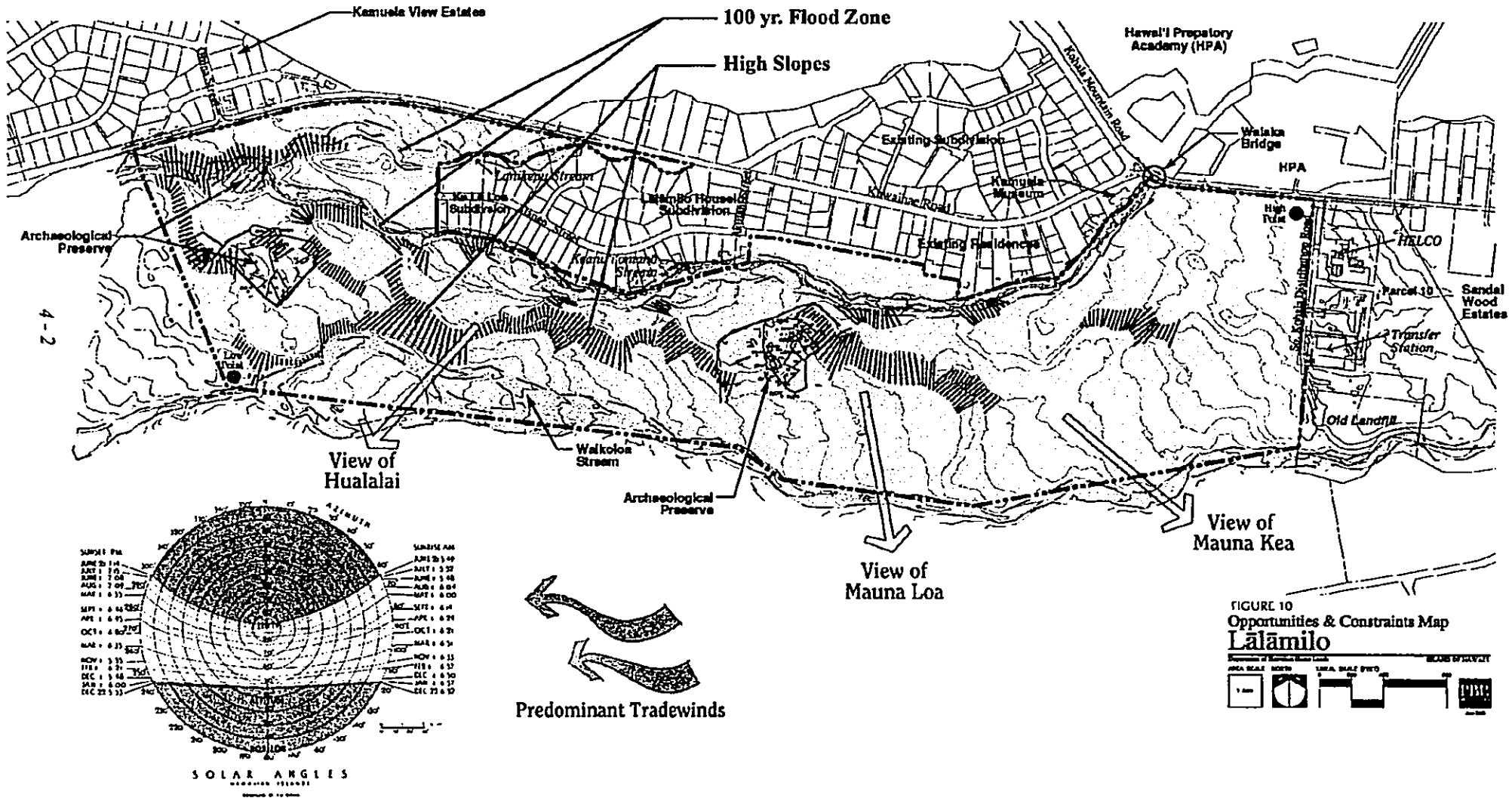

FIGURE 10
Opportunities & Constraints Map
Lālāmilo

The direct and indirect effects of grading within the flood ways, if unmitigated, could impact water quality in the streams on the Property and ultimately the nearshore ocean areas. Therefore, grading limits would be established outside of the flood boundaries.

Road crossings will be required at the three streams to provide access through the Property. Detailed analysis will be undertaken during the Development Plan design phase of the Project to determine whether the crossings would be constructed as in-stream culverts or bridges.

Grading activities would also affect archaeological sites which are distributed throughout the Property. An archaeological survey has been completed and findings are summarized in Section 5.1. The survey findings recommend various treatments for the sites, including Data Recovery and Preservation. The recommendations of the archaeologist and the DLNR State Historic Preservation Division will be followed to mitigate the impacts of grading on the archaeological sites.

Mitigation Measures

- *Utilization of the Natural Topography.* The relative gentle topography of the land will not require any major cut and fill, therefore, impacts to the topography will be minimized. However, in areas of steeper slopes, buildings will be designed to minimize grading.

- *Definition of Floodways.* Approximately 68 percent of the Property would be altered in the 2 phases of Residential construction. Construction grading would be outside the limits of any floodway areas. Definition of the flood boundaries will be required through the County LOMR/CLOMR process.

- *Grading Ordinance Compliance.* All grading operations will be conducted in full compliance with dust and erosion control and other requirements of the Hawai'i County Grading Ordinance. A grading permit is a requirement prior to construction. In addition, a National Pollutant Discharge Elimination System (NPDES) general permit will also be required prior to construction to address non-point source discharges to bodies of water.

- *Culverts.* In-stream grading for culvert construction, as necessary, would be subject to review by State and Federal agencies through the necessary permits, including a Stream Channel Alteration Permit and Department of the Army Permit.

- *Preservation Areas.* Three areas totaling approximately 20 acres are planned to be preserved to protect archaeology sites which are recommended for Preservation. Prior to any grading, the required preparation of a Data Recovery Plan, Preservation Plan, and Burial Treatment Plan will completed and submitted to the DLNR SHPD and the Hawai'i Island Burial Council.

- *Preconstruction Support.* Preconstruction support from the Department of the Army to address the former military use of the Property is planned for early 2003 to assure the site is clear of any unexploded ordnance.

4.2 SOILS AND AGRICULTURAL IMPACT

Existing Conditions

The Property is at the base of the Kohala Mountains which last erupted more than 60,000 years ago; thus, the soils of the area are well formed. There have been three soil suitability studies prepared for Hawai'i whose principal focus have been to describe the physical attributes of land and the relative productivity of different land types for agricultural uses. The studies are: 1) the U.S. Department of Agriculture Soil Conservation Service (SCS) Soil Survey; 2) the University of Hawai'i Land Study Bureau Detailed Land Classification; and 3) the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH).

Soil Conservation Survey. According to the United States Department of Agriculture Soil Conservation Service, *Soil Survey of the Island of Hawai'i, State of Hawai'i* (1972). The soils found on the subject property consist of Waimea very fine sandy loam (Figure 11) which exhibits the following characteristics:

> Waimea very fine sandy loam, 6 to 12 percent slopes (WMC). The Waimea series consists of well-drained very fine sandy loams that formed in volcanic ash. The WMC soil is at intermediate elevations on the leeward side of Mauna Kea and the Kohala Mountains at approximately 2000 feet AMSL. A representative profile has a surface layer about 17 inches thick. This layer consists of dark-brown and very dark brown very fine sandy loam and loam. The subsoil is dark-brown silt about 25 inches thick. It is underlain by weathering, hard basalt bedrock at a depth of about 42 inches. The surface layer is neutral; the subsoil is mildly alkaline. In places the surface is extremely stony. Permeability is moderately rapid, runoff is slow, and the erosion hazard is slight. The available water capacity is about 1.8 inches per foot of soil. Roots can penetrate to a depth of 30 inches or more. This soil is used for pasture and for irrigated truck crops.

Land Study Bureau Detailed Land Classification. The University of Hawai'i's Land Study Bureau *Detailed Land Classification Report for the Island of Hawai'i* (Figure 12) utilizes a five-class productivity rating using the letters A, B, C, D, and E with "A" representing the class of highest productivity and "E" the lowest. The physical characteristics of the soils of the Project Area are rated C and have a "fair suitability" rating for soil-based forms of agriculture.

Agricultural Lands of Importance to the State of Hawai'i. The State Department of Agriculture *Agricultural Lands of Importance to the State of Hawai'i (ALISH)* system assesses lands through a rating system for agricultural suitability. The Project Site is classified as "Other Important Agricultural Land" under the ALISH system (Figure 13).

The present agricultural uses of the Property and the vicinity of the Project have been related to cattle ranching over the past century and crop farming before that. The present uses include cattle grazing on Parcel 77 and horse paddocks on Parcels 12-17. The 232-acre Parcel 77 is currently leased to Palekoki Ranch. The General Lease will be withdrawn in January 2003.

To the south of the eastern boundary of the Project Site is the State Lālāmilo Farmlots consists of 300+ acres of productive agricultural land considered among the most productive on the island.

RECEIVED AS FOLLOWS

LEGEND

- Project Area
- WMC — Waimea very fine sandy loam
- WSD — Waimea extremely stony very fine sandy loam
- PLC — Palapalai silt loam
- MLD — Maile silt loam

FIGURE 11

Soil Conservation Service Soil Survey Map

Lālāmilo PROJECT

Source: USDA, Soil Conservation Service Soil Survey of Island of Hawai'i, State of Hawaii

0 1000 2000 FEET

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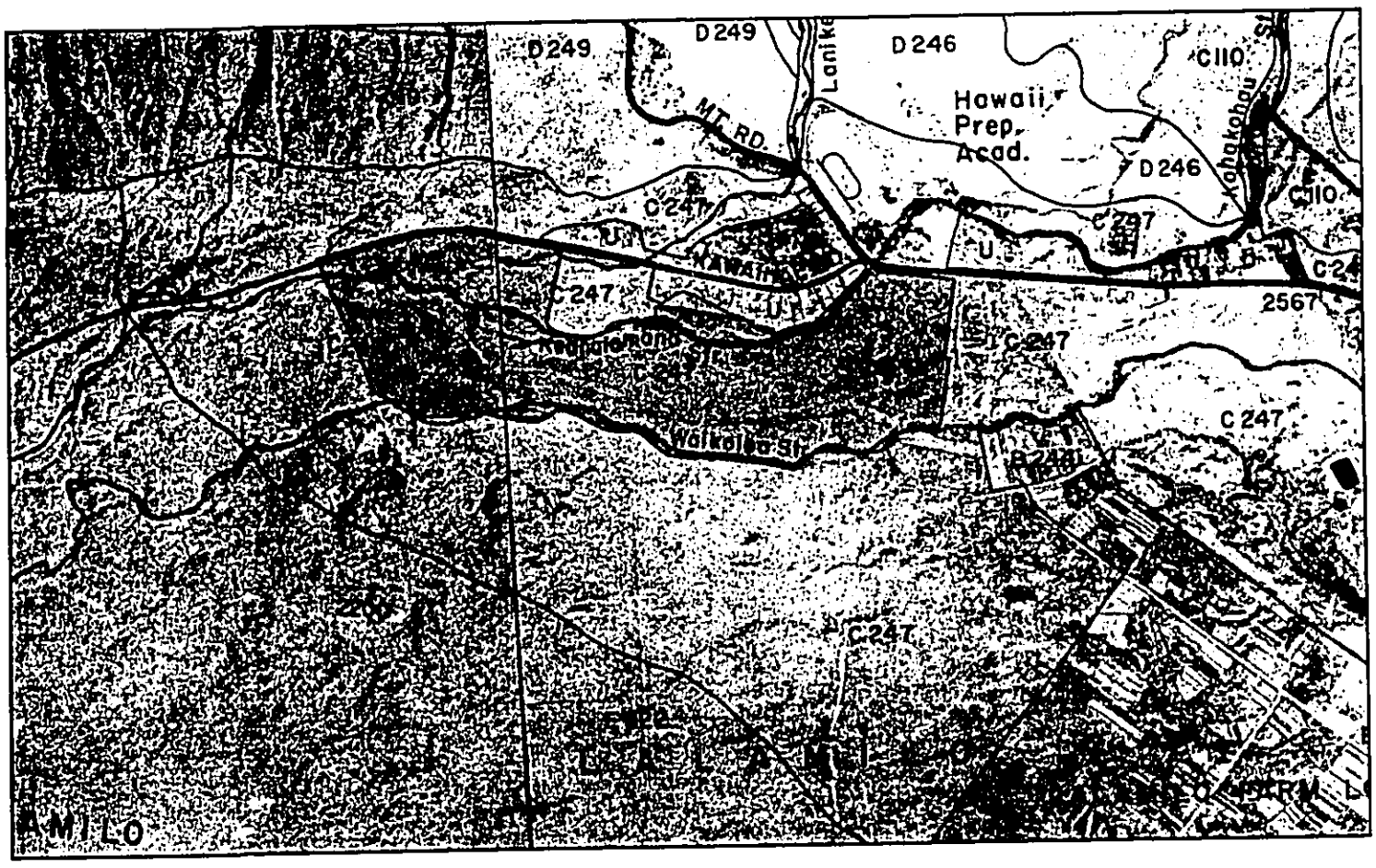

LEGEND

Project Area

C247 Fair Stability

FIGURE 12

Detailed Land Classification Map

Lālāmilo PROJECT

0 1000 2000

FEET

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Source: Detailed Land Classification - Island of Hawai'i

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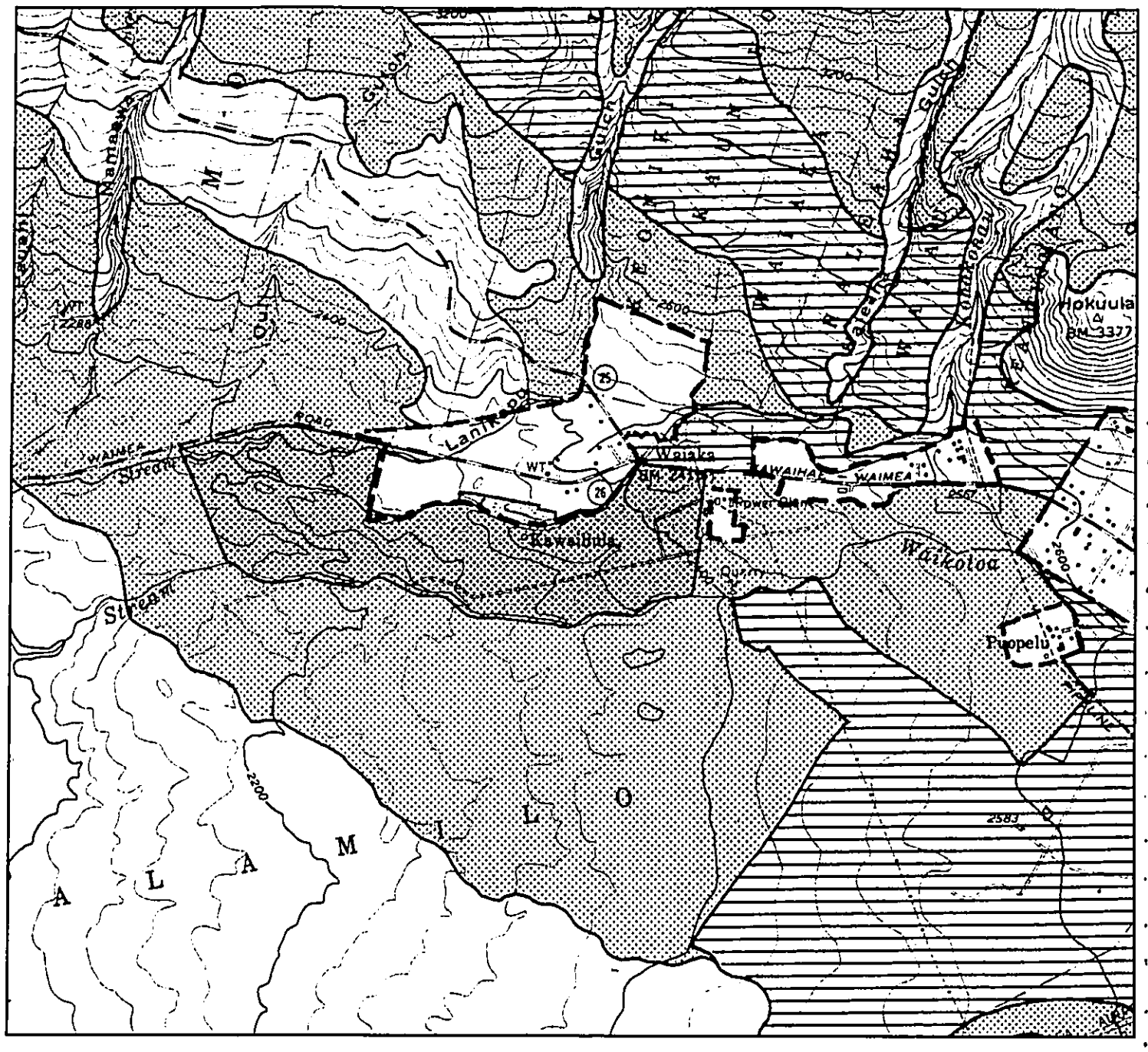

LEGEND

- Project Area
- Prime Agricultural Land
- Unique Agricultural Land
- Other Important Agricultural Land
- Existing Urban Development

FIGURE 13

Agricultural Lands of Importance to the State of Hawai'i (ALISH)

Lālāmilo PROJECT

0 1000 2000 FEET

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The County of Hawai'i has designated the Project lands (Parcel 77) as Urban Expansion in its General Plan (1989) and Low Density Urban (Parcels 12 - 17) in anticipation of growth in Waimea. The County's proposed changes to the General Plan (Draft 2002) maintains the Urban Expansion designation. Thus, the conversion from agricultural uses to urban uses has been anticipated.

Potential Impacts

The Project lands, consisting of approximately 249 acres would be converted from agricultural use to urban uses. Direct impacts include the loss of the present cattle ranching and horse pasture uses to Residential homestead lots, Community Center, and Park uses. Development of these uses would foreclose future ranching uses on the Property. Approximately 16 acres (formerly planned for commercial and industrial uses) are planned to remain as pastureland.

While there would be a loss of agricultural land, replacement lands of equal or better value are available. On an islandwide and statewide basis the amount of available agricultural land formerly in sugar cane production and suitable for grazing exceeds the actual demand for ranching uses. Within the vicinity of the Project, other State lands continue to be available.

Grading activities may be associated with soil loss if appropriate measures are not taken. Clearing and grubbing activities during construction will temporarily disturb and expose soils to erosional forces. However, development of the Property is planned over a 7 to 8 year buildout period. Therefore, the soil loss potential will be mitigated through grading in manageable increments as the Project is phased in. Measures associated with the Grading Ordinance will be imposed at each phase of construction. Best management practices at the jobsite would mitigate and minimize indirect impacts to the nearshore located downslope approximately 10 miles to the west.

With regard to the adjacent Lālāmilo Farmlots, dust, odor, and noise associated with normal farming operations could potentially affect the areas nearest the southeast boundary of the Project site. Design measures to minimize these effects would be taken and these offsite impacts would be disclosed to future Homestead residents.

Mitigation Measures

- *Construction erosion control.* Construction activities will follow strict erosion control measures specified by applicable State and County regulations. NPDES and grading permits require an erosion control plan and best management practices (BMPs) describing the implementation of appropriate erosion control measures. These generally include cut-off ditches, temporary ground cover, and use of detention basins.

- *Watering and grassing.* A watering program will be implemented to minimize soil loss through fugitive dust emissions during construction. Other control measures include cleaning of construction equipment on the job-site and establishment of ground cover as quickly as possible after grading.

- *Landscaping and long-term erosion control.* Permanent landscaping will re-establish the soil retention values. This extensive, continuous, and long-term landscape management program for the Project will significantly reduce erosion from the present conditions under agricultural use.

- *Other mitigation.* In addition to those listed above, erosion control measures to further lessen construction impacts include:
  a. Early construction of drainage control features.
  b. Station water trucks on-site during the construction period to provide immediate sprinkling as needed in construction zones (weekend and holidays, included).
  c. Plant and establish ground cover immediately after grading work has been completed.
  d. Construct temporary sediment basins to trap silt.
  e. Use temporary berms, cut-off ditches, and diversion channels where needed to interrupt and divert flows to the nearest sediment basin.
  f. Construct temporary silt fences or straw bale barriers to trap silt.
  g. Reduce the amount of exposed soils from agricultural areas during project construction by maintaining ground cover during project construction.

- *Loss of Agricultural Lands.* While the subject project is intended primarily for Residential Homestead use, 16 acres will remain in agricultural uses for pasturing of a small number of livestock. In addition, DHHL intends to develop Agricultural and Pastoral Homestead lots at other areas within North Hawai'i and the island of Hawai'i. The development of new areas for agricultural uses could include pastoral or ranching, and thus, offset the loss of these ranch lands.

- *Effect of adjacent Lālāmilo Farmlots on the subject Project.* The area nearest the Lālāmilo Farmlots will remain in agricultural use. However, there may be the potential for dust, odors, and other effects which may result from the Farmlots, therefore, notice will be given to future Homestead Lessees.

4.3 NATURAL HAZARDS

Existing Conditions

The island of Hawai'i is associated with volcanic eruption and earthquakes. The US Geological Survey (USGS) has developed Lava-Flow Hazard Zones with a numerical rating of 1 to 9, with 1 having the greatest risk. The Project Area at the base of the extinct Kohala Mountains is in Zone 9; Zone 9 lands have had no eruption in the past 60,000 years. The entire island of Hawai'i is designated in Seismic Zone 4. All planned structures will be designed in accordance with the Uniform Building Codes adopted by the County of Hawai'i.

The State of Hawai'i has been affected twice in the past two decades by devastating hurricanes, Iwa in 1982 and Iniki in 1992. While it is difficult to predict these natural occurrences, it is reasonable to assume that future events could be likely. The Project Area, as the rest of the island and state, is vulnerable to the destructive winds and torrential rains associated with hurricanes. The Waimea Elementary School located to the east of the Project is a designated Emergency Evacuation Center for this area.

Potential Impacts and Mitigation Measures

The Project will not exacerbate any hazard conditions. The potential impact of destructive winds and torrential rainfall of tropical hurricane on structures within the Project will be mitigated by compliance with the Uniform Building Code adopted by the County. All structures will be constructed for protection from earthquakes and tropical hurricanes in accordance with the

requirements of the County and will be constructed outside of the flood limits. Further discussion on drainage issues is found in Section 4.4 below.

4.4 DRAINAGE

An EIS-level drainage analysis was prepared by Tom Nance Water Resource Engineering to establish the probable limits of flood inundation and provide greater accuracy for Keanu'i'omanō and Lanikepu Streams (than shown on the FEMA FIRM maps), and to provide an initial flood delineation for Waikoloa Stream. The study findings are summarized below; the full report is included in the preliminary engineering report attached as Appendix A.

The following steps were undertaken in preparation of the drainage analysis:

- An aerial topographic survey with 2-foot contour intervals was prepared;
- The 100-year peak discharge rates for Waikoloa, Keanu'i'omanō, and Lanikepu Streams were determined; and
- The areas subject to flooding by the 100-year storm peaks were computed and mapped using the HEC RAS computer program.

Existing Conditions

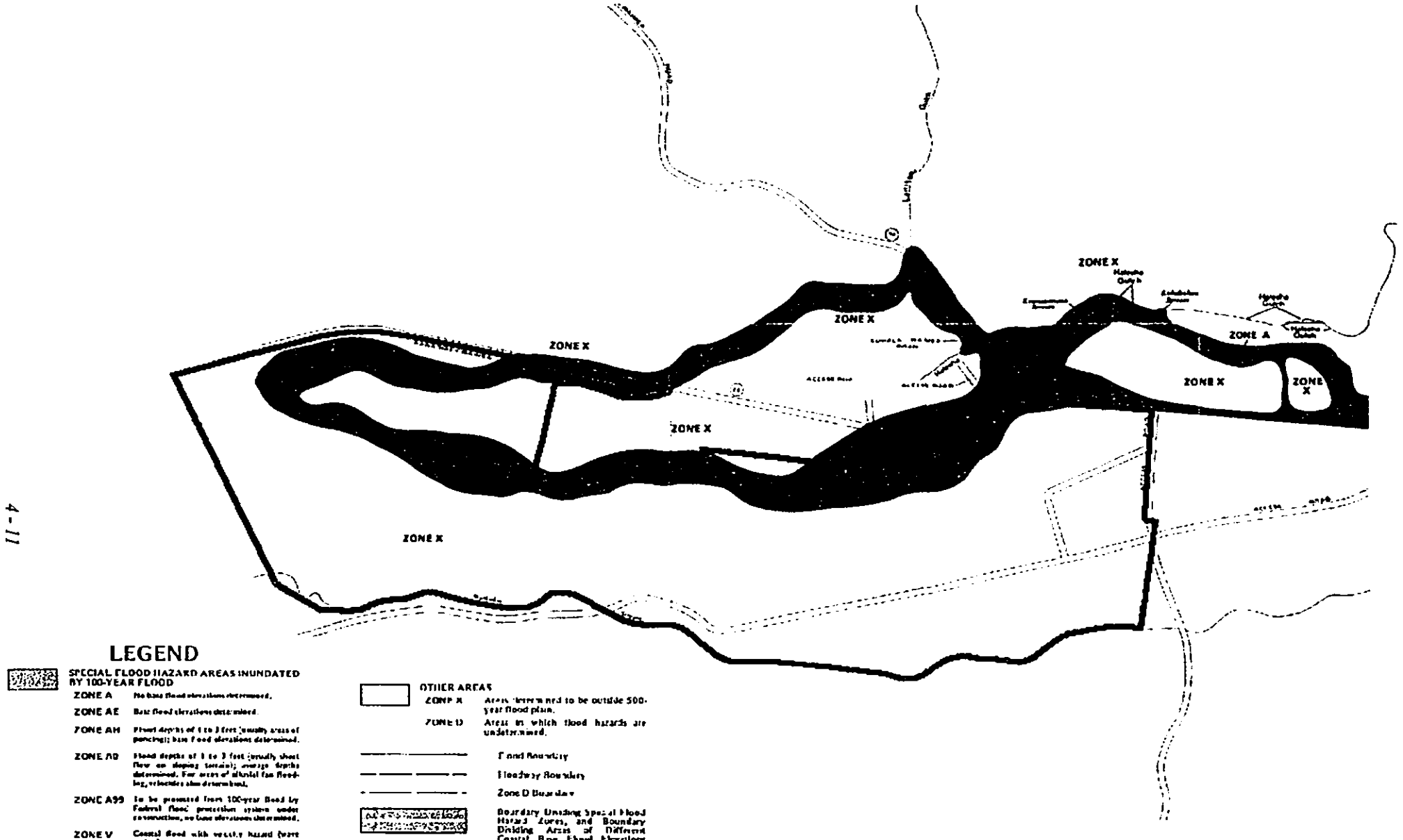
Three streams run along and delineate portions of the boundaries of the Project Site. From south to north, these three are the Waikoloa, Keanu'i'omanō, and Lanikepu Streams. Two of these, Waikoloa and Keanu'i'omanō, are essentially perennial despite the fact that the Department of Water Supply diverts the base flow from their upper reaches above Waimea for potable supply. The third stream, Lanikepu, is normally dry except during and immediately following significant rains.

Designation of Areas Subject to Flooding by FEMA's National Flood Insurance Program. The Federal Emergency Management Agency, on its Panel 155166 0164D of the Flood Insurance Rate Maps (FIRM), has delineated areas along Lanikepu and Keanu'i'omanō Stream which are subject to inundation by a 100-year flood (Figure 14). The Zone A flood designation on the FIRM panel indicates that the inundated area is an approximation rather than the result of a detailed study. The FIRM does not delineate an area of flood inundation by Waikoloa Stream along the project's south boundary. Waikoloa Stream as it passes through Waimea Town has been studied in detail, but that study ended mauka of the project site. The remaining areas of the Property is in Zone X which have been determined to be outside the 500-year flood plain.

100-Year Flood Peak Discharge Rates. The 100-year peak discharge rates used for the flood delineations on the FIRM panels for Hawai'i Island are based on regression equations developed by Charles Ewart of the U.S. Geological Survey in 1977. For the island's leeward streams, the equation for 100-year flood peak and results of applying this equation to the three streams in question as follows:

$$Q_{100} = 34.3DA^{0.77} P_{24\text{-}2}^{2.26}$$

where: Q_{100} = 100-Year Flood Peak in CFS
DA = Drainage Area in Square Miles
$P_{24\text{-}2}$ = 2-Year, 24-Hour Rainfall in Inches



Source: Flood Insurance Rate Map: Panels 155166 0162C & 155166 0164D

FIGURE 14

Flood Insurance Rate Map (FIRM)

Lālāmilo Residential Lots and Commercial / Industrial Mixed Uses

PBR

Table 10. Application of the USGS Regression Equation for the 100-Year Flood Peak

Stream	Area, DA (Square Miles)	$P_{24\text{-}2}$ (Inches)	Q_{100} (CFS)
Waikoloa	4.15	4.86	3660
Keanu'i'omanō	4.69	5.90	6225
Lanikepu	2.09	4.77	2070
Confluence of Keanu'i'omanō and Lanikepu	6.78	5.55	7210

Notes: 1. Areas were computed for the makai end of the project site.
2. $P_{24\text{-}2}$ rainfall amounts were interpolated from maps in the U.S. Weather Bureau's "Rainfall Frequency Atlas of the Hawaiian Islands" (Technical Paper No. 43, 1962).

The 1977 regression equations developed by the USGS have never been updated for FEMA, despite the fact that more streamflow data has been compiled since the USGS study was done than were available for it in 1977. To check the validity of the regression equation for leeward streams in light of the data now available, comparisons were made for four USGS gaging stations in the general vicinity of the project site. Table 11 below compares the 100-year flood peak based on a Log Pearson Type III analysis of the annual flood peaks with the 100-year flood peak computed with the 1977 regression equation.

Table 11. Comparison of Computed 100-Year Peak Discharge Rates

	Keanu'i'omanō Stream	Luahine Gulch	Waikoloa Stream	Kohakohau Stream
USGS Gage No.	7565	7558	7580	7560
Elevation of Gaging Station (Fee MSL)	2410	3160	3460	3273
Years of Record	31	33	53	37
Log Pearson Type III Analysis of Annual Flood Peaks:				
M (Log Units)	3.0092	1.9475	2.6779	3.0102
S (Log Units)	0.2936	0.2835	0.3457	0.3057
k_{100} (at skew = -0.05)	2.2895	2.2895	2.2895	2.2895
Q_{100} (CFS)	4801	395	2947	5130
Application of the 1977 Regression Equation:				
DA (Square Miles)	4.30	0.32	1.18	2.51
$P_{24\text{-}2}$ (Inches)	6.00	4.40	6.20	6.20
Q_{100} (CFS)	6050	406	2407	4304

- The regression equation provides a conservative (ie. safe) estimate for the Keanu'i'omanō Stream gage. Since this gage is located immediately above the mauka end of DHHL's project site, the regression equation result can be used for this stream.

- The regression equation also provides a conservative estimate for Luahine Gulch. This gulch has the same orientation relative to rainfall patterns as Lanikepu Stream and both waterways are normally dry. For this reason, it appears reasonable to use the regression equation for Lanikepu Stream.

- The regression equation significantly underestimates peak runoff for the gaging station site on Waikoloa and Kohakohau Streams. However, both these gaging stations are at high elevations in the watershed where the stream channels are relatively deeply dissected. The channel of Waikoloa Stream makai of Waimea Town has less topographic definition. This means that there would be a significant amount of overbank flow during the 100-year flood event, resulting in significant attenuation of the peak discharge rate. In other words, the regression equation is considered to be a reasonable predictor of peak flowrates in the reach of Waikoloa Stream that passes along the south boundary of the project site.

Analyses of the Areas Subject to Inundation by the 100-Year Flood Event. Areas subject to inundation by a 100-year flood were determined for Waikoloa, Keanu'i'omanō, and Lanikepu Streams (Figure 15). For Lanikepu and Keanu'i'omanō Streams, the areas subject to inundation by the 100-year flood are considerably narrower than shown on FEMA Panel 155166 0164D (see Figure 14). Waikoloa Stream's inundated area, with the single exception where the flow splits into two channels, is also relatively narrow. The drainage analysis determined that the capacities of the stream channels are generally sufficient to contain most of the flood waters.

Potential Impacts

The project's 10,000 square feet plan (Alternative A) shows an area of approximately 249 acres in residential, commercial, and industrial uses, and park, open space and natural preserve areas. It is estimated that 68 percent of the site would be affected by construction activities during the two phases of development over a construction period of 7 to 8 years. Thus at full buildout, about 80 acres will be unaffected by construction activities.

Grading for residential lots are planned outside of floodway limits. Road crossings over the streams are at Lanikepu and Keanu'i'omanō to create the main spine roadway at the western area of the Project. A smaller road crossing over Waikoloa Stream would also be needed to access the lots which are planned on the "island" at the southwest corner.

Impacts which may affect water quality will be mitigated by measures identified in a Best Management Practice Plan (BMP) associated with State and Federal permits.

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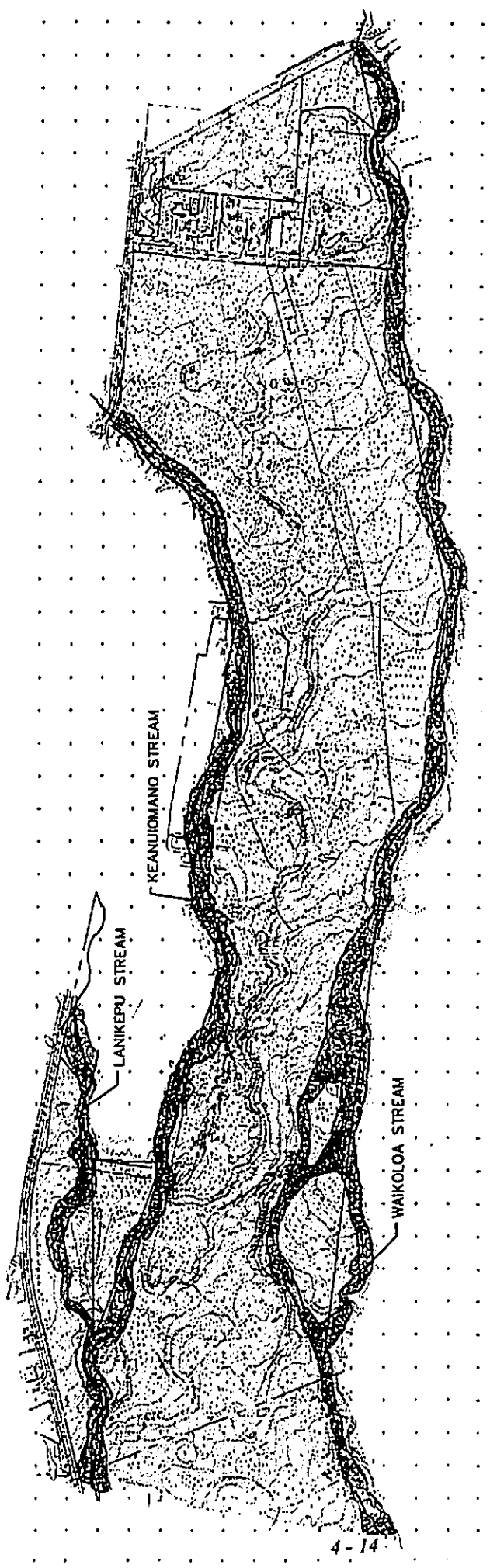

AREAS INUNDATED BY THE 100-YEAR FLOOD
ON LANIKEPU, KEANUIOMANO, AND WAIKOLOA STREAMS

NORTH

GRAPHIC SCALE:
600' 300' 0 600' 1200'

FIGURE 15
Preliminary 100-Year Flood Boundary Map
Lālāmilo PROJECT

PBR

Source: Tom Nance Water Resource Engineering
Towill, Shigeoka & Associates, Inc.

Mitigation Measures

Several measures will be implemented to insure public safety at on-site and off-site areas with respect to runoff volume, off-site flow and its constituents. These measures include the following:

All construction (with the exception of stream culvert crossings, as necessary) would be planned outside the flood limits. Detailed site specific measures for erosion and sediment control will be specified in the grading plans and applications for in-stream grading work (i.e., State SCAP and Federal Department of the Army permit).

The extensive open nature of the proposed development will allow the incorporation of detention basins and other best management mitigative measures into the project construction plans to minimize on-site drainage impacts. Such plans would be developed during the Design Phase of the project and will be reviewed by County, State, and Federal agencies responsible for issuing the appropriate permits.

The Keanu'i'omanō, Lanikepu, and Waikoloa Streams, are not listed as "impaired waters" under Section 303(d) of the Clean Water Act, thus, these streams would not fall under the Department of Health Total Maximum Daily Load program. Nevertheless, at the Development Plan design phase of the project (following the selection of the density alternative), subdivision plans would be prepared and finalized. Phased into the work schedule will be all required mitigation measures associated with a grading permit application. These would include identifying best management practices based on calculations of sediment runoff and the erosion potential utilizing the universal soil loss equation. At this time of conceptual planning and without a site subdivision or grading plan, it is premature to quantify changes in impervious cover, and pollutant use and loading that this earthwork and subsequent development implies. The County of Hawai'i and the Department of Health would have the opportunity to review detailed grading plans as part of the review process for the grading and subdivision plans and the DOH Notice of Intent (NOI) for a NPDES general permit.

4.5 STREAM RESOURCES

The Hawai'i Biological Survey of the Bishop Museum conducted a biological assessment of native and introduced aquatic animals at Waikoloa and Keanu'i'omanō Streams along the Project boundary during December 20-22, 2001. The findings are summarized below and the full report is attached as Appendix B.

Existing Conditions

Two major streams, Waikoloa and Keanu'i'omanō Streams, border the Lālāmilo Project Site. Flowing through mostly cattle pastures, these streams are situated in close proximity to each other (generally within 1,000 to 2,000 feet of each other in the Project Area). Both of these streams, designated as intermittent on the USGS Waimea topographic map, were fully flowing during the December 20-22, 2001 biological assessment following a period of heavy rainfall. Waikoloa and Keanu'i'omanō Streams originate in the rolling hills of the upper Kohala Mountains. Keanu'i'omanō Stream originates at approximately 3,600 feet to 4,000 feet with two smaller named intermittent tributaries, Wai'aka (which later becomes Lanikepu) and Hale'aha Gulches, and a third larger tributary, Kohākōhau Stream is permanent. Kohākōhau Stream which originates at over 5000 feet, and has a USGS gaging station located on it.

Waikoloa Stream originates above Pu'u Iki at approximately 4,000 ft and has numerous diversions and reservoirs upstream of Waimea Town. It is unclear whether Waikoloa Stream is now intermittent, with perhaps some occasional permanent pools downstream of Waimea, because of the numerous diversions and reservoirs by the County for the municipal water supply. Waikoloa and Keanu'i'omanō Streams flow parallel to each other throughout the Project Area and downstream to 1,440 feet elevation, where they then join to form Wai'ula'ula Stream that then crosses Queen Ka'ahumanu Highway and flows to the ocean.

The elevations surveyed ranged from 2,405 feet in the upper most section of the Lālāmilo Project to 2,225 feet in the downstream end of the proposed Project Area. An additional, lower area of Waikoloa Stream at 1,280 feet was also surveyed to further assess if native amphidromous species were found in the stream.

Stream habitat in both Waikoloa and Keanu'i'omanō Streams was fairly similar and quite uniform, with the mostly scoured, bedrock channels containing some moderately sized cobble in the upper reaches of the Project Area, with occasional large boulders. Favorable habitats such as relatively large waterfalls and cascades were common, and the water appeared to be slightly tannic but clear. At the upper 2,400 feet elevation sites the water temperature was measured at 62 °F, while a slightly warmer 65 °F was recorded at 1,280 feet elevation on Waikoloa Stream.

Results and Discussion

No federally Threatened, Endangered, rare, or imminently threatened species of aquatic animals were found in or around the areas of Waikoloa and Keanu'i'omanō Streams assessed during the study. Both streams contained very similar aquatic faunas, and during this study had similar flows and aquatic habitat characteristics. The complete lack of algae on the rocks on the dates of the survey, and no developed aquatic insect fauna indicated that section of stream examined within the Project Area are intermittent.

Fish, Crustacean, and Mollusk Results

Only one species of introduced fish, guppies (*Poecilia reticulata*), was found in low densities at the lower 1,280 feet elevation site on Waikoloa Stream. No other introduced or native species of fish, crustacean, or mollusk were observed or collected in the areas of Waikoloa and Keanu'i'omanō Streams. The upper, permanently flowing reaches of these two streams were not in the scope of this project, and were not surveyed. However, according to State DLNR Division of Aquatic Resources staff, the native endemic Hawaiian stream fish *Lentipes concolor*, or o'opu, are found both upstream and downstream of the Project Area, inhabiting permanent pools downstream of the Project Area and permanently flowing sections of Keanu'i'omanō Stream (at 3,000 feet elevation) above the project area. Therefore, the study concludes that native fish do use the intermittent stream channel in the area of the Project as an access corridor to the headwater regions of upper Keanu'i'omanō Stream.

Aquatic Insect Results

A total of 14 species of aquatic insects were collected at the 3 study sites. With 9 native species collected, 64% of the overall aquatic insect taxa found during this survey were native. This reflects the relatively undisturbed nature and high quality of the aquatic habitats examined, albeit

intermittent. The collected aquatic insects were all species with great dispersal capabilities and the ability to exploit ephemeral and intermittent aquatic habitats. For example, the highly vagile dragonflies are strong flyers and even exploit ephemeral rain puddles in Hawaiian forests. The smaller native insect species found, such as the native ephydrid flies are also early colonizers of Hawaiian streams, and indicative of the ephemeral nature of the sampled habitats. The introduced species of aquatic insects found within the Lālāmilo Project Area are also highly dispersive, and all were species that are also found in the most remote, high quality aquatic habitats. The presence of these alien species does not necessarily indicate degraded or impaired aquatic habitats.

The relatively high 64% overall native aquatic species found within the three study areas is very comparable to other high quality streams such as the Hanalei River (69%), Kaua'i and Hakalau Stream (68%), Hawai'i Island.

Potential Impacts

The watershed within and around the Project Area has been heavily disturbed by grazing and development for over 150 years, aquatic habitats and biota contained within this area remain relatively pristine, albeit apparently intermittent.

Efforts should be made to avoid impacting the stream channel during construction as Hawaiian migratory (amphidromous) native stream animals, especially *Lentipes concolor* use these stream channels to access the permanently flowing, upper reaches of Waikoloa and Keanu'i'omanō Streams and is also found in several permanent spring-fed pools downstream of the project area in Keanu'i'omanō Stream.

Stream crossings across Lanikepu, Keanu'i'omanō, and Waikoloa would be necessary to provide access to the property. Bridging over is being considered, however, if a culvert is required in Keanu'i'omanō Stream, it would be designed to be flush with the streambed. This will ensure native migratory aquatic animals continued access to upper areas of Keanu'i'omanō Stream, because any free space between the culvert pipe and streambed would potentially be an impassable obstacle.

Mitigation Measures

- Best management practices shall be employed during construction to prevent soil erosion into the stream channel that would eventually make its way into nearshore ocean areas. Any in-stream channel construction would be conducted during the dry season when the streams are not flowing, as practicable.

- A stream culvert crossing at Keanu'i'omanō Stream, if necessary, would be flush with the streambed to ensure native migratory (amphidromous) aquatic animals continued access to upper areas of Keanu'i'omanō Stream.

- Prior to any in-stream grading, if a culvert is necessary, state and federal permits would be acquired, including a Stream Channel Alteration Permit and Department of the Army Permit. Associated with the permits would be compliance with best management practices to assure water quality of downstream areas.

4.6 VEGETATION

Field studies to assess the botanical resources on the Lālāmilo Property were conducted in October 2001 and again in February 2002 following several periods of heavy rainfall in December 2001 and January 2002 (Appendix C). The primary objectives of the field surveys were to: 1) provide a general description of the vegetation on the site; 2) inventory the flora; 3)search for threatened and endangered species, as well as species of concern; and 4) identify areas of potential environmental problems or concerns.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time of the year and under varying environmental conditions may yield slight variations in the species list, especially of the weedy, annual plants.

Existing Conditions

Two vegetation types are recognized on the Lālāmilo site. Pasture scrub covers the majority of the site and consists of mixed grass pasture with scattered trees and shrubs. Rocky outcrops are occasional and usually support a somewhat denser cover of shrubs. Along the streams, which cross and border the site, there is a band or belt of vegetation varying in width from 50 to 100 feet. Because of the steady source of water, streamside vegetation is denser and supports a large number of species throughout the year. The streams have been eroded down to the hard basalt bedrock in most places. A more detailed description of the two vegetation types follows.

Pasture Scrub. A mosaic of different grass species characterizes the pasture lands on the project site. Buffel grass *(Cenchrus ciliaris)* and Bermuda grass *(Cynodon dactylon)* are widespread throughout the site, while Kikuyu grass *(Pennisetum clandestinum)* is associated with low lying swale areas with deeper soil. Areas with rocky outcrops support stiff clumps of fountain grass *(Pennisetum setaceum)* and loose mats of Natal redtop grass *(Melinis repens).* A number of weedy herbaceous species and small shrubs or subshrubs are associated with this vegetation type. These include pepperwort *(Lepidium virginicum),* fireweed *(Senecio madagascariensis),* butterfly weed *(Asclepias curassavica),* coat buttons *(Tridax procumbens),* hedge mustard *(Sisymbrium officinale),* fennel *(Foeniculum vulgare),* golden crown-beard *(Verbesina encelioides),* ʻuhaloa *(Waltheria indica),* ʻilima *(Sida fallax),* and indigo *(Indigofera suffruticosa).*

Woody components occur as scattered individuals or small stands of plants. Olive *(Olea europaea),* silk oak *(Grevillea robusta),* and black wattle *(Acacia mearnsii)* are the most commonly observed trees, while Christmas berry *(Schinus terebinthifolius)* is the most commonly encountered shrub. Other woody components which occur here in smaller numbers include jacaranda *(Jacaranda mimosifolia),* wiliwili *(Erythrina sandwicensis),* lantana *(Lantana camara),* panini *(Opuntia ficus-indica),* and eucalyptus *(Eucalyptus* spp.). ʻAkia *(Wikstroemia pulcherrima),* a native shrub with orange, marble-sized fruits and fragrant clusters of yellow flowers, is locally common on rocky outcroppings.

Streamside Vegetation. The streamside vegetation is characterized by lush, thick mats of Kikuyu grass with scattered thickets of Christmas berry and stands of black wattle trees. In some places, lantana may be locally abundant. Species richness and abundance is greater along the streams then on the adjoining areas with pasture scrub vegetation. Some of the more commonly observed plants

include narrow-leaved plantain *(Plantago lanceolata)*, fireweed, Vasey grass *(Paspalum urvillei)*, castor bean *(Ricinus coinmunis)*, Glenwood grass *(Sacciolepis indica)*, molasses grass *(Melinis minutiflora)*, allseed *(Polycarpon tetraphyllum)*, 'aheahea *(Chenopodium murale)*, weed verbena *(Verbena litoralis)*, and Cuba jute *(Sida rhombifolia)*.

In areas with shallow water and small mudflats, species which prefer a wetter habitat are found. These include several members of the sedge family (Cyperaceae) such as aka'akai or great bulrush *(Schoenoplectus lacustris)*, kyllinga *(Kyllinga brevifolia)*, *Carex longii*, *Fimbristylis dichotoma*, and *Cyperus haspan;* also found here are scattered clumps of the bog rush *(Juncus ensifolius)*. Other plants found along the water's edge include honohono *(Commelina diffusa)*, marsh purslane *(Ludwigia palustris)*, knotweed *(Persicaria glabra)*, elephant grass *(Pennisetum purpureum)*, and jungle rice *(Echinochloa colona)*. All nine fern species found during this study are associated with the moist, shaded stream banks.

Two ornamental species which have escaped cultivation and established small populations along the streams are a gladiolus *(Gladiolus dalenii)* and zephyr flower *(Zephyranthes* sp.). A large clump of Spanish bayonet or yucca *(Yucca gloriosa)*, another ornamental species, is found along Waikoloa Stream; plants were flowering and had produced a number of woody fruit.

Rare Plants Found in the Region

Research on rare plants found in the Waimea region was conducted. Of the four known plants, only one, koai'a, (*Acacia koaia*) is found on the property and is considered a Federal species of concern.

- The koai'a *(Acacia koaia)* is considered a Federal species of concern (U.S. Fish and Wildlife Service 1999a). About two dozen plants, 5 to 12 feet tall, have been planted on TMK 6-6-01: 54 between Kawaihae Road and Lanikepu Stream. Four naturally occurring koai'a trees, 15 to 18 feet tall, can be found on the adjacent State land along the southern boundary on the banks above Waikoloa Stream. The koai'a, a member of the pea family (Fabaceae), is closely related to koa *(Acacia koa)*. Koai'a is found in drier and more open habitats on Moloka'i, Lana'i, Maui, Hawai'i and, perhaps, O'ahu. It can be distinguished from the much more common koa by its small gnarled habit, shorter and straighter "leaves" (phyllodes), and narrower pods with the seeds longitudinally arranged.

  Species of concern are not protected by Federal and State endangered species laws. Species of concern means that there is a need for more biological and/or taxonomic information regarding whether a species might require conservation action in the future. *Acacia koaia* is not considered a high priority candidate (U.S. Fish and Wildlife Service 1999a) as the plants number in the thousands, occur on several islands, and a large population is protected at the State's Koai'a Sanctuary located near the Kohala Mountain Road.

- *Portulaca sclerocarpa,* a listed endangered species (U.S. Fish and Wildlife Service 1994a, 1999a) is known from the Waimea area. Plants were found on three pu'u on Parker Ranch lands in the early 1980s (U.S. Fish and Wildlife Service 1996). The Hawaiian names for this *Portulaca* species are po'e, 'ihi, and 'ihi makole (Wagner *et al.* 1990).

- *Portulaca sclerocarpa* is a member of the purslane family (Portulacaceae). On Hawai'i, populations are found on the Kohala Mountains, the northern slopes of Hualālai, the

northwestern slopes of Mauna Loa, and near Kilauea Crater (U.S. Fish and Wildlife Service 1994a, 1996). Although an intensive search was made for this species none were found on the Project Site. The nearest population can be found on Pu'u Pā.

- *Hibiscus brackenridgei* or *ma'o hau hele* is the State flower (mallow family (Malvaceae)) is a listed endangered species (U.S. Fish and Wildlife Services 1994). A cluster is located southwest of the project site on Department of Land and Natural Resources (DLNR) property near a stonewall enclosure. No plants of *Hibiscus brackenridgei* were observed on the project site.

Summary Discussion and Potential Impacts

The vegetation on the Lālāmilo Project Site is dominated by introduced species. Introduced species are all those plants which were brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is, Cook's arrival in the islands in 1778. Many of the grasses such as Kikuyu grass, Bermuda grass, and elephant grass; and legumes such as Spanish clover *(Desmodium incanum), Neonotonia wightii,* wild bean *(Macroptilium latyroides),* and common vetch *(Vicia sativa)* were originally introduced as fodder plants to improve range lands.

A total of 139 species were inventoried on the Lālāmilo site. Of these, 122 (88%) are introduced; 1 (<1%) is originally of Polynesian introduction; and 16 (11%) are native. Of the natives, 10 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and 6 are endemic, that is, they are native only to the Hawaiian Islands. The endemic species are: 'āweoweo *(Chenopodium oahuense),* koai'a *(Acacia koaia),* wiliwili *(Erythrina sandwicensis),* 'ōhi'a lehua *(Metrosideros polymorpha),* pua kala *(Argemone glauca),* and 'ākia *(Wikstroemia pulcherrima).* Most of these plants occur in low numbers on the site except for the 'ākia which can be locally common on the rock outcroppings scattered throughout the site.

None of the plants found during the field studies is a threatened and endangered species (U.S. Fish and Wildlife Service 1999a; Wagner *et al.* 1999). The koai'a, a species of concern, occurs on the site; about two dozen plants have been planted on the parcel located between Kawaihae Road and Lanikepu Stream; this area is planned as a natural open space area.

Given these findings, the proposed development of the Lālāmilo site for residential lots and commercial/industrial mixed uses is not expected to have a significant negative impact on the botanical resources.

Mitigation Measures

The lots bordering the streams will be landscaped/revegetated as quickly as possible to prevent soil erosion and discharge of sediments into the streams. Native plants would be used for landscaping common areas whenever possible. Subdivision residents would also be encouraged to plant native species including the 'ākia, 'a'ali'i, wiliwili, koai'a, 'ōhi'a lehua, and pua akala which are attractive and easily cultivated.

The parcel along Kawaihae Road with the two dozen or so planted koai'a trees will be set aside as a natural open space area. Should any trees be required for removal (say, for roadway construction), these plants would be transplanted and reused for landscaping the common areas.

4.7 WILDLIFE

A field survey in December 2001 was conducted to identify bird and mammal species and/or their unique habitats that may exist on the Project Site and the adjacent stream areas (Appendix D). The presence or likely occurrence of any native fauna, particularly any that are considered "endangered" or "threatened" was also a primary purpose of the survey.

Existing Conditions

The property consists of pastureland with mixed grasses and scattered trees and shrubs, rocky outcrops, and stream side vegetation. 'Uhaloa (*Waltheria indica*) and 'ilima (*Sida fallax*) were present and are important seed producers for seed eating birds. Christmas berry (*Schinus terebinthifolius*) was a common shrub throughout the property but especially dense along the streams.

Birds

Nine species of birds were identified on station counts; they are listed in order of abundance (count totals in parentheses, I = introduced, N = native):

European skylark (*Alauda arvensis*) (25) I
Gray francolin (*Francolinus pondicerianus*) (12) I
Common myna (*Acridotheres tristis*) (9) I
Black francolin (*Francolinus francolinus*) (5) I
Northern mockingbird (*Mimus polyglottos*) (4) I
Zebra dove (*Geopelia striata*) (6) I
Spotted dove (*Streptopelia chinensis*) (2) I
Northern cardinal (*Cardinalis cardinalis*) (1) I
Pacific golden plover (*Pluvialis fulva*) (1) N

In addition to the species encountered during count stations, the introduced Japanese White-eye (*Zosterops japonicus*) and Yellow fronted canary were seen between stations. The introduced gamebirds: California Quail (*Callipepla californica*) and Chukar (*Alectoris chukar*) are also known to use the Property.

Other species of introduced birds, such as Ring-necked pheasant (*Phasianus colchicus*), Common barn owl (*Tyto alba*), House finch (*Carpodacus mexicanus*) and Nutmeg mannikins (*Lonchura punctulata*) were expected to be seen on the property but were not encountered during the survey.

Of the species found during the survey, only the Pacific golden plover is considered native. Pacific golden plovers are migratory. They are present in the Hawaiian islands from August through April where they typically establish feeding territories on flat open land to feed on insects.

No native short-eared owl or pueo (*Asio flammeus sandwichensis*) was seen during the survey but are expected to occur in the area. Pueo inhabit grasslands, shrublands and mountain parklands throughout the Big Island. Unlike the common barn owl, the pueo is active during the day and can be readily observed at mid-day. Pueo is widespread on all the main islands except O'ahu where the population on that island is listed by the State of Hawai'i as endangered. The Hawai'i island

population is not endangered or threatened. Short-eared owls feed extensively on house mice (*Mus musculus*) and Polynesian rats (*Rattus exulans*).

The endangered koloa or Hawaiian duck (*Anas wyvilliana*) was reestablished on the island of Hawai'i between 1976 to 1982, when captive-bred birds were released in the Kohala Mountains (USFWS 1999). They have been observed using stock ponds in the Kohala Mountains, stream habitats of Pololū, Waimanu and Waipi'o Valleys (USFWS 1999). No koloa were seen on the Lālāmilo property during the survey. According to a DLNR staff wildlife biologist, the streams running through the site could be used by koloa, but there are no records of such use.

Hawaiian hawks (*Buteo solitarius*) occur in the Kohala Mountains but they are virtually absent from areas with few or no trees. No hawks were observed during the survey and the site is near the edge of the known range of the species for the Kohala Mountains.

Mammals

Trapping is usually required to adequately survey an area for small mammals. No trapping was conducting for the survey but the following mammals could be expected for the area:

Small Indian mongoose (*Herpestes auropunctatus*)
Feral cat (*Felis cattus*)
Rats (*Rattus* sp.)
House mouse (*Mus musculus*)

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native terrestrial mammal found in Hawai'i. It is a federally listed endangered species. Bats are more commonly observed at dusk (Kepler and Scott 1990), but early morning foraging can be observed (Jacobs 1994). Bats were sighted along the coast at Kawaihae and near Honoka'a, between 10 and 15 miles away, but no bats were found in the vicinity of Waimea by Jacobs (1994). Kepler and Scott (1990), however, do report a sighting in the vicinity of Waimea.

No bats were observed during the current survey. Kawaihae Road was not sampled by Jacobs (1994), who conducted a survey of bats to determine the island-wide distribution, using a bat detector instrument. The omission of this major section of highway in his survey, suggests that Jacobs did not expect the area to produce any bat detections. The upper portion of the property near the Kohala Road junction was surveyed by Jacobs, but produced no detections (Jacobs 1994).

Potential Impacts and Mitigation Measures

The Project Site does not support native plant communities although a few natives are scattered through some areas. No threatened or endangered wildlife were observed. The Koloa *(Anas wywiliana)* or Hawaiian duck, a federally listed endangered species, was released in the Kohala Mountains and could be expected to use the streams that run through the property but there are no records of such use. The Hawaiian hoary bat, another federally listed endangered species has been observed in the vicinity of Waimea but no bats were observed on the property at Lālāmilo and the omission of the Kawaihae Road in the island wide survey by Jacobs (1994) suggests that there is a low probability of encountering a bat on the DHHL property. The property is on the edge of the known range of the federally listed endangered Hawaiian hawk, that prefer habitat with more trees.

No pueo were observed but they are expected in such grassland habitat. Pueo nest on the ground, usually in the grass but there were no signs of pueo presence. Pacific golden plovers were present but they may be able to adapt to the new lawns within parks of the housing development. The lack of any significant impacts do not warrant any specific mitigation measures.

5

Lālāmilo PROJECT

Assessment of the Existing Human Environment, Potential Impacts, and Mitigative Measures

5.0 ASSESSMENT OF EXISTING HUMAN ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATIVE MEASURES

This section presents summary background information on the existing human or anthropogenic environment. Subject areas such as archaeology, traffic, air, noise, and visual conditions, as well as social conditions are addressed below.

5.1 ARCHAEOLOGICAL AND HISTORIC RESOURCES

An archaeological inventory survey of the Project Site was conducted by Haun & Associates to fulfill historic preservation regulatory review requirements of the Department of Land and Natural Resources State Historic Preservation Division (DLNR SHPD), pursuant to the draft Hawai'i Administrative Rules, Title 13; Department of Land and Natural Resources, Subtitle 13; State Historic Preservation Division Rules, Chapter 276, Rules Governing Standards for Archaeological Inventory Survey Surveys and Reports. The full report is contained in Exhibit E. The archaeological survey study area and site distribution is shown in Figure 16.

Section 7 of Chapter 6E, HRS, established a State historic preservation program to preserve, restore and maintain historic properties in a spirit of stewardship and trusteeship for future generations. The DLNR SHPD keeps an inventory of known sites in the State of Hawai`i, and has the responsibility to serve as the technical and administrative point of contact for all historic preservation issues within the State.

Existing Conditions

Historical documentary research and field investigators have yielded information of the Lālāmilo Site including evidence of early Hawaiian use of the Property for agricultural and habitation purposes. Much of the site was utilized as part of the extensive Lālāmilo Agricultural Field Complex (Site 22632) which extends through many areas of Waimea. Current ranching uses trace back to Captain Vancouver's trip in 1793 when Longhorn cattle was presented to King Kamehameha as a gift. The sites distributed throughout the Lālāmilo Property largely reflect these major events. More recent use of the Property for military purposes were also evident and is further described in Sections 5.2 and 5.3 below.

Site Distribution

The inventory survey identified 75 sites with 818 features. Subsurface testing was undertaken at 33 features at 24 sites. The features consist of 20 formal feature types including terraces, mounds, enclosures, field boundaries, stone walls, irrigation ditches, platforms, walled terraces, C-shapes, U-shapes, modified outcrops, surface hearths, L-shapes, cairns, pond fields, and several miscellaneous types. Feature function includes agriculture, permanent habitation, temporary habitation, burial, marker, military defensive position, historic foundation, storage, and quarry.

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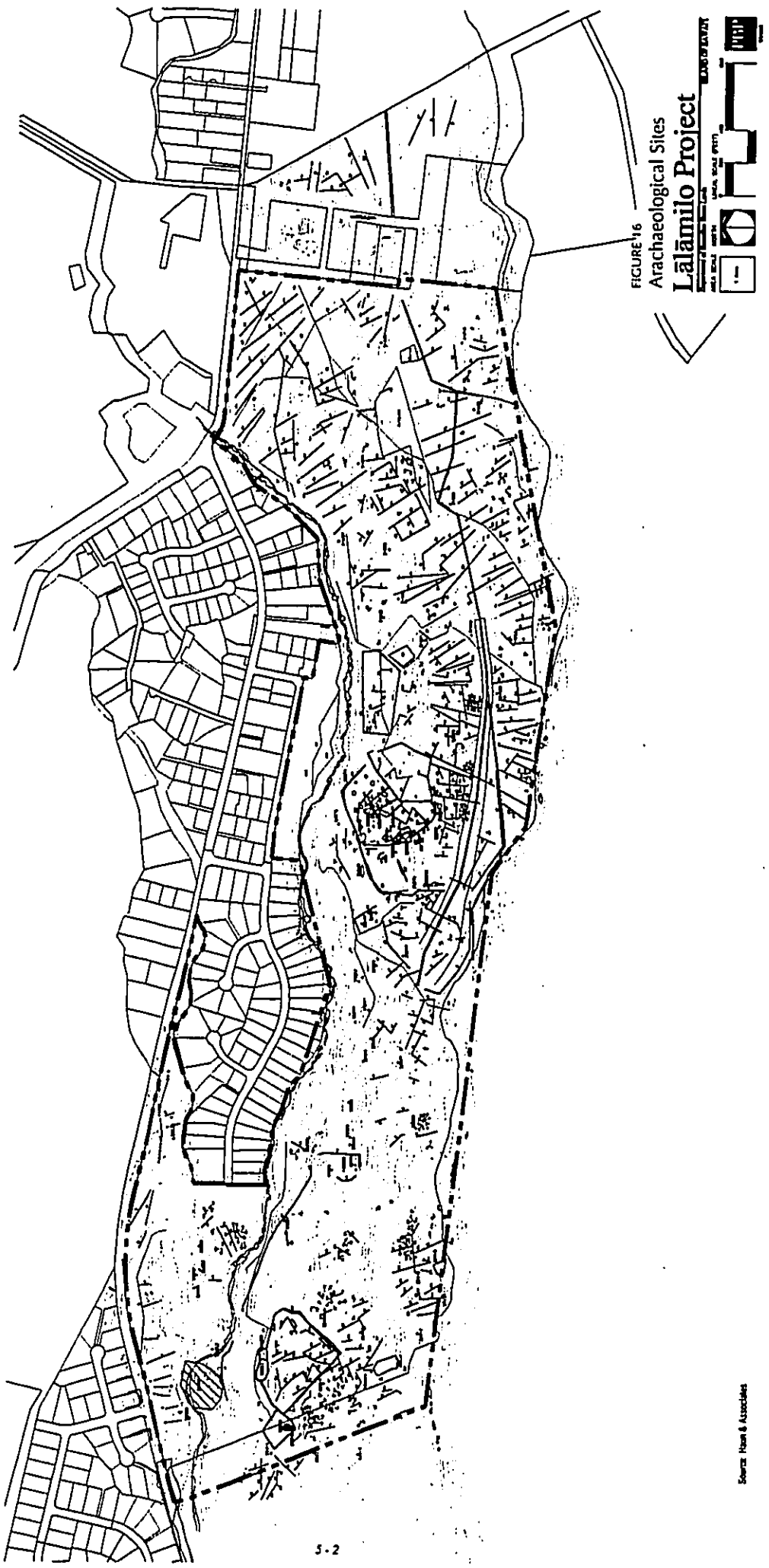


FIGURE 16
Archaeological Sites
Lālāmilo Project

Source: Hoen & Associates

The identified sites and features conform to the site/feature types expected in Clark's (1987) Kula Zone of the Waimea-Kawaihae region based on previous archaeological work and historic documentary research. Probable late prehistoric to historic agricultural features, consisting of modified outcrops, mounds, terraces, field boundaries and irrigation ditches, are distributed across much of the project area. The terraces and field boundaries define over 300 discrete fields covering 28.7 hectares (70.93 ac). Other areas were also cultivated as evidenced by clusters of mounds of stones cleared from cultivation plots. Two probable pondfields were documented indicating that cultivation of wet taro was also practiced on at least a limited scale. The field system includes nearly three miles of irrigation ditches. Another characteristic of the field system is the extensive network of walls, most of which form large enclosures that apparently where built to keep cattle out of the fields.

Other traditional Hawaiian sites consist of burials and numerous permanent and temporary habitations. The permanent habitation features primarily consist of walled terraces and enclosures. Many permanent habitation sites have enclosed yards, a typical early historic form that served to keep free-ranging cattle out. Burials were identified at nine sites including an historic cemetery. More than half of the burial features show evidence of disinterment.

The combined evidence from radiocarbon dating, artifact assemblages, and historic documentary research documents traditional Hawaiian utilization of the project area beginning as early as the 1500s. This use continued until at least the mid-1800s. Military ordnance fragments and impact craters scattered across the project area evidence the project areas use for military training in the 1940s. Ranching-related infrastructure including wire fences, corals, and water troughs are scattered across the project area and document the longstanding and current use of the area for grazing.

Significance Criterion

The initial significance assessments are based on criteria established by both the Hawai'i and the National Registers. To be significant, an historic property shall through design, construction materials, workmanship, feeling and association meet one or more of the following criterion:

a) Be associated with events that have made an important contribution to the broad patterns of our history;
b) Be associated with the lives of persons important in our past;
c) Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
d) Have yielded, or be likely to yield, information important for research on prehistory or history;
e) Have an important traditional cultural contribution or value to the native Hawaiian people or to other ethnic groups of the State.

Appropriate procedures have been followed to identify and gather sufficient inventory information to make an initial assessment regarding a site's significance. The archaeology report has been submitted to DLNR SHPD for its "consensus determination."

Significance Assessments

All 75 sites are assessed as significant under Criterion "d". The sites have yielded information important for understanding late prehistoric to historic land use in the project area. Nine sites are

also assessed as culturally significant because probable Hawaiian burials are present. Four of these culturally significant sites and six sites are additionally assessed as significant under Criterion "c" as a well-preserved example site types including the agricultural field complex, an historic cemetery, a basalt quarry, and several permanent habitation sites. The Lālāmilo Agricultural Field Complex (Site 22632) is also assessed as significant under Criterion "a" because it is associated with the broad pattern of traditional and early historic agricultural intensification in Hawai'i.

The mapping, written descriptions, photography, and test excavations at six sites adequately documents them and no further work or preservation is recommended. Ten sites, including four with burials, are recommended for preservation. The remaining sites, except the sites with burials and representative portions of the Site 22632 agricultural complex, could be mitigated through data recovery. DHHL will preserve two clusters of sites that include examples of the Site 22632 agricultural features. The remaining sites outside of the preservation clusters and remaining features of Site 22623 are recommended for data recovery. The plans for preservation of sites and data recovery would be detailed in a Mitigation Plan prepared for SHPD review and approval. The specific plans for preservation and maintenance of the nine sites with burials would be detailed in a Burial Treatment Plan prepared for DLNR SHPD and the Hawai'i Island Burial Council (HIBC) review and approval.

Significance and Recommendations

An important aspect of the survey was to provide functional interpretations and to apply an initial assessment of significance. The functional interpretations were established on the basis of structural characteristic and in some cases associated artifacts, in conjunction with external correlations with other archaeological studies and interpretations in the general region. Additionally, limited subsurface testing was performed to provide important information regarding the likely function of the sites and chronological information. All collected artifacts and midden underwent laboratory analysis to assess age with dating results. Artifacts collected from the project area were placed in temporary curation until a location is chosen for permanent curation by the landowner in agreement with the SHPD/DLNR.

The following general recommendations were presented by the consulting archaeologists:

- Preservation of all burial sites. Those sites listed as probable burials should be favored for preservation if burials are found during testing.
- Preservation of selected examples of Lālāmilo Agricultural Field Complex (Site 22632).
- Preservation of Quarry Site (Site 22624).
- Data Recovery of numerous sites.
- Recommended treatment of sites may change as a result of further study through data recovery. For example, burials may be uncovered during excavations. In this case, preservation would be the favored alternative. Information on functional associations may also be generated in data recovery, which could change the presently recommended treatment.

- Preservation treatment would be in accordance with a Preservation Plan submitted to the DLNR SHPD for review and approval.

Each of the 75 sites is listed in Table 12, describing its function, ascribed significance criteria, and recommended treatment.

Table 12. Site Significance and Recommended Treatment

*Recommended Treatment - NFW = No Further Work, DR = Data Recovery, PR = Preservation

SIHP Site No.	Type	Function	Significance Criteria	Recommended Treatment
11100	Concrete piers	Foundation	d	NFW
21900	Enclosure	Permanent Habitation	d	DR
21910	Terrace	Temporary Habitation	d	DR
21920	Platform	Burial	d, e	PR
21955	Platform	Burial	d, e	PR
21956	Walled Terrace	Permanent Habitation	d	DR
21957	C-shape	Temporary Habitation	d	DR
21958	U-shape	Temporary Habitation	d	DR
21959	Complex	Permanent Habitation / Burial	d,e	PR
21960	Complex	Permanent Habitation	d	DR
21961	Complex	Burial	d, e	PR
21962	Complex	Permanent Habitation	d	DR
21963	Platform	Temporary Habitation	d	DR
21964	Complex	Permanent Habitation	d	DR
21965	Walled terrace	Permanent Habitation	d	DR
22573	Complex	Permanent Habitation	c, d	PR
22574	U-shape	Temporary Habitation	d	DR
22575	Walled terrace	Permanent Habitation	d	DR
22576	Walled terrace	Permanent Habitation	d	DR
22577	Walled terrace	Permanent Habitation	d	DR
22578	Enclosure	Permanent Habitation	d	DR
22579	Complex	Permanent Habitation	d	DR
22580	Complex	Permanent Habitation	d	DR
22581	C-shape	Temporary Habitation / Burial	d, e	PR

SIHP Site No.	Type	Function	Significance Criteria	Recommended Treatment
22582	Enclosure	Permanent Habitation	d	DR
22583	U-shape	Temporary Habitation	d	DR
22584	Hearth	Temporary Habitation	d	DR
22585	Complex	Permanent Habitation / Storage	c, d	PR
22586	Complex	Military	d	NFW
22587	Complex	Permanent Habitation / Burial	d, e	PR
22588	Complex	Permanent Habitation	d	DR
22589	Walled terrace	Permanent Habitation	d	DR
22590	Walled terrace	Permanent Habitation	d	DR
22591	Cairn	Marker	d	NFW
22592	Complex	Permanent Habitation	d	DR
22593	Terrace	Temporary Habitation	d	DR
22594	Complex	Permanent Habitation	d	DR
22595	Walled terrace	Permanent Habitation	d	DR
22596	Walled terrace	Permanent Habitation	d	DR
22597	Enclosure	Permanent Habitation	d	DR
22598	Complex	Temporary Habitation	d	DR
22599	Complex	Permanent Habitation	d	DR
22600	Complex	Permanent Habitation / Burial	d, e	PR
22601	Enclosure	Permanent Habitation	d	DR
22602	Cairn	Marker	d	NFW
22603	Enclosure	Permanent Habitation	d	DR
22604	U-shape	Permanent Habitation	d	DR
22605	C-shape	Temporary Habitation	d	DR
22606	Platform	Burial	d, e	PR
22607	Enclosure	Temporary Habitation	d	DR
22608	L-shape	Temporary Habitation	d	DR
22609	L-shape	Temporary Habitation	d	DR
22610	Walled terrace	Permanent Habitation	d	DR
22611	Walled terrace	Permanent Habitation	d	DR
22612	C-shape	Temporary Habitation	d	DR

SIHP Site No.	Type	Function	Significance Criteria	Recommended Treatment
22613	Complex	Permanent Habitation	d	DR
22614	Walled terrace	Permanent Habitation / Burial	d,e	PR
22615	Complex	Permanent Habitation	d	DR
22616	L-shape	Temporary Habitation	d	DR
22617	Enclosure	Permanent Habitation	d	DR
22618	Walled terrace	Permanent Habitation	c, d	PR
22619	Walled terrace	Permanent Habitation	d	DR
22620	Complex	Permanent Habitation	c, d	PR
22621	Enclosure	Permanent Habitation	d	DR
22622	Complex	Permanent Habitation	d	DR
22623	C-shape	Temporary Habitation	d	DR
22624	Lithic scatter	Quarry	c, d	PR
22625	Concrete piers	Foundation	d	NFW
22626	C-shape	Temporary Habitation	d	DR
22627	C-shape	Temporary Habitation	d	DR
22628	Walled terrace	Permanent Habitation	d	DR
22629	Terrace	Temporary Habitation	d	DR
22630	Cairn	Marker	d	NFW
22631	Complex	Permanent Habitation	d	DR
22632	Complex	Agriculture	a, c, d	DR/PR

Source: Haun & Associates

Potential Impacts

The inventory survey identified 75 sites with 818 features. Table 12 lists the site significance and recommended treatments of each site. The recommended treatments are: 1) No Further Work (NFW), 2) Data Recovery (DR), and 3) Preservation (PR). As listed, 5 sites have been sufficiently documented during the inventory survey; thus no further work is recommended. Fifty-five sites are recommended for data recovery, and 15 sites are recommended for Preservation.

Impacts to archaeological sites would result in a loss of those sites not designated for preservation due to earthwork and construction.

The preparation of acceptable detailed treatment (mitigation) plans will be submitted for review and approval by SHPD/DLNR. The Hawai'i Island Burial Council will also need to review and approve the proposed burial treatments. The proposed treatments will be addressed and will include buffer

zones, and both interim and long-term protection measures. It is considered that once SHPD agrees in writing with the plan(s), that the project would result in a "no adverse effect" to the significant historic sites.

Mitigation Measures

Mitigation of significant historic sites generally takes one of two forms: 1) preservation, or 2) data recovery. Preservation is accomplished either through site protection as is, or through the development of an interpretation program.

Data Recovery

- *Data Recovery and Mitigation Plan.* Information gathering on the site has been extensive, and an in-depth inventory of archaeological sites has been completed. Measures have been recommended and the conceptual site plan has been modified to avoid the recommended preservation areas. An archaeological data recovery and mitigation plan will be prepared for review and approval by DLNR/SHPD. This would be followed by implementation of data collection of significant sites prior to any construction grading of the property.

  Table 12 above lists the site significance and recommended treatments of every site. The mitigation plan would include site-specific measures for data recovery as well as a preservation plan.

- Any burials which may be discovered during the data recovery process, which were not previously documented, would be reported to the SHPD and the Hawaii Island Burial Council, and allowed to be preserved in place. Should the location be along a roadway alignment which cannot be relocated, specific treatment will be discussed with SHPD and the Burial Council to reach an acceptable resolution.

- A Data Recovery Report will be submitted and filed with the SHPD.

Preservation

To mitigate potential impacts to the historical/archaeological resources of the project area, the recommendations of the consulting archaeologist which are subject to the approval of the SHPD/DLNR will be followed. The proposed "level" of preservation was developed in consultation with the DLNR-SHPD Archaeology Branch Chief. Moreover, the number and extent of the sites proposed for preservation is significantly greater than the amount recommended by SHPD.

Roadways, buildings, and infrastructure have been planned to avoid all sites noted for preservation, including adequate buffer zones. Interpretive preservation would be determined as part of the review process, in conjunction with the recommendations of the SHPD/DLNR and Hawai'i Island Burial Council and other appropriate resource groups. The Mitigation Program for archaeological sites, including plans for site preservation will require approval by the County Planning Department in conjunction with the SHPD/DLNR prior to issuance of a grading permit for any portion of the proposed development.

Specific preservation of significant sites include portions of the Lalamilo Agricultural Field Complex and a basalt quarry site (approximately 20 acres), and burials which are scattered throughout the Property:

- Approximately 20 acres which include portions of the Lalamilo Agricultural Field Complex (Site 22632) and the basalt quarry (Site 22624) will be preserved and protected:

  Site 22632. The areas of the Lalamilo Agricultural Field Complex which are recommended for preservation will be protected in large chunks; and as such, will also include other sites and features within the boundaries of the preserve areas. The intent is to protect a representative sample of the field system and associated habitations and other features.

  Site 22624. A basalt quarry consisting of a mound at the Keanu'i'omanō and Lanikepu Streams confluence would be preserved.

- *Treatment of known and potential burial sites.* All of the known burials are proposed to be preserved in place. Possible burials will be tested to determine if human material is present; positive identification will require preservation in place. All burials would be protected in place and buffers would allow access to any lineal descendants.

In recognition of the significance of the Lālāmilo Agricultural Complex (Site 22632) which extends across the adjacent State lands and other lands in Waimea, the SHPD has made preliminary plans to protect an area of approximately 200-300 acres to the south of the Lālāmilo Project Site and to the east of the Lālāmilo Farmlots.

Notification Procedures During Construction

- During construction, should any unexpected cultural features, deposits, or burials, be encountered, work in the area will be suspended and the SHPD office will be immediately notified to determine an appropriate course of action.

5.2 CULTURAL IMPACT ASSESSMENT

A Cultural Impact Assessment (CIA) was conducted for the Project and is included in Appendix F. It is intended to be informational for the purpose of disclosing any cultural impacts to native rights and practices the proposed development might have on Hawaiian culture, and to address Act 50 passed by the 20th Legislature and approved in April 2000. The thrust of Act 50 is to consider the effects a proposed development may have on native Hawaiians as it pertains to the culture and their right to practice traditional customs. In addition, the Hawai'i State Constitution, Article XII, Section 7 protects "all rights" of native Hawaiians that are "customarily and traditionally exercised for subsistence, cultural and religious purposes".

The suggested "Guidelines for Assessing Cultural Impacts" issued by the Office of Environmental and Quality Control discusses the types of cultural practices and beliefs that might be assessed. The Guidelines (11/19/1997) read:

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational and religious and spiritual

customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

In addition, Ka Pa'akai o ka 'Āina v. Land Use Commission (94 Hawai'i 31, 7P. 3d 1068 (September 11, 2000)) set forth an analytical framework independent of but consistent with, the cultural impact assessment requirements set forth in Act 50. The specific findings and conclusions required in three areas include the following:

1. The identity and scope of "valued cultural, historical, or natural, resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised there;
2. The extent to which those resources - including traditional and customary native Hawaiian rights - will be affected or impaired by the proposed action; and
3. The feasible action, if any, to be taken by the LUC to reasonably protect native Hawaiian rights if they are found to exist.

5.2.1 Scope of Work and Methodology

The Scope of Work was designed to meet the cultural impact assessment requirements of the Office of Hawaiian Affairs (OHA), the OEQC and any other State and County agencies involved in the review process for the proposed project. Based on OEQC Guidelines, the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing ethnographic, historical, and anthropological documentary literature relating to traditional cultural practices and resources in the project area and its immediate vicinity;

2. Identify and consult with individuals and organizations to identify knowledgeable individuals with expertise concerning the types of cultural resources, practices, and beliefs found in the vicinity of the project area;

3. Conduct ethnographic/oral historical interviews.

4. Prepare and submit a Cultural Assessment report in conformance with regulatory agency requirements for such reports.

Hawaiian organizations, agencies, and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project area and the surrounding vicinity. Although approximately 60 people were contacted, very few people had specific knowledge of the subject property and nearby environs. One formal interview was conducted and several informal talk-story sessions with long-time residents of the area were held.

Much of the information gathered through the CIA process was historical and related to ranching activities which is not derived from traditional native Hawaiian culture and practices, but rather, an introduction of non-Hawaiians. Ranching however, has come to define much of the culture of Waimea and crossed ethnic lines to a diverse segment of the population.

The reader is directed to Appendix F for full information of the discussion sessions and the literature described in the CIA which includes traditional and legendary associations to Waimea, proverbs and sayings, mellowly or stories of Waimea, early historic accounts of Waimea, as well as a description of the historic Waimea Water Rights Case.

5.2.2 Cultural Impact Assessment Findings

Early Historic Accounts of Waimea (1778-1848)

Looking at the Waimea area as we know it today, one may have difficulty imagining what it looked like during traditional times and a couple of hundred years before contact (1778). Descriptions from early visitors, *Māhele* records, and native testimony (Carter vs. Territory of Hawai`i:1914-1915) indicate the native forest once extended much lower into the upland plains than it does today. The project area itself was most likely comprised of sandalwood forest up until the early 1800s. Depletion of the forest zone no doubt affected general rainfall and precipitation patterns as well as the notoriously strong *mumuku* winds that originate in the Waimea area and blow down to Kawaihae. This is evident from reading native testimony from the Waimea Water Rights Case (1914-1915).

One of the earliest glimpses of Waimea from a distance was given in 1793 by Archibald Menzies, the British naturalist who traveled with Captain Vancouver's expedition. Landing at Kawaihae, Menzies took a short excursion inland in the hopes of collecting plants. He wrote:

> I traveled a few miles back . . . through the most barren, scorching country I have ever walked over . . . A little higher up, however, than I had time to penetrate, I saw in the verge of the woods several fine plantations, and my guides took great pains to inform me that the inland country was very fertile and numerously inhabited. Indeed, I could readily believe the truth of these assertions, from the number of people I met loaded with the produce of their plantations and bringing it down to the water side to market, for the consumption was now great, not only by the ship, but by the concourse of people which curiosity brought into the vicinity of the bay. (Menzies 1920: 55-56)

Vancouver's trip had monumental impacts for Waimea and the Hawaiian Islands. It was on two separate trips 1793 and 1794 that Vancouver presented Longhorn cattle, along with some sheep to Kamehameha as a gift. At the request of Vancouver, Kamehameha put a ten-year *kapu* on the cattle. They were not to be touched or hunted, but were left to breed and multiply. The cattle were taken to a large penned area in upland Waimea which was ". . . very rich and productive, occupying a space of several miles in extent, and winding at the foot of . . . lofty mountains far into the country. In this valley is a great tract of luxuriant, natural pasturage, whither all the cattle and sheep . . . were to be driven, there to roam unrestrained, to "increase and multiply" far from the sight of strangers" (Vancouver *in* Kuykendall 1965:28, 40-41). Along with cattle, other early western visitors introduced goats, horses, a new pig breed, and new vegetable, fruit and plant varieties. Kawaihae and its port became the impetus for the development of trade and commerce.

In 1832, the Reverend Lorenzo Lyons and his wife Betsy settled in Waimea to start a mission station. His territory included the broad districts of Waimea, Kohala and Hāmākua. Lyons kept a detailed diary of his daily activities and impressions. A September 24th entry of the same year in Lyons' diary indicates that he traveled to an area called Kekula, four to five miles away. There he found a group of Hawaiians salting beef for drying. Of cultivation, he noted seeing watermelons,

beans and corn as well as *wauke* and *mamaki* for making *kappa*. He also commented on the presence of prickly pear growing in the *kula* area (*Ibid.* 63).

Ironically, the California Gold Rush impacted the economy of Waimea as well as other parts of the Hawaiian Islands. There was a shortage of Irish potatoes and vegetables on the West Coast. Traditionally, Hawaiians had always grown sweet potatoes and had been supplying provisioning ships since contact (1778). Prior to the Gold Rush craze, Irish potatoes were already being grown in Waimea on a small scale. With the demand of early settlers in California, Waimea farmers were able to quickly benefit by increasing their production and shipping barrels of sweet potatoes and Irish potatoes to California. Other vegetables, along with sugar, molasses and coffee were also exported during this same time (Kuykendall 1965: 313-314; 322-321). In December 1849, Lyons wrote:

"Pilikia" enters cattle history in 1847 . . . two thirds of Waimea has been converted into government pasture land. People are compelled to leave their cultivated spots and seek distant corners of the woods beyond the reach of the roaming cattle, sheep and goats. But the cattle follow, and soon destroy the fruit of their labors. "There is a despairing spirit among my people, and great suffering among them."

One of the renowned bullock hunters was John Palmer Parker who settled in Hawai'i in 1815. He became friends with John Young and spent much of his early years at Kealakekua, where Kamehameha held court. After the death of Kamehameha in 1819, Parker moved to Waiapuka in Kohala with his *ali'i* wife, Kipikane and their new-born daughter (Wellmon 1970: 20-26).

An 1823 account describes a visit to Waimea and Mauna Kea where John Parker was found shooting wild cattle.

> . . . several herds of wild cattle, which are very numerous in the mountains and inland parts of the island . . . became so wild and ferocious that the natives are afraid to go near them. Although there are immense herds of them, they do not attempt to tame any and the only advantage they derive is by employing persons, principally foreigners, to shoot and salt the meat in the mountains and bring it down to the shore for the purpose of provisioning the native vessels. But this is attended by great labor and expense. They first carry all the salt to the mountains. When they have killed the animals, the flesh is cut off their bones, salted immediately and afterwards put in small barrels which are brought on men's shoulders, ten or fifteen miles to the seashore. (Ellis 1963: 291)

Early 19th Century Impacts and Changes to Hawaiian Culture

There were many changes that impacted the traditional lifestyle of the Hawaiians in the early half of the 19th century. Introduced cattle were allowed to overpopulate the land. Undomesticated and left to roam at will, the cattle destroyed and ate crops, knocked down fences and disrupted traditional agricultural practices. Sheep and goats left their mark on the land as well. The traditional lifestyle was further disrupted by the sandalwood trade which was controlled by the king and, after 1819, the chiefs. The working people were ordered to leave their fields to go to the mountains to cut sandalwood. The sandalwood trade was another main contributor to the loss of the native forest in the Waimea area.

The history of Waimea as a land unit is unclear. In earlier times, Waimea may have been its own district, separate from Kohala (Nakamura 1981: 29). This is alluded to in the Boundary Commission records (No. 1: 6) which indicate that "Waimea is an *ahupua`a* of Waimea, which is a kalana, with eight divisions." One native witness (Mi 1st) who testified for George Davis on the boundaries of Waikoloa described Waimea as being a kalana ". . . which is the same as an island divided into districts -- there are eight Okana in Waimea. In those Okana are those lands said to extend out (*lele ma waho*)" [running to the sea] Boundary Commission *Ibid.*: 7).

C. J. Lyons, considered Waimea an *ahupua'a* comprised of predominantly ("Nine-tenths) two larger independent *'ili kūpono* of Waikoloa and Pu`ukapu and as well as smaller *`ili* (Lyons 1875: 119). Boundary Commission records and Land Commission Awards (LCAs) for Hawai`i Island indicate the lands of Waikoloa, Wai`aka 1st and 2nd, and `Ōuli were considered *`ili* of Waimea rather than separate *ahupua'a*. The State of Hawai'i, in an attempt to clarify the matter determined that South Kohala District comprised only three *ahupua'a*: Kawaihae 1, Kawaihae 2 and Waimea (Kelly & Nakamura 1981: 29).

Likewise, Lālāmilo was designated an *'ili*, but in the early land records, Lālāmilo does not seem to be attached to any larger land unit such as an *ahupua`a*. It only appears as a land name, "The `Ili of Lālāmilo and Waimaa" within the "District of South Kohala" (Boundary Commission, Hawai`i, Vol. A, No. 1: 298). However, Lālāmilo seems to have shared a special relationship with Puako on the coast. The Boundary Commission records indicate Lālāmilo shared fishing rights with Puako. Testimony for Puako Ahupua`a from Kauwewahine who lived at Lālāmilo since the time of Kamehameha II indicate Puako had "Ancient fishing rights in the shallow waters near shore [and] the sea outside belongs to Lālāmilo" (*Ibid.*: 297). It is interesting to note that Charles Kanaina claimed the "*'ili* of Lālāmilo in South Kohala" as part of his claim for Puako Ahupua'a (*Ibid.*: 456; Volume B: 298). An additional note follows the boundary testimony: "Note: His Honor, C. Kanaina only claims the beach and fishing rights. Lālāmilo had ancient fishing rights extending out to sea" (*Ibid.*: 298).

At the *Māhele,* Waikoloa was deemed Crown land. Waikoloa was sometimes referred to as "Waikoloa Nui" and "Waikoloa Iki", differentiating between the Crown land and Davis' land respectively (Boundary Commission No. 1: 11). Dorothy Barrere explains: "Later, the greater portion of the king's Waikoloa became known as the *ahupua'a* of Lālāmilo and the smaller portion as the *'ili 'āina* of Waikoloa-iki [Davis' portion] . . . It is not known when the name Lālāmilo was extended to most of the king's Waikoloa (1983:29).

Most people today seem to consider Lālāmilo as an *ahupua'a* within the South Kohala District, the other *ahupua'a* being Kawaihae 1, Kawaihae 2, 'Ōuli, Waimea, Kalāhuipua'a, Waikoloa and 'Anaeho'omalu.

Land Commission Awards (LCAs)

Though the Boundary Commission records indicate the name of "Lālāmilo" was in use at the time of the Māhele, the listing of Land Commission Awards for South Kohala District (by location) does not list any awards under the land name of "Lālāmilo". However, examination of old maps indicated there were indeed lands awarded within Lālāmilo, listed under smaller `ili names instead such as Koali`ula, a place name located within the bounds of the project study area and a name which people no longer seem to use today. In fact, Koali`ula is incorrectly identified as Kawailiulā on modern

USGS maps.

Within upper Lālāmilo, nine LCAs and two grants were awarded at the *Māhele*. This does not seem like very many for such a land section of this large size. As has been the case on Government lands, it is very likely that more native tenants than the nine who received awards lived on the lands, but saw no need to file a *Māhele* claim because the land belonged to the Government and the *hoa`āina* had native tenant or *kuleana* rights (Hawaiian Reports Vol. 24: 54).

The Waihona 'Aina Mahele Database (Waihona 'Aina Corp. 2000); which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); does not list any Land Commission Award (LCA) claims for Lālāmilo; however, examination of current tax maps and other historic maps identified thirteen awarded claims in Lālāmilo for which most list the *ahupua'a* as Waimea. The database also lists four claims that were not awarded in Puako. There are probably other claims within Lālāmilo that were not awarded, but it is not possible to distinguish them from the over 140 claims that are listed as being in the *ahupua'a* of Waimea.

Within the project study area, one LCA (3828) was awarded to J. A. Palea. Three of the LCAs (3762, 4195 and 976:2) and one grant (2129) are in somewhat close proximity to Palea's award. Situated outside (south/southwest) of the project boundaries, these four awards are listed on the Hawai`i Register of Historic Places and are known as the Lālāmilo *Kuleana* and Ranch District. The description of the site is as follows:

> The site consists of numerous stone walls, stone platforms, agricultural terraces, *auwai*, cattle pens, and stone wall-enclosed *kuleana* and house sties. A few structures show the use of mortar, plaster and ironware. Empty metal cartridge cases indicate military use of the area in recent years. (Historic Sites Information and Review Form :2)

Testimony from the Native Register for Waimea indicate that many of the *kuleana* house lots already had enclosure walls built around them at the time of the *Māhele*. If there was no wall, most of the native tenants indicated they were either building or were planning to build a wall to enclose their house lot. No doubt, this was a response to dealing with the cattle problem.

The Waimea Water Rights Case

In the year 1914, Alfred Carter, on behalf of his trustee, Thelma Parker, filed a petition against the Territory of Hawai`i and 62 individuals over appurtenant water rights to Waikoloa Stream for the purposes of irrigation. Carter alleged that in 1905 the Territory wrongfully diverted water from Waikoloa stream when it constructed a dam and ran connecting pipe-lines from the stream above the lands of the petitioner (Carter) to Waimea Village (Hawaiian Reports Vol. 24: 49). In essence, Carter was protecting the interests of Parker Ranch and their right to utilize water from Waikoloa Stream for purposes other than normal household use (e.g., irrigation for pasturelands). The majority of the respondents did not show up and the Territory of Hawai`i was the only one to contest Carter's claim. The "Hawaiian Report" summarized the case as follows:

> This is a proceeding . . . for the purpose of determining water rights in the Waikoloa stream, at Waimea, Island of Hawai`i . . . In the petition the petitioner's ownership of certain lands was alleged and the right to the quantities of water claimed as appurtenant thereto for irrigation

purposes by immemorial custom was stated as follows: An area of 94.3 acres at Kaomaloo, within and a part of the ili of Waikoloa, through the ditch known as the "Lyons" ditch, not less than 940,000 gallons per day; three *kuleanas* in the government land of Waikoloaiki, comprising an area of about nine acres, through a ditch (called Lanakila), not less than 95,000 gallons per day; five *kuleanas* in the government land of Lālāmilo (adjoining Waikoloa), and a grant (R. P. 1157) of a parcel of land containing an area of 250 acres at Lihue (stipulated to be a portion of the "land or so-called ahupuaa" of Waimea), not less than 2,000,000 gallons per day through the ditch known as the "Akona" ditch. Also water for domestic use upon a parcel of land described in a deed from Kamehameha IV to Waimea Grazing Co., adjoining Waikoloa stream; and the right to the surplus freshet water of the stream as it flows into and upon the *ahupua'a* of Ouli (adjoining Lālāmilo) was claimed.

Two World Wars

As a major supplier of beef, Parker Ranch played a pivotal role in providing beef and mutton to the Armed Forces in Hawai'i during both WWI (1914) and WWII (1941). During WWII, the military (Army and Marines) basically took over Waimea town. Large areas of ranch lands were turned over to the U.S. Government for a campsite, and a firing range for training the U.S. Marines -- all for the sum of $1.00 (Brundage 1971: 109). When the war was over in 1945, Mr. Carter wrote the following:

> At the present time, there is a division, I think, consisting of something over 20,000 men, located in Waimea. They are moving out now. The licenses and leases which we gave the Armed Forces run for the duration and six months thereafter. Much, if not all, of the installations I expect will be removed within that time. The U.S.O. also has two leases upon which they have built. They have the right to remove their improvements unless we can agree to a price (*Ibid.*).

A Pasture Lease map for Lālāmilo, Līhu`e, `Ōuli, Koali`ula and Wai`aka 1 was obtained from Woody Ramos. The map indicated an easement for a "tank trail" which was used by the military during WW II. (Personal Communication, Woody Ramos)

The firing range was one of the last properties to be released by the military. Mr. Carter wrote:

> The Army and Marines have released most of the property which we had turned over to them except what is known as the Firing Area. This is the land below the Kona Road and runs down to the sea, consisting of about 50,000 acres. On this land they used their artillery and many of the shells which came down did not explode and are called duds. They have about 200 men retained there in this area, detonating the duds as they find them. It is surprising how many were on the place. They are extremely dangerous because if a man going along on horseback should hit one, it would explode with fatal results so it is senseless to put our men into this area until we are well satisfied that all of the duds have been exploded. We have been promised they will keep this gang of men there as long as we wish them. It will be several months before it will be safe for us to use the land -- it is a big country to go over.

In an informal talk-story session with Radcliffe (Rally) Greenwell, former Ranch manager, he indicated there had been several accidents on the ranch due to unexploded ordinance. The actual project area was a small portion of the lands used by the Marines for training during WW II (Personal Communication from R. Greenwell, H. Kimura, Y. Kimura).

Lālāmilo Farm Lots

After the war, the Japanese farmers found other venues to market their produce. Using their profits from the war, many of the farmers began to purchase land outright rather than lease farmlands. Besides mechanizing their farming equipment, they organized to form a cooperative.

World War II reshaped the farming industry in Waimea and ironically the war was a boon to the farmers -- most of whom were Japanese. The birth of Lālāmilo farm lots stems from an amusing anecdote about how the lands were acquired. Several farmers wanted to purchase Government land around the area of Richard Smart's home at Pu`uopelu. Paniolo Yutaka Kimura foresaw that Mr. Smart's home would be a dustbin from the farmers plowing their fields so close to Mr. Smart's residence. Parker Ranch came up with a viable solution for the farmers by exchanging the Government owned land for Parker Ranch lands that would in turn be granted to the farmers. In 1963 a legislative bill was passed authorizing the sale of ranch lands at Lālāmilo to Parker Ranch in exchange for the Government lands at Pu`uopelu. The outcome actually benefitted the farmers in the long run. Today, most of the privately owned farmland in Waimea belongs to Japanese farmers and they are the largest vegetable producers in the State.

Late 1900s

Other than military use during the war, the project area has been used almost entirely for ranching purposes. A small portion of the subject parcel, near South Kohala Distribution Road was used as a dump after the war (late 1940s -1950s) and remnant pieces of disposed car parts and miscellaneous "junk" can be seen lying on the surface.

At one time Lālāmilo, including the project area, was leased by Parker Ranch for pasturing their cattle. A Pasture Lease map for Lālāmilo and the surrounding area indicated a 100 ft.-wide easement for a "Lālāmilo Cattle Trail" which traverses through nearly the full length of the project area and LCA 3828 to Palea. Yutaka Kimura recollected that in the "old days" the cowboys used to drive cattle through this area. Having more productive pasture lands elsewhere, the Ranch opted not to renew their lease when it came up for review in the late 1950s or early 1960s. The pasture lands of Lālāmilo are marginal. They are considered "seasonal" pasture lands and are not used for pasturing year-round. They are most productive for grazing during the winter months and early spring (Personal Communication, Radcliffe Greenwell & Woody Ramos).

Parcel 77 and Parcel 12-17 is currently under lease to Jack Ramos who uses the land for cattle grazing and branding. The ranch was formerly known as the Palekoki Ranch (Petticoat Ranch) after two women owners who had the lease before Ramos (Personal Communication, Jack Ramos). People today refer to the it as the "Ramos Ranch". Parcel 10 is currently under a general lease to Roy Mattos and the parcel is used for pasturing horses.

5.2.3 Community Consultation

The cultural impact assessment process included a search for informants with any knowledge of the property. It was hoped that three to four formal, taped interviews with *kūpuna* and others in the community could be conducted which would provide cultural information about the project study area relative to cultural practices, especially in relation to the cultural sites and burials present in the project area. It was especially hoped that descendants of the original families who were awarded

kuleana lands during the *Māhele* could be located and could offer information that was more specific to the project study area and the sites there.

Consultation with agencies, community organizations, Hawaiian Civic Clubs, the Waimea Community Association and members of the community at large yielded a hopeful list of potential people to contact who might be knowledgeable about the project area. An effort was made to contact the older Hawaiian *paniolo* who worked for Parker Ranch. However, although 50+ individuals were contacted, this did not yield any leads for a successful in-depth interview. A complete list of all individuals is found in Appendix F.

Talk-story sessions were conducted with several potential interview informants with the intent to find prospective interviewees: Yutaka Kimura (96 yrs.), Hisao Kimura (89 yrs.), Radcliffe Greenwell (80s), Allen Lindsey (70 yrs.), Helen Aveiro (86 yrs.) and Ethel Andrade (75 yrs.).

Yutaka Kimura began working for Parker Ranch in 1918 at the age of 13. He retired from the Ranch after 49 years of service. He is one of Waimea's oldest (if not the oldest) *kupuna* still living today. Though not of Hawaiian ancestry, with his *paniolo* background, it was hoped he would be able to relate stories or information he had heard from the older Hawaiian cowboys about the project area.

Hisao Kimura, Yutaka's brother, was also contacted. Hisao is married to Elizabeth Lindsey of the Lindsey clan in Waimea. Elizabeth's family is from Wai`aka, just across the highway from the project area. Like Yutaka, Hisao also worked for Parker Ranch and retired from the ranch. Hisao was in charge of the nursery and was responsible for planting/upkeeping the grasses in the paddocks and pastures.

An informal session was conducted with both Kimura brothers at the home of Hisao Kimura in Waimea. Hisao's wife, Elizabeth was also present. Both Kimuras have an extensive and intimate knowledge of Parker Ranch and ranch lands, as well as general knowledge about Waimea. However, they did not know any specific cultural information about cultural practices in the project area. Neither did Elizabeth Lindsey Kimura. However, they did confirm that Parker Ranch used the project area in the past for grazing and they also confirmed military use of the project area during WW II. They were all familiar with the house sites at Papua'a. Yutaka related that several peach trees used to grow in that area when he was young. Testimony from the Waimea Water Rights substantiated his memory. Part-way into the talk-story session, Mrs. Kimura called a friend whom she thought might be helpful. Her friend, Mrs. Nobriga (70s), came over to chat as well. As it turned out, she was a descendent of Auwae who was awarded LCA 3762 at Papua'a. She was familiar with the sites at Papua'a because she had visited them and walked over the land there. But she could not offer cultural information about the project study area, nor did she have any stories to relate through her family ties to the area.

A talk-story session was also arranged with Radcliffe (Rally) Greenwell at his home in Waimea. Mr. Greenwell was a prior ranch manager and retired from the ranch. Like the Kimura brothers, Mr. Greenwell only knew a few general details about the area such as military use, grazing use by the ranch, and the dump.

Talk-story with Helen Aveiro, gave some insight into traditional Hawaiian lifestyle in the early 20th century. Helen Aveiro (born in 1915) was raised at Mauna Horepa in Kawaihae Uka and moved to Waimea around the age of 14 or 15. She is familiar with the Hawaiian use of *`auwai* (ditch systems)

because the traditional *`auwai* were utilized by her family in Kawaihae Uka as a young child. Mrs. Aveiro indicated that the Lālāmilo use of *`auwai* was the same as in Kawaihae Uka – using the stream for irrigation (mostly sweet potato) as well as for household use -- washing dishes, cooking, bathing and drinking. During dry times, water from pools in the stream was utilized -- certain pools were designated for bathing, certain pools for drinking and so forth. Drinking water was carried to the house in buckets and stored in a large barrel. The staple diet consisted of sweet potatoes -- the main agricultural crop. The main hot meal (involving a cooking fire) was eaten in the evening. Poi was usually eaten with this meal as well. Breakfast was a very simple meal of sweet potatoes cooked overnight in the charcoals left over from preparing the evening meal. Lunch usually consisted of dried meat or dried *`ōpae*, crackers and maybe some *poi* if there was enough to go around. *Poi* had to be purchased and was not eaten at every meal so that the supply would last throughout the week.

Allen Lindsey (born in 1931), a descendent of the original Thomas Weston Lindsey who settled in Waimea in the early 1830s, worked as a *paniolo* for Parker Ranch for about 31 years. Mr. Lindsey grew up on family land in Wai`aka, across the highway from the project area and the present Kamuela Museum. He recalled that taro was grown on the family land at Wai`aka and traces of older agricultural terraces were seen in the general Wai`aka area. When the family decided to sell the Wai`aka land (approximately 7.6 acres), the Lindsey family burials, twenty-two in all, were reinterred at the County cemetery next to `Imiola Church in Waimea Town. Even though Mr. Lindsey grew up across the highway from the project area, he could not offer more insight into the history or cultural practices of the project area.

An informal talk-story interview was also conducted with Ethel Andrade (born in 1926), a homesteader from Pu`ukapu, Waimea. Mrs. Andrade and her husband Albert have been ranching 300 acres of Hawaiian Homestead land since they were awarded their homestead in 1952. Mrs. Andrade also served as a past Waimea Homestead Association president. Mrs. Andrade grew up in Hāmākua and moved to Waimea in 1952. She offered glimpses into life in Waimea in the 1950s from a Hawaiian perspective. In the 1950s, it was almost impossible for Hawaiians to obtain credit from the local store. So Hawaiians bartered and traded for food, gas and other needed items. Though a long-time Waimea resident, Mrs. Andrade reiterated she is more familiar with the Pu`ukapu end of Waimea than the Lālāmilo end. She could not give any information specific to the project area. Mrs. Andrade did raise some social impact issue concerns that are unrelated to the scope of work for this cultural assessment.

None of these respected *kupuna* were surprised to hear about the sites in the project area. The general comment was, "That whole area is full of sites." Neither were they surprised to hear that the project area contained burials. It was to be expected that where you found house sites, you would probably find burials as well. Their feeling about the sites in the project area was the *kama`āina* of that place moved away so long ago that it would be difficult to find anyone who had intimate knowledge of them. Many of the old families that used to live in Waimea moved away or their *kupuna* have passed on.

A taped interview was conducted with Ku Kahakalau, founder of Kanu o Ka `Āina, a charter school in Waimea. Though not native to Waimea, Kū is of Hawaiian ancestry and has lived in Kukuihaele for the last ten years. Her family roots take her back to Waipi`o Valley, Molokai and O`ahu.

Kū was interviewed because she is very interested in the project area itself and she has a definite vision of how the project plans could better serve the community of Waimea in the long-term -- more

specifically how the charter school can be an asset to the project, making it a win-win situation for all concerned, the charter school, the community at large and the project planners. Previously, when the project area was still designated State land, Kū had considered the project area as a site for the charter school because of the cultural sites there with the idea of preservation and *mālama* (to care for) in mind.

For Kū, key to the success of the project is communication and involvement with the community from the very beginning stages of project planning. As far as specific cultural information pertaining to the sites and past cultural practices, Kū was very up front about saying that she was not the right person to ask because even though she works in Waimea, she was not raised there. Kū did recommend several names of *kupuna* who might be able to offer more insight on cultural practices in Lālāmilo. She also had recommendations to make about the cultural sites (overall data recovery, especially for those sites not being preserved, i.e., house sites) and burials (preservation in place for all burials) within the project area.

5.2.4 Discussion and Potential Impacts of the Project

The study did not identify any cultural practices occurring within the study area at the present time. As for the gathering of plants for medicinal uses, several cultural practitioners indicated the project area was not ideal to gather due to past military use and the presence of unexploded ordinance. Past cultural practices related to traditional Hawaiian methods of agriculture were identified. Testimony from the Waimea Water Rights Case (Carter v. Territory of Hawai`i, 1914-1915) indicated the lands of Lālāmilo were in previous times heavily inhabited. The remains of a large network of *`auwai* or ditch system can be seen on the landscape and within the project area.

The lack of cultural practices are attributed to the negative impacts of the introduction of cattle, the sandalwood trade and ranching activities, all of which displaced people from their kuleana and disrupted their agricultural practices. Early 20th century testimonies indicated that major environmental changes occurred during the 19th century: the denudation of the Waimea forest zone, higher evapotranspiration resulting in less rain fall. By the late 1800s - very early 1900s, there were very few *hoa`āina* living in Lālāmilo Uka.

This cultural impact assessment did not identify any present-day cultural practices nor did it identify anyone who currently uses the project area for cultural practices of any kind. Past cultural practices identified were related to agricultural practices and the utilization of an ancient *`auwai* or ditch system which traversed much of the Lālāmilo area. The project area is part of the larger Lālāmilo field system evidenced by remnant *`auwai* and dryland terraces. Hawaiian burial practices (pre-contact and historic) were conducted in the project area as evidenced by the presence of burials and grave sites.

Archival research indicated there was one *kuleana* awarded during the *Māhele* period. This Land Commission Award 3828 to Palea lies within the boundaries of the project area. Though not certain, the research also suggested the possibility that Palea might have been buried within this *kuleana*.

Testimony from the Waimea Water Rights Case (1914-1915) indicated the Lālāmilo area was heavily populated in earlier times and probably remained so up until the late 1700s - very early 1800s. This might have been due to agricultural expansion by the Waimea chiefs to serve a specific purpose such as supporting large armies and chiefly retinues and, in particular the construction of

Pu`ukoholā *Heiau* by Kamehameha I which required a vast quantity of laborers. The negative impact of cattle, the sandalwood trade, and the influx of foreigners due to commerce and trade at Kawaihae contributed to dispersal of these communities before the mid-19th century. A few *hoa`āina* continued to maintain their kuleana on a very small scale -- mostly for domestic use. But, by the late 1800s, most of the *kuleana* were abandoned. Beginning in the 1840s, ranching activities became the primary land-use activity and has remained so up to the present day.

The Archaeological Inventory Survey identified a number of sites within the project area, including house sites, enclosure walls, agricultural terraces, remnant *`auwai* and burials. Networking with community members did not yield new cultural information specific to these sites or burials. No formal interviews were conducted for this study due to lack of identified knowledgeable informants. Through consultation, one informant (name withheld) was identified who intimated he had more specific knowledge of the project area, especially in relation to burials. This individual declined to be interviewed for the time being.

Several cultural practices of the surrounding area have been alluded to by several people however they chose to remain silent for the time being, honoring their oral tradition as it was passed on to them. Perhaps in time, people will feel comfortable to talk about these traditions so they can be documented for posterity.

In addition, Roy A. Vitousek, Esq., as counsel for Hawaii Preparatory Academy stated in a letter dated October 7, 2002, that "there has been ongoing use of the subject property by a wide range of individuals in the community for purposes including but not limited to hunting, hiking, picnicking along the stream, visiting archaeological and historical sites, other cultural uses, gathering, exercise, dog training, and the like."

5.2.5 Recommendations and Mitigation Measures

Studies on the natural flora, fauna, and stream resources, as well as archaeological resources have been conducted for the EIS and are all summarized in Sections 4 and 5 with full reports contained in the Appendix. Also described are the conditions related to former military use of the property and the potential for the presence of live ordnance. The reader is directed to these sections of the EIS for detailed discussions and the mitigation measures which are proposed.

The following recommendations are suggested to mitigate cultural concerns identified by this assessment:

1. Follow-up with the one identified informant (name withheld) to see if a plan can be worked out to safely document his knowledge of the project area and related burials without jeopardizing these cultural properties.

2. For sites not being preserved, archaeological data recovery is being recommended prior to any ground disturbance or ground altering activities. The data recovery could perhaps even contain an educational component, whereby Hawaiian students participate in the data recovery process, giving them first-hand experience in archaeological fieldwork in their own backyard so to speak.

3. Try to locate and map Palea's house site (LCA 3828).

4. Incorporate preserved sites into the overall plan utilizing cultural protocol, sensitivity and integrity.

5. Preserve all burials in place with a buffer zone, the specifics to be worked out with the Hawai'i Island Burial Council, any lineal/cultural descendants and/or the community.

6. In light of the sites and burials within the project area, cultural monitoring is recommended for all ground disturbing activities.

7. Lastly, as a safety precaution, clear the project area of any remaining unexploded ordnance.

The following recommendations deal with how to respond in the event that inadvertent burials are encountered during subsurface work in the project area. Regarding the discovery of burials, State law (Chapter 6E, Hawai`i Revised Statues) *requires the following:*

1. Stop all disturbing activity in the immediate area

2. Leave all remains in place

3. Immediately notify the State Department of Land and Natural Resources, Historic Preservation Division (DLNR/SHPD), at 692-8026 and the County Police Department.

The following recommendations speak to cultural concerns the Hawaiian community has regarding proper handling of *`iwi* (bones) should they be encountered within the project area and consultation with appropriate parties. It is stressed that utmost sensitivity, caring and understanding be employed when dealing with burial issues and the *`iwi.*

1. If for some reason the *`iwi* must be moved or touched, it is highly recommended this be done by a cultural monitor, a lineal/cultural descendant or someone of Hawaiian ancestry who will be cultural sensitive to the *`iwi.*

2. Consult with appropriate agencies and organizations: State Department of Land and Natural Resources, Historic Preservation Division (DLNR/SHPD), SHPD Burial staff, the Hawai`i Island Burial Council, the Office of Hawaiian Affairs (OHA), Hui Mālama I Nā Kūpuna o Hawai`i Nei and any other interested Hawaiian organizations.

3. Consult with all known lineal and/or cultural descendants.

4. Prepare and implement a Burial Treatment Plan to be developed in consultation with the affected agencies, the appropriate organizations and parties wishing to be consulted, including lineal and/or cultural descendants.

With regard to the activities such as hunting, gathering, hiking, picknicking along the stream, visiting archaeological and historical sites, exercise, dog training, and other uses, the following discussion and measures address these issues and would mitigate the effects of the project:

1. *Hunting*: The State DLNR lease of Parcel 77 does not allow hunting on this and other contiguous lands covered under the General Lease; thus any ongoing hunting activities at the DHHL

property would not be considered to be a lawful activity. The development of the Project would curtail any ongoing hunting activities; however, such activities would be directed to other State or private game management areas.

2. *Hiking/exercise*: The County Department of Parks and Recreation and Waimea Trails and Greenways' proposed linear trail system would border the DHHL Parcel 77 along the west boundary and the opposite bank of Waikoloa Stream and connect to Parcel 10. Parcel 10 was previously included in the Lālāmilo Project but has been removed in deference to the community's efforts for this linear park system. Thus, hiking and exercise activities would be redirected onto the new trails system and not be curtailed as a result of this Project.

3. *Picnicking along streams*: The Keanu'i'omanō and Waikoloa Streams are present on the DHHL property along the full 7,000 feet length. Both streams originate from mauka offsite areas and continue to the west where they join to form Wai'ula'ula Stream before crossing Queen Kaahumanu Highway. Thus, with landowner permission, there would be other areas of the streams that could provide opportunities for uses such as picnicking.

4. *Visiting archaeological and historical sites:* Three preservation areas of approximately 20 acres are planned. Of note is that DLNR SHPD is in the process of preserving a 200-300 acre portion of the expansive Lālāmilo Agricultural Field Complex on other State lands adjacent and to the south west of the DHHL property. Thus, development of the Lālāmilo Project would not eliminate access to archaeological and historic sites.

5. *Dog training:* The use of this property for dog training purposes has not been previously identified in any study for the Project. Whether for individual or group training, school yards (e.g. Hawaii Preparatory Academy and public schools) and other lands could be available with landowner permission. Thus, the development of the Lālāmilo Project would not curtail these activities.

6. *Gathering and other cultural uses:* The use of this property for gathering or other cultural uses have not been previously identified in any study for the Project. The DHHL portion of the Lālāmilo General Lease has been under pasture uses and heavily grazed. The botanical and wildlife surveys indicated the presence of primarily non-native flora and fauna, with the exception of a few common native plants. Other lands, which are not heavily grazed in the vicinity of the Project could be available for these uses with landowner permission.

5.3 ORDNANCE ISSUES

Existing Conditions

Lālāmilo lies within the former Waikoloa Maneuver Area, which is described as a sizeable area of land acquired by the US Navy in December 1943 through a license agreement with Richard Smart of Parker Ranch. The training area extends from the ocean to the Pōhakuloa Training Area, and from the Waimea-Kawaihae Road to south of Waikoloa Road. The area was used for military exercises including the use of live ammunition and other explosives. The land was returned to Parker Ranch in September 1946. Some areas of the formerly used defense site have the potential to contain unexploded ordnance (UXO).

The US Army Corps of Engineers in a *Engineering Evaluation/Cost Analysis, Former Waikoloa Maneuver Area and Nansay Sites, Island of Hawai'i, Hawai'i* (EE/CA) (Earth Tech 2001) has identified that 123,000 acres at Waimea and Waikoloa, including the Lālāmilo Project Site, is part of the Former Waikoloa Maneuver Area/ Nansay Combat Range which closed in 1946. A total of 16,499 acres (or approximately 13 percent) of the total defense site were investigated during the Phase II EE/CA field investigation. The investigation recovered 38 unexploded ordnance (hazardous) items and 2,160 OE scrap (inert and nonhazardous) items.

The results of the Phase II EE/CA field investigation were examined using a qualitative risk analysis approach referred to as the Ordnance and Explosives Risk Impact Assessment (OERIA). The OERIA analyzed site conditions and human issues to qualitatively evaluate the risk of ordnance and explosives (OE) sites. The qualitative risk assessment follows a very conservative approach and evaluates the level of OE risk to the public in terms of likelihood of exposure and the severity of the exposure to OE. A residual risk (no matter how small) will always be present based on past military use of the area. For each OERIA evaluation area, an OE hazard level of "high," "moderate," or "low," was determined based on the analysis of the OERIA risk

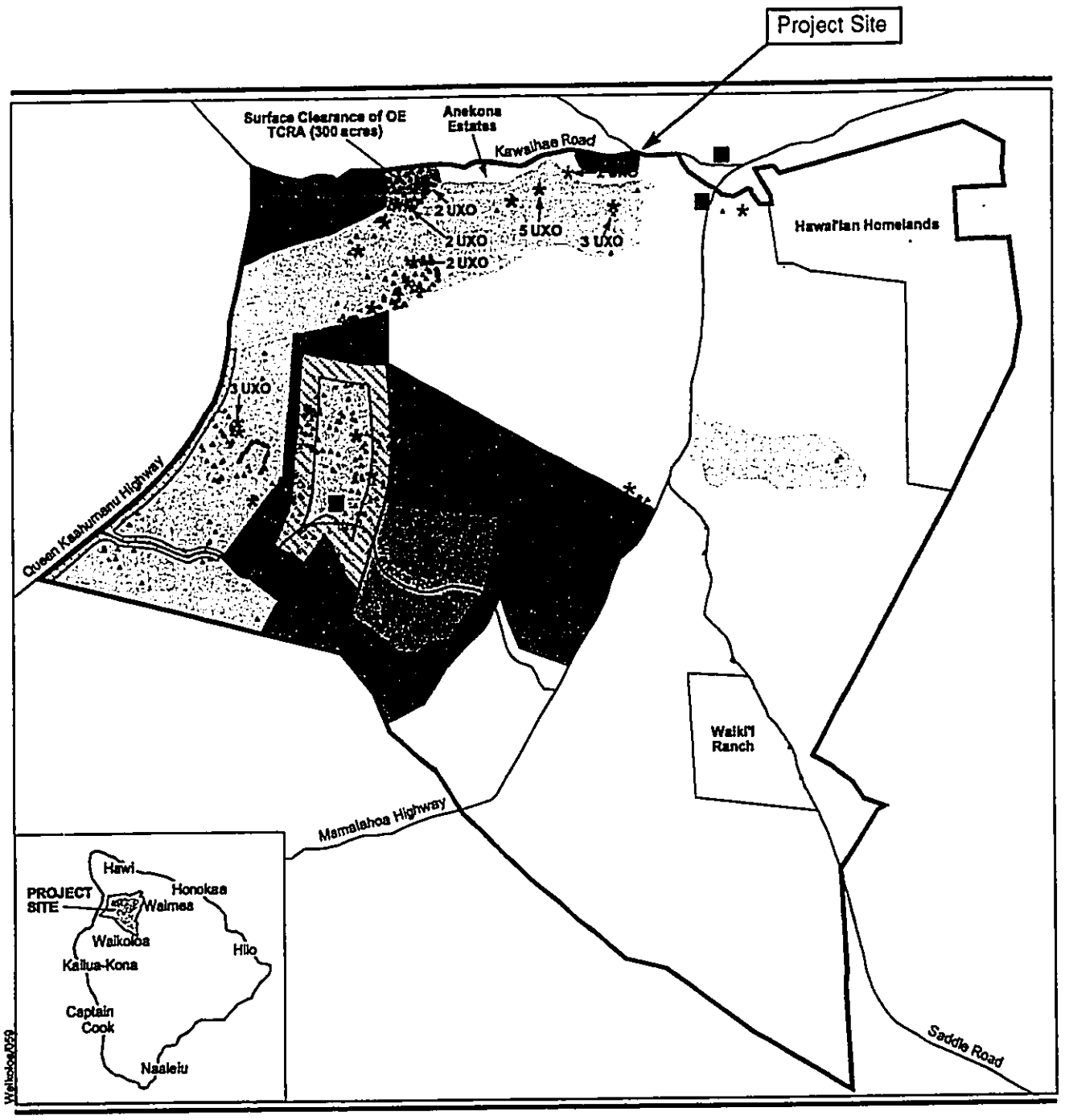
In the vicinity of the DHHL Project Site, two UXO were recovered on adjacent State land located to the south of Waikoloa Stream near the Project's western boundary. A map showing the boundaries of the OERIA evaluation areas and results of the qualitative risk evaluation indicates the DHHL Lālāmilo Property in OERIA Area Q (Figure 17), with a risk rating of "High".

Potential Impacts and Mitigation Measures

Unmitigated, the presence of ordnance and explosives (OE), and specifically unexploded ordnance (UXO), presents a risk on the Property during the construction phases and over the long-term of homeowner occupation. Following recent meetings between the Corps of Engineers and DHHL staff, the Corps has informed DHHL that funding has been appropriated in Fiscal Year 2002 - 2003 for pre-construction site support including surface clearance of ordnance and explosives and subsurface clearance of ordnance and explosives to depth of detection. This work is anticipated to commence and be completed prior to the start of Phase 1 residential lot development in 2003.

5.4 ROADWAYS AND TRAFFIC

A Traffic Impact Assessment Report (TIAR) update has been prepared by The Traffic Management Consultant (Appendix G) to analyze the traffic impacts of the proposed Lālāmilo Project. The updated addresses the revised Lālāmilo Project plans (removal of commercial and industrial uses). The study scope includes: 1) Evaluation of existing roadways and traffic conditions; 2) development of trip generation characteristics of the proposed project; 3) analysis of the Year 2012 traffic conditions without the proposed project; 4) identification and analysis of traffic impacts resulting from the full build-out of the proposed project; and 5) recommendations of improvements that would mitigate the traffic impacts identified in the study.



LEGEND

Project Area

Source: U.S. Army Corps of Engineers
Phase II EE/CA Former Waikoloa Maneuver Area and
Nansay Sites, Island of Hawai'i, Hawai'i
"Figure ES-1 - Recommended OE Response Actions"

FIGURE 17

Waikoloa Maneuver Areas

Lālāmilo PROJECT

Existing Conditions

A. Roadways in the Vicinity of the Project

Kawaihae Road is a two-way, two-lane arterial highway between Kawaihae Harbor and Waimea Town in South Kohala, Hawai'i. Kawaihae Road is a curvilinear roadway with unrestricted access along most of the roadway. In the vicinity of the Project, the posted speed limit on Kawaihae Road is 35 mile per hour (mph), except on the approaches to Waiaka Stream Bridge. The posted speed limits on the approaches to the Waiaka Bridge are reduced to 25 mph, because of the narrow bridge crossing and curvilinear roadway alignment.

Kohala Mountain Road is a narrow, mountainous roadway between Hawi and Kawaihae Road. Kohala Mountain Road is stop-controlled at its junction with Kawaihae Road, which is comprised of three closely spaced intersections, separated by a triangular island.

South Kohala Distribution Road is a two lane local roadway, which provides access to the County of Hawai'i base yard and solid waste transfer station and the Hawaiian Electric Light Company Waimea electrical generation plant. South Kohala Distribution Road is stop-controlled at its Tee-intersection with Kawaihae Road. There is no exclusive left-turn lane on Kawaihae Road at South Kohala Distribution Road and the sight distance on the westbound Kawaihae Road as it approaches South Kohala Distribution Road is limited by a crest vertical curve.

Akulani Street is a local roadway, which provides access to the existing Lālāmilo House Lots and Ka La Loa Subdivisions. Akulani Street is stop-controlled at its Tee-intersection with Kawaihae Road. There is no exclusive left-turn lane on Kawaihae Road at Akulani Street. Alaneo Street is an internal subdivision roadway in the existing Lālāmilo House Lots and Ka La Loa Subdivisions.

Other Roadways in the Vicinity

Waiaka Street is a local roadway, which provides access to the residences located within the triangle formed by the Kohala Mountain Road and Kawaihae Road intersection. Waiaka Street is stop-controlled at its Tee-intersection with Kawaihae Road. There is no exclusive left-turn lane on Kawaihae Road at Waiaka Street.

Ohina Street is a local roadway to the north of Kawaihae Road and opposite the west end of the DHHL property. Ohina Street provides access to the existing Kamuela View Estates and South Kohala View Estates subdivisions. Ohina Street is stop-controlled at its Tee-intersection with Kawaihae Road. There is no exclusive left-turn lane on Kawaihae Road at Ohina Street. Within the subdivision Ohina Street forms a Tee-intersection with Mahua Street which loops westward through the subdivisions and then connects to Kawaihae Road.

Lindsey Road/Mamalahoa Highway intersection is about 2 miles from the Project Site in the heart of Waimea Town.

B. Existing Peak Hour Traffic Volumes and Operating Conditions

Field Investigation and Data Collection. Manual traffic count surveys were conducted along Kawaihae Road on October 2-3, 2001, December 10-11, 2001 and May 23-24, 2002, during the peak

periods of traffic - from 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM. The following Kawaihae Road intersections were surveyed: Akulani Street, Kohala Mountain Road, South Kohala Distribution Road. Additional traffic data were obtained from the State Department of Transportation. The existing AM and PM data are summarized in Figure 18.

The Transportation Research Board's concept of Level of Service (LOS) was used to qualitatively evaluate traffic conditions. Six Levels of Service ranging from ideal "A" to unacceptable "F" were recognized.

Existing AM Peak-Hour Traffic. The AM peak hour of traffic on Kawaihae Road occurred from 7:15 AM to 8:15 AM. Kawaihae Road carried about 1,080 vehicles per hour (vph), east of South Kohala Distribution Road, total for both directions. The AM peak hour direction of traffic was 52 percent westbound and 48 percent eastbound. East of South Kohala Distribution Road, Kawaihae Road operated at LOS "E" and a v/c ratio of 0.46, during the existing AM peak hour of traffic.

The left-turn movement from Kohala Mountain Road to eastbound Kawaihae Road operated at LOS "E". The other intersections in the study area operated at satisfactory Levels of Service, i.e., LOS "C" or better, during the existing AM peak hour.

Existing PM Peak-Hour Traffic. The PM peak hour of traffic generally occurred between 4:00 PM and 5:00 PM. Kawaihae Road carried about 1,020 vph, during the PM peak hour of traffic. The PM peak hour directions of traffic were 60 percent eastbound and 40 percent westbound. During the existing PM peak hour of traffic, Kawaihae Road operated at LOS "E" and a v/c ratio of 0.35, east of South Kohala Distribution Road.

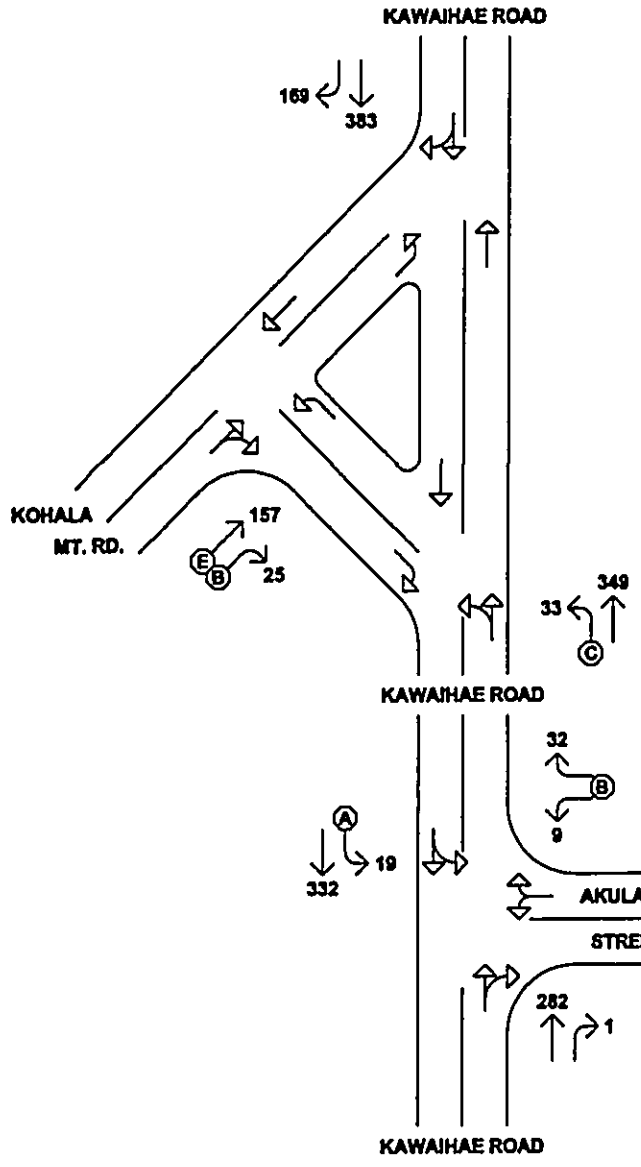
Future Traffic Conditions

A. Future Roadway Improvements in the Project Vicinity

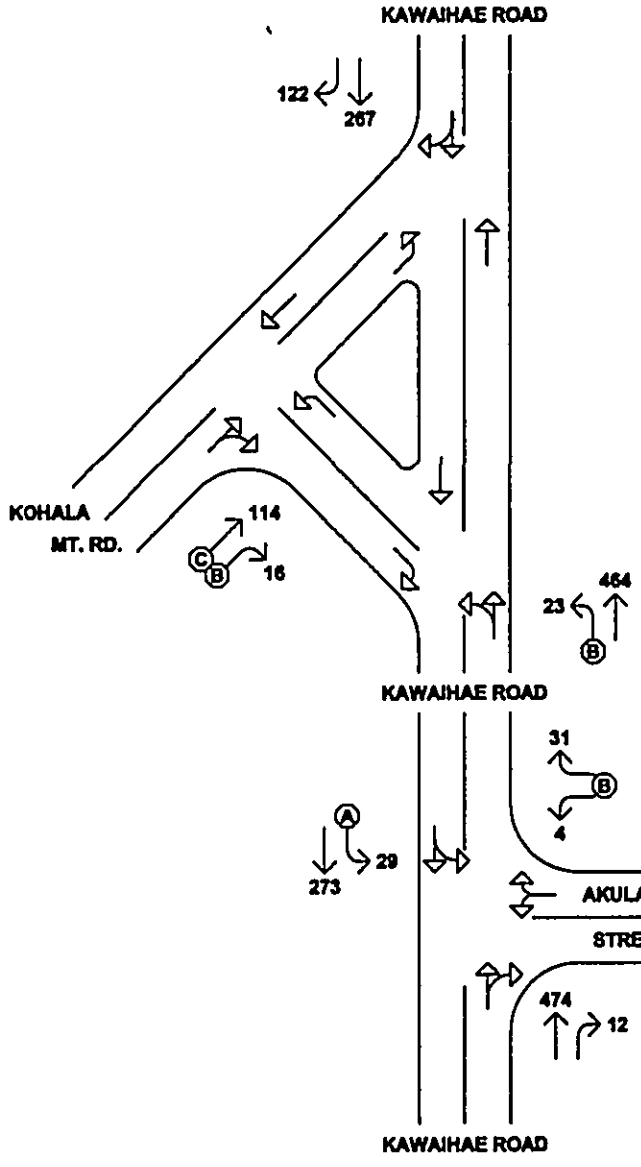
Waiaka Stream Bridge Widening/Relocation and Kawaihae Road Realignment. DOT is planning to widen/relocate Waiaka Stream Bridge on Kawaihae Road. The bridge project also would include realigning Kawaihae Road. At this writing, the specific roadway alignment has not been determined. Access improvements for the Lālāmilo Project are being coordinated with the DOT.

Kawaihae Bypass Highway. The Kawaihae Bypass Highway is also being planned by DOT. The two-lane highway would extend from Māmalahoa Highway, near the Waimea Airport, along a westerly alignment, to Queen Ka'ahumanu Highway. The proposed highway would bypass the subject Project and be located to the south of the project site. The construction of the future Kawaihae Bypass Highway is beyond the time frame of the proposed project, and was therefore, not taken into consideration in this traffic impact analysis.

Affecting the overall development of the Waimea Bypass along the segment from Waimea Town to the vicinity of Mud Lane are a few Hawaiian homelands lots within the existing Pu'ukapu homestead. DHHL is continuing to work with its lessees and the Department of Transportation to resolve issues related to the alignment.



Existing PM Peak Hour Traffic



Existing AM Peak Hour Traffic

LEGEND

90 Traffic Movement Volume (VPH)

Lane Control

© Level of Service (Unsignalized Condition)

Source: Traffic Management Consultant

FIGURE 18

Existing Traffic Volumes

Lālāmilo PROJECT

N NOT TO SCALE

PBR

B. External Traffic

South Kohala Regional Traffic Forecasts. The travel forecasts for this traffic impact analysis was based upon the Draft South Kohala Regional Traffic Forecasts, prepared for the State DOT, by Julian Ng, Inc., dated April 19, 2002. The purpose of the Ng study was to develop traffic forecasts for three ongoing DOT highway projects in the South Kohala region: the Kawaihae Bypass Highway, the Waimea Bypass Highway, and the Saddle Road Extension. In general, the Ng study projected an annual growth of 3.83 percent in the vicinity of the project. On Kawaihae Road, the Ng study projected little growth along Kawaihae Road up to the Year 2005. Thereafter, the Ng study projected an annual growth of 3.83 percent per year to the Year 2025 on Kawaihae Road. The future traffic without the proposed project was developed for the Year 2012 using the Ng annual growth rates in traffic.

Hawaii Preparatory Academy. Hawaii Preparatory Academy has plans to relocate its lower and middle school campus to the north side of Kawaihae Road, opposite South Kohala Distribution Road. At this writing, Hawaii Preparatory Academy does not have detailed plans for its proposal, therefore, the relocation of the lower and middle school campus was not included in this traffic impact analysis.

Forestry Industry Traffic. Future traffic that would be generated by the transport of forestry products originating from Hamakua lands to shipping destinations at Hilo and/or Kawaihae is anticipated at some time in the future. However, quantifiable information is not currently available to assess the effects on the roadways in the vicinity of the Lālāmilo Project; hence, this is not taken in to consideration in the traffic impact analysis.

C. Traffic Impact Analysis

The Lālāmilo Project would be comprised of 442 single-family (SF) lots, and amenities (Park and Community Center).

For the purpose of this traffic impact analysis, it was assumed that only one dwelling unit would be constructed on each lot. The proposed project would include a community center, recreational park, passive parks, and open space. The proposed project would be developed in phases over a period of 10 years. Construction is planned to begin in 2003 and reach full build-out and occupancy by the Year 2012.

Proposed Project Access

Access to the residential area would be provided by a new loop access road, which would intersect Kawaihae Road at two intersections: the "West Access Road" would intersect Kawaihae Road between Ohina Street and Akulani Street; the "East Access Road" would intersect Kawaihae Road Kohala Mountain Road and South Kohala Distribution Road. The West Access Road would connect to an extension of Alaneo Street at Parcel 54 to provide a second access to the existing Ka La Leo Subdivision. This access would serve 19 new lots in Phase 1 and ultimately become an integral part of the Project's spine road.

The proximity of the East Access Road and the South Kohala Distribution Road intersections on Kawaihae Road have been discussed with the State Department of Transportation (DOT). DOT has

not raised any objections during these consultations. DHHL will continue to work with DOT during the Development Plan design phase of the East Access Road. Similarly, DHHL will also coordinate traffic improvements with the future Hawaii Preparatory Academy driveway improvements.

Fifteen (15) house lots are proposed to be developed on Parcels 12-17, which is part of the existing Lālāmilo House Lots Subdivision at the east end of Alaneo Street. Access to Parcels 12-17 would be provided by the "Alaneo Street Extension" to the east, and intersecting Kawaihae Road between Akulani Street and Waiaka Street, providing a third access to the existing subdivision.

Trip Generation

During the AM peak hour of traffic, the proposed project is expected to generate a total of 503 vehicles per hour (vph) - 222 vph entering the site and 281 vph exiting the site. The proposed project is expected to generate a total of 976 vph - 472 vph entering the site and 503 vph exiting the site, during the PM peak hour of traffic. Of the total 976 PM peak hour trips, 233 vph generated by the commercial component are expected to be pass-by trips. Therefore, the total PM peak hour trips would be reduced by the commercial pass-by trips, resulting in a net PM peak hour trip generation of 743 vph (total PM trips less pass-by trips). The future traffic conditions showing the AM and PM peaks in traffic volume with the Project are shown in Figures 19A and 19B.

Traffic Improvements

Traffic Improvements Without Project

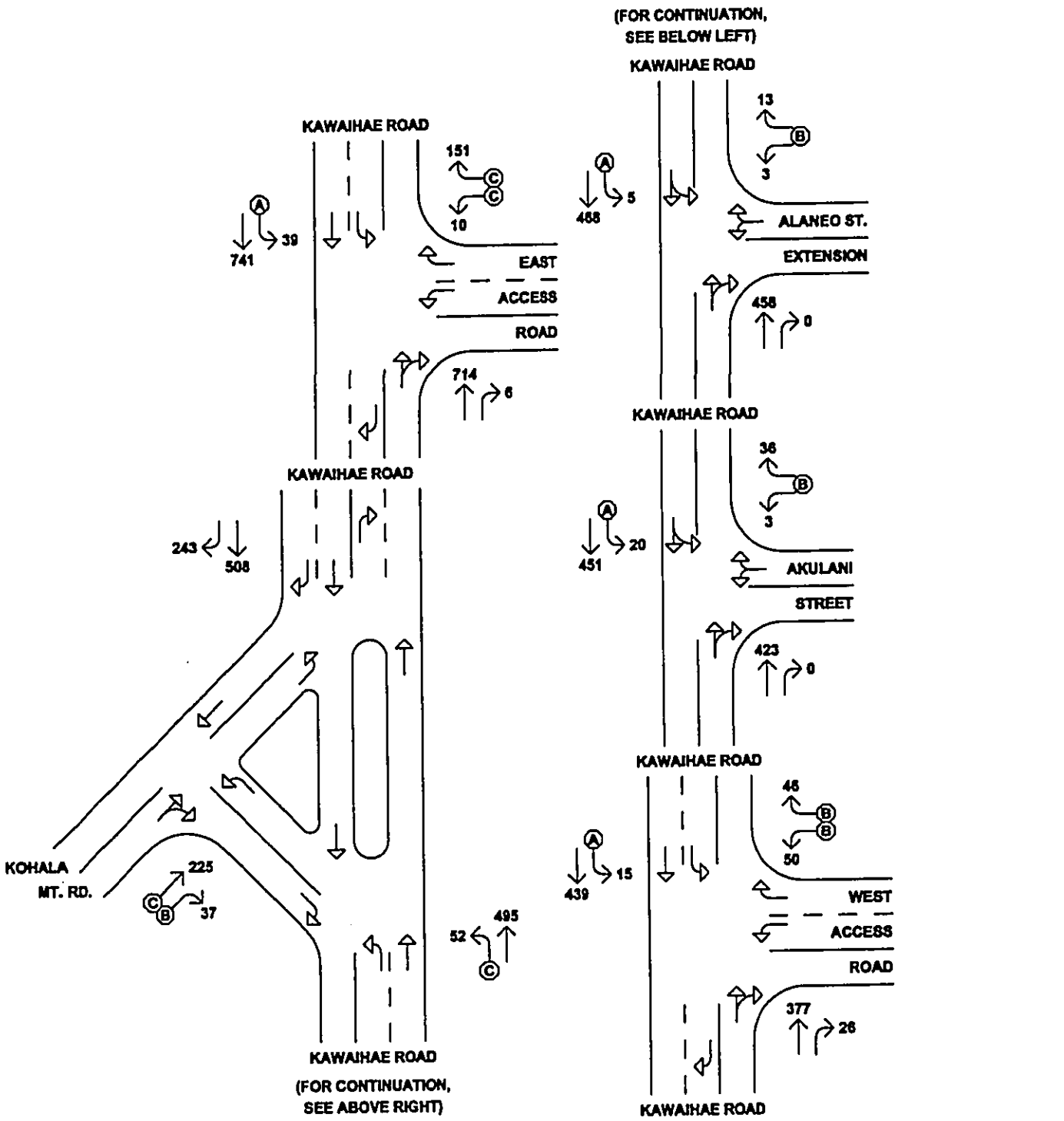
For the purpose of the traffic impact analysis, the following improvements by State DOT are assumed to be implemented to mitigate existing roadway deficiencies:

- Waiaka Stream Bridge and Kawaihae Road are widened/realigned (ongoing DOT project).
- Exclusive left-turn lane and a median shelter lane are constructed on eastbound Kawaihae Road at Kohala Mountain Road.

Project Access Improvements

DHHL would implement the following improvements as part of the Lālāmilo Project to provide or improve access to the Project Site:

- Alaneo Street should be extended to the east to provide access to the proposed house lots on the remnant Parcels 12-17 in the existing Lālāmilo House Lots Subdivision.
- Alaneo Street (East) Extension should intersect Kawaihae Road at a stop-controlled Tee-intersection.
- Extension of Alaneo Street to the West Access Road within Parcel 54.
- A new east-west access loop road system should be constructed along the length of the residential project site.



LEGEND

90 Traffic Movement Volume (VPH)

Lane Control

C Level of Service (Unsignalized Condition)

Source: Traffic Management Consultant

FIGURE 19A

2020 AM Peak Hour Traffic With Project

Lālāmilo PROJECT

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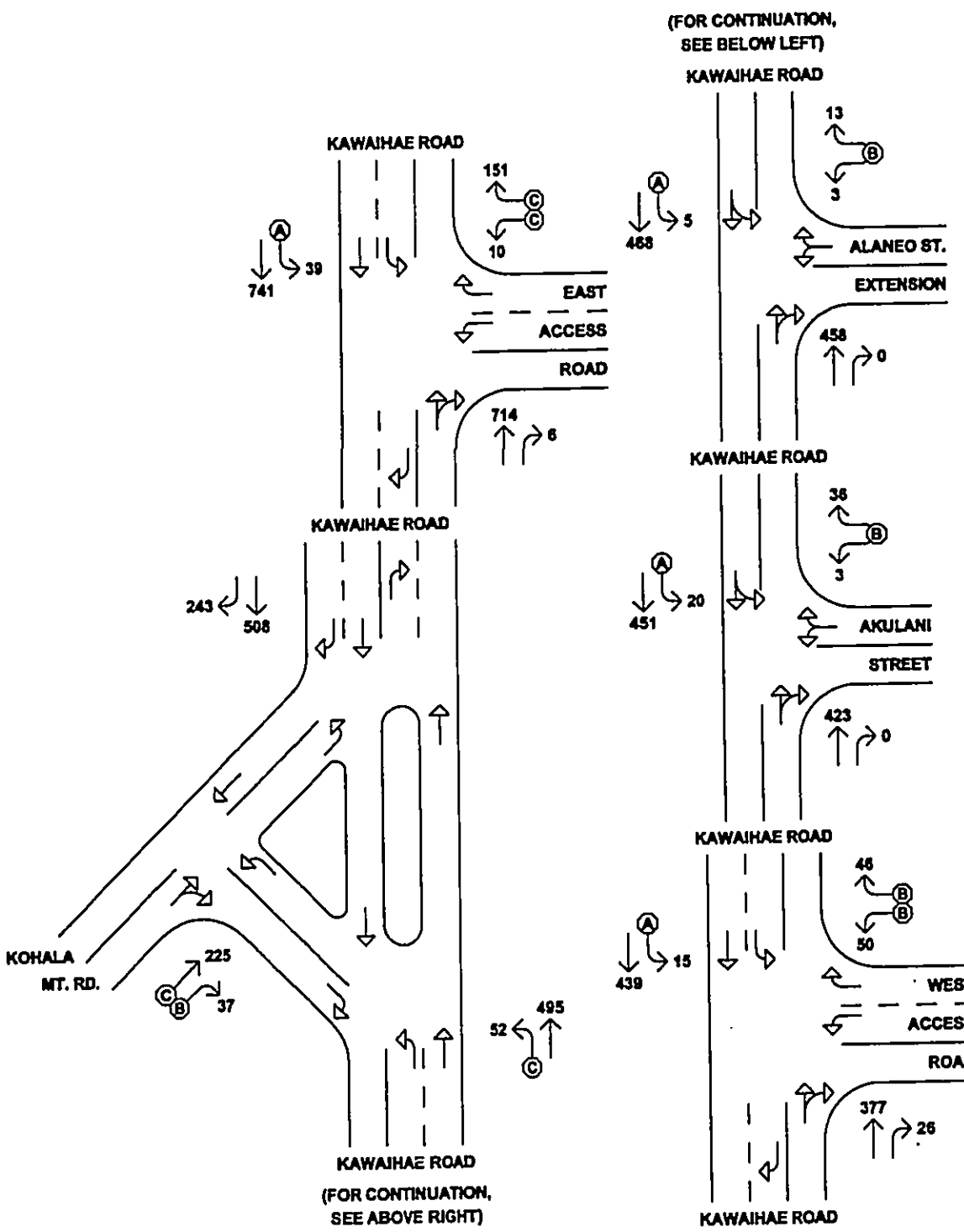


LEGEND

90 Traffic Movement Volume (VPH)

Lane Control

C Level of Service (Unsignalized Condition)

Source: Traffic Management Consultant

FIGURE 19B

2012 PM Peak Hour Traffic With Project

Lālāmilo PROJECT

N NOT TO SCALE

PBR

- Bicycle facilities will be considered on the major collector roadway.

- The "West Access Road" should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Ohina Street and Akulani Street. An exclusive left-turn lane and a median shelter lane should be constructed on westbound Kawaihae Road at the West Access Road.

- The "East Access Road" should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road. An exclusive left-turn lane and a median shelter lane should be constructed on westbound Kawaihae Road at the East Access Road.

Year 2012 AM Peak Hour Traffic Impact Analysis With Project

Kawaihae Road, east of South Kohala Distribution Road, is expected to continue to operate at LOS "E", during the Year 2012 AM peak hour of traffic. The volume-to-capacity (v/c) ratio is expected to increase to 0.67.

The left-turn movement from Kohala Mountain Road to eastbound Kawaihae Road is expected to improve the LOS "F" to LOS "C", with the construction of the recommended median shelter lane and the channelized right turn lane on Kawaihae Road. The left-turn movement from eastbound Kawaihae Road to northbound Kohala Mountain Road is expected to operate at LOS "C", during the AM peak hour with the proposed project. The other intersections within the study area are expected to operate at satisfactory Levels of Service, during the Year 2012 AM peak hour of traffic with the proposed project. Figure 19A depicts the Year 2012 AM peak hour traffic with the proposed project, and the results of the capacity analysis.

Year 2012 PM Peak Hour Traffic Impact Analysis With Project

During the Year 2012 PM peak hour of traffic with the proposed project, Kawaihae Road east of Kohala Mountain Road is expected to continue to operate at LOS "E". The v/c ratio is expected to increase to 0.68. The intersections within the study area are expected to operate at satisfactory Levels of Service. The Year 2012 PM peak hour traffic with the proposed project, and the results of the capacity analysis are depicted on Figure 19B.

D. Additional Assessment of Vicinity Roadways

Assessment of Mamalahoa Highway/Lindsey Road Intersection

The intersection of Mamalahoa Highway and Lindsey Road is about 2 miles from the project site. The most recent available traffic count data (Year 2000) indicate that the intersection of Mamalahoa Highway and Lindsey Road carried about 2,000 vehicles per hour (vph), during the AM and PM peak hours of traffic. The traffic study for the Mamalahoa Highway Improvements, recently completed in Waimea Town, projected the AM and PM peak hour traffic volumes at the intersection of Mamalahoa Highway and Lindsey Road at about 3,000 vph by the Year 2006. Extrapolating the peak hour volumes to the Year 2012, the Lindsey Road intersection can be expected to carry about 4,000 vph, assuming that the Waimea Bypass Road is not constructed. The project would add about 6 percent and 8 percent, during the Year 2012 AM and PM peak hours of traffic, respectively,

assuming that 100 percent of the eastbound traffic generated by the subject project would pass through the Lindsey Road intersection.

Assessment of Waiaka Street and Ohina Street

Additional traffic analyses on Waiaka Street and Ohina Street at Kawaihae Road indicate that both streets currently operate at Level of Service (LOS) "C" at Kawaihae Road. At full-build out of the subject project, Ohina Street would continue to operate at LOS "C", during both the AM and PM peak hours of traffic. Waiaka Street also would operate at LOS "C", during the AM and PM peak hours of traffic. As traffic continues to increase on Kawaihae Road with or without the subject project, motorists on both side streets are expected to experience increases in delays, during the peak hours of traffic. The proposed Kawaihae Bypass Road is expected to be the long-range mitigation measure for delays to side street traffic.

Assessment at Akulani Street and new Alaneo Street Intersection

The traffic analysis indicated that exclusive left turn lanes at Akulani Street and at the new Alaneo Street intersection were not warranted.

Mitigation Measures

The traffic in the vicinity of the proposed project is generally expected to increase by 3.83 percent per year to the Year 2012 without the proposed project. With implementation of the recommended roadway improvements, the Levels of Service during the peak hours of traffic on Kawaihae Road are not expected to be affected by traffic generated by the proposed project. The peak hour v/c ratios are expected to increase as a result of the development of the proposed project. The proposed Kawaihae Bypass Road is a regional highway improvement proposed by DOT, which is expected to divert through traffic, between Waimea and Kawaihae, around the vicinity of the Project. When constructed, the Bypass is expected to provide long-term solution to traffic congestion on Kawaihae Road. However, the bypass project is in the planning stage and the implementation schedule is unknown at this time; thus, the Lālāmilo traffic impact analysis does not take the Kawaihae Bypass Road into account.

With the addition of two additional access points from the Ka La Loa and Lālāmilo House Lots Subdivisions, the existing intersection of Kawaihae Road and Akulani Street is not expected to be adversely impacted by traffic generated by the proposed project. Access to the existing Lālāmilo House Lots and Ka La Leo Subdivisions is actually expected to be improved by providing the two new access points with the proposed extension of Alaneo Street in the east and west directions.

The traffic improvements recommended in this study are expected to mitigate the expected traffic impacts resulting from the Lālāmilo Project. The improvements which will be implemented as part of the development of the Lālāmilo Project are summarized below.

Proposed Project Access Improvements

- Alaneo Street

  Alaneo Street will be extended to the east to provide access to the 15 proposed lots on the remnant parcel (Parcels 12 - 17) in the existing Lālāmilo House Lots Subdivision.

  Alaneo Street Extension will intersect to Kawaihae Road at a stop-controlled Tee-intersection to provide access to the proposed house lots and a second access point for the existing Lālāmilo House Lots and Ka La Leo Subdivisions.

  The west end of Alaneo Street will be extended to the West Access Road to provide a third access point to provide access to 19 proposed lots (on Parcel 54) and for the existing Ka La Leo and Lālāmilo House Lots Subdivisions.

- Kawaihae Road and the West Access Road

  The West Access Road will provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road.

  An exclusive left-turn lane will be constructed on westbound Kawaihae Road at the West Access Road to minimize the delay to westbound traffic on Kawaihae Road by separating the left-turn traffic from the through traffic.

  A median shelter lane will be constructed on westbound Kawaihae Road at the West Access Road to facilitate vehicles turning left from the side street by separating the left-turn movement into two stages: crossing the eastbound lane to the median shelter lane; then merging into westbound traffic.

- Kawaihae Road and the East Access Road

  The East Access Road will provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road.

  An exclusive left-turn lane will be constructed on westbound Kawaihae Road at the East Access Road to separate the left-turn traffic from the through traffic and to minimize the delay to the westbound traffic on Kawaihae Road.

  A median shelter lane will be constructed on westbound Kawaihae Road at the East Access Road to facilitate vehicles turning left from the side street.

With the removal of the commercial and industrial uses from the Project, the previously proposed improvements to the South Kohala Distribution Road and its intersection with Kawaihae Road are no longer necessary and have been removed as mitigation measures.

5.5 AIR QUALITY

An air quality study to examine the potential short- and long-term air quality impacts that could occur as a result of the Project and the potential impacts on the project from nearby industrial uses were examined and are summarized below. The air quality study is attached as Appendix H.

Existing Conditions

Regional and Local Climatology

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is very much affected by the elevation of the site and by nearby mountains. There are no published wind data for the area, but the situation of the site in the gap between Mauna Kea and the Kohala Mountains makes it a fairly windy location. During tradewind conditions, winds are often gusty during the daytime and the wind direction is predominantly from the east.

Except for periodic impacts from volcanic emissions (vog) and possibly occasional localized impacts from traffic congestion and local industrial sources, the present air quality of the project area is believed to be relatively good. There are no air quality monitoring data from the Department of Health for the Waimea area, but the limited air quality data that are available for other locations on Hawai'i Island suggest that (despite the vog) concentrations are generally well within State and national air quality standards.

Present Air Quality

Present air quality in the project area is mostly affected by air pollutants from vehicular, industrial, natural and/or agricultural sources. Vog, or volcanic emissions, have periodically plagued the island and the project area since the latest eruption phase of the Kilauea Volcano began in 1983. Air pollution emissions from the Hawaiian volcanoes consist primarily of sulfur dioxide. After entering the atmosphere, these sulfur dioxide emissions are carried away by the wind and either washed out as acid rain or gradually transformed into particulate sulfates or acid aerosols. Although emissions from Kilauea are vented on the other side of a mountain barrier more than 60 miles southeast of the project site, the prevailing wind patterns eventually carry some of the emissions into the Kona and Kohala areas. These emissions can be seen in the form of the volcanic haze (vog) which persistently hangs over the area.

Industrial sources of air pollution in the project vicinity include generating units at Hawai'i Electric Light Company's (HELCO) Waimea Generating Station, which is located immediately to the east, and the Waimea Solid Waste Transfer Station, also located adjacent to the project on the east. Air pollution emissions from the HELCO generating units consist mostly of sulfur dioxide and oxides of nitrogen, while emissions from the transfer station consist mainly of potential odor nuisance. Also located adjacent to the project site on the east is an old landfill (now covered) that continues to emit odorous emissions. Potential impacts on the project from these sources are discussed in more detail below.

Kawaihae Road (Highway 19), which borders the project site on the north, is a regional arterial roadway. Motor vehicle emissions consist primarily of carbon monoxide and nitrogen oxides. The

prevailing winds should tend to carry emissions from motor vehicles traversing this roadway away from the project area most of the time.

Agricultural activity consists primarily of pasturing of cattle and horses on the surrounding lands and crop farming at the Lālāmilo Farmlots to the southwest of the Project. Any air pollution from this source is limited mainly to fugitive dust.

Ambient Air Quality Standards

Both Federal and State standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawai'i air quality standards are more stringent than the comparable national standards except for those pertaining to sulfur dioxide and particulate matter, which are equivalent.

Local Air Quality Data

The State Department of Health operates a network of air quality monitoring stations at various locations around the State. Unfortunately, very limited data are available for Hawai'i Island, and virtually none is available for the South Kohala area specifically. The closest monitoring site is at Kealakekua, some 40 miles south of the project site, where particulate matter and sulfur dioxide are measured, but these data may not be representative of the project area, particularly due to the nearby HELCO power plant. In general, DOH monitoring stations in the state indicate compliance with State and Federal air quality standards. This is so even in areas affected by vog. Thus, except perhaps for locations with localized impacts, ambient air quality in the state is well within the standards.

Potential Air Quality Impacts of the Project on the Environment

Short Term Impacts and Mitigation Measures

Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts related to slow-moving construction equipment traveling to and from the project site and from a temporary increase in local traffic caused by commuting construction workers.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Slow-moving construction vehicles traveling on roadways leading to and from the project site could obstruct the normal flow of traffic to such an extent that overall vehicular emissions are increased,

but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume. Likewise, the schedules of commuting construction workers can be adjusted to avoid peak hours in the project vicinity. Thus, most potential short-term air quality impacts from project construction can be mitigated.

State of Hawai'i Air Pollution Control Regulations prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phases is essential. Such a management plan will be developed which identifies and addresses the activities that have a potential to generate fugitive dust. Further, adequate dust control measures during all phases of construction, and including on roadways, will be implemented.

Construction activities will comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, Air Pollution Control and Section 11-60.33, Fugitive Dust.

Mitigation Measures for Short-term Impacts

- Prepare and implement a dust control management plan.
- Implement a frequent watering program for fugitive dust control to keep bare-dirt surfaces in construction areas from becoming significant sources of dust.
- In dust-prone or dust-sensitive areas, implement other control measures such as limiting the area of disturbed area at any given time, applying chemical soil stabilizers, mulching and/or using wind screens, as necessary.
- Cover open-bodied trucks all times when in motion if they are transporting materials that could be blown away.
- Haul trucks tracking dirt onto paved streets from unpaved areas may be a source of dust. Alleviate problem by road cleaning or tire washing, as necessary.
- Paving of parking areas and/or establishing landscaping as early in the construction schedule as possible, if practicable.
- Comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, Air Pollution Control and Section 11-60.33, Fugitive Dust.

Long-Term Air Quality Impacts of the Project

Roadway Traffic: After construction is completed, use of the proposed facilities will result in increased motor vehicle traffic on nearby roadways, potentially causing long-term impacts on ambient air quality in the project vicinity. Motor vehicles with gasoline-powered engines are sources of carbon monoxide, nitrogen oxides, and other contaminates.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the Clean Air Act Amendments became law. This legislation requires further emission reductions which have been phased in since 1994. During the Clinton Administration, additional restrictions were signed into law which will begin to take effect during the next decade. The added restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. Carbon monoxide emissions, for example, will go down by an average of about 10 percent per vehicle during the next 10 years due to the replacement of older vehicles with newer models.

A detailed modeling analysis of the associated air quality impacts was not performed. However, it is probable that any impacts on air quality due to project-related roadway improvements and motor vehicle traffic will be minimal.

General Agriculture: Approximately 16 acres (previously planned for commercial and light industrial uses) will remain in pasture use for a few sheep, horses, or cattle. An area of this size would support a maximum of 2 to 3 animals to minimize overgrazing, soil exposure and erosion.

Electrical Demand: The proposed project also will cause indirect air pollution emissions from power generating facilities as a consequence of electrical power usage. Electrical power for the project will most probably be provided mainly by oil-fired generating facilities, but some of the project power may also be derived from geothermal energy, wind power or other sources. In order to meet the electrical power needs of the proposed project, power generating facilities will likely be required to burn more fuel and hence more air pollution will be emitted at these facilities.

Solid Waste Disposal: Currently, all solid waste on the island is buried at solid waste landfills. Thus, assuming this continues to be the method for solid waste disposal, the only associated air pollution emissions that will occur will be from trucking the waste to the landfill and from heavy equipment used to bury it. These emissions should be relatively minor.

Potential Long-Term Impacts On the Project from Adjacent Industrial Uses

Several heavy industrial uses are located adjacent to the east boundary of the Lālāmilo Project. Of concern are the Hawai'i Electric Light Company Waimea Generating Station, the Waimea Solid Waste Transfer Station, and the old Waimea landfill.

HELCO Waimea Generating Station

Three electric generating units of 2.5 MW each are located at the HELCO Waimea Generating Station, which is situated along South Kohala Distribution Road adjacent to the east boundary of the Project Site. The generating units are fueled by diesel with a maximum sulfur content of 0.5 percent by weight. The diesel-fueled generating units emit sulfur dioxide, nitrogen oxides, particulate, hydrocarbons and other air contaminants. The generating units located at the HELCO Waimea Generating Station are operated on an as-required basis. Although the three generating units generally do not operate simultaneously or continuously, the recently acquired operating permit obtained from the Department of Health has no restrictions on the hours of operation. Thus, if deemed necessary by HELCO, all three units can be operated simultaneously and continuously. Since the probable prevailing wind direction is from the east, the project site is in the prevailing downwind direction from the power plant, and exhaust emissions from the generating units will likely move toward the project site a high percentage of the time.

Even with only one unit operating, the odor of exhaust fumes from the facility is often readily noticeable along the public roadway in front of the plant. The primary reason for this is the absence of vertical extensions on the generating unit stacks. HELCO'S generating unit stacks consist basically of a muffler on each unit that the exhaust gases move through horizontally and an elbow that directs the exhaust gases upward upon exiting the muffler. The exit point is below the height of the adjacent building. Good Engineering Practice (GEP) as defined by the U.S. Environmental Protection Agency requires that stack heights generally be 2.5 times the height of any nearby

structures to avoid aerodynamic downwash effects. Emissions from stacks of shorter heights can be caught in the aerodynamic wakes of adjacent structures and rapidly mixed to the ground, causing high ground-level concentrations near the source.

Waimea Solid Waste Transfer Station

The Waimea Solid Waste Transfer Station is situated immediately to the east of the project area, making it upwind of the project site much of time and a potential source of odor nuisance. Waste is deposited at the transfer station into an enclosed container, and the container is removed from the site on a daily basis. Several visits to the transfer station revealed no evidence of any odor problems. The enclosed storage of refuse at the site and the frequent removal of the storage containers appear to effectively control odor. Thus, it is not expected that odor from the transfer station will significantly impact the proposed project.

Old Landfill

The old Waimea landfill is also located immediately to the east of the project area. After closure in 1987, it was covered with approximately 2 feet of soil and grassed.

Over time, however, material buried in the landfill has decomposed and sometimes spontaneous combustion occurs, causing underground fires. Also, cracks and sinkholes occasionally develop in the landfill surface, which allow fumes from the underground fires to leak into the atmosphere and be carried away by the wind. Fumes from underground fires at landfills have been a problem at several locations in the state and many locations across the country. The fumes are particularly odorous and may contain toxic compounds as well. Some of the chemicals that have been found to exist in the fumes at other landfills include: methane, hydrogen sulfide, toluene, xylenes, benzene, vinyl chloride, mercury and phosgene.

Recent inspections of the old landfill by the Department of Health (DOH) in April 2001 and February 2002 confirmed the presence of an active underground fire. The presence of surface cracks, fissures, sinkholes, and smoke were noted during the inspections, indicating the presence of an underground fire as well as sub-surface settling. The 30 to 40 feet deep land fill is comprised of fuel which historically was burned to reduce bulk and smoulders to the present day.

The landfill is under the jurisdiction of the County Department of Environmental Management. The County is currently managing the fire situation under DOH orders to develop and implement a remediation and monitoring plan with an objective to suppress the effects of the underground fire. The suppression of smoke, particulate emissions, and odor is done through layers of dirt which is applied on a regular basis.

DHHL has consulted with DOH Solid and Hazardous Waste Branch staff environmental engineer and reviewed a filed report of a recent survey prepared for Sandalwood Estates. Sandalwood Estates residential subdivision is located to the east of the old landfill and has filed complaints with DOH of odors from the landfill. The survey for sub-micron aerosol particulate matter, smoke and odor summarized that "[n]o obvious airborne toxic hazards were evident in the survey" (Michaud, July 15, 2002).

Mitigation Measures - Adjacent Industrial Uses

The Waimea Generating Station, which is located immediately to the east of the project, includes three diesel-fueled electric generating units. These units are in the prevailing upwind direction from the project, and the stacks that are used to exhaust the emissions are very short. Worst-case dispersion calculations indicate that exceedances of the air quality standards are likely to occur at times over the project area. Increasing the stack heights to meet good engineering practice would substantially alleviate this potential problem.

The Lālāmilo Project master plan is designed with a buffer of 600 feet to 800 feet between the adjacent heavy industrial uses and the closest residential lots near the eastern boundary. Construction of these residential lots would commence in 2006 with occupancy in 2007-2008. At that time HELCO would be required to renew its permit and it is expected that taller stacks to meet good engineering practices would be required by DOH considering the proximity of the residential lots at this project and the surrounding area.

Given the landfill's location relative to the project site and the wind flow in the area, odorous fumes from the landfill will likely impact the project area at times, particularly during the nighttime and early morning hours when dispersion conditions are worst and the wind flow tends to be downslope. The County, as required by DOH, already performs regular monitoring and remedial work at the landfill to cover cracks and sinkholes with soil in an effort to suppress and reduce the leakage of fumes into the air. With residences and businesses locating closer to the landfill, it may become necessary to perform this maintenance activity on a more regular basis. An additional but much more expensive solution would be to install a gas collection system to remove and burn landfill gas.

As a further action, DHHL will disclose to all of its lessees the presence of the adjacent industrial and agricultural uses and the periodic odor and dust nuisances.

5.6 NOISE

Existing Conditions

The project area and vicinity are currently exposed to daytime ambient noise with the dominant noise sources being wind, birds, traffic and an occasional small aircraft flyover. Along the areas nearest the roadways (e.g. Kawaihae Road and South Kohala Distribution Road) the ambient noise levels increase slightly due to local traffic.

Potential Impacts

Noise impacts of the Project include the short-term construction generated noise and long-term operational noise associated with the future activities at Lālāmilo. These are summarized below:

Project Construction Noise. The dominant noise sources during project construction will probably be earth moving equipment, such as bulldozers and diesel powered trucks. Noise from construction activities will occur on the property. The noise from construction activities could impact nearby residences to the north of the project site. Noise from construction activities should be short term and must comply with State Department of Health noise regulations.

Project Generated Traffic Noise. Traffic noise levels (due to the project) corresponding to the morning and afternoon peak hour travel are not expected to have a perceptible change due to the project. The minimal change in noise levels perceptible to the average listener is generally taken to be 3 dB, therefore, the increase in traffic noise due to the project is not expected to be significant.

Residential Noise. Noise associated with residential ground maintenance equipment such as lawn mowers, and other household tools could occasionally be noticeable at the nearby adjacent residential subdivisions but unlikely to be audible at the proposed Hawaii Preparatory Academy campus across Kawaihae Road.

Community Center /Park Areas Noise. Activities at the community center and park facilities could include meetings, athletic and cultural events, and parties, some of which may utilize amplified sound systems. Noise generated by such systems could cause annoyance to the nearby residents and adjacent Hawaii Preparatory Academy property. Parking lot and lawn maintenance equipment could include leaf blowers, hedge trimmers, lawn mowers and other equipment which could occasionally affect the surrounding areas.

Stationary Equipment Noise. Noise from air conditioning equipment, exhaust fans, trash compactors, and any other stationary equipment at the community facilities will not exceed the levels allowable by State and County noise regulations. Noise from equipment at the various buildings will not be audible off-site.

Mitigation Measures

Compliance with existing regulations will mitigate construction noise generated by the project to acceptable levels. State and County regulations have been established to limit construction noise generation.

- Construction activities which emit noise in excess of the maximum permissible sound levels will be limited to 7:00 a.m. - 6:00 p.m., Monday - Friday, 9:00 a.m. - 6:00 p.m. on Saturday, and prohibited on Sunday.

- Construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers, and construction vehicles using trafficways must satisfy the DOH's vehicular noise requirements.

- The design of the community center facility will include noise mitigation measures in the planning of the location and orientation of any air conditioning equipment, exhaust fans, and other equipment, to comply with all noise regulations.

- Ground maintenance equipment will be powered by internal combustion engines with exhaust mufflers. Schedules for maintenance will be arranged so noisier operations do not occur near residences (on and off the Project area) before 7:00AM or after 5:00PM.
- The site planning for all facilities will incorporate adequate setback distances. For community center facilities, proper sound insulation measures will be incorporated into the building design, as needed.

- Events at the community center and park facilities that propose the use of amplified sound outside the buildings shall be maintained at appropriate levels and be scheduled at hours which do not conflict with the proposed Hawaii Preparatory Academy and neighboring residential areas.

5.7 PUBLIC INFRASTRUCTURE

5.7.1 Roadway Facilities

Primary access to the Project is planned from a new loop road off of Kawaihae Road. Any required offsite roadway improvements would be coordinated with the State Department of Transportation and the County of Hawai'i. Internal circulation roadways will conform to County of Hawai'i standards. Section 5.4 describes the existing roadways and proposed improvements which would be implemented to mitigate project impacts to the public roadway system.

5.7.2 Potable Water System

A preliminary engineering study by Tom Nance Water Resource Engineering (TNWRE) which describes the water supply requirements for the Lālāmilo Project is included in Appendix A. The calculations for water use have been revised to reflect the change in the conceptual plans (revmoval of commercial and industrial uses).

Existing Conditions

At the present time, the Waimea system of the County Department of Water Supply (DWS) is supplied entirely by surface water diverted from Waikoloa and Kohakohau Streams and stored in three 50-million gallon (MG) open reservoirs. After treatment, water is stored in a 4 MG Clear Water Reservoir at elevation 3,050 feet above Waimea Town. Distribution from the Clear Water Reservoir to customers in the Waimea service area occurs through a network of 12-, 8-, 6-, and 4-inch distribution pipelines.

Flow from the streams varies greatly with the weather. During extended drought periods, the supply is not sufficient to meet demands. Presently the system's reservoirs has a total capacity of 162.5 million gallons. The Waimea-Pu'ukapu system uses an average of 0.91 million gallons per day (MGD) (County and General Plan Draft 2002).

Project Water System Requirements and Impacts

Project phasing and the final decision on the two density alternatives (Alternatives A and B) will determine the need for water system facilities, including: 1) water supply requirements and source development, 2) storage capacity, and 3) transmission lines.

Water supply for the project would be provided by the DWS' Waimea system. All onsite water system infrastructure would be designed and built to DWS standards and dedicated to that agency. In addition, a number of offsite improvements to the system's source, storage, and transmission capacities will have to be made to serve this project. Coordination and cooperation between DHHL, DWS, and the Department of Land and Natural Resources for source development of DLNR well (State Well #6240-02) has been initiated by the agencies for new source development.

Project Water Supply Requirements

Phase 1 - Infill Development in Remnant RS-10 Zoned Lots

Possible Supply for Initial Residential Lots of Phase 1 Prior to Completion of the Offsite Improvements. Several parcels of the project site (TMKs 6-6-01:54 and 6-6-04:12 to 17) are remnant parcels within existing subdivisions. These already have appropriate zoning for residential use. Their total area of 16.8 acres may ultimately contain 34 residential lots of about 10,000-square foot size. In cooperation with DWS, monitoring of pressures and flowrates in the service zone of the 0.10 MG Waiaka tank was undertaken by TNWRE during January - March 2002 and again between October 30 to November 5, 2002 to determine if some of these lots can be developed prior to completion of the offsite water improvements (i.e., new source development, storage, and transmission lines). Based on these results and data and analysis it appears that the hydraulics of the DWS system in the service zones of the Waiaka Tank and Laelae PRV station can accommodate the 34 lots of the first phase before the offsite improvements described below for Phase 2 are implemented (Appendix A-1 and A-2). The specific details would be coordinated with the DWS prior to the Phase 1 development.

Phase 2 - Parcel 77 Residential Lots Development

Required Average Supply. Tabulated below are the project's potable supply requirements for both development alternatives based on DWS' average use rate factors. Alternative A, with a total of 442 units in Phases 1 and 2, would ultimately require an average supply of 215,100 gallons per day (GPD).

Table 13. Alternative A: Average Potable Supply Requirements

Phase	Land Use	Area (Acres)	No. of Units	Use Rate (GPD/Unit or Ac.)	Req'd Supply (GPD)
1	Residential Lots	16.8	34	400	13,600
2	Residential Lots Community Center Park	145.1 1.7 8.3	408 -- --	400 3,000 4,000	163,200 5,100 33,200
	Cumulative Req'd Supply thru Phase 2				215,100

Alternative B with larger lots with a combination of 1-acre and 10,000 square foot lots would ultimately require 96,600 GPD.

Table 14. Alternative B: Average Potable Supply Requirements

Phase	Land Use	Area (Acres)	No. of Units	Use Rate (GPD/Unit or Ac.)	Req'd Supply (GPD)
1	Residential Lots	16.8	34	400	13,600
2	Residential Lots Community Center Park	131.0 1.8 7.3	121 -- --	400 3,000 4,000	48,400 5,400 29,200
	Cumulative Req'd Supply for both Phases				96,600

Off-Site Water System Requirements

Reservoir Storage Requirements. Elevations of the project site range from 2,160 feet at its makai end to 2,450 feet in its mauka end. For DWS' established service pressure zones along the Waimea-Kawaihae Road, the portion of the site below about 2,420 feet would be served from DWS' 0.10 MG Waiaka Tank which has a 2,521-foot spillway elevation. This portion of the site includes essentially all of the residential lots and the 8-acre park for both land use alternatives.

The portion of the site above 2,420-foot elevation would be supplied directly from the Clear Water Reservoir, albeit through the Laelae Road pressure reducing valve (PRV) station.

Based on these service zone elevations and DWS' design criteria, the project would require reservoir storage of 0.323 and 0.145 MG for Alternatives A and B in the service zone of the 0.10 MG Waiaka tank (the maximum day sizing criterion governs). This requirement would have to be met by acquiring land adjacent to the Waiaka tank from the State and constructing a 0.30 or 0.20 MG tank with a 2,521-foot spillway elevation to match the Waiaka tank.

Source of Supply Requirements. The project's ultimate maximum day required supply is 0.323 MGD for Alternative A and 0.145 MGD for Alternative B. Expansion of DWS' surface water supply to meet either of these requirements is not a likely or practical prospect. However, with the relatively recent discovery of high level groundwater beneath the Waimea area, development of wells to supply the DHHL project and other growth in Waimea can be undertaken. There are two possibilities for source development:

(1) Well No. 6240-02. This well was developed by the State DLNR in 1999 to serve future State development projects; however, at this date, it remains unused. It is located at 2,970-foot elevation just below DWS' Clear Water Reservoir. The well was pump tested for five days in January 2000 at 1,450 GPM (2.1 MGD), demonstrating its considerable supply capability. Outfitting the well would involve installing a pump (to a depth of about 1,900 feet), construction of an 850-foot long delivery pipeline to the Clear Water Reservoir, all electrical service requirements, and site work. Development of this well requires DLNR's consent, and initial coordination efforts between DHHL and DLNR have been initiated.

(2) Develop a new well at the site of DWS' 0.10 MG Waiaka tank. In 1999, the U.S. Geological Survey (USGS) completed a 4-inch diameter monitor well (State No. 6141-01) to a depth of 1,507 feet. Groundwater was found at approximately 1,262 feet below ground (equivalent to 1,243 feet above sea level). The advantage of this site in comparison to Well No. 6240-02 near the Clear Water Reservoir is the less costly pumping lift that would be required (about 1,280 versus 1,800 feet). However, this site would require construction of a new well and the well would only serve the portion of DWS' Waimea system below the Waiaka tank. Further, additional storage at the Waiaka site would be needed to ensure proper cycle times for the well pump.

Transmission/Distribution Requirements. Most of the project site, including essentially all of the residential lots, would be within the service zone of the 1.0 MG Waiaka tank. The pipeline from this tank down the Waimea-Kawaihae Road is 8-inch and most of its capacity is already committed to existing uses. Based on a preliminary hydraulic analyses, there are two pipeline options to consider for this portion of the DHHL project:

- Install a 12-inch pipeline for approximately 1,900 feet along the Waimea-Kawaihae Road to the site. The pipeline through the project site itself could be 8-inch and it would ultimately loop back to the existing 8-inch Waimea-Kawaihae Road pipeline when the project's connecting road at the makai end of the site is completed. The 12-inch pipeline to the site would enable all except the uppermost several residential lots to be within the Waiaka tank's service zone.

- Install an 8-inch pipe for 1,900 feet along the Waimea-Kawaihae Road, through the project site, and ultimately loop back to the Waimea-Kawaihae Road. Friction losses in the 8-inch pipeline would require the higher elevation residential lots (possibly as many as 100 of these lots in Alternative A) to be served from DWS' service zone above the Waiaka Tank.

Mitigation Measures

To address the water system needs of the Project, water system improvements would be required for Phases 1 and 2. The following summarizes the required offsite water system improvements for the project:

For Phase 1:

- Based on pressure recordings undertaken at critical locations in the service zone of the Waiaka Tank in the service zone above it (ie. the zone supplied from the Laelae Road PRV Station), it appears that DWS' system has adequate capacity to supply the 34 residential lots in Phase 1 prior to undertaking the improvements required for Phase 2.

For Phase 2:

- Construction of a 0.30 or 0.20 MG reinforced concrete tank next to the Waiaka Tank (size depends on the alternative selected).

- Collaborate with DLNR and DWS to outfit Existing Well No. 6240-02 below the Clearwater Reservoir (pump, connecting pipeline, electrical improvements, and related site work).

- Installation of a 12-inch, 1,900-foot long pipeline along the Waimea-Kawaihae Road from the Waiaka Tank to the top of the project site.

- Depending on the actual date of construction of the DHHL project relative to other ongoing development along the Waimea-Kawaihae Road corridor, it may also be necessary to install a parallel 8-inch, 3,900 foot long pipeline from the Laelae Road intersection to the Waiaka Tank.

5.7.3 Wastewater Facilities

The preliminary engineering study describes the wastewater collection, treatment, and disposal options for the project (Appendix A).

Existing Conditions

Waimea is not served by municipal wastewater treatment. All of Waimea, including the area of the Lālāmilo Project, is on individual wastewater systems (IWS) consisting of cesspools or septic tank leachfield systems with the exception of the Parker Ranch 2020 expansion area.

Parker Ranch owns and operates the only wastewater treatment plant located several miles south of Waimea Town and makai of Māmalahoa Highway to serve its master plan projects. While this system has capacity, it was designed to serve its own expansion plans (see further descriptions below).

Wastewater Treatment Options and Potential Impacts of the Project

Approximately 70 percent of the Lālāmilo Project's projected residential, commercial, and industrial water use or about 0.2 MGD will become wastewater to be collected, treated, and disposed in a manner acceptable to the State Department of Health. By DOH's regulations, projects with more than 50 residential units which have lot sizes less than 1-acre may not use individual wastewater treatment and disposal systems (i.e., septic tanks and leach fields).

Based on these criteria, some type of community treatment system will be required for Alternative A Phase 2 development consisting of 408 10,000 square feet lots. With the 1-acre (minimum) lot size of Alternative B, individual septic tank-leachfield systems would be allowed.

Possible wastewater treatment alternatives for the Alternative A are listed below and described more fully in the paragraphs following:

- Connect to Parker Ranch's privately owned and operated Waimea wastewater treatment plant.
- Construct and operate a wastewater treatment plant at the makai end of the project site.
- Utilize a "clustering" concept of several treatment systems throughout the project.

Connection to the Parker Ranch Wastewater Treatment Plant. Parker Ranch owns and operates the only wastewater treatment plant in the Waimea area. It is located several miles south of Waimea Town and makai of Māmalahoa Highway. The wastewater system is a PUC-regulated utility. The treatment plant has a current capacity of 0.1 MGD with planned expansion capability to 1.0 MGD. Present inflow is on the order of 0.04 to 0.05 MGD. Treatment is to a primary (R-3 quality) level. The treated effluent is reused for pasture irrigation. Connection of the project to the Parker Ranch treatment plant would require the following:

- Parker Ranch's consent to the connection. The system was constructed to serve Parker Ranch projects, not the general public;
- Agreement by the PUC to the expansion of the treatment plant's service area to include the DHHL project site;
- Expansion of the treatment plant's capacity (in phases, as appropriate); and

- Construction of a sewage pump station within the project site and an 18,200-foot long force main to the treatment plant.

- The first 11,000 feet of the main would cross State land (TMK 6-6-01:2) and the last 7,800 feet would be across Parker Ranch land (TMK 6-8-01:1). The vertical lift from the sewage pump station at the makai end of the project site to the treatment plant would be about 370 feet. The pipeline length and travel time to the treatment plant make this a problematic alternative.

Wastewater Treatment Plant at the Makai End of the Project Site. A package treatment plant capable of incremental expansion could be constructed at the makai end of the project site or beyond the makai end of the project site, enabling gravity delivery from the entire site to the treatment plant. The treatment plant would be far inland of DOH's Underground Injection Control line, meaning that using wells for effluent disposal would not be allowed. Reuse for pasture irrigation on State land makai of the project site (TMK 6-6-01:1) would be the appropriate method of disposal. For such reuse on land beyond potential human contact, treatment to R-3 (primary) standards would be acceptable.

Clustering Concept of Multiple Treatment Systems. Although more often used on the mainland than in Hawai'i, several treatment systems of the type described herein and located throughout the site could be utilized. Their locations would be selected based on development phasing and topographic constraints (to avoid the need for pumping). Each of these systems would consist of the following:

- An appropriately sized septic tank for pre-treatment;

- A slow sand filter to receive the septic tank's effluent;

- A pumping system to recirculate a portion of the slow sand filter's effluent back through the filter (typically about 75 to 80 percent would be recirculated); and

- A leach field for disposal.

There are no regulatory limits on the maximum number of residential units that could be served by such systems as long as an R-2 quality effluent is delivered to the leach field. As such, development phasing and the site's topography would dictate the number of such systems that would need to be constructed. These systems do require monitoring and periodic maintenance and as such, may not be a practical application for this project.

1-Acre Lot Size Alternative

Reducing the number of residential lots to approximately 200 units would reduce the total wastewater production at the project's free build-out to approximately 0.15 MGD. Because all lots would be 1-acre or more in size, wastewater collection and treatment could be done on the individual lots with conventional septic tank and leach fields. With proper selection of the soil for the leach field trenches, these systems would adequately remove phosphorus but would provide only minimal nitrogen removal.

Vertical travel distances from the leach fields to underlying groundwater, based on the results of the USGS test well (No. 6141-01), would be 900 to 1,200 feet. Further nutrient removal in the several years of downward travel through this unsaturated zone would occur. As a result, the impact on groundwater would not be significant.

Discussion and Mitigation Measures

The preferred Alternative A would require facilities for community treatment of wastewater, whereas, Alternative B with 1-acre (minimum) lot size would qualify for individual septic tank-leachfield systems. The preferred Alternative A would yield 442 lots in Phases 1 and 2, whereas, Alternative B would yield 155 lots. In consideration of DHHL's overall goal for the project to develop and deliver residential homestead awards to the 1,500+ native Hawaiian applicants who have identified their preference to reside in North Hawai'i, Alternative A has been determined as the preferred alternative, inasmuch as additional costs for community treatment would be incurred. Such a facility would be maintained and operated as required by all applicable State Department of Health rules and regulations.

The logical potential site for a wastewater treatment plant and effluent disposal area would be on State lands adjacent to the Project's west boundary. DHHL shall take appropriate measures to acquire any additional land required for wastewater treatment. At this time, approximately 200-acres of additional land is needed to address a facility for treatment of wastewater and effluent disposal. An environmental assessment of the wastewater treatment facilities and the additional lands would be undertaken prior to implementation pursuant to Chapter 343, HRS and the DOH environmental impact statement rules.

5.7.4 Solid Waste Collection and Disposal

Existing Conditions

The County of Hawai'i does not provide solid waste collection services in Waimea or elsewhere on the island. Private companies haul approximately 50 percent of the waste generated in areas that have relatively dense residential development to County landfills. The remaining 50 percent, or possibly greater, is self-hauled. Most self-hauled waste is taken to the County's transfer stations, which are provided for disposal of waste from single-family residences.

Hawai'i County has 21 transfer stations and two landfills at Pu'uanahulu in West Hawai'i and South Hilo in East Hawai'i. The South Hilo Landfill is nearing full capacity and must be closed in the next few years. Pu'uanahulu Landfill has more than 12,000,000 cubic yards of permitted air space, which is enough for an estimated 50+ years. Recyclers in the County of Hawai'i diverted approximately 13 percent of the countywide waste during FY 1998/1999 compared to a rate of 19 percent for the state and 28 percent nationally.

The former Waimea dump (old landfill) site located across the Project Site has been closed and replaced by a Solid Waste Transfer Station where refuse collected from residential areas is compacted for transport to the Pu'uanahulu Landfill. According to the *Draft Addendum to the Integrated Solid Waste Management Plan for the County of Hawai'i* (Harding ESE May 2002), Pu'uanahulu Landfill has more than 12 million cubic yards of permitted air space which is expected to be enough to accommodate the current waste stream from West Hawai'i for the first half of the

21st Century. The landfill has enough capacity for the current waste streams from both West and East Hawai'i for more than 30 years - should East Hawai'i waste require diversion due to the South Hilo Landfill nearing capacity in the next few years.

Potential Impacts and Mitigation Measures

The Pu'uanahulu Landfill is expected to have the capacity to handle municipal solid waste for the foreseeable future. Waste management strategies are evolving, and it is anticipated that less land-intensive, locally based solutions will emerge in the near future to help resolve the solid waste problem in Hawai'i.

No substantial impact to the municipal solid waste collection and disposal system is anticipated during construction and over the long-term of the Project. It is anticipated that refuse from the residences would be individually hauled to the transfer station adjacent to the Project.

Waste generation would be typical for residential developments and new residents at Lālāmilo would be encouraged to participate in community and County sponsored recycling efforts. As planned, the increase in residential population will not significantly increase until Phase 2 (2006 -2010 for Alternative A) and development has been phased to lessen the impacts to the existing community and county resources. DHHL will work with the County to discuss the Lālāmilo Project's impact to solid waste facilities.

5.7.5 Electrical and Communication Systems

Existing Conditions

Electrical System

Island-wide electrical service is provided by Hawai'i Electric Light Company (HELCO). A HELCO baseyard and electrical generating plant is located across the Project on South Kohala Distribution Road. The Project will tie into the HELCO facilities.

Communication System

Telephone communication lines will be provided by Sandwich Isles Communications (SIC). SIC has a license to serve lands administered by DHHL with state-of-the-art broad band telecommunications infrastructure and services. Cable services is not yet provided by SIC, however, allowance is made to cable companies to co-locate their lines in the SIC conduits.

All necessary infrastructure (i.e., cabling, handholes, and conduits, will be constructed below ground by SIC. Above ground remote units are required to extend service from the SIC office located at Puukapu. The remote units consist of three metal cabinets that will house electric service, telephone electronic and cable terminals. The cabinets are approximately 5 feet in height and will be placed onsite within a fenced area approximately 20 feet X 20 feet in area. Cable television service will be provided by Oceanic and will probably be installed in the underground system.

The subdivision will be connected to SIC's fiber optic network that is currently under construction along Kawaihae Road. A full description of the SIC's rural fiber optic duct lines for the County of Hawai'i, and including the routes of the lines to serve the Lālāmilo Project are described in a Final Environmental Assessment and Finding of No Significant Impact (Terry June 2001). The environmental study did not identify any concerns in the Lālāmilo area.

The fiber optic system is located on the south side of Kawaihae Road at the Lālāmilo west access and switches over to the north side at the east access. SIC will be placing manholes at both access locations and connect to the Lālāmilo Project at whichever access is first constructed.

The cabinet system will be installed on project land and will require a 20' X 20' area near the west access. To connect the west and east parcels an underground conduit and cabling will be installed along Alaneo Street. The installation will consist of two 4" diameter conduits and handholds spaced approximately 200 feet apart. The conduits are placed about 3 feet below grade.

Except for the cabinet installation, all other infrastructure is constructed below grade with minimal impact to surrounding areas. All conduit and manhole installations are located in the roadway right of way.

The majority of SIC's fiber optic construction activity is currently taking place along Queen Kaahumanu Highway. Boring activities have been taking place along Kawaihae Road with trenching work scheduled to start in the near term.

Potential Impacts and Mitigation Measures

The Lālāmilo Project will require an additional electrical demand on the overall HELCO electrical system that serves the project area. The additional energy consumption will indirectly affect islandwide resources. Thus, DHHL will closely coordinate facility requirements with HELCO. The generation of additional electrical energy could also indirectly affect air quality (see discussion in Section 5.5). Energy efficient and conservation measures to reduce the maximum electrical demand will be considered for implementation into the Project where feasible.

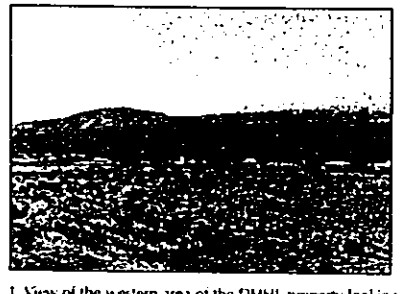
All impacts regarding SIC's work within the roadways to install the fiber optic lines have been fully described in the approved Final EA (Terry June 2001).

5.8 VISUAL ATTRIBUTES

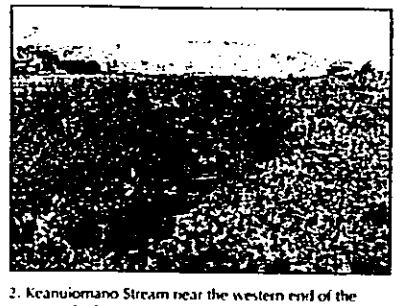
Existing Conditions

The natural beauty of Hawai'i is a universally recognized characteristic and is a significant and valuable asset. The Waimea region lies in a plateau between the Kohala Mountains and Mauna Kea. The Kohala Mountains provide a backdrop of rolling hills and volcanic cones covered with pastures kept green by fog, fine mist, and rain. Mauna Kea provides a distant but dramatic mass as it rises steeply above the plateau.

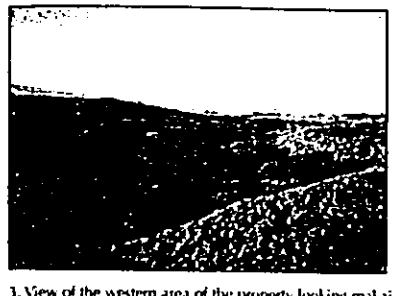
The Lālāmilo Project Site is characteristic of Waimea's rolling verdant pasturelands. The photographs in Figure 20 depict the property and the surrounding environs. From within the property, the Kohala Mountains, Mauna Kea, Mauna Loa, Hualālai, and distant views of the ocean



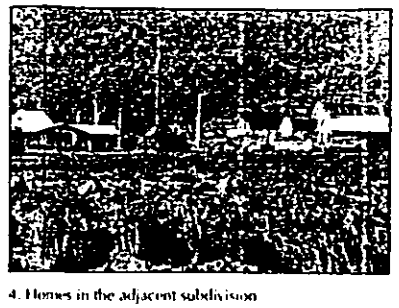
1. View of the western area of the DHHL property looking north towards Kawaihae Road and the homes in the Kamuela View Estates residential subdivision.



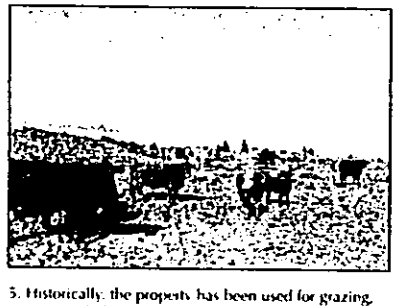
2. Keanuiomano Stream near the western end of the property (looking east). The area to the left of the stream would remain as an open space buffer along Kawaihae Road (lined with utility poles).



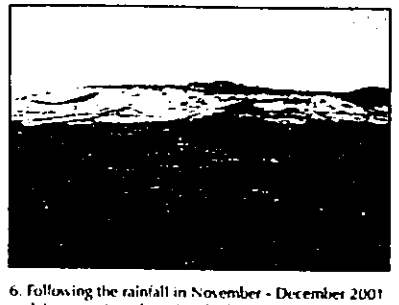
3. View of the western area of the property looking makai towards the ocean in distance.



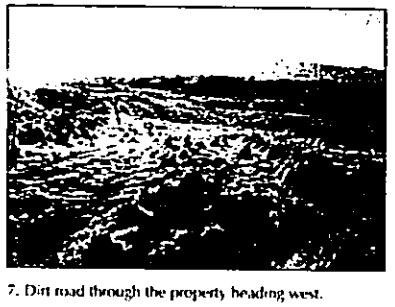
4. Homes in the adjacent subdivision



5. Historically, the property has been used for grazing, most recently by Palekoki Ranch. Prior to heavy rainfall in November and December 2001, the pastureland was heavily grazed and arid.

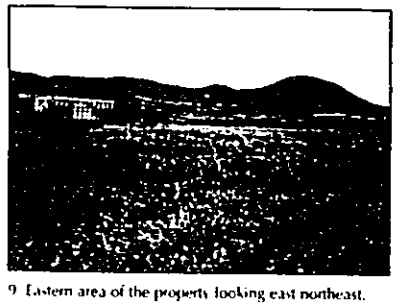


6. Following the rainfall in November - December 2001 and the cessation of grazing, herbaceous grasses quickly sprouted throughout the property. (Photo taken in January 2002.)



7. Dirt road through the property heading west.

8. Waikola Stream – defined by the tree line and lush growth along the top bank.



9. Eastern area of the property looking east northeast.

10. South Kohala Distribution Road forms the eastern boundary of the DHHL property. The HELCO and County Solid Waste Baseyard facilities are shown to the right

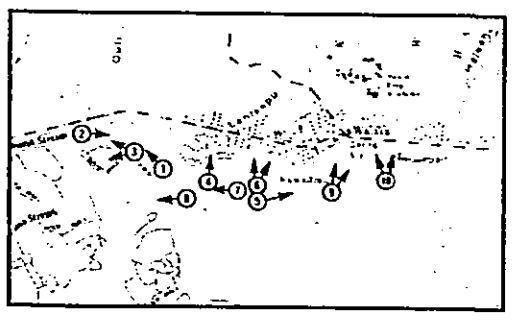


FIGURE 20
Photographic Analysis
Lalamilo PROJECT

are available. Also characterizing the site are the Waikoloa, Lanikepu, and Keanu'i'omanō Streams that border it. Development which surrounds the Project Site include the adjacent Ka La Loa and Lālāmilo House Lots Subdivisions to the north and the HELCO generating plant, County baseyard, and transfer station facilities to the east.

Public or off-site views of the property are from portions of Kawaihae Road, the South Kohala Distribution Road, and the Kohala Mountain Road. In addition, the existing residences in the adjacent Ka La Loa and Lālāmilo House Lots Subdivisions and other subdivisions to the north of Kawaihae Road, and the existing Hawaii Preparatory Academy Upper School located along the Kohala Mountain Road, have enjoyed views of the plain and the distant mountains through the vacant Project Site.

The proposed Hawaii Preparatory Academy's proposed Lower/Middle School site may be at the same elevation or possibly at a slightly higher elevation than the highest point on the Project Site at the Kawaihae Road/South Kohala Distribution Road intersection.

Potential Impacts

Any new development proposed to occupy vacant property would affect open vistas. However, the DHHL Property has been planned by the County of Hawai'i General Plan for Urban Expansion uses for more than 20 years. Thus, the impacts to the visual character has been implied through the County planning process. The following are the anticipated impacts to the Property and surrounding areas.

Change in the visual character of the property. The development of the Project will change the visual character of the undeveloped pasture lands from an open plain to a built environment. The adjacent residences along the Keanu'i'omanō Stream within the Ka La Loa and Lālāmilo House Lots Subdivisions would be most affected. Also to be affected are public views from roadways including Kawaihae Road and Kohala Mountain Road and the Hawaii Preparatory Academy Upper Campus.

There is also a potential visual impact to Hawaii Preparatory Academy's proposed Lower/Middle School campus if that campus is built. The campus location is across the HELCO generating plant, South Kohala Distribution Road and the DHHL eastern property boundary. Although the HPA site plan has not been made available to DHHL, HPA has noted that commercial and light industrial uses would affect their view (Vitousek October 7, 2002).

Views of Keanu'i'omanō Stream from Kawaihae Road are already blocked by the adjacent Ka La Loa and Lālāmilo House Lots Subdivisions. The short segment of Lanikepu Stream would be preserved by maintaining the open space along Kawaihae Road.

Density. Concerns have been raised about the density as proposed in Alternative A with 400+ lots of 10,000 square feet size. This site, with appropriate County General Plan designation of Urban Expansion was selected and designated by DHHL as a priority tract for development. The Urban Expansion designation has been in place for more than 10 years and is consistent with the surrounding residential subdivisions.

Housing Quality. Concerns have been raised about the potential for inconsistent housing quality and negative visual impacts such as at the Kawaihae Hawaiian homestead. On the other hand, recent projects completed by DHHL which include Laiopua at Kealakehe in North Kona, Kalāwahine Streamside and Villages at Kapolei on O'ahu, and Waiehu Kou on Maui have successfully incorporated conditions, covenants, and restrictions (CCRs) for a consistent appearance and quality in turn key and owner builder/self-help homes (Figure 21).

Design. The need to enforce and maintain design guidelines to avoid the situation of inconsistent housing quality in the Kawaihae homestead community. It is DHHL's policy to offer turn-key homes and vacant lots for owner builder or self-help construction. All housing types would be subject to conformance to conditions, covenants, and restriction (CCRs). Recent projects which include CCRs that been completed by DHHL include Laiopua at Kealakehe in North Kona, Kalāwahine Streamside and Villages at Kapolei on O'ahu.

Mitigation Measures

Change in the visual character

- DHHL has discontinued its plan to develop Village Commercial uses on the Project and will maintain the 16 acres of land bordered by Kawaihae Road and South Kohala Distribution Road as agricultural land for pasturing sheep, horses, or cattle. The previously planned commercial and light industrial uses have been discontinued in response to community concerns.

- Preservation of open spaces will reduce potential adverse impacts. Thus, ample open spaces and preservation areas are integrated into both of our alternatives. Open spaces and preservation areas total approximately 90 to 100 acres and include open space buffers along Kawaihae Road and Waikoloa Stream, three clusters of archaeological sites, an active park, and 16 acres of pastureland.

- Landscape the open space buffer along a 2,400 ft length of Kawaihae Road with appropriate native and culturally relevant plantings. Preserve the koai'a trees which have been planted along the strip net to Kawaihae Road.

Density

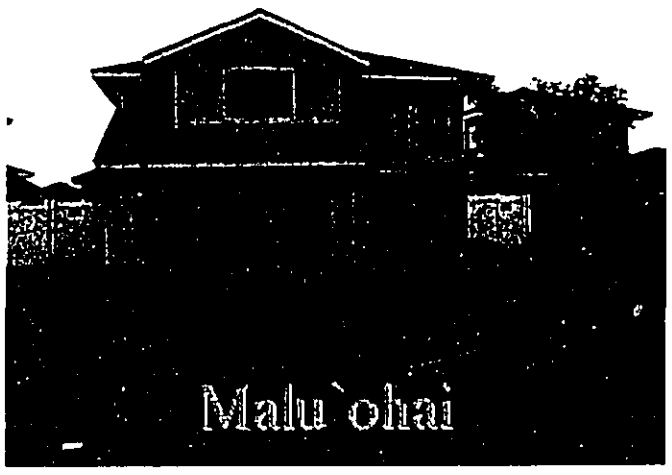
- The preferred Alternative A would include 34 homes in the existing Ka La Loa and Lālāmilo Subdivisions and 408 homes on the main Parcel 77. The Development Plan design phase will explore clustering of homes to create more view channels and open spaces within the various phasing increments.

- Appropriate setbacks and landscaping along roadways will also mitigate the density impacts.

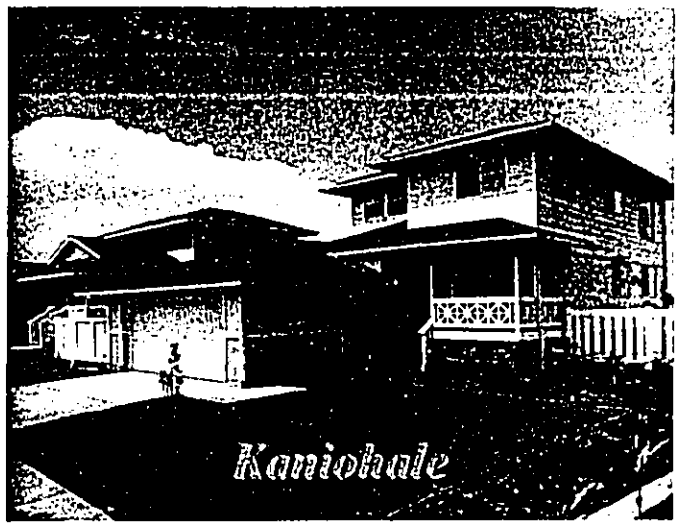
Housing Quality / Design

- Conformance to the rural character of Waimea with design guidelines that would be enforced through conditions, covenants, and restriction (CCRs) for all housing product types (i.e., turn key, owner builder, and self-help). Rural standards for roadway design will be pursued through coordination with the County.

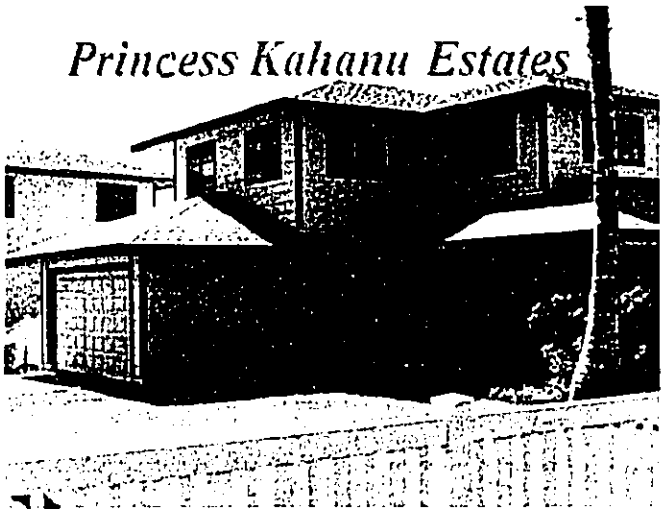
These recent DHHL Residential Homestead projects were successfully developed as turn-key, owner builder, and self-help homes utilizing design guidelines and covenants, conditions, and restrictions (CCRs).



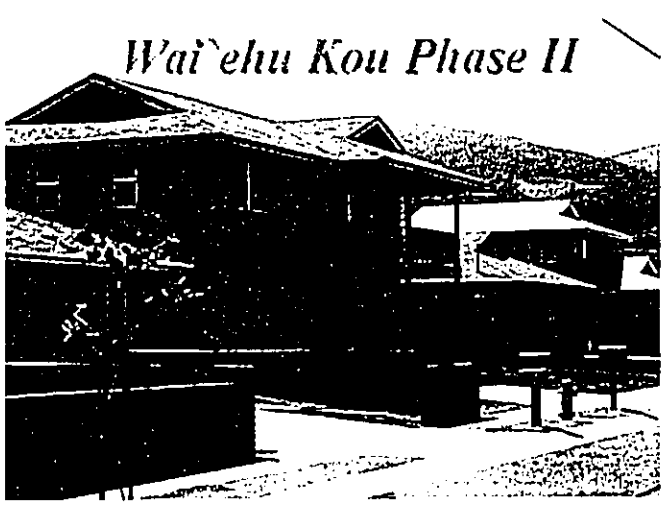
1. Malu 'ohai Phases I and II located at the Villages of Kapolei, island of O'ahu, was completed in 2001.



2. Kaniohale is part of the State's Kealakehe development in North Kona, island of Hawai'i. This residential homestead of 225 lots was completed in 1999.



3. Princess Kahanu Estates was completed in 1996. Located in Nanakuli, island of O'ahu.



4. Wai'ehu Kou Phase II, completed in 2000, is a northwest Maui Homestead consisting of 109 lots.

FIGURE 21

Recent DHHL Projects

Lālāmilo PROJECT

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- All construction would be in conformance to County building standards for consistent housing quality. Conformance would be enforced through conditions, covenants, and restriction (CCRs) for all housing product types (i.e., turn key, owner builder, and self-help).

5.9 PUBLIC SERVICES

5.9.1 Schools

Existing Conditions

As part of a Social Impact Assessment (Appendix I) an evaluation of the Department of Education's Hamakua Complex facilities has been made to predict the Lālāmilo Project's impact to the school system.

Residents of the Lālāmilo Project would be served by the Department of Education's Waimea Elementary and Middle Schools for grades kindergarten through eight, and the Honoka'a High and Intermediate Schools for grades nine through twelve. The lack of a public high school in Waimea requires Waimea students to travel approximately 15 miles (30 miles round trip) to Honoka'a each school day. Indirectly, the effect to the Waimea community is the lack of facilities which could be used by the community such as a gymnasium, athletic field, and swimming pool.

Kanu o ka 'Āina (KANU), a public charter school, serves students from Waimea and the broader South Kohala district.

Private schools in Waimea include Parker School (grades 6-12) and Hawai'i Preparatory Academy (grades K-12).

Public school enrollment data and project enrollment has been provided by DOE and is shown in Table 15. In Year 2001, the Waimea Elementary and Middle schools were over capacity by 56 students. The projections suggest that unless there is an increase in capacity, there will be continued over-capacity until 2006.

Table 15. Design, Actual and Projected Enrollment for Schools Affected by the Lālāmilo Project

	Design Enrollment	Actual Enrollment in 2001	Projected Enrollment					
			2002	2003	2004	2005	2006	2007
Waimea Elementary School	1035	590	556	549	548	548	540	538
Waimea Middle School		501	505	510	501	490	483	476
Honoka'a High and Intermediate School	850	784	764	763	758	756	751	746

Source: The design enrollment is contained in "Total Annual Enrollment: Hamakua Complex 1993 - 2003," as contained in the draft Complex Development Plan for the Hamakua Complex: 1997 - 2017. The actual and project enrollment figures are contained in "2001 - 2007 Actual and Project Enrollment: Hawai'i District," provided by Keith Kameoka, Statistical Research Branch of the State Department of Education.

The DEIS used a "design enrollment" statistic to compare with the 2001 actual enrollment figures to determine that Waimea schools were over enrollment capacity in 2001. The DOE relies on a "school capacity" statistic to measure whether enrollment is over or under capacity.

The State DOE and the Waimea community are working towards finding solutions to these existing problems. On a short-term time frame, the DOE is planning to build a new classroom building at either the elementary or middle school. A funding request is planned for the next biennium, which would mean that the new facility will be available in 2005 or 2006.

Previously, DOE had plans for a new elementary school near the existing facility. A land exchange with Parker Ranch would have provided for additional space for the new elementary school. The current elementary school would then be improved to house the middle school. However, the Waimea community preferred a new middle school and has been working with DOE to explore alternatives. Plans for the new school are therefore currently on hold, as is the land exchange.

Kanu o ka ʻĀina New Century Public Charter School (KANU) is the educational component of the Kanu o ka ʻĀina Learning Ohana (KALO) organization. KALO was recently awarded 15 acres of DHHL land at Puʻukapu to establish the Kauhale ʻŌiwi o Puʻukapu. The "kauhale" will include a site for a permanent campus for the charter school. This achievement is a direct result of the participation of Dr. Ku Kahakalau, Director of KALO, in the EIS process for the Lālāmilo Project.

Kanu o ka ʻĀina started in August 2000 as Hawaiʻi's first native designed and controlled K-12 public school. With a first graduating class of only four students, KANU has grown rapidly and currently has over 150 elementary through high school students. Ninety percent of the students are of Hawaiian ancestry. KANU's temporary campus is located in several buildings at the Department of Agricultures Waimea facility. On October 22, 2002 DHHL approved a land award for a permanent campus for Kanu o ka ʻĀina consisting of 15 acres at Puʻukapu across from Kuhio Village. Additional discussion on KALO and KANU is found in Section 5.10

Potential Impacts

The Lālāmilo Project's preferred Alternative A which would consist of 442 new homes with occupancy over a seven-year period (2004 - 2010) would contribute between approximately 180 - 288 students in all grades. As seen in Table 16, the numbers represent two methods of calculating student projections. The "low end"estimates is provided by the DOE's Facilities Branch, and utilizes a formula for quantifying a "fair share" requirement to determine the project's impact on the school system.

The "high end" estimates, provided by the DOE's Statistical Research Branch, is based on a truer household size and population estimate of similar projects (e.g. other Hawaiian Home Lands neighborhoods).

Table 16. Estimated Student Population of the Proposed Lālāmilo Project

	Low Estimate* (based on fair share standards used to calculate developer contributions)	High Estimate** (based on averages in comparable areas)
Elementary	100	180
Middle	40	52
High	40	56
TOTAL	**180**	**288**

Source: The low end estimates were provided by Sanford Beppu, Facilities Branch of the State Department of Education. The high end estimates were provided by Keith Kameoka, Statistical Research Branch of the State Department of Education. Both were based on personal communications on May 3, 2002.
** Based on statewide enrollment formula*
*** Based on actual enrollment figures from projects similar to Lālāmilo, including other communities.*

The Lālāmilo Project is expected to generate a range of students at all grade levels from 180 to 288, with the "high end" estimate being more likely.

Table 17 depicts DOE's projections for student enrollment at the Waimea Elementary and Middle Schools and Honokaa High School through 2010, when the Lālāmilo Project is expected to be built out. Assuming there are no changes in the existing facilities (i.e., no new middle school) by 2010, both Waimea Elementary and Waimea Middle Schools will be over capacity by 146 and 131 students respectively. Honokaa High School will see a decline in enrollment.

Table 17. DOE 2010 Projection for Honoka'a Complex Schools with Lālāmilo Project

School	2002 School Capacity	2007 Estimated Enrollment	2010 High Estimate for Lālāmilo	2010 # of Students Over Capacity
Waimea Elementary	624	590	180	146
Waimea Middle	422	501	52	131
Honoka'a High School	981	784	56	-141

Source: DOE letter dated September 10,2002.

It is anticipated that some of the Lālāmilo Project families may already reside in the Waimea area in extended family situations, others will come from other areas beyond the school service area. The projected 232 elementary and middle schools students would be attending the DOE public schools, Kanu o ka 'Āina charter school, as well as the private schools in the community.

Mitigation Measures

- DHHL recognizes the critical nature of the crowded conditions at the Waimea Elementary and Middle Schools and will work with the DOE to mitigate the impact of the new Lālāmilo Project students that will be served by the area schools. Upon decision between the two alternatives and

refinement of the subdivision development plan, DHHL will be able to specifically quantify impacts, and will collaborate with the DOE and make an appropriate contribution towards school facilities.

- DHHL and Kanu o ka 'Āina have evaluated several DHHL properties for a permanent site for the charter school campus. The Hawaiian Homes Commission approved a 15-acre parcel at DHHL's Kuhio Village in the Pu'ukapu area for a comprehensive native Hawaiian cultural learning center which will include a permanent campus for the charter school.

5.9.2 Recreational Facilities

Existing Conditions

Recreation provides an avenue for the fulfillment of social, cultural, physical, and educational needs of people through leisure experiences. As described in the County's General Plan (Draft 2002), recreational facilities may be defined as Resource-based and Facility-based. Resource-based parks provide public access to and enjoyment of an outstanding natural or cultural resource. Facility-based parks, on the other hand, include parks which are provided for organized, spectator, or informal play recreational activities. Playfields, gymnasiums, swimming pool complexes, and tennis courts are examples of facility-based parks.

Recreation areas in the South Kohala district are limited (General Plan, Draft 2002). Park facilities in Waimea consist of primarily facilities-based parks including community and neighborhood parks.

- Waimea Elementary and Intermediate School playground and gymnasium - used by the schools during school days and jointly operated by the County after school hours;
- Waimea Park, a 10.5-acre County park, serves the South Kohala District as a recreation center with a community center, playfields and facilities for spectators, tennis courts, restrooms, and attractive playground for young children;
- Passive roadside park - County 2.8-acre passive roadside park area;
- Senior citizen center - operated by the County at the former courthouse in Waimea Town;
- Parker Ranch private rodeo facilities;
- Waimea Country Club - 18-hole golf course open for public play.

Within the South Kohala District there are major beach parks along the coastline.

- Hāpuna Beach State and Recreation Area - 61.1 acres;
- Samuel M. Spencer Beach Park - 13.4 acres, County beach park;
- Kawaihae Small Boat Harbor;
- Pu'ukoholā Heiau National Historic Site overlooking Samuel M. Spencer Park;

- Resort and resort-community facilities include golf courses.

Other recreational facilities which are planned for Waimea in the near future:

- Regional Park - on approximately 30-acres of land to be donated by Parker Ranch;
- Waimea Trails & Greenways and Waimea Nature park (Ulu La'au) - Trail system linking residential areas to Waimea's urban center.

Potential Impacts and Mitigation Measures

The County's Park Dedication Code (Chapter 8, Hawai'i County Code) provides standards for the dedication of land, facilities, or assessments of in lieu fees for recreational purposes upon the subdivision of land or the development of multiple family residential units. The code requires a minimum ratio of 5 acres of land for park and playground purposes for every 1,000 persons in each district.

The Lālāmilo Project Alternative A consisting of 442 lots, would, at buildout, generate between approximately 1,300 to 1,500 residents. Thus, by the County's standards, approximately 7.5 acres of park and playground areas would be recommended.

The Lālāmilo Project Alternatives A and B provides 9 - 10 acres for recreational facilities. These include Park facilities meeting the County's standards and addressing the recreational needs of the community with provisions for playfields and courts. Also to serve the needs of the project community, a Community Center building is planned. This facility is envisioned to include a multi-purpose hall capable of being utilized for meetings, gatherings, and other appropriate group activities.

The Park and Community Center facilities are planned near the eastern boundary adjacent to the General Agriculture lands. Together the land area for these uses form a buffer between the adjacent industrial uses (e.g. HELCO generating plant, County baseyard and transfer station, and old landfill) and the nearest residential lots. This location also concentrates traffic movement at the edge of the residential homestead area and minimizes traffic through the subdivision. The site planning for the facilities will be undertaken during the Development Plan design phase which will specify other relevant cultural uses.

The active park spaces and community center facility, along with preservation areas and open space areas will allow passive and active park uses on approximately 70+ to 80+ acres as shown in Table 18.

Table 18. Lālāmilo Project Proposed Recreational Facilities and Passive Open Space Areas

	Area (Acres)		Description
	Alternative		
	A	B	
Community Center	1.7	1.8	Community Center building, parking
Park	8.3	7.3	Playfields and courts, restrooms, parking
Preservation Area	19.1	19.7	Three areas for the protection of archaeological sites, interpretation signage, walking trails
Open Space	42.2	53.4	Passive uses - hiking along streamside, recreational gardening
Total Area	71.3	82.2	

Update on Waimea Trails and Greenways project. DHHL, in consideration of the County's and community's requests, has withdrawn TMK: 6-6-01:10 (Parcel 10) from the Lālāmilo Project and will not acquire the parcel. This proposed trail system will be adjacent to the Lālāmilo Project's west boundary and along the opposite bank of the Waikoloa Stream directly to the south of the Project. This concession is a direct result of DHHL's consultation process pursuant to Chapter 343, HRS.

5.9.3 Police and Fire Protection

5.9.3.1 Police

Existing Conditions

Police protection in the South Kohala District is provided by officers located at the Waimea Police station, a police substation at the Mauna Lani Resort, and a mini police station at Waikoloa Village. South Kohala has four beats in operation. The mauka beats are in and around Waimea. The makai beats include Waikoloa and Mauna Lani. The minimum watch is four police officers which is one officer per beat, and five officers are generally available.

Potential Impacts and Mitigation Measures

The Lālāmilo Project will impact police protection services by increasing the service population, thereby increasing the number of calls and incidences.

Measures will be undertaken to mitigate impacts on police protection services through security measures with design measures such as well-lit public areas and walkways and the establishment of neighborhood watch programs.

5.9.3.2 *Fire*

Existing Conditions

The project site is served by the Waimea Fire Station No.9 located in Waimea Town approximately two miles from the Lālāmilo site. This fire station is an engine company, with one engine, a tanker, and a medic unit. Equipment includes a 1,200 gallons per minute pumper with a 1,000-gallon capacity and a 750 gallon tanker.

The backup company is Engine Company No. 14 located in South Kohala. Four to five firefighters are on duty at all times at both fire stations. The anticipated response time to the project site is about ten minutes.

Emergency services are served by the North Hawai'i Community Hospital, located behind the Fire Station, thus the emergency response time to the project site would also be ten minutes.

Potential Impacts and Mitigation Measures

The Lālāmilo Project will impact fire protection services by increasing the service population and structures, thereby increasing the number of potential fires and emergencies.

The Project will meet fireflow requirements. Further, the individual residential units will meet Hawai'i County building code requirements to ensure public safety and roadways will be constructed to ensure proper tuning radiuses for emergency vehicles.

- *Fire apparatus access roads.* The design of all Project roadways will be in accordance with the provisions of UFC Section 10.207 and the building plans will be provided to the County for detailed review.

- *Water supply.* At t he present time DHHL is coordinating with the Department of Land and Natural Resources and County Department of Water Supply for the development of an adequate water supply and infrastructure to meet the fire flow requirements. Further, the design of all Project roadways will include on-site fire hydrants and mains capable of supplying the required fire flow. Provision of a water supply for the Project will be in accordance with UFC Section 10.301.

5.9.4 Health Care

Existing Conditions

The County General Plan states that the County is responsible for the general welfare of its residents and must continue to make every effort to ensure that adequate health services are provided. Actual planning of health programs and facilities is the direct administrative responsibility of the State.

Currently there are six licensed hospitals operating on the Big Island: Hilo, Honoka'a, North Kohala, South Kohala, and Ka'u. Together these six hospitals make up the Hawai'i County Network.

Various health care services in Waimea provide primary patient care to adults, women and children. All facilities provide out-patient care. Ambulance service is available from the Waimea Fire Station.

Waimea possesses state-of-the-art health care facility through the North Hawai'i Community Hospital and Lucy Henriques Medical Center.

Potential Impacts and Mitigation Measures

The added population created by the Project will create unavoidable and occasional need for emergency health care services; however, the proposed Project is not anticipated to have a significant adverse impact on emergency medical services.

5.10 SOCIAL CHARACTERISTICS

A social impact assessment (SIA) for the Project was undertaken by Earthplan. This section summarizes the study; the reader is directed to the full assessment report in Appendix I. The social impact assessment has been prepared in accordance with Chapter 343, HRS and Hawai'i Administrative Rules, Subsections 11-200- 16-18.

5.10.1 Social Impacts

The social aspects of an area relate to people living and interacting with other people. Social impact analysis explores how the physical environment of a community or neighborhood may be changed by a proposed land development, and how these changes may affect the neighborhood as a social environment. Its primary function has to do with the development and disclosure of social information relevant to informing the decision-making process and/or designing management actions to deal with problematic social outcomes of a proposed project. Commonly identified uses of SIA include:

Understanding the ability of a community or group to adapt to changing conditions - In identifying social consequences of a proposed action, cause- and-effect relationships are complex. Different people and different communities react differently to similar events. An important function of SIAs is therefore to obtain and analyze the necessary information about community organization and likely responses to changing conditions. As such, the non-project social scenario is as important as the with-project scenario because it provides a realistic social context for the proposed action.

Defining the problems or clarifying the issues involved in a proposed change - Frequently, opposition to or support for a proposed project can only be understood and addressed when the proponent is aware of cultural tendencies, underlying issues, vested interests, and misperceptions. The SIA is the basis for defining and clarifying project or program issues in a systematic approach within the EIS framework.

Illuminating the meaning and importance of anticipated change - An important objective of SIA is to determine what meaning a probable impact would have for a community and its residents. Whereas a certain impact may have relatively low social significance in some communities, it may be given more import or significance in other settings or communities.

Identifying mitigation opportunities or requirements - Another function of SIA is to explore how a proposed action can cause the least adverse and most beneficial impacts, and to identify responses from the community and affected persons. SIA information can be crucial in determining what mitigation is necessary, what mitigation alternatives exist, and which mitigation strategies are most likely to work.

5.10.2 Profile of the Existing Community

The total study area for the social impact assessment is the South Kohala District which is generally coterminous with Census Tract 217 in the 1990 census and 217.01 and 217.02 in 2002. The Lālāmilo Project Site is in Census Tract 217.02.

Population Trends and Projections

The Hawai'i County population increased from 92,053 to 120,317 persons between 1980 and 1990. It increased to 148,677 persons in 2000. The 31 percent increase between 1980 and 1990 translates into an average annual growth rate of 2.7 percent. The County's average annual growth rate between 1990 to 2000 decreased to 2.1 percent.

The Total Study Area population grew at a higher pace than that of Hawai'i County. South Kohala's population nearly doubled from 4,607 to 9,140 persons from 1980 to 1990. This 98 percent increase suggests an average annual growth rate of 7.1 percent. By 2000, the population grew to 13,131 persons. This 44 percent increase breaks down into an average annual growth rate of 3.7 percent.

In 1990, the South Kohala District comprised eight percent of the total Hawai'i County population. This proportion increased slightly, to nine percent, in 2000.

Age and Ethnicity

The County experienced a decrease in youngsters 17 years and younger, and increases in the working age (18 to 64) and the elderly. County-wide, the median increased from 34.3 to 38.6 years. South Kohala experienced a similar aging of the population, and its median age increased from 32.1 to 36.2 years from 1990 to 2000.

As suggested by the median ages, when compared to the Hawai'i County population, South Kohala is proportionally younger.

A detailed analysis of ethnic trends is not possible due to the methodology differences in gathering information between the 1990 and 2000 census taking. In 1990, census respondents were required to pick a single ethnic category. In 2000, multi-ethnic respondents were allowed to select the appropriate number of categories.

Nevertheless, ethnic information for 2000 is valuable for comparisons between the various populations. When compared to the Hawai'i County ethnic profile, the Total Study Area tended to have higher proportions of Caucasians and lower representation of those of Asian ancestry. The proportion of Native Hawaiians and other Pacific Islanders was higher in the Total Study Area, at 13 percent, compared to 11 percent islandwide.

The 2000 ethnic makeup of the Primary Study Area was different from both Hawai'i County and Total Study Area populations. The Primary Study Area proportion of Caucasian was lower than that of the Total Study Area (31 versus 39 percent in the Total Study Area), and the proportion of Native Hawaiians and other Pacific Islanders was higher (16 versus 13 percent).

Households

Hawai'i County households increased 20 percent between 1990 and 2000, from 41,461 to 52,985. The Total Study Area households increased by a significant 50 percent, from 3,095 in 1990 to 4,648 in 2000.

In 2000, the Total Study Area households comprised nine percent of the Hawai'i County households. At the same time, the Primary Study Area accounted for 59 percent of the Total Study Area households.

While the proportion of family households decreased in Hawai'i County between 1990 and 2000 (from 73 to 70 percent), it increased in the Total Study Area by one percent.

Further, the proportion of family households tended to be higher in the Total and Primary Study Areas, as compared to the Hawai'i County households. In 2000, 70 percent of Hawai'i County households were families. In the Total Study Area, 72 percent of the households were families; in the Primary Study Area, 75 percent.

The average household and family sizes decreased throughout the County between 1990 and 2000, but both remained higher in the Total and Primary Study Areas. In 2000, the Hawai'i County average household and family sizes were 2.75 and 3.24 persons, respectively. The Total Study Area household and family sizes were 2.81 and 3.23 persons, respectively. In the Primary Study Area, both households and families tended to be larger, at 2.94 and 3.35 respectively.

Housing Units

Housing units throughout Hawai'i County generally increased proportional to the increase in households between 1990 and 2000. In 2000, the Total Study Area 5,268 households comprised eight percent of the total islandwide housing unit supply. The Primary Study Area accounted for about half of the Total Study Area housing units, with 2,634 units.

The proportion of owner-occupied units increased in Hawai'i County between 1990 and 2000 (from 52 to 54 percent), and increased significantly in the Total Study Area (from 38 to 47 percent).

Nevertheless, the Total Study Area tended to have proportionally less owner-occupied units when compared to Hawai'i County and the Primary Study Area in 2000. In the most recent census, 55 percent of the islandwide housing supply were owner-occupied. Fifty-nine percent of the Primary Study Area housing units were owner-occupied. Only 47 percent of the Total Study Area housing units were owner-occupied.

There was a significant difference in housing vacancy rates at the time of the 2000 census. In Hawai'i County, 16 percent of the housing units were reportedly vacant. A significantly high 20 percent of the Total Study Area housing units was vacant. In contrast, nine percent of the Primary Study Area housing units were vacant in 2000.

5.10.3 Findings Related to the Existing Community Issues

To ascertain the concerns raised in the community, the social impact assessment utilized interviews to determine the community concerns.

Community Strengths

Those interviewed felt that Waimea's greatest strengths are its natural beauty, climate, and its qualities as small, tight-knit community. They felt that Waimea's beauty lies in its green hills and its open plains, and appreciated the proximity to the dramatic Mauna Kea and Mauna Loa, and the verdant environment of North Kohala. The region is reportedly cool and moist, differing from the extremes of Hilo's downpour and Kona's dryness.

Interviewees appreciated the rural lifestyle and characterized it as slow-paced and easy-going nature. They contrasted the region's lifestyle to the visitor and business-like atmospheres present along the Kohala coast and Kona.

Those interviewed strongly felt that the people are a major component of the community's strength. They noted that the people are willing to work together on important issues. While the community comprises several distinct groups, including ranchers, homesteaders, farmers, environmentalists, and business people, they felt that there is an underlying trust and caring that unite people in dealing with youth and school-related matters.

It was also felt that Waimea has a strong Hawaiian presence. The ranch and paniolo legacy helped to shape the existing community identity, and much of the rural character is based on Hawaiian values such as 'ohana and aloha.

Community Problems

While the interviewees appreciated its cohesive qualities, they also noted socioeconomic divisions as problems. There is a reported division between the affluent and those with low income. Interviewees felt that more affluent residents have choices that allow them to separate themselves from others. The school situation was cited as an example. Waimea has two private schools that provide educational alternatives to the public school system. It was felt that those who can afford private school tuition have little incentive to advocate improvement of the Waimea Elementary and Middle Schools, and are not interested in helping to establish a high school in Waimea.

It was noted that relative newcomers and long-time residents do not typically interact in community matters, and that long-time residents often do not join large community organizations. Long-time residents noted that newer residents have increasingly dominated community organizations. Newcomers tend to be more affluent, more articulate and bring different values to the community. As a result, long-time residents have shied away from organizational meetings unless there are clear

benefits to their participation.

Interviewees were very concerned that crime and drug use are increasing in Waimea. It was felt that the use of drugs, particularly crack, is escalating for several reasons. Interviewees believed that drugs appeal to young people correlates to the shortage of youth facilities and activities. Financial pressures require that parents commute and work extensive hours, thereby leaving children on their own for long periods of time. The drug problem is not isolated to the youth. Reportedly, many adults also use drugs to escape from daily stress often related to making financial ends meet. It was further believed that the high presence of affluent people, including boarding students at private schools, makes it easier for drugs to enter the community.

School-related issues were a major concern. It was felt that there is disparity between the private and public educational facilities, which, in turn, contributes to social divisions. More importantly, there were numerous problems cited regarding the public education system and facilities. Interviewees noted that the facilities at the Waimea Elementary and Middle Schools are old and over-crowded. These conditions result in program deficiencies. One example cited is the recent transition of a high school shop facility to a regular classroom. This has eliminated the shop classes that were popular among the students.

Related to the school conditions is the lack of a public gathering places especially for young people. The only gym available to the general community is the Thelma Parker Gym at the Waimea Elementary and Middle Schools. It is old and overused, according to those interviewed. In addition, use is restricted through rules administered by the State Department of Education. Organizations must pay a fee to use the facility, even though many of the programs benefit the schools' students.

Traffic is a major concern. Interviewees noted that there is only one main roadway artery that must be shared by the town's residents and people just passing through. While there have been discussions about a new route designed to direct traffic away from the town, the bypass route is not scheduled for implementation in the near future.

A related community problem is the rapid pace of growth and the changes associated with growth. Long-time residents remembered that traffic lights are relatively recent, and that shopping malls and commercial strips have begun to dominate the town. They pointed out that "we don't know everybody anymore," and that they are losing that small town feeling.

Desired Future for the Community

Interviewees want the area to remain a rural community. They felt that there has already experienced major changes, and hoped that future development will be limited and designed to maintain the rural character. They advocated strong planning measures to limit commercial and industrial uses, and the level of residential development.

Those interviewed also want an answer to the growing problem of traffic. While a bypass has been discussed, there seems to be no solution in sight. They felt that any new development should address cumulative traffic impacts.

Education was also high on the list of a desired future. Interviewees expressed a hope for better educational system and facilities. They wanted the Waimea Elementary School expanded and improved, and the new facilities for the Waimea Middle School. They also hoped that Waimea would eventually have its own high school.

Further, given the high proportion of native Hawaiians in Waimea, it was hoped that the Charter School, Kanu o ka 'Āina, has permanent facilities.

Interviewees were also hopeful for new community gathering places. They strongly felt that new residential development projects should provide publicly-accessible recreational facilities.

Kanu o ka 'Āina Learning Ohana (KALO)

Kanu o ka 'Āina Learning Ohana (KALO) is a non-profit 501(c)3 organization whose primary purpose is to assist in the establishment of sustainable Hawaiian communities, particularly in rural areas. KALO recognizes the need to provide native Hawaiians with educational opportunities and resources to perpetuate and enhance their rich cultural heritage, while providing them with the tools necessary to live productive and fulfilling lives.

KALO recognizes the need to provide native Hawaiians with educational opportunities and resources to perpetuate and enhance their rich cultural heritage, while providing them with the tools necessary to live productive and fulfilling lives. KALO was established in 1998 in Waimea and has formed the Kauhale Oiwi o Puukapu (or kauhale) which is envisioned as a comprehensive native Hawaiian cultural learning center which will address a diversity of cultural, social, economic, and educational needs of native Hawaiians residing in South Kohala. It will serve as a focal point of community and cultural activities for the region.

In theory, the programs which would fall under the kauhale umbrella include multipurpose, multi-agency learning center to provide early childhood education, as well as cultural learning centers which would lead towards a goal of forming a sustainable community. The kauhale would house the K-12 public charter school and provide training opportunities to students and adults.

KANU charter school has committed to provide academically rigorous instruction based on personal and collective excellence, incorporating the latest technologies. KANU believes in the inclusion of protocol and other native Hawaiian cultural traditions and practices, including the promotion of the use of Hawaiian language at all age levels and instruction and assessment tailored to native learning styles. In addition, KANU believes and emphasizes moral education and developing leadership and active citizenship skills as essential for future success. KANU wants to provide its students with extended career and college exploration opportunities, including internships, that prepare them for life after high school. KANU emphasizes strong family involvement, by utilizing the essential wisdom of kupuna, and by integrating the natural environment and community into the daily learning process.

KANU and DHHL are working together and DHHL has already taken the first step in providing KALO with land for the kauhale. Fifteen acres of land at Puukapu across Kuhio Village was approved on October 22, 2002 by the Hawaiian Homes Commission for the kauhale.

Potential Impacts

As a State agency responsible for providing homes to native Hawaiian beneficiaries, DHHL is always challenged to meet their needs but also to become an accepted and integral part of the neighborhood and community. As of June 30, 2002 there are 19,302 applicants statewide on the DHHL wait list. According to an islandwide survey (SMS 2001) roughly 1,500 have indicated their preference to reside in North Hawai'i, therefore, this site, with appropriate County General Plan designation of Urban Expansion was selected as a priority tract for development. This designation of Urban Expansion has been in place for more than 10 years.

The proposed Lālāmilo Project will increase the area's residential population due to the development of these lots. At full build-out, with the added 442 homes, the population would increase by 1,300 to 1,500 people. The lower estimate is based on the 2000 average household size for the Primary Study Area, which extends from Waimea to Pu'uanahulu. The higher estimate is based on the 2000 average family size for the same area. It is likely that the project will generate a resident population at the high estimate level, in that the new residents are expected to be mostly in family households.

Table 19 shows the proportion of the project population relative to projected population estimates for the South Kohala District. At full build-out, the Lālāmilo Project will comprise eight percent of the projected South Kohala population in 2010. However, after 10 years, with general growth in the South Kohala population, that proportion is reduced to six percent.

Table 19: Proportion of Lālāmilo Resident Population to Projected South Kohala District Population: 2010, 2015, 2020

	Year		
	2010	2015	2020
Population Projection for South Kohala District	18,154	21,072	24,426
Percentage of Lālāmilo Project Residents	8%	7%	6%

Compared to the 2000 population for Total Study Area, or the South Kohala District, the proposed Lālāmilo Project would represents ten percent increase over the 2000 resident population. Further, the Lālāmilo Project represents a 20 percent increase over the Primary Study Area 2000 population

As discussed in Section 1, DHHL is charged with managing and distributing trust lands for the use of its beneficiaries. As of June 30, there were 31,318 applications for homestead awards held by 19,302 applicants. Applicants are allowed to hold two applications, including one for a residential lot and one for an agricultural or pastoral lot. In 2000 and 2001, DHHL conducted a study to determine land area preferences among Hawai'i Island applicants and to identify applicant needs and preferences related to land use and lot size. Hawai'i Island lessees were also surveyed to quantify opinions on issues related to land use and distribution.

At the time of the survey, there were 7,883 Hawai'i applicants who made 11,755 applications. Of these, 5,114 applications were for residential lots. The preferred Alternative A site plan includes 442 lots (10,000 square feet in size) which will serve approximately 30 percent of the 1,500 beneficiaries who have identified North Hawai'i as their first preference location for a residential lot.

Among residential applicants, North Hawai'i, which includes the Lālāmilo Project Site, ranked second in terms of area preferences; East Hawai'i ranked first. Geographic preferences were very important to applicants. Forty percent of the residential applicants were willing to accept a smaller lot size to get on the land sooner rather than change area preferences.

In terms of how their house would be built, 38 percent indicated they would build a house with a contractor, 29 percent would use a self-help housing program, and 33 percent expected DHHL to build a unit.

For those who selected North Hawai'i as their preferred area, and expect to reside on the property, the majority said that they would reside on the land two to three years after receiving the award. The proposed Lālāmilo Project would have significant positive impact on DHHL's homesteading program. The project is consistent with applicant preferences to reside in North Hawai'i. The project will include turnkey development, self help and owner-build options to accommodate applicant needs. More importantly, it will provide 442 qualified beneficiary families houselot opportunities that would be available only through the DHHL homesteading program.

Other impacts associated with the added population to the Waimea community include impacts to public facilities and services which have been described and discussed in previous sections of Section 5. These include water and wastewater facilities, traffic and roadways, schools, recreational facilities, and police, fire, and health services.

Discussion of Concerns Raised During Public Consultation

A few comments on the Draft EIS have suggested that this Project would aggravate social conditions within the community. Writers have asserted that the new Lālāmilo families will cause significant negative adverse impacts on the social structure and human interaction of this rural community. This assertion is unfounded.

The interviews conducted for the social impact assessment identified existing socioeconomic divisions within the Waimea community today. There is a reported division between the affluent and those with low income. Interviewees felt that more affluent residents have choices that allow them to separate themselves from others. The new Lālāmilo residents will enter into this pre-existing condition.

The new residents at Lālāmilo are expected to share similar social and economic characteristics as existing Waimea residents. They will be similar in terms of the diversity of families with various levels of incomes and occupations. The only distinguishing factor is ethnicity in that the families are native Hawaiian beneficiaries. These comments imply that the Lālāmilo Project will bring more poverty, more domestic violence, more illiteracy, and other social ills, to the Waimea community. Recent DHHL developments prove there is no evidence to support these implications.

DHHL is committed to its mandate to provide homestead land to native Hawaiian beneficiaries. Thousands of Hawaiian families have homes and agricultural and pastoral through this program. DHHL neighborhoods are thriving communities, with residents that contribute to the social and cultural fabric of their respective regions. They are part of the general workforce, they participate in the general school system, and patronize local stores and services.

DHHL is making every effort to mitigate impacts related to the number of number of new residents. The Lālāmilo project is the result of thoughtful planning and consideration of beneficiary needs and desires. The project density, the types of homes and community amenities are a direct result of discussions and a survey of DHHL beneficiaries. The implementation time frame has be extended to seven to eight years to ensure that infrastructure needs and social assimilation can occur in a timely manner. The Lalamilo Project will not bring any more social problems than would a private development project. The following are specific measures to mitigate the impacts of the Project.

Mitigation Measures

- *Population.* The Lālāmilo Project preferred Alternative A consisting of 442 units is anticipated to generate 1,300 to 1,500 individuals. The effect of this added number of people into the community will affect public resources as noted previously. The mitigation measures for the impact areas are specified below.

- *Water and Wastewater Systems.* The Project's impact to the municipal water system facilities and wastewater issues are described in Sections 5.7.2 and 5.7.3. As described, discussions with the Department of Land and Natural Resources, County Department of Water Supply, and Department of Health have been initiated to address the Project's water and wastewater needs.

- *Traffic.* The mitigation measures for the Project's impacts to roadways and thoroughfares in the vicinity of the Project are described in Section 5.4.

- *Schools.* Mitigation measures to address the Project's impact to the area's public schools are described in Section 5.9.1.

- *Recreational Facilities.* Community Center and Park facilities which total 10 acres will are planned and will be developed for active park use and community gatherings.

- *Archaeology Preserves.* Three areas (total approximately 20 acres) will be preserved. These includes portions of the Lalamilo Agricultural Field Complex and a basalt quarry.

- *Rural character.* The Development Plan design phase of the Project will set as criteria, design guidelines appropriate for the Waimea rural character as well as establish rural design guidelines in coordination with the County.

- *Police and Fire.* Mitigation measures to address the Project's impact to police and fire services is described in Section 5.9.3.

- *Housing.* The planned Lālāmilo homesteads will fulfill a long-standing pent-up need for affordable homes for native Hawaiians.

- *Social ills.* The subject Project is not expected to generate social ills any more than what presently exists in the community. However, DHHL recognizes that organizations such as Kanu o ka ʻĀina Learning Ohana (KALO) and the its Charter School would contribute programs that would benefit the native Hawaiian and larger Waimea community including future Lālāmilo Homesteaders. DHHL, therefore, in support of KALO has contributed 15 acres for development of a permanent facility for KALO's "kauhale" for a sustainable community.

- *Relationship of the Project to land use plans, policies, and controls for the affected area.* The mandate of the Hawaiian Homes Commission Act requires DHHL to provide Homestead awards to qualified native Hawaiians. This and other matters related to the County General Plan and zoning ordinance are described in Sections 1, 3, and 7.

- *Scale of the Project.* Through the public consultation process, concerns about the scale of the Project have been raised. Specifically, the use of portions of the Property for commercial and light industrial uses have been a community concern. DHHL has initially removed Parcel 10 from the Project, and subsequently removed all commercial and light industrial uses. This represents a significant change in the scale of the Project. With these changes the following impacts to public resources have also been lessened: 1) traffic on area roadways, 2) wastewater treatment and water resource requirement, and 3) visual impact to the proposed Hawaii Preparatory Academy Middle and Lower Schools. The potential revenue generation is sacrificed, but agricultural use will be maintained at the east end of the Property.

6 Alternatives to the Proposed Action

Lālāmilo PROJECT

6.0 ALTERNATIVES TO THE PROPOSED ACTION

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the "known feasible" alternatives to the proposed project are limited to those that would allow the objectives of the Project to be met, while minimizing potential adverse environmental impacts.

The DHHL objective is to provide land and homes to qualified native Hawaiian beneficiaries, and specifically to optimally develop Residential Lots on the Lālāmilo Property to serve the 1,500 beneficiaries who have identified North Hawai'i as their preferred location for a homestead award. Due to the high demand for homes in North Hawai'i and also the property's consistency with the County General Plan, Lālāmilo is designated as a "priority tract" for development in DHHL's *Hawai'i Island Plan*. Thus, in the analysis of the known feasible alternatives to allow the DHHL's objectives to be met, emphasis is placed on the Preferred Alternative A.

6.1 PREFERRED ALTERNATIVE

The preferred alternative is described as Alternative A consisting of 442 Residential Lots 10,000 square feet in size on approximately 160 acres (including 34 lots in the RS-10 zoned remnant infill parcels in the adjacent subdivision). This development would serve 442 or approximately 29 percent of the 1,500 beneficiary applicants who desire North Hawai'i for a residential lot. Other uses on the remaining 89 acres would include Community Center and Park uses, General Agriculture, Open Spaces, and Preservation Areas on the remaining 89 acres.

This alternative is described in Section 2 and shown in Figures 3 and 5. A wastewater treatment facility and effluent disposal system would be required to serve the Residential lots. Additional land of approximately 200 acres for the plant and for effluent disposal would need to be acquired and a separate environmental assessment would be prepared.

6.2 ONE-ACRE RESIDENTIAL LOTS

Alternative B, is also described in Section 2 and shown in Figures 4 and 6. In the one-acre lot alternative, 121 one-acre lots (including 34 10,000-square foot lots within the RS-10 zoned remnant lots in the adjacent subdivision) would be developed on 150 acres. The other uses on the remaining 98 acres would include Community Center and Park uses, General Agriculture, Open Spaces and Preservation Areas.

The one-acre minimum lots would qualify for individual septic/leachfield systems, and thus eliminate the need to construct and operate a community wastewater treatment system.

While Alternative B would incur less cost in construction and operation, it would serve only 155 beneficiaries or roughly 10 percent of the number of applicants for North Hawai'i lots. The final decision on the density of the project will be made by the Hawaiian Homes Commission.

6.3 NO ACTION ALTERNATIVE

The No-Action Alternative would involve no changes to the DHHL Property for the foreseeable future. Ranching activities would cease in January 2003 and the property would remain vacant. The No-Action Alternative would not be consistent with stated governmental policies of establishing the property as an Urban Expansion area and would not create the overall positive benefit to DHHL beneficiaries.

This alternative would deny the Hawaiian Home Lands native Hawaiian beneficiaries of the potential benefits associated with home ownership. The lack of new residential homesteads and potential revenue generation from this Property would further delay the placement of qualified native Hawaiians on the land.

No action would also result in lost benefits to the larger Waimea community - the lost potential State involvement in additional water resource development, lost park space and community facility.

6.4 OTHER ALTERNATIVES CONSIDERED

DHHL considered other alternatives including various mixes of homestead types - Residential Lots (range of lot sizes no greater than 1 acre) and various Agricultural lots.

Residential lots consistent with the neighboring subdivision would have to conform to RS-10 zoning; these lots could range in size from 10,000 square feet to one acre. A mix of lot sizes however, would yield fewer lots than the maximum under a uniform 10,000 square foot size. Moreover, awarding dis-similar lots would warrant different criteria and equity issues would arise.

DHHL categorizes Agricultural Lots as Subsistence Lots (3 acres) and Supplemental Lots (10 acres). Under the Agricultural Lots alternative a range of 25 to 82 lots could be developed. A further type of Homestead is described by DHHL as Pastoral Lots consisting of a minimum of 40 acres. Approximately 6 Pastoral Lots would be possible at the Property. These agricultural alternatives, however, would not meet the objective of providing Residential Lots to the beneficiaries who have identified North Hawai'i as a place of residence, and were thus, dismissed.

7

Lālāmilo PROJECT

Relationship of the Proposed Action to Land Use
Plans, Policies, and Controls for the Affected Area

7.0 RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS FOR THE AFFECTED AREA

The Project's conformance to state and local land use plans, policies, and controls as well as the permitting requirements have been fully described in Section 3 above. Other relevant State of Hawai'i and County of Hawai'i laws, ordinances, land use plans, and policies are described below.

7.1 STATE OF HAWAI'I

7.1.1 Hawaiian Homes Commission Act

The legal foundation for the existence and mandate of the DHHL is the Hawaiian Homes Commission Act, 1920, as amended. This Congressional Act, hereafter referred to HHCA, mandates the Hawaiian Homes Commission to manage a Hawaiian Home Lands trust that currently encompasses 203,500 acres on Hawai'i, Maui, Moloka'i, O'ahu, and Kaua'i. As a federal condition allowing Hawaii to become a state in 1959, the HHCA was adopted as a provision of the Hawaii State Constitution. The State Legislature created the Department of Hawaiian Home lands in 1960 to manage the Hawaiian home lands and administer the provisions of the HHCA. DHHL is charged with managing and protecting this trust so that land distribution to beneficiaries is carried out in a timely and efficient manner.

DHHL beneficiaries are those with at least 50 percent Hawaiian blood. The intent is to promote economic self-sufficiency by providing land. Direct benefits to beneficiaries include 99-year homestead leases at an annual rent of $1 for residential, agricultural and pastoral uses.

In addition, HHCA provides the following services to beneficiaries:

- Financial assistance through direct loans or loan guarantees for home construction, home replacement or repair, and for the development of farms and ranches;
- Technical assistance to farmers and ranchers;
- Operation of water systems.

To generate revenues for the homesteading program, DHHL is authorized to dispense lease lands and issue revocable permits, licenses and rights-of-entry for lands not in homestead use.

During the 1990s, several key events advanced the goal of strengthening the Hawaiian Home Lands trust. One was the resolution of trust claims with the State of Hawai'i. On June 19, 1995, the Governor signed Act 14 of the Special Session of 1995 into law. The Act resolves land claims involving compensation for the past use of and title to Hawaiian Home Lands. Act 14 established a Hawaiian Home Lands trust fund, and required the State to make 20 annual deposits of $30 million into the trust fund for a total of $600 million. As of December 2001, DHHL received approximately $60 million. All of this money has been used to open new homestead areas for beneficiaries of the program. Other provisions of Act 14 include:

- Transfer lands and resolve specific claims in Waimanalo, Anahola, Kamalomalo'o, and Moloa'a;
- Compensate all remaining confirmed uncompensated public uses of Hawaiian Home Lands;
- Initiate land exchanges to remedy uncompensated use of Hawaiian Home Lands for State roads and highways claims;
- Authorize DHHL first priority to select up to 200 acres of surplus ceded land at Bellows Air Force Station, Waimanalo, upon its return to the State of Hawai'i; and
- Authorize the transfer of 16,518 acres of public lands to DHHL to be designated as Hawaiian Home Lands.

This final action increases the total DHHL land inventory to 203,500 acres. The subject Lālāmilo Project Site, acquired in 1999, is a direct result of Act 14.

Another key event is the resolution of trust claims with the Federal Government. The Hawaiian Home Lands Recovery Act was passed by Congress in June 1994, and signed into law in November 1995. This law established a mechanism for valuing Hawaiian Home Lands under the control of Federal government and authorizing exchanges of excess Federal land based a value determination. In August 1998, a Memorandum of Agreement was signed to allow for the transfer of 960 acres of excess land on Oahu to DHHL.

In terms of land resources, Hawai'i Island has 116, 703 acres of land resources. The breakdown of acreage by use is as follows:

- 27,268 acres are in homestead use
- 46,157 acres are held in general leases
- 15,935 acres are licensed
- 27,193 acres are in other uses

Discussion: Since the inception of the Hawaiian Homes Commission Act, the DHHL has served 7,260 native Hawaiian beneficiaries within the State of Hawai'i through homestead awards. Today there are 31,318 applicants for Homestead awards statewide. On the Island of Hawai'i, 2,054 beneficiaries have been awarded homesteads with an additional number of 7,883 applicants who have submitted 11,755 applications still waiting for Homestead awards (DHHL November 2000 in SMS 2001).

A survey of beneficiaries (SMS February 2001) was conducted with the objective to gather information from DHHL applicants and current lessees for the preparation of Department of Hawaiian Home Lands *Hawai'i Island Plan* (approved October 2002). The survey results indicated approximately 38 to 42 percent of all applications were for Residential Lots with approximately 1,624 applicants desiring DHHL-built homes. The choice of geographical locations on the island of Hawai'i included North, East, South, West, and Central Hawai'i. The subject Project lands at Lālāmilo is in North Hawai'i.

The survey of all applicants in November 2000 (SMS February 2001) attempted to measure preference by geographic region. The 567 applicants identified in the EISPN selected the North Region as their "first and only" choice; but there were 958 other people who had North Hawai'i as their first choice, but would be willing to switch to another location if awards are limited. Thus the true number of applicants who have identified North Hawai'i as a first choice for a Residential Lot is 1,525. Therefore, need for the homes as proposed in this development at Lālāmilo represents a clear pent-up demand and is recommended in DHHL's *Hawai'i Island Plan* as a Phase 1 priority tract project to consist of approximately 400 lots.

7.1.2 Hawai'i State Land Use Law

Chapter 205, HRS, establishes the State Land Use Commission (LUC) and gives this body the authority to designate all land in the state within one of four districts: Urban, Rural, Agricultural, or Conservation. HRS § 205-2 requires the LUC to group contiguous land areas suitable for inclusion in one of these four districts. It further provides that in establishing the boundaries of Urban districts, those lands that are now in urban use and a sufficient reserve area for foreseeable urban growth shall be included, and that in establishing the boundaries of the districts in each county, the Land Use Commission shall give consideration to the general plan of the county.

Discussion: The Lālāmilo Project lands consist of several parcels, including approximately 16.8 acres of in-fill Urban District lands which are part of an existing State of Hawai'i developed subdivision. The remaining 232 acres in the main parcel is in the Agricultural District. This property is identified as Urban Expansion lands on the County General Plan Land Use Pattern Allocation Guide (LUPAG) map. Thus, there is consistency with the State Land Use Law and the Project is planned to be constructed according to the standards of the Urban District.

7.1.3 Hawai'i State Plan, Chapter 226, Hawai'i Revised Statutes

The Hawai'i State Plan (Chapter 226, HRS), establishes a set of themes, goals, objectives and policies that serve as long-range guidelines for the growth and development of the State.

The Hawai'i State Plan lists three "Overall Themes" relating to: (1) individual and family self-sufficiency; (2) social and economic mobility; and (3) community or social well-being. These themes are viewed as "basic functions of society" and goals toward which government must strive (§226-3). To guarantee the elements of choice and mobility embodied in the three themes, the Plan states three goals:

1) A strong, viable economy, characterized by stability, diversity and growth that enables fulfillment of the needs and expectations of Hawai'i's present and future generations.
2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
3) Physical, social and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring and of participation in community life (§226-4).

Discussion: The proposed project elements are new affordable residential opportunities for native Hawaiians and would contribute to the attainment of the three goals by 1) providing direct and indirect construction-related employment opportunities for the present and future residents of Waimea and South Kohala; 2) generating increased State and County tax revenues; 3) contributing to the stability, diversity and growth of local and regional economies; and 4) protecting the archaeological, historic, and natural features of the site. Key elements of the proposed Project relative to the above goals are that it would provide 1) additional short-term employment, recreational and cultural opportunities; 2) a planned setting where design, operation and maintenance and environmental protection provisions can be effectively, efficiently and economically controlled; 3) opportunities close to existing and planned developments would minimize travel times and yet would be sufficiently separated from planned or existing residential developments.

Specific objectives, policies and priority directions of the State Plan most relevant to the proposed Project are listed and discussed below.

Objectives and Policies for Population (§226-5)

Objective: It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic and social objectives contained in this chapter.

Policies:

1) Manage population growth statewide in a manner that provides increased opportunities for Hawai'i's people to pursue their physical, social and economic aspirations while recognizing the unique needs of each County.
2) Promote increased opportunities for Hawai'i's people to pursue their socio-economic aspirations throughout the islands.
7) Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

Discussion: Increasing population levels in the South Kohala area are a concern to both State and County planners because of the lack of affordable housing, limited public facilities and services and increased demands on those facilities and services. The planned Lalamilo Residential lots allows much needed affordable housing opportunities for native Hawaiians in North Hawaii. Prior residential homestead developments are at Kealakehe in North Kona and Kawaihae in South Kohala. While this Project will have an effect on the constrained municipal water resources, cooperative development between the State and the County will allow development of a new groundwater resource for the benefit of the Project and the greater Waimea community.

Objectives and Policies for Socio-Cultural Advancement—Housing (§226-19)

Objective: 2) The orderly development of residential areas sensitive to community needs and other land uses.

Policies:

1) Effectively accommodate the housing needs of Hawai'i's people.
5) Promote design and location of housing developments taking into account the physical

setting, accessibility to public facilities and services and other concerns of existing communities and surrounding areas.

7) Foster a variety of lifestyles traditional to Hawai'i through the design and maintenance of neighborhoods that reflect the cultures and values of the community.

Discussion: As a State agency responsible for providing homes to native Hawaiian beneficiaries, DHHL is always challenged to meet their needs but also to become an accepted and integral part of the neighborhood and community. The development of the Lālāmilo Project within the established Waimea community will require sensitivity to the existing rural character.

Current Hawaiian Homes Commission policy is toward development of residential lot projects as developer-built turn-key homes and owner builder or self-help homes in approximately equal proportions. DHHL's policy for all new residential development include "Design Guidelines" for both turn-key, owner builder, or self help products (or housing type) which would be enforced through conditions, covenants, and restrictions (CCRs). These policies would be applicable to each of the proposed alternatives.

DHHL will be developing rural design standards as design guidelines for the request for proposals (RFP) process for the Lālāmilo Project. These rural standards will be reviewed and approved by the County prior to the RFP process.

7.2 COUNTY OF HAWAI'I

Planning in Hawai'i County is conducted in a three-tier system. The first tier is the General Plan, which is a long-range plan containing goals, policies, standards and courses of action for the island. The General Plan forms the legal foundation of other elements in the County's planning system.

The second tier of the County planning system includes short and mid-range plans related to specific geographic regions, functions and special areas within a region. The third tier includes zoning and subdivision codes and other specific mechanisms intended to implement the first and second tier.

7.2.1 General Plan - Hawai'i County

The first General Plan was adopted by County ordinance on December 15, 1971. The plan is currently being revised and a draft was issued in December 2001. As the most fundamental and directed document in Hawai'i County's planning system, the General Plan includes a comprehensive review program that investigates and analyzes all aspects of the County under a standard methodology. General Plan elements include:

Economics
Energy
Environmental quality
Flooding and other natural hazards
Historic sites
Natural beauty
Natural resources and shoreline
Housing

Public facilities and utilities
Recreation
Transportation
Land uses in terms of agriculture, commercial, industrial, multiple residential, open space, public lands, resort and single family residential

Land Use Pattern Allocation Guide (LUPAG) Map

The LUPAG Map designations for the property are Urban Expansion, Low Density Urban, Flood Plain. Zoning designations are A-5a (Parcel 77) and RS-10 (Parcels 54 &12-17). The proposed uses are in compliance with the existing General Plan LUPAG Map designation.

Relevant Goals, Policies and Standards

Economic:

- Provide residents with opportunities to improve their quality of life.
- Economic development and improvement shall be in balance with the physical and social environments of the Island of Hawai'i.

Discussion: Fundamental to increased quality of life to native Hawaiian beneficiaries on the DHHL waitlist is the attainment of a homestead award. Overall construction over the two phases would create short-term employment over a 6 to 7 year period.

Environmental Quality

- Maintain and, if feasible, improve the existing environmental quality of the island.

Discussion: The applicant will endeavor to maintain or improve environmental quality, will comply with all Federal, State, and County environmental rules and regulations, and will mitigate potential adverse impacts to the greatest extent practical. Applicable and appropriate pollution control measures will be employed.

Flood Control and Drainage

Goals:

- Protect human life.
- Prevent damage to man-made improvements.
- Control pollution.
- Prevent damage from inundation.
- Reduce surface water and sediment runoff.

Policies:

- All development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works.

Discussion: The development will insure that habitable structures are placed outside flood zones or that necessary improvements are made to accommodate development. Standard engineering and design precautions and adherence to State and County design standards will be followed. Additionally, construction specifications, in accordance with County requirements, will provide plans and describe techniques to mitigate the potential for erosion and to control sedimentation. To

further ensure that erosion control is maintained, best management practices (BMPs) are implemented and followed along stream edges. Construction will utilize a series of sedimentation basins throughout the graded areas; these will be specified in the grading plans for County review and approval.

During the development phases appropriate site-specific plans will be prepared including a detailed drainage plan. A letter of map revision (LOMR) or physical map revision will be obtained to reflect the changes on the flood insurance rate map (FIRM) and the subdivision plat map. In addition a conditional letter of map revision (CLOMR) will be obtained prior to construction of the stream crossings. Further, the plans will reflect no rise in the base flood elevation, in accordance with Chapter 27 of the Hawai'i County Code.

Historic Sites

Goals:

- Protect and enhance the sites, buildings and objects of significant historical and cultural importance to Hawai'i.
- Access to significant historic sites, buildings and objects of public interest should be made available.

Policies:

- The County of Hawai'i shall require both public and private developers of land to provide a historical survey prior to the clearing or development of land when there are indications that the land under consideration has historical significance.

Discussion: A full archaeological survey of the property has been completed and historic sites have been identified, documented, and inventoried. Approximately 20 acres of the Lālāmilo Agricultural Field Complex which is prevalent throughout areas of Waimea and on the project site are planned to be perpetually preserved and protected. Further plans including a Data Recovery Plan, Preservation Plan, and Burial Treatment Plan will be prepared for approval by the State Historic Preservation Division.

Natural Beauty

Goals:

- Protect scenic vistas and view planes from becoming obstructed.

Policies:

- Increase public pedestrian access opportunities to scenic places and vistas.

Discussion: The visual character will be modified from an open plain to a built environment, however, by maintaining pasturelands at the area previously planned for commercial and light industrial uses, scenic vistas will be preserved along the eastern boundary of the Project. Open spaces and preservation areas total approximately 90 to 100 acres and include open space buffers along Kawaihae Road and Waikoloa Stream, three clusters of archaeological sites, an active park, and 16 acres of pastureland. Along with the Park and Community Center facilities, these areas will be amenities to the new Lālāmilo residents with appropriate public access.

Natural Resources and Shoreline

Goals:

- Protect and promote the prudent use of Hawai'i's unique, fragile and significant environmental and natural resources.
- Ensure that alterations to existing land forms and vegetation, except crops, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides. erosion, siltation, or failure in the event of earthquake.

Policies:

- Encourage the use of native plants for screening and landscaping.

Discussion: Precautions, including best management practices, will be implemented to prevent erosion and degradation to the streams on the property. All structures would be constructed outside the floodway boundaries and in accordance with County standards. The botanical survey of the property identified no endangered or threatened species on site and encouraged the planting of native species and culturally relevant species. Koai'a trees have been planted along the open space areas along Kawaihae Road. These will be preserved and additional native shrubs will be planted.

Housing

Goals:

- Attain safe, sanitary, and livable housing for the residents of the County of Hawai'i.
- Attain a diversity of socio-economic housing mix throughout the different parts of the County.
- Maintain a housing supply which allows for a variety of choice.
- Develop better places to live in Hawai'i County by creating viable communities with decent housing and suitable living environments for our people.
- Ensure that housing is available to all persons, regardless of age, sex, marital status, ethnic background, and income.
- The cornerstone of the County's housing programs and activities shall continue to be the encouragement and expansion of appropriate home ownership opportunities for our residents.

Discussion: The proposed project will provide as many as 442 additional dwelling units, which will partially fulfill a pent-up demand for native Hawaiian homestead awards, and thus relieve the demand for affordable housing on the open market. The project will have an overall positive impact to regional housing conditions, especially with regard to meeting the goals of the County General Plan and will be designed and constructed according to County standards.

Public Facilities

Goal:

- Encourage the provision of public facilities that effectively service community needs and seek ways of improving public service through better and more functional facilities which are in keeping with the environmental and aesthetic concerns of the community.

Discussion: A new active Park with ball fields and courts consisting of 8+ acres and a Community Center facility will be built to serve the new DHHL community.

Public Utilities

Goals:

- Ensure that adequate, efficient and dependable public utility services will be available to users.
- Maximize efficiency and economy in the provision of public utility services.
- To have public utility facilities which are designed to fit into their surroundings or concealed from public view.

The Public Facilities functional group is subdivided into five subgroups: water, telephone, electricity, gas and sewer. Specific policies and standards within those areas are as follows.

Water

Policies:

- All water systems shall be built to Department of Water Supply standards.
- Improve and replace inadequate systems.
- The fire prevention systems shall be coordinated with water distribution systems in order to ensure water supplies for fire protection purposes.

Telephone

Policy:

- The County shall encourage underground lines where they are economically and technically feasible.

Standard:

- In the development and placement of telephone facilities, such as lines, poles and substations, the design of the facilities shall consider the existing environment, and scenic view and vistas shall be considered and preserved where possible.

Electricity

Policies:

- Power distribution shall be placed underground when and where feasible.
- Route selection for high voltage transmission lines should include consideration for setbacks from major thoroughfares and residential areas.
- Safety standards for power systems shall conform to safety standards as established by appropriate regulatory authority.

Sewer

Policies:

- The "Sewerage Study for All Urban and Urbanizing Areas of the County of Hawai'i, State of Hawai'i," December 1970 and the "Water Quality Management Plan for the County of Hawai'i," December 1980, shall be used as guides for the general planning of sewerage disposal systems.
- Schemes for wastewater reclamation and reuse for irrigation shall be utilized where feasible and needed.

Discussion: Infrastructure systems will be constructed to support the proposed Lālāmilo Project, including roadways, wastewater, potable water, drainage, communications and electrical systems. Wastewater treatment will be handled through appropriate systems depending on the ultimate density of the project as described in Alternatives A and B, consisting of 10,000 square feet and 1-acre lots, respectively. Water system facilities for the development will be provided through the County Water system through cooperative development of a new resource to satisfy the project's potable water requirements. Discussions have been initiated with the County Department of water Supply and State DLNR. Such facility development would benefit the overall Waimea community. Consideration will be made for the use of underground utilities to enhance the physical appearance of the project while also improving the system safety and reliability. The facilities will conform to current standards as to efficiency and quality.

Recreation

Goals:

- Provide a wide variety of recreational opportunities for the residents and visitors of the County.
- Provide a diversity of environments for active and passive pursuits.

Discussion: Phase 2 development includes active Park and a lot for a Community Center facility. The combined approximately 10-acre recreational use area is planned to meet the County's standards and will address the recreational needs of the community with provisions for playfields and courts. The Community Center will serve the needs of the project community. This facility is envisioned to include a multi-purpose hall capable of being utilized for meetings, gatherings, and other appropriate group activities. In addition to the active park spaces and community center facility, preservation areas and open space areas will allow passive park uses.

Transportation

Goal:

- Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.

Policy:

- The improvement of transportation service shall be encouraged.

Discussion: Traffic impacts related to the Lālāmilo Project have been studied and are described in the traffic analysis performed for the proposed project. The results of this analysis indicate that with mitigative measures such as turning and storage lanes, the future traffic conditions will not be negatively affected by the increased trips on Kawaihae Road.

Land Use

Goals:

- Designate and allocate land uses in appropriate proportions and mix and in keeping with the social, cultural, and physical environments of the County.
- Protect and preserve forest, water, natural and scientific reserves and open areas.

Policies:

- Zone urban and rural types of uses in areas with ease of access to community services and employment centers and with adequate public utilities and facilities.

- Promote and encourage the rehabilitation and use of urban and rural areas which are serviced by basic community facilities and utilities.
- The County shall encourage the development and maintenance of communities meeting the needs of its residents in balance with the physical and social environment.

Standard:

- The designated land uses will be delineated on the General Plan LUPAG map.

The Goal and Policy for Public Lands is especially relevant to the Lālāmilo Project:

Public Lands

Goal:

- Utilize publicly owned lands in the best public interest and to the extent possible, to the maximum benefit for the greatest number of people.

Policy:

- Encourage uses of public lands which will satisfy specific public needs, such as housing, recreation, open space and education.

Discussion: As described above, the Hawaiian Home Lands Trust has been bolstered by Act 14, and is now equipped with funds to implement its plans to provide homesteads to native Hawaiian beneficiaries. Thus, the described Alternative A would optimize the use of public lands to benefit the maximum number of people.

7.2.2 Hawai'i County Zoning

Parcels 54 and 12-17 are zoned RS-10 and considered to be infill, remnant lots from the State of Hawai'i developed Ka La Loa and Lālāmilo Houselots Subdivisions.

The A-5a designation is pursuant to the County Zoning Code Section 25-3-1(b), which states " ... any building site within the unplanned (U) district as of December 7, 1996, shall automatically be redesignated as an agricultural (A) district with a minimum lot size of five acres (A-5a)". Therefore, the previously Unplanned (U) lands are presently designated in the Agricultural district. Surrounding zoning includes Residential (RS-10) and Agricultural (A-5a and A-1a) zoned lands as well as other unplanned (U) lands.

The subject Residential Lots are proposed to conform to the Residential (RS-10) zoning district. Lands previously planned for commercial and industrial use will remain in agricultural use (e.g. pastures use) and will buffer the residential uses from the adjacent heavy industrial uses (e.g. HELCO power plant, County transfer station and old landfill) on the South Kohala Distribution Road.

7.2.3 Waimea Design Plan

The *Waimea Design Plan* (1984), though not formally adopted, has provided guidance and effected the original intent to identify and recognize the unique rural character of Waimea and to provide recommendations and guidelines to:

1. Insure the preservation of Waimea's ranch and agricultural heritage in the face of growth and change;
2. Reinforce the traditional role of Waimea town as the regional support and service center for ranching and intensive agricultural activities;
3. Encourage the present trend towards the establishment of Waimea as the home base for various educational, cultural, medical, and scientific organizations.

Section 3 of the *Waimea Design Plan* establishes the guidelines to allow growth in an orderly, functional, and aesthetically pleasing community that it has historically been.

Curbs, gutters, and sidewalks should not be required unless drainage and/or pedestrian and vehicular traffic dictate. The construction of roads to rural standards – without curbs, gutters and sidewalks, is a major aspect of the ranch character of Waimea. Consequently, where there is a clear need for such elements in all but the central commercial areas, their design could incorporate rural appearance; for example, rolled curbs without sidewalks. Where possible, light standards should be distinctive in character and complement the natural environment of Waimea. Light standards and intensity of illumination should relate to the type of street and adjacent land use. Upward reflection should be minimized.

Discussion: The Lālāmilo Project will integrate rural design standards for roadways, yet maintain proper access for emergency vehicles. The Development Plan design phase will establish criteria for a rural design in the housing architecture. Quality and consistency in property maintenance throughout the Project will be assured by CCRs and design guidelines.

8 Contextual Issues

Lālāmilo PROJECT

8.0 CONTEXTUAL ISSUES

A summary of the key issues within the context of the overall project is presented in this section. These include 1) Relationship between short-term uses and maintenance of long-term productivity, 2) irreversible and irretrievable commitments of resources, 3) offsetting considerations of governmental policies, potential unavoidable and adverse environmental effects, 5) potential adverse effects on public services and facilities, and 6) unresolved issues.

8.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

The project area consisting of approximately 249 acres is in an area designated for Urban Expansion by the County General Plan. Approximately 17 of those acres are State Urban lands zoned RS-10 for residential use and the remaining is zoned as agricultural land (A-5a). The current uses of the land are in agricultural uses associated with ranching and pasturage.

Thus, the current short-term uses of the RS-10 zoned land for horse pasture uses and the cattle ranch use of the large 232-acre parcel will be terminated to allow the development of the Lālāmilo Project as designated by the land use policies of the State and County. The exception is a 16-acre area at the eastern property boundary (previously planned for commercial and light industrial uses) will remain in General Agriculture use for pasture uses for the long-term.

Maintenance of long-term productivity of these lands would shift from agricultural uses to more urban uses (except for the 16 acres afore mentioned). The proposed development would result in certain benefits to the existing community, including new water resource development, improvements to vicinity roadways, new recreational facilities, as well as increased housing opportunities, increased job opportunities, and increased tax revenues. Temporary construction employment will be generated by the project and these in turn will impart multiple benefits to the regional and islandwide economy.

Long-term impacts to the environment are generally mitigated with the implementation of the proposed measures as described in the earlier Sections 4 and 5. Analyses of the natural environmental features have found that the Project Site has been altered by over a century of cattle ranching, yet possesses physical attributes that are desirable as amenities in a residential community. These attributes include a superior location for with regard to views, climate, and access to the services and amenities of an existing community. In turn, the new community would contribute additional Park land and Open Spaces, but conversely also add to an already stressed school system. Specific measures will be employed to mitigate potential adverse environmental and social impacts (as discussed in Sections 4 and 5) in the design, construction, and operations phases of the project.

8.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The development and construction of the project components - Residential lots and homes, Community Center, Park - would result in the irreversible and irretrievable commitment of certain natural, cultural, and fiscal resources.

Major resource commitments include the 248.9-acre property and the monetary funds, construction materials, non-renewable resources, manpower and energy required for the Project's completion. The impacts represented by the commitment of these resources, however, should be weighed against the positive socio-economic benefits that would be derived from the project.

The evidences of past ancient and historical natural and cultural uses of the property were first ravaged by wild cattle in the 1700s and subsequently altered through decades of ranching. The archaeological survey of the property and the proposed preservation of 19+ acres of these remnant archaeological sites and 40+ to 50+ acres of open spaces will offset the land commitment to urban uses.

Thus, the proposed action will foreclose future ranching options with the exception of 16 acres which would remain in limited pasture use; however, the range of beneficial uses will shift to residential and urban uses which are not expected to pose long-term risks to health or safety.

8.3 OFFSETTING CONSIDERATIONS OF GOVERNMENTAL POLICIES

The Hawaiian Homes Commission Act mandates the Hawaiian Homes Commission to manage a Hawaiian Home Lands trust that currently encompasses 203,500 acres throughout the state. DHHL is charged with managing and protecting this trust so that land distribution to beneficiaries is carried out in a timely and efficient manner. DHHL beneficiaries are those with at least 50 percent Hawaiian blood. The intent of the Act is to promote economic self-sufficiency through the provision of land. To generate revenues for the homesteading program, DHHL is authorized to dispense lease lands and issue revocable permits, licenses and rights-of-entry for lands not in homestead use.

DHHL is lawfully required to provide homesteads to qualified native Hawaiian beneficiaries. On the island of Hawai'i, 7,800 applicants are waiting for awards. Of those, 1,500 desire homes in North Hawai'i. The Lālāmilo Project would serve no more than 442 of those applicants. Thus, retention of the property in its present use (as described in Section 6), would not be an optimal use of the land when a clear need for homes for native Hawaiian beneficiaries in North Hawai'i has been identified.

The Lālāmilo Project preferred Alternative A is projected to absorb approximately 30 percent of those desiring North Hawai'i homesteads. This demand is a subset of the overall demand for housing in North Hawai'i. New home demand will occur from the growth of the existing population, immigration, and replacement of old housing. Consequently, cumulative and secondary environmental impacts typical of housing developments may result from project development. However, if the project is not built, the future demand for new housing and employment would still have to be satisfied by new development located in North Hawai'i.

The proposed project largely conforms to governmental policies as described in Sections 3 and 7 above. The land use General Plan designation of Urban Expansion for the whole site and RS-10 zoning of portions, and the property's adjacency to other residential and industrial uses connote the appropriateness of the proposed project.

The supportive governmental policies for the Lālāmilo Project are offset by inherent existing inadequacies in the public infrastructure systems including the heavy traffic on vicinity roadways, limited water supply, overcrowded public schools, limited parks and recreational facilities. These

offsetting factors are mitigated by roadway improvements, water source development, new park facilities, and participation with the Department of Education through a monetary contribution the provision of land to Kanu o ka ʻĀina charter school to address the overcrowded conditions at the local schools.

8.4 POTENTIAL UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Adverse environmental effects would potentially occur as a result of the project.

Land Use Character. Community concerns have been raised that Waimea is undergoing a gradual land use change from a small rural town to a more diversified community. The Lālāmilo Project with 442 residential lots 10,000 square feet in area would contribute to this cumulative land transformation. This unavoidable impact would be offset by the rural standards and design guidelines which are planned. A key element of the rural quality is maintaining open spaces with landscaping and appropriate building design. The 16 acres of land previously planned for commercial and light industrial uses will remain in agricultural uses for pasturing livestock; this significant change to the plan represents a major mitigation measure is addressing the issue of land use character of rural Waimea.

Visual Resources. The vacant property, with the exception of the limited agricultural use, would be transformed from a natural open area to a residential neighborhood. Community concerns which have been raised include the need for building and design standards to avoid visual clutter and inappropriate building materials . Additional concerns of the adjacent residents include the loss of the unrestricted vistas they presently enjoy. CCRs for design standards, well maintained open spaces, and overall property management will help to mitigate some of the visual impacts; however, the general development would create an unavoidable visual impact of a changed landscape. The removal of the 16 acres of commercial and industrial uses alleviates the concern of the Hawaii Preparatory Academy as they prepare their plans to relocate their Lower and Middle Schools to their recently acquired property across Kawaihae Road from the east end of the Project Site.

Archaeological and Historic Resources. The Lālāmilo Agricultural Field Complex is prevalent on these lands and the surrounding adjacent lands. To mitigate the effects of construction specific preservation of significant sites will include portions of the Lālāmilo Agricultural Field Complex, a basalt quarry site, and burials; these total approximately 20 acres of the Lālāmilo property. Prior to construction mitigation plans for Data Recovery and Preservation, as well as a Burial Treatment Plan would be prepared, reviewed and approved before the commencement of grading.

Impacts to Streams. Without best management practices (BMPs) and appropriate mitigative measures, the Lālāmilo Project has the potential to create adverse impacts to the bordering streams. These impacts would be minimized however, because extensive measures will be implemented to control erosion, storm water and chemical use on the site.

The preferred Alternative A consisting of 442 residential lots requires a contained wastewater treatment facility. A sewage treatment plant and effluent disposal area will significantly reduce impacts to the Keanuʻiʻomanō and Waikoloa Streams. Treated effluent (reclaimed wastewater) will be disposed on an adjacent site (to be acquired) and disposal will be set apart from streams. All waste water generated by the project will be treated in a manner meeting State Department of Health

standards and will be subject to a separate environmental review process.

Construction of culverts may become necessary if bridging is not possible or is infeasible. Stream alteration would be unavoidable; however, impacts would be mitigated through measures to be taken and specified in permit applications prior to any construction. In addition, a water quality monitoring regimen in accordance with the Department of Health's requirements will be implemented during in-stream construction of culverts, as necessary.

Air Quality. During construction, the project will unavoidably contribute to air pollutant concentrations due to fugitive dust releases on construction areas, however, appropriate mitigative measures including frequent watering of exposed surfaces will help to establish controls. Over the long-term operation of the project, future project related and ambient traffic even during worst-case conditions are expected to remain within the national and the state standards.

Noise. The project will generate short-term noise impacts during the construction period and long-term noise associated with residential life and activities. All requirements of the County and the State would be met to minimize the impacts.

8.5 POTENTIAL ADVERSE EFFECTS ON PUBLIC SERVICES AND FACILITIES

Roadways and Traffic. Traffic levels on the area roadways will increase as the project achieves buildout. The traffic in the vicinity of the proposed project is generally expected to increase by 3.83 percent per year to the Year 2012 without the proposed project. The Levels of Service during the peak hours of traffic on Kawaihae Road are not expected to be affected by traffic generated by the proposed project; however the peak hour v/c ratios are expected to increase as a result of the development of the proposed project. With the addition of two additional access points from the Ka La Loa and Lālāmilo House Lots Subdivisions, the existing intersection of Kawaihae Road and Akulani Street is not expected to be adversely impacted by traffic generated by the proposed project. Access to the existing Lālāmilo House Lots and Ka La Leo Subdivisions is anticipated to improve by providing the two new access points with the proposed extension of Alaneo Street in the east and west directions. The traffic improvements recommended in this study are expected to mitigate the expected traffic impacts resulting from the development of the proposed Lālāmilo Residential Lots.

Schools. The Alternative A plan which includes 442 residential lots will be phased over a seven year period from 2003 to 2010. The projected population of 1,300 to 1,500 people is anticipate to include 180 to 288 students in elementary, middle, and high school. Due to the rapid growth in the Waimea area over the past 20 years, and the existing crowded conditions at the pubic elementary and middle public schools, the added number of students from the project is expected to have a significant impact on schools in the area.

DHHL recognizes the existing overcrowded condition of the local schools and is committed to improving educational conditions in Waimea through a monetary contribution to the Department of Education to address the impact of new students from the Lālāmilo Project and has provided 15 acres to Kanu o ka ʻĀina Charter School for a permanent campus on Hawaiian Homestead land at Puʻukapu.

Potable Water. The Lālāmilo Project will create an additional demand for potable water on the County Department of Water Supply's Waimea system. The water resources study for the project has identified the availability of high level groundwater at the DLNR Well No. 6240-02 above Waimea town that would be capable of providing the 215,100 gallons per day required by the Alternative A, 10,000 square feet plan at buildout.

8.6 UNRESOLVED ISSUES

Density. The preferred Alternative A consisting of 442 residential lots is anticipated to be selected; however, the final determination is unresolved at this time. This environmental document has based all studies on the higher density alternative. The ultimate decision on density will be by the Hawaiian Homes Commission and will be based on the costs associated with the development and operation of a community wastewater treatment plant.

Wastewater Treatment. The Project's ultimate density and lot size will determine the method of wastewater treatment. Alternative B, consisting of 121 1-acre lots (and 34 lots in the RS-10 zoned parcels) would qualify for individual septic/leachfield systems; whereas, the preferred Alternative A would require a community sewage treatment facility to treat and dispose its wastewater. The final determination on the Project's density will also determine the method of wastewater treatment. A wastewater treatment facility on adjacent land to be acquired by DHHL would require compliance to Chapter 343, HRS prior to construction.

Potable Water. The water resource study for the project has indicated that a high level groundwater source is available within the project region. Water commitments to meet the potable water demand of 215,100 gallons per day will be pursued through the development of additional water resources in the area in coordination with the Department of Land and Natural Resources and the County Department of Water Supply. DHHL has initiated coordination with DLNR and the County in source development as required to meet the projected Project requirement; however, final resolution will require time and the issue remains unresolved at the present time. The Project schedule allows water and wastewater infrastructure development between 2003 - 2006.

Schools. The decision on the density of the Project also would also affect the number of students that the Lālāmilo Project would generate and consequently the amount DHHL would contribute towards Department of Education facilities.

Site Preservation Measures. A complete archaeological inventory survey has been conducted for the 248.9- acre property. Based on the field survey, limited data recovery and subsurface testing, initial significance determinations and treatment recommendations were provided. The survey report has been submitted to DLNR State Historic Preservation Division (SHPD) for review and approval. Although the property has been thoroughly surveyed for the presence of archaeological sites, and evaluated for their potential historic or cultural significance, the specific measures for site preservation and appropriate buffer treatment will be determined through discussions with the Historic Preservation Division and the Hawai'i Island Burial Council. DHHL will continue to work closely with the Historic Preservation Division, in gaining full appreciation of the archaeological sites and preparing a comprehensive plan for site protection and preservation.

9 Parties Consulted and Those Who Participated in the EIS Process

9.0 PARTIES CONSULTED AND THOSE WHO PARTICIPATED IN THE EIS PROCESS

In the course of planning for this Project, agencies (or agency documents) were consulted and/or provided information for the preparation of this environmental impact statement. In addition, presentations were made to the Waimea community on three occasions and coordination during the EISPN and DEIS comment periods involved community interaction.

9.1 COUNTY OF HAWAI'I

County Council (Leningrad Elarionoff)
Department of Environmental Management
Department of Parks and Recreation
Department of Public Works
Department of Research and Development
Department of Transportation
Department of Water Supply
Fire Department
Office of the Mayor (Hilo and Kona)
Planning Department (Hilo and Kona)
Police Department

9.2 STATE OF HAWAI'I

Community Development Corporation of Hawai'i
Department of Accounting and General Services
Department of Agriculture
Department of Business, Economic Development and Tourism
Department of Business, Economic Development and Tourism, State Office of Planning
Department of Business, Economic Development and Tourism, State Energy Office
Department of Defense, Civil Defense Office
Department of Education
Department of Health
Department of Land and Natural Resources, Commission on Water Resources Management
Department of Land and Natural Resources, Land Division
Department of Land and Natural Resources, Office of the Chair
Department of Land and Natural Resources, State Historic Preservation Division
Department of Transportation, Highways Division
Office of Environmental Quality Control
Office of the Governor
Office of Hawaiian Affairs

9.3 FEDERAL

U.S. Army Corps of Engineers, Pacific Ocean Division

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)
U.S. Department of the Interior, Fish and Wildlife Services

9.4 UTILITIES

Hawai'i Electric Light Company (HELCO)
Sandwich Isles Communications (SIC)

9.5 UNIVERSITY OF HAWAI'I

University of Hawai'i, Environmental Center
University of Hawai'i, Water Resources Research Center

9 .6 COMMUNITY ORGANIZATIONS/INDIVIDUALS/CONSULTED PARTIES

Organizations

Tom & Mare Grace, "Aaah, the views" Bed and Breakfast
Hamakua Complex - members of DOE schools (Cindy Shiraki etal)
Hawaii Preparatory Academy - Headmaster
Kamuela Museum
Kamuela View Estates (Sheila Sumaylo)
Kanu o ka 'Āina
South Kohala Traffic Safety Committee
Waimea Community Association
Waimea Community Association, Planning and Design Committee
Waimea Hawaiian Homesteader's Association
Waimea Preservation Association
Waimea Trails and Greenways

Individuals

Alexandra Bernstein
Steve Bowles
Junah Boda
Steve Coffee, MEd
Pamela Davis
Richard Ednie
Robert & May Itamoto
Roku & Hazel Kanekuni
Janet Lam
Roy Mattos
Leonora Rainbow and neighbors
Jack Ramos, Palekoki Ranch, Inc.
Jim Rizutto
Rosie Sakamoto

Consulted Parties

Greg R. Mooers, Mooers Enterprises, LLC
Hawaii Preparatory Academy through Roy A. Vitousek, Esq. And Mooers Enterprises, LLC
Hui Kako'o Ho'opulapula and Bruce Tsuchida (Townscape, Inc.)
Roy A. Vitousek, Esq.
Sandalwood Homeowners' Association
Waiaka Hui
Waimea Outdoor Circle

10

Lālāmilo PROJECT

List of Preparers

10.0 LIST OF PREPARERS

The Department of Hawaiian Home Lands is the Applicant and Developer of the Lālāmilo Project.

Raynard C. Soon	Chairman, Hawaiian Homes Commission
Cleighton Goo	Temporary Development Assistance Group Branch Chief
Amy Arakaki	Project Manager

The EIS has been prepared by PBR HAWAII, Hilo Lagoon Center, Suite 310, 101 Aupuni Street, Hilo, Hawai'i 96720. The staff involved in the preparation of this document included:

Frank Brandt, FASLA	Principal in Charge
James M. Leonard, AICP	Principal, Hilo Office
Yukie Y. Ohashi	Project Manager
Scott Abrigo	Master Planning
Kanai'a Nakamura	Graphic Designer
Etsuyo Kila	CAD Planner
Sue Keohokapu	Administrative Support
Rose Agbayani	Administrative Assistance/Production

Several key technical consultants were retained to provide specific assessment of environmental factors for this project. These consultants, their company affiliation, and their specialty are listed below:

Name	Firm	Area of Expertise
Tom Nance, P.E.	Tom Nance Water Resource Engineering	Preliminary Engineering
Randall Okaneku, P.E.	The Traffic Management Consultant	Traffic Impact Analysis
Barry Neal	B.D. Neal & Associates	Air Quality Assessment
Alan Haun. Ph.D.	Haun & Associates	Archaeology and Cultural Impact Assessment
Berna Cabacungan	Earthplan	Social Impact Assessment
Winona Char	Char & Associates	Botanical Survey
Tim Ohashi	Tim Ohashi Wildlife Biologist	Wildlife Survey
Ron Englund	Bishop Museum, Hawai'i Biological Survey	Stream Survey

11 References

11.0 REFERENCES

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Char, Winona P. (February 2002) *Botanical Survey, Lālāmilo Residential Lots and Commercial/Industrial Mixed Uses.* Char & Associates, Honolulu, Hawai'i

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Haun, A.E., Ph.D. and K. McGuire, B.A. (February 2002) *Cultural Impact Assessment, DHHL Residential Development at Lālāmilo, South Kohala District, Island of Hawai'i (TMK: 6-6-01: 10 54 & 77, and TMK: 6-6-06:12-17).* Haun & Associates, Kea'au, Hawai'i

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Neal, B.D. (July 2002) *Air Quality Study for the Proposed Department of Hawaiian Home Lands Lālāmilo Project.* B.D. Neal & Associates, Honolulu, Hawai'i

Ohashi, Tim J. (March 10, 2002) *Wildlife Survey, Lālāmilo Subdivision, Waimea, Hawai'i.* Volcano, Hawai'i

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12 Comments and Responses on the EISPN

Lalamilo PROJECT

12.0 COMMENTS AND RESPONSES - EISPN

12.1 STATE OF HAWAI'I

Department of Accounting and General Services
Department of Agriculture
Department of Business, Economic Development & Tourism - Energy, Resources & Technology Division
Department of Business, Economic Development & Tourism - Office of Planning
Department of Defense - Civil Defense
Department of Education
Department of Health
Department of Land & Natural Resources - Historic Preservation Division
Department of Land & Natural Resources - Land Division
Department of Transportation
Office of Environmental Quality Control
Office of Hawaiian Affairs

12.2 COUNTY OF HAWAI'I

Department of Parks and Recreation
Fire Department
Leningrad Elarionoff, Councilmember of the District
Planning Department, County of Hawai'i
Police Department
Department of Water Supply

12.3 COMMUNITY

Organizations
Hamakua Complex - members of DOE schools
Hawaii Preparatory Academy through Roy A. Vitousek, Esq.
Hui Kako'o 'Āina Ho'opulapula
Sandalwood Homeowners Association
Sandwich Isles Communications, Inc.
South Kohala Traffic Safety Committee
Waiaka Hui
Waimea Community Association
Waimea Community Association, Planning and Design Committee
Waimea Outdoor Circle
Waimea Trails and Greenways

Individuals
Steve Coffee, MEd
Mare Grace, "Aaah, the views" Bed and Breakfast
Janet Lam
Greg R. Mooers, Mooers Enterprises, LLC
Leonora Rainbow and neighbors

BENJAMIN J. CAYETANO
GOVERNOR

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

GLENN M. OKIMOTO
COMPTROLLER

MARY ALICE EVANS
DEPUTY COMPTROLLER

LETTER NO. (P)1008.2

JAN - 8 2002

RECEIVED
JAN 10 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

MEMORANDUM

TO: The Honorable Raynard Soon
Chairman
Department of Hawaiian Home Lands

FROM: Glenn M. Okimoto
State Comptroller

SUBJECT: Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses
Environmental Impact Preparation Notice

Thank you for the opportunity to review the Environmental Impact Preparation Notice for the subject project.

The project does not impact any of the Department of Accounting and General Services projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Planning Branch at 586-0488.

c: Ms. Yukie Ohashi, PBR Hawaii
Ms. Genevieve Salmonson, OEQC

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

August 7, 2002

To: Mr. Glenn M. Okimoto, State Comptroller
Department of Accounting and General Services

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 8, 2002 on the EISPN for our proposed development at Lalamilo.

We note your comment that the subject project does not impact any of the Department of Accounting and General Services projects or existing facilities.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
Governor

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 South King Street
Honolulu, Hawaii 96814-2512

JAMES J. NAKATANI
Chairperson, Board of Agriculture

LETITIA N. UYEHARA
Deputy to the Chairperson

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96823-215

Fax: (808) 973-9613

January 9, 2002

To: Raynard Soon, Chairperson
Department of Hawaiian Home Lands

From: James J. Nakatani, Chairperson
Board of Agriculture

Subject: Environmental Impact Statement Preparation Notice
Lalamilo Residential Lots and Commercial/Industrial Area
TMK: 6-6-01: 10, 54, 77
6-6-04: 12-17 Lalamilo, Hawaii
Area: 265.388 acres

The Department of Agriculture has reviewed the subject document and offers the following comments.

The eastern end of the subject project adjoins the northwestern edge of the 280-acre Lalamilo Farmlots. The Farmlots is the largest contiguous, intensively cultivated, diversified agriculture production area on the island. The proposed use on the eastern end of the project area is industrial/commercial, scheduled as the third phase of development (2006-2010). Upon its development and prior to leasing, we recommend that businesses be advised of the existence of nearby farms and that their normal operations may emit odors, noise, and dust. Phase I of the residential portion of the project appears to be no less than a thousand feet distant from the nearest farm. This distance may be sufficient to minimize the likelihood of nuisance complaints.

Should you have any questions, please contact Earl Yamamoto at 973-9466.

c: OEQC
PBR Hawaii

IslamiloEN1.s02

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

August 7, 2002

To: Mr. James J. Nakatani, Chairperson
Department of Agriculture

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 9, 2002 on the EISPN for our proposed development at Lalamilo.

Due to the proximity of the proposed commercial and light industrial uses to the Lalamilo Farmlots, upon development and prior to leasing, prospective tenants would be advised of the existence of nearby farms and that their normal operations may emit odors, noise, and dust.

We appreciate your participation in the environmental review process.

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

BENJAMIN J. CAYETANO
Governor
SELI F. NAYA
Director
SHARON S. NAKAMATSU
Deputy Director
DAVID W. BLANE
Director, Office of Planning

Energy, Resources & Technology Division
235 South Beretania Street, Leiopapa A Kamehameha Bldg., 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, HI 96804-2359
Web site: www.hawaii.gov/dbedt/ert

Telephone: (808) 587-3807
FAX: (808) 587-3820

December 27, 2001

RECEIVED
JAN 10 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raymond Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attn: Ms. Amy Arakaki

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses
Tax Map Keys: 6-6-01: 10, 54 & 77; 6-6-04: 12-17

Thank you for the opportunity to comment on the EISPN for the Lalamilo Residential and Commercial/Industrial Mixed Use site development project. Our comments are addressed to (1) State energy conservation goals, (2) energy saving design practices and technologies, and (3) recycling and recycled-content products.

(1) Energy conservation goals. Project buildings, activities, and site grounds should be designed with energy saving considerations. The mandate for such consideration is found in Chapter 344, HRS ("State Environmental Policy") and Chapter 226 ("Hawaii State Planning Act"). In particular, we would like to call to your attention HRS 226 18(c)(4) which includes a State objective of promoting all cost-effective energy conservation through adoption of energy-efficient practices and technologies.

The County of Hawaii has an Energy Code and we would suggest that you consider that in implementing your project. Hawaii Electric Light Co. may also have demand-side management programs that offer rebates for energy efficient technologies.

(2) Energy saving design practices and technologies. In this project, we recommend that you specifically address energy efficient design practices and technologies similar to those used in the "BuiltGreen" energy efficient home in Waianae. Some of the methods and technologies that could be considered during the design phase of the project include:

a. Use of site shading, orientation, and use of naturally ventilated areas to reduce cooling load;

b. Maximum use of day lighting;
c. Use of high efficiency compact fluorescent lighting;
d. Use of high wattage metal halide lighting for sports and recreational areas;
e. Exceed Energy Code requirements; and
f. Technologies such as solar water heating systems, roof insulation, radiant barriers, and energy efficient windows.

(3) Recycling and recycled-content products.
a. Develop a job-site recycling plan for the construction phase of the project and recycle as much construction and demolition waste as possible;
b. Incorporate provisions for recycling into the built project – a collection system and space for bins for recyclable;
c. Specify and use products with recycled-content such as: steel, concrete aggregate fill, drywall, carpet and glass tile; and
d. Specify and use locally produced products such as plastic lumber, hydromulch, soil amendment and glass tile.

Sincerely,

Maurice H. Kaya
Energy, Resources, and Technology
Program Administrator

c: OEQC
PBR-Hawaii, Hilo Office

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Maurice H. Kaya, Program Administrator
Energy, Resources, and Technology Division
Department of Business, Economic Development & Tourism

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated December 27, 2002 on the EISPN for our proposed development at Lalamilo. Your comments are addressed to (1) State energy conservation goals, (2) energy saving design practices and technologies, and (3) recycling and recycled-content products.

1. Energy conservation goals. The project's Design Phase will integrate applicable and feasible components of the County of Hawaii Energy Code and any Hawaii Electric Light Company's demand-side management programs that offer rebates for energy efficient technologies.

2. Energy saving design practices and technologies. The measures which you recommend will be considered in the design of the project.

3. Recycling and recycled-content products. DHHL supports recycling efforts and will promote recycling and utilize recycled-content products, to the extent feasible.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR
SELHI F. NAYA, PH.D.
DIRECTOR
SHARON S. HARIMATSU
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. 9344

January 17, 2002

RECEIVED
JAN 23 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

To: Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands

Attn: Ms. Amy Arakaki

From: David W. Blane,
Director, Office of Planning

Subject: Lalamilo Residential and Commercial/Industrial Mixed Use Project,
TMK: 6-6-01: 10, 54, 77; 6-6-04: 12-17

The Office of Planning has reviewed the Environmental Assessment (EA) for the Lalamilo Project. The document also serves as an Environmental Impact Statement Preparation Notice (EISPN). The Project consists of 265.4 acres of State land owned by the Department of Hawaiian Home Lands (DHHL) and the Department of Land and Natural Resources (DLNR). DHHL is proposing to build a 400-lot housing subdivision on 232.5 acres. Then on neighboring lots, they are proposing development of one commercial and two industrial parcels. The property runs parallel to the Kawaihae Road (Highway 19) close to where it intersects with the Kohala Mountain Road (Highway 250).

Most of the property is in the State Agricultural District, except for some areas adjacent to the Kawaihae Road and adjacent to an existing subdivision, which are in the State Urban District.

The EA/EISPN contains numerous maps but they are all roughly the same scale. It would be helpful to include one map on a smaller scale that illustrates the proximity of the project site to the commercial center of Waimea. This more regional map could also illustrate the proposed route of the Waimea By-Pass Road, especially since one proposed easement connection to the Road is on the east boundary of the project.

It would also be helpful if some maps were on a larger scale so that the three streams that were described as forming the boundaries of the project could be more easily identified. A map more clearly identifying the neighboring housing subdivisions would also be helpful, especially

with the clear labeling of streets across the highway and streets that will serve as entries to the project.

Thank you for the opportunity to comment. Should you have any questions, please call Heidi Meeker at 587-2802.

c: Genevieve K.Y. Salmonson, Office of Environmental Quality Control
✔ Yukie Ohashi, PBR Hawaii

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. David W. Blane, Director
Office of Planning
Department of Business, Economic Development & Tourism

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 17, 2002 on the EISPN for our proposed development at Lalamilo.

1. The completion of a detailed topographic surveyed map and physical site studies, have allowed us to refine the Lalamilo plan (revised plan is included in the Draft EIS). One of the major changes to the plan is the elimination of the non-contiguous 16.5+ acre Parcel 10 which was proposed for light industrial uses. DHHL, in deference to the requests of the County Parks Department and the Waimea Trails and Greenways committee, has removed this parcel from the project. At this time we are working with the County and the community on their partial use of this parcel for a trailhead.

2. Additional maps are included in the Draft EIS, including a Site Characteristics map which shows the streams, the neighboring residential subdivisions and streets in the vicinity of the project. At this time the proposed Waimea ByPass Road alignment has not been specified; thus we are unable to depict its location on a map.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

MAJOR GENERAL EDWARD L. CORREA, JR.
DIRECTOR OF CIVIL DEFENSE

EDWARD T. TEIXEIRA
VICE DIRECTOR OF CIVIL DEFENSE

STATE OF HAWAII
DEPARTMENT OF DEFENSE
OFFICE OF THE DIRECTOR OF CIVIL DEFENSE
3949 DIAMOND HEAD ROAD
HONOLULU, HAWAII 96816-4495

PHONE (808) 733-4300
FAX (808) 733-4287

January 24, 2002

RECEIVED
JAN 2 5 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attention: Ms. Amy Arakaki

Dear Mr. Soon:

ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE (EISPN), LALAMILO

Thank you for the opportunity to comment on the EISPN for Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses, South Kohala, Hawaii, TMK 6-6-01: 10, 54, and 77; 6-6-04: 12-17.

The location of the subdivision has inadequate outdoor warning siren coverage. Request that the developer include a 118 DBC, solar powered outdoor warning siren on the grounds of the park located at the far northwest corner of this project.

State Civil Defense (SCD) technicians and planners are available to assist and answer questions you may have. Please call Mr. Norman Ogasawara, SCD, at 733-4300, extension 531, if you need assistance.

Sincerely,

EDWARD T. TEIXEIRA
Vice Director of Civil Defense

c: Ms. Yukie Ohashi, PBR Hawaii
Office of Environmental Quality Control
Hawaii Civil Defense Agency

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Edward T. Texeira, Vice Director of Civil Defense
Office of the Director of Civil Defense
Department of Defense

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 24, 2002 on the EISPN for our proposed development at Lalamilo.

We will coordinate with your State Civil Defense office in the appropriate siting of a 118 DBC solar powered outdoor warning siren on the parcel planned for Park uses.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

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

OFFICE OF THE SUPERINTENDENT

January 3, 2002

RECEIVED
JAN 14 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

02 JAN -7 A9:29
DEPT. OF HAWAIIAN HOME LANDS

MEMO TO: The Honorable Raynard C. Soon, Chairman
Department of Hawaiian Home Lands

F R O M: Patricia Hamamoto, Superintendent
Department of Education

SUBJECT: Lalamilo Residential Lots - EISPN

The Department of Education (DOE) offers the following comments on the subject environmental impact statement preparation notice:

1. The proposed 400 single-family Homestead lots are projected to generate 100 elementary students, 40 middle school students, and 40 high school students.

2. We understand that Phase I (200 units) is expected to be constructed in the 2002-03 period. Phase II (200 units) is expected to be constructed in the 2004-05 period.

3. The schools affected by the proposed development are:

School	2001 Capacity	2001 Enrollment
Waimea Elementary	831	590
Waimea Middle	407	501
Honokaa High and Intermediate	1,085	784

3. DOE recognizes that the Department of Hawaiian Home Lands is not subject to our fair-share requirements. Nonetheless, we would appreciate your consideration in mitigating some of the project's impact upon the schools via facilities upgrades or other improvements.

Thank you for the opportunity to comment. If you have any questions, please call Mr. Sanford Beppu at 733-4862.

PH:SB:hy

cc: A. Suga, DAS
K. Kameoka, DLTSS

[redacted]
PATRICIA HAMAMOTO
SUPERINTENDENT

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Ms. Patricia Hamamoto, Superintendent
Department of Education

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 3, 2002 on the EISPN for our proposed development at Lalamilo.

1. We have clarified the student projection numbers through the social impact assessment which has been prepared for the EIS. As shown on the table below, the low end estimates, provided by the State Department of Education, Facilities Branch, utilizes a general formula for quantifying a "fair share" requirement to determine the project impact on the school system.

The "high end" estimates, provided by the DOE, Statistical Research Branch, is based on a truer household size and population estimate of similar projects (e.g. other Hawaiian Home Lands neighborhoods).

	Low end (based on fair share standards used to calculate developer contributions)	High end (based on averages in comparable areas)
Elementary	100	180
Middle	40	52
High	40	56
Total	180	288

Thus, the range of students of all grade levels is 180 to 288, with the "high end" number being more likely.

We recognize the critical nature of the crowded schools. Thus, DHHL has publicly announced that the department is working with the State Department of Education and the Kanu O ka Aina Charter School to see how we can participate in improving educational conditions in Waimea.

2. The number of residential lots has been revised to 442. The Phase 1 initial construction of 34 homes between 2003 - 2005, and the remaining Phase 2 construction of 408 homes between 2006 - 2010.

Thank you again for your comments; we appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M
DIRECTOR OF HEALTH

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

In reply, please refer to:
File

01-196/cpo

February 15, 2002

Mr. Raynard Soon, Chair
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

DEPT. OF HAWAIIAN HOME LANDS
'02 FEB 19 A9:14

Dear Mr. Soon:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
Lalamilo, South Kohala, Hawaii
Tax Map Key: (3) 6-6-01: 10, 54 & 57; (3) 6-6-04: 12-17

Thank you for the opportunity to review and comment on the subject proposal. The EISPN was routed to the various branches of the Environmental Health Administration. We have the following comments:

Clean Water Branch (CWB)

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...", pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act");

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following discharges to waters of the State:

   a. Discharge of storm water runoff associated with industrial activities, as define in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

   b. Discharge of storm water runoff associated with construction activities that involve the disturbance of five (5) acres or greater, including clearing, grading, and excavation;

c. Discharge of treated effluent from leaking underground storage tank remedial activities;

d. Discharge of once through cooling water less than one million gallons per day;

e. Discharge of hydro-testing water;

f. Discharge of construction dewatering effluent;

g. Discharge of treated effluent from petroleum bulk stations and terminals; and

h. Discharge of treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters. Discharges shall be permissible following issuance of a Notice of General Permit Coverage;

3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharges of storm water runoff into State waters; and

4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-4309.

Wastewater Branch (WWB)

The project site is located in the critical wastewater disposal area with five (5) acres per lot. Due to the number of lots involved, a centralized wastewater treatment works would be required. We recommend that the Department of Hawaiian Home Lands contact the owners/operators of the Waimea WWTP and investigate the feasibility of connecting to this facility.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Wastewater Branch at (808) 586-4294.

Clean Air Branch (CAB)

There is a significant potential for fugitive dust emissions during the removal of vegetation, grading, trenching, excavation and construction activities. It is recommended that a dust control management plan be developed which identifies and addresses those activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of construction is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

Fugitive Dust Control:

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads; and

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: CWB
WWB
CAB

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Gary Gill, Deputy Director
Environmental Health Administration
Department of Health

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated February 15, 2002 on the EISPN for our proposed development at Lalamilo.

Clean Water Branch (CWB)

1. Stream crossings by bridges or culverts will be necessary to access the property. Should stream alteration to construct culverts be required, federal and state permits including Section 404, Clean Water Act compliance and the associated State Section 401, Water Quality Certification will be requested.

2. Compliance with the National Pollutant Discharge Elimination System (NPDES) general permit coverage is anticipated for disturbance including clearing and grading. A Notice of Intent (NOI) will be filed at least 30 days prior to the commencement of any grading activities.

3. Construction of an area greater than one (1) acre is anticipated after March 10, 2003. A NOI will be filed for NPDES compliance.

4. Wastewater options for the project may include a treatment facility and effluent reuse on land or individual septic / leachfield systems. Discharge of wastewater into State waters will be prohibited.

Wastewater Branch (WWB)

1. A centralized wastewater treatment facility is under consideration for the project's preferred Alternative A consisting of 442 residential units.

2. All wastewater plans will conform to the applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." Detailed plans will be submitted to the WWB for review.

Clean Air Branch (CAB)

1. A dust control management plan will be developed which identifies and addresses the activities that have a potential to generate fugitive dust. Further, adequate dust control measures during all phases of construction, and including on roadways, will be implemented.

2. Construction activities will comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.33, Fugitive Dust.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAMELAMELA
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AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

January 4, 2002

Mr. Raynard Soon
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

RECEIVED
JAN 14 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

LOG NO: 28912
DOC NO: 0201PM04

Dear Mr. Soon:

SUBJECT: Environmental Impact Statement Preparation Notice for Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
Lalamilo, South Kohala, Hawaii
TMK: 6-6-01:10, 54, 77; 6-6-04:12-17

Thank you for submitting for our review and comment a copy of the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lalamilo Residential Lots and Commercial/Industrial Mixed Uses Project. We are aware that an archaeological inventory survey of the proposed project area has been undertaken as State of Hawaii site numbers have already been assigned.

Section 5.1 of the EISPN notes that descriptions and maps of the archaeological sites identified in the inventory survey will be included in the Draft EIS and that the conceptual master plan for the project will contain mitigation proposals made in consultation with our office. The EISPN notes that a cultural impact assessment is also being undertaken and will be described in the Draft EIS.

We look forward to receipt of the archaeological inventory survey report for our review and approval. If you or your archaeological consultant should have any questions about this project please contact our Hawaii Island archaeologist, Patrick McCoy (692-8029).

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:jen

c Office of Environmental Quality Control
PBR Hawaii
Christopher Yuen, Hawaii County Planning Department

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 4, 2002 on the EISPN for our proposed development at Lalamilo.

The archaeological inventory survey and the cultural impact assessment reports will be appended to the Draft EIS. We note that the archaeological inventory survey report has been submitted to your office by Haun & Associates. The mitigation proposal includes three areas of 20+ acres which would be preserved in perpetuity. In addition, burial sites will also be preserved in place with access provisions for any lineal descendants.

We appreciate your participation in the environmental review process.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

February 11, 2002

LOG/159/749/287/441/497
LALAMILOPROJECT

LD-NAV
DHHLNHHTMK661.RCH

PBR Hawaii
Ms. Yukie Ohashi
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

Dear Ms. Ohashi:

SUBJECT: Environmental Assessment - EIS Preparation Notice (EIS)
Applicant: Department of Hawaiian Home Lands
Authority: Governor, State of Hawaii
Project: Lalamilo Residential Lots, Commercial and Industrial Mixed Uses
Location: Lalamilo, Waimea, South Kohala, Hawaii
TMK: 3rd/ 6-6-1 various and 6-6-4 various

Thank you for the opportunity to review and comment on the subject Draft Environmental Assessment (DEA).

A copy of the subject document covering the proposed project was transmitted to the following Department of Land and Natural Resources' Divisions for their review and comment:

- Division of Aquatic Resources
- Division of Forestry and Wildlife
- Division of State Parks
- Commission on Water Resource Management
- Land Division Engineering Branch
- Land Division Planning and Technical Services
- Land Division Hawaii District Land Office

Attached is a copy of the Division of Aquatic Resources, Division of Forestry and Wildlife, Commission on Water Resource Management and Land Division Engineering Branch comment. Historic Preservation had previously commented on the subject matter (copy attached).

The Department of Land and Natural Resources has no other comment to offer. Should you have any questions, please contact Nick Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

HARRY M. YADA
Acting Administrator

c: Hawaii District Land Office

Suspense Date: Tuesday June 9, 1998

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii

MEMORANDUM

To: William Devick, Administrator, WD
From: Richard Sixberry, Aquatic Biologist RS
Subject: Comments on EA/EIS Preparation Notice

Comments Requested By: Harry Yada, Land Management

Date of Request: 1/14/02 Date Received: 1/14/02

Summary of Project

Title: Lalamilo Residential Lots

Proj. By: Dept. Of Hawaiian Home Lands

Location: South Kohala, Hawaii

Brief Description:

The applicant proposes to develop approximately 265-acres, located in Lalamilo, Waimea, S. Kohala into a project consisting of residential use, industrial & commercial activities, a park, and open space.

Comments:

We will review the DEIS when it is completed and comment on any significant impacts adverse to aquatic resource values,including the nearby abutting streams, at a later date.

Although the EA/EIS Preparation Notice describes briefly the proposed project, we suggest the forthcoming DEIS discuss in detail potential short term impacts and propose specific means for averting or minimizing adverse effects, and provide possible mitigation for unavoidable damage to natural resource values.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii

January 14, 2002

LD/NAV/LOG159
Ref.: DHHLNHHTMK32139.COM Suspense Date: 2/11/02

MEMORANDUM:

TO: XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Historic Preservation Division (RD)
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Hawaii District Land Office

FROM: Harry W. Yada, Acting Administrator
Land Division

SUBJECT: Review: Environmental Assessment - EIS Preparation Notice (EIS)
Applicant: Department of Hawaiian Home Lands
Authority: Governor, State of Hawaii
Proposed: Lalamilo Residential Lots, Commercial and Industrial Mixed Uses
Location: Lalamilo, Waimea, S. Kohala, Hawaii
Tax Map Key: (3) 6-6-1 various and 6-6-4 various

Please review the attached copy of the Environmental Assessment covering the **Department of Hawaiian Home Lands "Lalamilo" project** and submit your comments (if any) on Division letterhead (signed and dated) within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(X) We have no comments.
The draft EIS will provide botanical + wildlife surveys and it will be at this time that DOFAW will complete its comments on this project

( ) Comments attached.

Signed: [signature]
DOFAW Administrator
Date: 1/15/02

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE S. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

RECEIVED
LAND DIVISION
2002 JAN -4 A 11: 54

January 31, 2002

TO: Mr. Harry Yada, Acting Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Environmental Assessment – EIS Preparation Notice, DHHL Lalamilo Project

FILE NO.: DHHLNHHTMK32139.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[x] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[x] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[x] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[x] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Ryan Imata at 587-0255.

LNR-LAND DIVISION
ENGINEERING BRANCH

COMMENTS

LD/NAV/LOG159
REF.: DHHLNHHTMK32139.COM

Please correct the Community-Panel Numbers for the project site indicated on page 24, paragraph 2 of the EISPN. The correct Community-Panel Numbers for the project site, according to FEMA Flood Insurance Rate Map are 155166 0163 C (Not Printed) and 155166 0164 D. The project site is located in Zones X and A. Zone X is an area determined to be outside the 500-year flood plain (Not shaded) while Zone A is an area where base flood elevations are determined.

The proposed project must comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances. If there are questions regarding the NFIP, please contact the State Coordinator, Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, please contact the applicable County representative.

The Draft Environmental Impact Statement (DEIS) should include project water demand and infrastructure required to meet water demands.

We reserve the right to provide additional comments upon review of the Draft Environmental Impact Statement (DEIS) and/or flood study/EIS-level drainage assessment.

M:\WLD\MAKAI\SUZIE\HI\LalamiloRes.Lots.DHHL.Hawaii59.DOC

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

January 4, 2002

Mr. Raynard Soon
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

LOG NO: 28912
DOC NO: 0201PM04

Dear Mr. Soon:

SUBJECT: Environmental Impact Statement Preparation Notice for Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
Lalamilo, South Kohala, Hawaii
TMK: 6-6-01:10, 54, 77; 6-6-04:12-17

Thank you for submitting for our review and comment a copy of the Environmental Impact Statement Preparation Notice (EISPN) for the proposed Lalamilo Residential Lots and Commercial/Industrial Mixed Uses Project. We are aware that an archaeological inventory survey of the proposed project area has been undertaken as State of Hawaii site numbers have already been assigned.

Section 5.1 of the EISPN notes that descriptions and maps of the archaeological sites identified in the inventory survey will be included in the Draft EIS and that the conceptual master plan for the project will contain mitigation proposals made in consultation with our office. The EISPN notes that a cultural impact assessment is also being undertaken and will be described in the Draft EIS.

We look forward to receipt of the archaeological inventory survey report for our review and approval. If you or your archaeological consultant should have any questions about this project please contact our Hawaii Island archaeologist, Patrick McCoy (692-8029).

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:jen

c Office of Environmental Quality Control
Yukie Ohashi, PBR Hawaii
Christopher Yuen, Hawaii County Planning Department

JAN 11 2002

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Harry Yada, Acting Administrator
Land Division
Department of Land and Natural Resources

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated February 11, 2002 on the EISPN for our proposed development at Lalamilo. This responds to the comments of the following DLNR Divisions.

Division of Aquatic Resources

A survey of the Waikoloa and Keanuiomano Streams which border the subject property has been completed and is included in the Draft EIS. The Draft EIS also describes the potential short term impacts and proposes measures to avert or minimize adverse effects, as well as mitigate unavoidable impacts to resource values.

Division of Forestry and Wildlife

The Draft EIS includes the completed botanical and wildlife surveys.

Commission on Water Resource Management

DHHL and its consultants PBR Hawaii and Tom Nance Water Resource Engineering have initiated discussions with the County of Hawaii Department of Water Supply and DLNR regarding water resource development for this project. Actions to request water related

permits would be taken at the appropriate time following the cooperative discussions.

Stream crossings by bridges or culverts will be necessary to access the property. Should stream alteration to construct culverts be required, a Stream Channel Alteration Permit will be requested.

Land Division Engineering Branch

A drainage analysis for EIS planning purposes has been completed to establish the flood boundaries on the property. This information, as well as the corrected FEMA Community-Panel Numbers, is included in the Draft EIS.

The project intends to comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances.

A preliminary engineering study has calculated the water demand for the project; this information is described in the Draft EIS.

Historic Preservation Division

A separate response to the comments of the Historic Preservation Division is attached for your use.

We thank you and appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
JEAN L. OSHITA
JADINE Y. URASAKI

IN REPLY REFER TO:

HWY-PS
2.5513

JAN 3 1 2002

RECEIVED
FEB 01 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

TO: THE HONORABLE RAYNARD C. SOON, CHAIR
DEPARTMENT OF HAWAIIAN HOME LANDS

ATTN: MS. AMY ARAKAKI

FROM: BRIAN K. MINAAI
DIRECTOR OF TRANSPORTATION

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE AND ENVIRONMENTAL ASSESSMENT, LALAMILO: RESIDENTIAL LOTS AND COMMERCIAL/INDUSTRIAL MIXED USES, WAIMEA, SOUTH KOHALA, TMK: 6-6-01: 10, 54, 77; 6-6-04: 12-17

Thank you for requesting our review and comments on the proposed residential, commercial, and industrial mixed use development.

We have the following comments:

1. The access intersections for the proposed project's access road should provide for left-turn storage and deceleration lanes on Kawaihae Road to provide safety and to maintain the traffic flow along Kawaihae Road.

2. A 20-foot wide setback should be observed along the project frontage with Kawaihae Road to allow for future roadway improvements.

3. The draft environmental impact statement (including the traffic impact analysis report) should also be sent to the Highways Division, Hawaii District Engineer.

4. Construction plans for all work done within Kawaihae Road rights-of-way must be submitted to us for our review and approval.

5. To prevent future conflicts, this project must be coordinated with our Waiaka Stream Bridge Replacement and Realignment project.

If there are any questions regarding our comments, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

c: Ms. Yukie Ohashi, PBR Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Brian K. Minaai, Director
Department of Transportaion

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 31, 2002 on the EISPN for our proposed development at Lalamilo. We have prepared responses to the points you raised and have addressed them in the Draft EIS.

1. Left-turn storage and deceleration lanes on Kawaihae Road at the west and east access intersections of the project's spine road are planned and will be designed during the Design Phase.

2. A 20 - foot wide setback along project frontage on Kawaihae Road would be reserved for future highway widening.

3. The Draft EIS will include the traffic impact analysis report by The Traffic Management Consultant. A copy will be sent to the Hawaii District Engineer.

4. Construction plans for all work which is anticipated within Kawaihae Road rights-of-way will be submitted to the Head Planning Engineer, Highways Division.

5. DHHL staff has met with your Highways -Planning Section and your engineering consultant to coordinate planning of DHHL and your Waiaka Bridge / Kawaihae Road realignment projects. We appreciate the effort for continued coordination.

We thank you and appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMO
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

January 14, 2002

Raynard Soon
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, Hawaii 96805

Attn: Amy Arakaki

Dear Mr. Soon:

Subject: Environmental impact statement (EIS) preparation notice
Lalamilo Lots, Waimea, South Kohala

Please include the following in the draft EIS:

1. Two-sided pages: In order to reduce bulk and save on paper, please consider printing on both sides of the pages in the EIS.

2. Correspondence: In the draft EIS be sure to enclose copies of all correspondence with those consulted during the pre-consultation phase of the preparation notice.

3. Figures and tables:

   a. Figure 5 (*LUPAG Map*) shows areas of "intensive agriculture" and "extensive agriculture." In the section on land use patterns, please explain the difference between these two designations.

   b. To Table 4 (*Permits and Approvals*) indicate the dates or expected dates of issuance of the various permits.

4. Industrial/commercial uses: In section 2.2.3 of the draft EIS, discuss more fully the industrial and commercial uses this project could contain. If it is not possible to predict them, discuss the permitted uses for these types of zoning.

5. Development timetable: Section 2.3 uses the term "order of magnitude" discussing costs. What does this term mean?

6. Energy consumption: The analysis in Section 7.0 notes that the project will require additional energy consumption. In the draft EIS include a brief discussion of this increase, including the probable volume of consumption.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Yukie Ohashi, PBR Hilo

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation
Notice

Thank you for providing your comments dated January 14, 2002 on the EISPN for our proposed development at Lalamilo.

1. Two-sided pages. The EIS will be printed on both sides of the page to reduce bulk and save on paper.

2. Correspondence. All correspondence on the Project's EISPN will be addressed and included in the Draft EIS.

3. Figures and tables. Figure 5 (LUPAG map)and Table 5 (Permits and Approvals) will be revised to clarify designations and specify expected dates of issuance of permits.

4. Industrial/commercial uses. The Draft EIS will specify the County Neighborhood Commercial zoning district and the uses that are permitted therein as potential types of businesses that may become tenants of the commercial/industrial areas.

5. Development timetable. The "order of magnitude" or broadbrush cost of infrastructure development of $28 million has been estimated by Rider Hunt for this project. This will be specified in the Draft EIS.

6. Energy consumption. Additional electrical energy related information will be described in the Draft EIS.

We appreciate your participation in the environmental review process.

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD01-422

January 2, 2002

Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

Subject: EIS Preparation Notice
Lalamilo: Residental Lots and Commercial/Industrial Mixed Uses

Dear Mr. Soon:

Thank you for the opportunity to comment on the above-referenced project.

If the project involves the use of Federal funds, the project may implicate Section 106 of the National Historic Preservation Act. If Section 106 consultation is required, please submit a written request to OHA's Administrator.

OHA looks forward to reviewing the draft EIS and offering substantive comments on the project at that time. If you have any questions, please contact Sharla Manley, policy analyst at 594-1944.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

CK: sam

cc: OHA Board of Trustees
Clyde W. Namu'o, Administrator
Kona CAC
Hilo CAC

DEPT. OF HAWAIIAN HOME LANDS
'02 JAN 29 P12:42

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

To: Mr. Colin C. Kippin, Jr., Deputy Administrator
Office of Hawaiian Affairs

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 2, 2002 on the EISPN for our proposed development at Lalamilo.

Should Federal funds be utilized for the development of this project, Section 106 consultation will be implemented, as appropriate.

We appreciate your participation in the environmental review process.

Harry Kim
Mayor

Patricia G. Engelhard
Director

Pamela N. Mizuno
Deputy Director

County of Hawai'i
DEPARTMENT OF PARKS AND RECREATION
25 Aupuni Street, Room 210 • Hilo, Hawai'i 96720-4252
(808) 961-8311 • Fax (808) 961-8411

RECEIVED
JAN 2 1 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 18, 2002

Honorable Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attn: Amy Arakaki

Re: EISPN for Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
Lalamilo, South Kohala, Hawaii

Dear Chairman Soon:

The County of Hawaii, through its Department of Parks and Recreation, and the Waimea community, have been working together for a number of years on the Waimea Trails and Greenways project.

The proposed alignment of the trail system follows the Waikoloa Stream, in the vicinity of the DHHL project, and we have been in communication with the Department of Land and Natural Resources and the lessee of TMK: 6-6-01:10 on the potential use of this parcel as a trailhead park. Since this portion of the trail would accommodate equestrian use, the trailhead park would include parking and other facilities and also serve as a major access point along the trail.

It is noted that the DHHL plan designates this particular parcel for industrial use. We humbly request that the DHHL reconsider its use of this parcel and support the County's effort to acquire and develop this parcel as a trailhead park. However, if this parcel is essential to the success of your project, we request that a portion of the parcel be made available to accommodate trail users.

Thank you for the opportunity to provide input on your project.

We request to remain a consulted party and we would appreciate receiving a copy of the Draft EIS when available.

Sincerely,

Patricia G. Engelhard
Director

cc Harry Kim, Mayor, County of Hawaii
Leningrad Elarionoff, Hawaii County Councilman
Christopher Yuen, Planning Director, County of Hawaii
Office of Environmental Quality Control
PBR Hawaii
Clem Lam, Waimea Main Street
Kaz Shigezawa, Landscape Images

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Patricia Englehard, Director
Department of Parks and Recreation
County of Hawaii
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

Dear Ms. Englehard:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 18, 2002 on the EISPN for our proposed development at Lalamilo.

In deference to the requests of the County and the community regarding the Waimea Trails and Greenways project, we are no longer including TMK: 6-6-01:10 as part of the DHHL Lalamilo Project. We have met with Mr. Roy Takemoto of the Planning Department and Mr. Glen Miyao of your staff, as well as members of the Waimea community regarding the use of Parcel 10 as a trailhead and we are very optimistic that an agreeable solution can be arranged to achieve our respective goals.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII
345 KEKUANAOA STREET, SUITE 20 • HILO, HAWAII 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

January 3, 2002

RECEIVED
JAN 0 4 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
ATTENTION: MS. AMY ARAKAKI
State of Hawaii
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

ENVIRONMENTAL ASSESSMENT AND EIS PREPARATION NOTICE FOR LALAMILO: RESIDENTIAL LOTS AND COMMERCIAL/INDUSTRIAL MIXED USES SOUTH KOHALA, ISLAND OF HAWAII
TAX MAP KEY: 6-6-001: 10, 54 & 77; 6-6-4: 12 to 17

We have reviewed the subject document and water availability conditions for the Waimea water system are such that the Department's existing water system can not support the proposed development. The environmental assessment states that the draft environmental impact statement will have an evaluation of the project's water requirements. We will have further comments once we have reviewed the draft environmental impact statement.

If you have any questions, please contact our Water Resources and Planning Branch at 961-8070, extension 1.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

BCM:cuf

copy - Office of Environmental Quality Control
Planning Department
PBR Hawaii

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Milton D. Pavao, P.E., Manager
Department of Water Supply
County of Hawaii
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 96720

Dear Mr. Pavao:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 3, 2002 on the EISPN for our proposed development at Lalamilo.

The preliminary engineering and water system analysis for the EIS has been prepared by Tom Nance Water Resource Engineering and is included in the Draft EIS. The engineering report makes recommendations for a County and State coordinated development of water facilities. DHHL looks forward to working with the County Department of Water Supply in addressing the water needs for this project.

We will be happy to provide a copy of the Nance report to your Water Resources and Planning Branch. Thank you again for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Edward Bumatay
Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

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PBR HAWAII
PHILLIPS BRANDT REDDICK

December 27, 2001

Mr. Raymond Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813
Attention: Ms. Amy Arakaki

Governor, State of Hawaii
State Capitol
415 South Beretania Street
Honolulu, HI 96813
Attention: Office of Environmental Quality Control

Subject: **EISPN – LALAMILO: RESIDENTIAL LOTS & COMMERCIAL/ INDUSTRIAL MIXED USES**
SOUTH HILO, ISLAND OF HAWAII
TAX MAP KEY: 6-6-01:10, 54 & 77; 6-6-04:12-17

We have no comments on the above-referenced project.

EDWARD BUMATAY
Fire Chief

EB/mo

cc: PBR Hawaii, Attention: Ms. Yukie Ohashi
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

August 7, 2002

Mr. Edward Bumatay, Fire Chief
Fire Department
25 Aupuni Street, Suite 103
Hilo, Hawaii 96720

Dear Mr. Bumatay:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated December 27, 2002 on the EISPN for our proposed development at Lalamilo. We note that you do not have any comments on the project.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

LENINGRAD ELARIONOFF
Councilman

COUNTY COUNCIL
County of Hawai'i
Hawai'i County Building
25 Aupuni Street
Hilo, Hawai'i 96720

Phone: (808) 961-8265
FAX: (808) 961-8912

RECEIVED
JAN 0 7 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 4, 2002

Mr. Raymond Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawai'i 96813

Dear Mr. Soon,

I applaud the Office of Hawaiian Affairs in their effort to provide house lots for people of Hawaiian ancestry. The proposal to provide lots in Kamuela is good. The location chosen for the lots has set backs that need to be addressed.

1. The influx of children into this community from a housing project in the past has had a negative impact especially in the established school system. There needs to be some form of social and academic acclamation of the new families to ease the transition and the acceptance factor. It is not socially sufficient to just dump new families into an established community.

2. There is some question in the selection of the housing site. Does the site location have anything to do with the fact the Freddy Rice's home is located directly across the street?

3. The local Power Company (HELCO) maintains a power generation plant upwind and adjacent to the project. When fired up, the residents will be subjected to the fumes generated by the diesel generators.

4. Besides the power plant, an old landfill located upwind still smolders to this day saturating the area with undesirable odors depending on wind conditions.

5. The local Solid Waste Transfer Station is also located upwind and adjacent to the proposed project site contributing to the stench common with this type of operations. Associated with this transfer station are the flies and rats that breed in that environment.

DISTRICT 9
Kohala, Waimea, Waikoloa, Kawaihae

6. The most serious and sensitive issue is the concern about your proposal for Residential/Commercial/Industrial mixed uses. This contradicts with the effort to maintain the area as a more rural residential location that centers around the more "local Waimea look."

7. There is a growing opposition as word spreads about this project and the comparison made to the negative visual impact the Kawaihae Hawaiian Homes project has made in the minds of our residents.

While the project may be honorable, the project site chosen will subject the Hawaiians to measures not conducive to wholesome planning and self-confidence. My comments are based on the fact that I have lived both down wind and up wind to the above mentioned amenities. As the County Council Representative for this area, I am reminded of the discomforts associated with this location through the complaints received.

Thank you for the opportunity to make comments. Should you have any questions, please feel free to contact me.

Sincerely,

Leningrad Blarionoff
Council Member, District 9
Hawai'i County Council

LE/pnb

Xc: The Honorable Ben Cayetano, Governor, State of Hawai'i
PBR Hawai'i
John Ray
Clem Lam

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYMARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Leningrad Blarionoff, Councilmember, District 9
Hawaii County Council
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Blarionoff:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 4, 2002 on the EISPN for our proposed development at Lalamilo.

As you are aware, DHHL is faced with the need to provide homesteads for over 19,000 native Hawaiian beneficiaries, including approximately 1,500 applicants who have identified North Hawaii as their first choice for a Residential Lot. The Department has several properties in the area, at Kawaihae, Honokaia, and the subject Lalamilo property in Waimea. Lalamilo offers the best prospect for near term development. We recognize the issues and are working to resolve or mitigate impacts which may result.

1. A social impact assessment (SIA) has been prepared for the EIS. The SIA recognizes and affirms the growth in population of the Waimea area and the less than adequate public facilities, including the overcrowded public schools and shortage in recreational facilities. The SIA also analyzes community integration of new residents into an established community while still maintaining and enhancing the small-town environment of Waimea today.

2. This parcel is part of the overall settlement package to restore the Hawaiian Home Lands Trust. Its selection was based on the current General Plan designation of Urban Expansion and the potential for development within a reasonable timeframe.

3. An air quality study has been completed for the EIS. This study analyzed the potential impacts of the HELCO operations

on the proposed project area and found that by extending the height of the power plant's stacks to meet good engineering practices (GEP), much of the fumes would be taken upward in the aerodynamic flows on the prevailing winds. It is our intent to make this recommendation to the Department of Health during HELCO's permit renewal process.

4. The air quality study also assessed the impact of the old landfill on the surrounding project area and concluded that the nuisance odors can be mitigated by more frequent covering with soil in areas where slumping has occurred due to the underground fire.

5. The County compacts and removes the trash in the transfer station containers on a regular basis, thus, eliminating nuisance odors and vector problems. The air quality study identified odor as a potential nuisance; however, due to the regular maintenance by County personnel odor is generally not detected at this facility.

6. With the removal of Parcel 10 from the project we have reduced the land area for commercial and light industrial uses by approximately half. These uses will provide a buffer between the adjacent heavy industrial uses (i.e., HELCO power plant, old landfill, and solid waste transfer station) as well as create long-term revenue generation potential for the homesteading program. Design guidelines to assure compatibility with the rural character will be implemented in this development.

7. Our recent residential developments have integrated design standards which are enforced by conditions, covenants, and restrictions (CCRs). These include Kaniohale at the Villages of Laiopua at Kealakehe, Kalawahine Streamside in Honolulu, and recent construction in Kapolei. We will work with the County on appropriate rural design standards (i.e., road widths, grass swales, and sensitive street lighting).

We thank you again for your comments and we appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii

PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

RECEIVED
JAN 25 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 17, 2002

Mr. Raynard Soon
Department of Hawaiian Home Lands
1099 Alakea Street, 20th floor
Honolulu, HI 96813

Dear Mr. Soon:

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Request: Comments for Lalamilo Residential, Commercial/Industrial Uses
TMK: 6-6-01: 10, 54, 77; 6-6-04: 12-17

This is to acknowledge receipt of the above-referenced environmental assessment for the development of residential homestead lots and commercial/industrial uses in Lalamilo, Waimea, South Kohala. Our comments are as follows:

We agree that the subject property is located in the State Land Use Agricultural and Urban districts and zoned Agricultural (A-5a) and Residential (RS-10) by the County. The property is not located in the Special Management Area (SMA). In reviewing the location of the proposed commercial and industrial uses, we would prefer that the commercial area proposed for DHHL lands be kept at a very small neighborhood scale that primarily serves the immediate residential area, rather than creating a new commercial center that would detract from the Waimea core, where a commercial area has already been established. A traffic impact analysis report should be included to discuss the project's impact on existing roadways and proposed alignments of the Mamalahoa Highway ByPass and new Waimea-Kawaihae Road. We recommend that infrastructure requirements be further evaluated in the draft environmental impact statement.

Thank you for the opportunity to provide comments. Please call this department at 961-8288 if you have any questions.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

PF:CJY:pak
p:\wpwin60\ch343\2002\DEALalamilo02-01.doc

cc: PBR Hawaii Hilo Office (Ms. Yukie Ohashi)
Office of Environmental Quality Control
West Hawaii Office
Long Range Planning

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Christopher J. Yuen, Planning Director
Planning Department
County of Hawaii
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720

Dear Mr. Yuen:

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 17, 2002 on the EISPN for our proposed development at Lalamilo.

The proposed commercial uses are limited to less than 5 acres and would conform to uses specified in the Neighborhood Commercial zoning district, similar to other CN zoned areas in Waimea to serve the immediate residential areas. It is not intended to be a new commercial center that detracts from the established business core in Waimea Town.

Current congested traffic conditions at the Lindsay Road intersection in he center of town is due to funneling of traffic from the Mamalahoa Road and Kawaihae Road highway systems. The large volume of traffic on these roadways contribute to the heavy traffic conditions on Kawaihae Road near the Project vicinity.

When the Waimea ByPass system, including the Waimea-Kawaihae leg, is implemented, these conditions would be greatly alleviated. However, there has been little progress in the status of this State project. Since the completion of the ByPass is not anticipated within the timeframe of our Lalamilo

Project (2003 - 2012), the traffic impact analysis report (TIAR) does not evaluate the future roadway conditions with a completed ByPass road. The TIAR will be appended to the Draft EIS which is presently being completed.

The TIAR recommends measures that would mitigate for the Project's additional traffic impact on the area roadways. These include left-turn storage and deceleration lanes on Kawaihae Road at the west and east access intersections of the project's spine road and at the South Kohala Distribution Road; details will be specified during the Design Phase.

We appreciate the Planning Department's participation in the environmental review process. We look forward to working with you and your staff on this and other DHHL projects.

Aloha,

Ben Henderson for

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

James S. Correa
Police Chief

County of Hawaii
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-8865

RECEIVED
JAN 2 5 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 24, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attention: Ms. Amy Arakaki

Dear Mr. Soon:

SUBJECT: LALAMILO-RESIDENTIAL LOTS AND COMMERCIAL/ INDUSTRIAL MIXED USES; TMK 6-6-01: 10,54 & 77; 6-6-04: 12-17

Staff has reviewed the above referenced proposal and found that there are no concerns with the planned development.

Thank you for the opportunity to comment.

Sincerely,

JAMES S. CORREA
POLICE CHIEF

DAVID A. KAWAUCHI
MAJOR
FIELD OPERATIONS BUREAU, AREA I

RKK:lk

cc: Ms. Yukie Ohashi, PBR Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. James S. Correa, Police Chief
Mr. David A. Kawauchi, Major, Field Operations Bureau, Area 1
Police Department
County of Hawaii
349 Kapiolani Street
Hilo, Hawaii 96720-3998

Dear Chief Correa and Major Kawauchi:

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 24, 2002 on the EISPN for our proposed development at Lalamilo. We note your statement that the Police have no concerns with the planned development.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

DEPT. OF HAWAIIAN HOME LANDS

'02 JAN 28 A8:41

January 23, 2002

MEMO TO: The Honorable Raynard C. Soon
Chairman, Dept. of Hawaiian Home Lands

SUBJECT: Lalamilo Residential Lots - EISPN

As parents, community members, and long-standing participants in the planning and administration of schools in the Hamakua Complex, we are deeply concerned that the student numbers projected for families moving into the planned Lalamilo Hawaiian Homelands development are woefully low.

We believe that these figures should be re-evaluated. Any planning done using them can only exacerbate the already existing problem of school facilities which fall well short of the real need.

Please feel free to contact Mr. John Znamierowski (Waimea Middle School principal), at 887-6090, or Mr. Art Souza (Waikoloa Elementary School principal) at 883-0237 if you have any questions.

Thank you for the opportunity to comment, and for your time.

Sincerely,

Cindy Shiraki
Waimea School parent

Art Souza
Waikoloa Elementary School principal

John Znamierowski
Waimea Middle School principal

David Anderson
Paauilo Community member

Beverly Castillo
Waimea School PTSA president

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Cindy Shiraki, Waimea School Parent
Mr. Art Souza, Waikoloa Elementary School Principal
Mr. John Znamierowski, Waimea Middle School Principal
Mr. David Anderson, Paauilo Community Member
Ms. Beverly Castillo, Waimea School PTSA President
PO Box 2949
Kamuela, Hawaii 96743

Dear Messrs. Art Souza, John Znamierowski and David Anderson,
Ms. Cindy Shiraki and Ms. Beverly Castillo:

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation
Notice

Thank you for providing your comments dated January 23, 2002 on the EISPN for our proposed development at Lalamilo. We have clarified the student projection numbers through the social impact assessment which has been prepared for the EIS.

As shown on the table below, the low end estimates, provided by the State Department of Education, Facilities Branch, utilizes a general formula for quantifying a "fair share" requirement to determine the project impact on the school system.

The "high end" estimates, provided by the DOE, Statistical Research Branch, is based on a truer household size and population estimate of similar projects (e.g. other Hawaiian Home Lands neighborhoods).

	Low end (based on fair share standards used to calculate developer contributions)	High end (based on averages in comparable areas)
Elementary	100	180
Middle	40	52
High	40	56
Total	180	288

Thus, the expected range of students at all grade levels is 180 to 288, with the "high end" number being more likely.

We recognize the critical nature of the crowded schools. Thus, DHHL has publicly announced that the department is working with the State Department of Education and the Kanu o ka Aina Charter School to see how we can participate in improving educational conditions in Waimea.

Thank you again. We appreciate your participation in the environmental review process.

Aloha,

for Raynard C. Soon, Chairman
Hawaiian Homes Commission

ROY A. VITOUSEK, ESQ.
75-170 Hualalai Road, Suite B-303
Kailua-Kona, Hawaii 96740
(808) 329-5811
January 3, 2002

The Hon. Benjamin J. Cayetano
Governor of Hawaii
c/o Office of Environmental Quality Control
Leiopapa A. Kamehameha, Suite 702
235 S. Beretania Street
Honolulu, Hawaii 96813

Yukie Ohashi
PBR Hawaii
101 Aupuni Street
Hilo, Hawaii 96720

RECEIVED
JAN 14 2002
PBR HAWAII
PHILLIPS BRANOT REDDICK

Re: Environmental Impact Statement Preparation Notices (EISPN)
Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
South Kohala, Island of Hawaii
TMK (3) 6-6-01:10, 54, & 77; 6-6-04: 12-17

This letter is written on behalf of the Hawaii Preparatory Academy (HPA) requesting that HPA be a consulted party relative to the proposed Lalamilo Residential Lots and Commercial/Industrial Mixed Use Development proposed by the Department of Hawaiian Home Lands. HPA is a nonprofit corporation which operates a K-12 school on lands located north of Kawaihae Road and what appears to be the project site. HPA clearly stands to be impacted by the proposed development.

On behalf of HPA we request that HPA be a consulted party relative to the EISPN and any environmental assessment or environmental impact statement required. Further, HPA requests that the environmental impact study carefully evaluate impacts of the proposed project on existing infrastructure in the Waimea area including roads, water resources, wastewater disposal, visual impacts, loss of open space, and related issues.

It is HPA's impression that the project may cause significant adverse and environmental effects and that a full, thorough, and thoughtful environmental impact statement is required. HPA would like to participate as a consulted party in the EIS process.

As always, if you have any questions or require additional information, please contact the undersigned at 329-5811.

Very truly yours,

Roy A. Vitousek

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Roy A. Vitousek, Esq.
Hawaii Preparatory Academy
75-170 Hualalai Road, Suite B-303
Kailua-Kona, Hawaii 96740

Dear Mr. Vitousek:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 3, 2002 on the EISPN for our proposed development at Lalamilo. By way of this letter and future correspondence, we will continue to inform the Hawaii Preparatory Academy as a consulted party of our progress. Similarly, we are requesting that the Hawaii Preparatory Academy reciprocate and inform us of its relocation plans for its Lower and Middle Schools.

The Draft EIS evaluates the existing infrastructure, including vicinity roadways, water system facilities and resources, wastewater treatment and disposal, visual impacts and impacts to open space, as well as other related issues. The Draft EIS will be sent to you for transmittal and review by Hawaii Preparatory Academy.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Kanu o ka 'Āina New Century Public Charter School
65-1170 Opelo Road w P.O.Box 398 wKamuela, Hawai'i 96743
Phone/Facsimile: (808) 887-8144 w E-mail: ku@kalo.org

FAXED 2/11/02

DATE: 21 January 2002

PBR Hawai'i
Attn: Ms. Yukie Ohashi
101 Aupuni Street
Hilo Lagoon Center, Suite 310
Hilo, Hawai'i 96720-4276

RE: Environmental Assessment – EIS Preparation Notice for Lālāmilo Residential Lots and Commercial/Industrial Mixed Uses

This letter is to inform you of our concerns regarding the lack of community facilities in the current Environmental Assessment – EIS Preparation Notice for the Lālāmilo Residential Lots and Commercial / Industrial Mixes Uses. As discussed at our meeting on January 17 and explicated in the partnership proposal submitted to you and Department of Hawaiian Homes Land Management Division Acting Branch Manager Linda Chinn, Kanu o ka 'Āina New Century Public Charter School would be delighted to work together with you and the Department of Hawaiian Homes in establishing a culturally-driven, sustainable learning center for all community members at the Lālāmilo site, to assure the creation of a viable Hawaiian homes community at Lālāmilo.

Sincerely,

Kū Kahakalau,
Director

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOSEE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Ku Kahakalau, Director
Kanu o ka Aina
New Century Public Charter School
P. O. Box 398
Kamuela, Hawaii 96743

Dear Ms. Kahakalau:

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo.

1. Community Facilities - A Community Center facility including a building for community gatherings is planned on a 1.8-acre parcel which is adjacent to an 8.8-acre Park site. The development of these facilities is anticipated in Phase 2 (2006-2008). This is described in the Draft EIS for the project.

2. Partnership Proposal - The Department supports your commitment towards education and we anticipate that our future residents of Lalamilo will benefit from the opportunities of the Charter School and other educational facilities in Waimea. Although, the subject Lalamilo property is committed to residential and commercial/industrial uses, we will continue to work with your organization to find a suitable site on other DHHL lands in Waimea.

We look forward to a long-lasting relationship with Kanu o ka Aina and we appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

SANDALWOOD HOMEOWNERS ASSOCIATION
%PROPERTY MANAGEMENT HAWAII, INC.
77-6435 KUAKINI HWY,
KAILUA-KONA, HI 96740
(808) 329-6488

RECEIVED
JAN 18 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 16, 2002

The Hon. Benjamin J. Cayetano
Governor of Hawaii
%Office of Environmental Quality Control
Leiopapa A. Kamehameha, Suite 702
235 S. Beretania Street
Honolulu, HI 96813

Yukie Ohashi
PBR Hawaii
101 Aupuni Street
Hilo, HI 96720

Re: Environmental Impact Statement Preparation Notices (EISPN)
Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
South Kohala, Island of Hawaii
TMK: (3) 6-6-01:10, 54, & 77; 6-6-04: 12-17

This letter is written on behalf of the Sandalwood Homeowners Association requesting that Sandalwood be a consulted party relative to the proposed Lalamilo Residential Lots and Commercial/Industrial Mixed Use Development proposed by the Department of Hawaiian Home Lands. Sandalwood is a nonprofit corporation, homeowners association on lands located adjacent to the project site. Sandalwood clearly stands to be impacted by the proposed development.

On behalf of Sandalwood we request that Sandalwood be consulted party relative to the EISPN and any environmental assessment or environmental impact statement required. Further, Sandalwood requests that the environmental impact study carefully evaluate impacts of the proposed project on existing infrastructure in the Waimea area including roads, water resources, wastewater disposal, visual impacts, loss of open space, and related issues.

It is Sandalwood's impression that the project may cause significant adverse and environmental effects and that a full, thorough, and thoughtful environmental impact statement is required. Sandalwood would like to participate as a consulted party in the EIS process.

Sincerely,

Balbi Brooks
President
Sandalwood Homeowners Association

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Balbi Brooks, President
Sandalwood Homeowners Association
C/o Property Management Hawaii, Inc.
77-6435 Kuakini Highway
Kailua-Kona, Hawaii 96740

Dear Ms. Brooks:

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 16, 2002 on the EISPN for our proposed development at Lalamilo. By way of this letter and future correspondence, we will continue to inform the Sandalwood Homeowners Association of our progress.

Parcel 10 (TMK: 6-6-01:10), is the non-contiguous parcel which is adjacent to Sandalwood. In deference to the requests of the County and the community regarding the Waimea Trails and Greenways project, we are no longer including Parcel 10 as part of the DHHL Lalamilo Project. We have met with County officials and Waimea Trails and Greenways members regarding the use of Parcel 10 as a trailhead and we are very optimistic that an agreeable solution can be arranged to achieve our respective goals.

The Draft EIS evaluates the existing infrastructure, including vicinity roadways, water system facilities and resources, wastewater treatment and disposal, visual impacts and impacts to open space, as well as other related issues. The Draft EIS will be sent to you for your review.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Sandwich Isles Communications, Inc.
A Wiisana Company

DEPT. OF HAWAIIAN HOME LANDS
'01 DEC 28 A10:20

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

December 27, 2001

RECEIVED
JAN 14 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon
Chairman
Department of Hawaiian Home Lands
20th Floor
1099 Alakea Street
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement Preparation Notice (EISPN)
Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses

Dear Mr. Soon:

Thank you for the opportunity to comment on the EISPN.

Although we have no comments at this time, we would like to remain as a consulted party in the development of the EIS.

Sincerely,

Sandwich Isles Communications, Inc.

Kauhi Keliiaa
Chief Network Officer

KK:jgc

1001 Bishop Street, Pauahi Tower 27th Floor, Honolulu, HI 96813 – (808) 524-8400 – Fax (808) 599-4653
email: info@sandwichisles.com

August 7, 2002

Mr. Kauhi Keliiaa, Chief Network Officer
Sandwich Isles Communications, Inc.
1001 Bishop Street
Pauahi Tower 27th Floor
Honolulu, Hawaii 96813

Dear Mr. Keliiaa:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your letter dated December 27, 2001 on the EISPN for our proposed development at Lalamilo. As requested, we will keep you informed of our EIS process.

We appreciate your participation in the environmental review process.

Aloha,

p~ Raynard C. Soon, Chairman
Hawaiian Homes Commission

SOUTH KOHALA TRAFFIC SAFETY

PO BOX 1680 ≈ KAMU'ELA, HI 96743

January 21st, 2002

RECEIVED
JAN 2 3 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

RE: Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses

Dear Chairman Soon,

Thank you for the staff attendance at our January 8th South Kohala Traffic Safety Committee meeting. While the presentation was general and preliminary in nature, we want to work closely with DHHL to mitigate impacts of this project on the Waimea Community.

In a regional context, the Mamalahoa/Kawaihae Road highway system through Waimea is of great concern to the Community. As you are well aware, the Waimea By-Pass System has been in the planning status for over 30-years, with little progress. From a traffic safety standpoint, the Waimea/Kawaihae leg of the By-Pass System is by far the most critical in terms of traffic safety due to the road grade, the mix of personal and commercial traffic, and the heavy cross-island commuter traffic from East Hawaii to the Resort area. This major residential and commercial development on the Kawaihae side of town will have a major impact on an already aggravated system. Additionally, there are no alternative routes around the main intersection (Lindsey Road/Mamalahoa Highway). All traffic to work, shop, and attend public schools, etc. has to funnel through this intersection, as well as emergency/police, and fire vehicles.

Specifically we hope the traffic study will address overall impacts to the road system as well as the detailed intersections with Kawaihae Road. Some key points:

- Will the Kawaihae Road intersections have adequate stacking lanes and channelized features?
- Will the project take into account the realignment of Waiaka Bridge and Kawaihae Road?
- Hawaii Preparatory Academy plans to relocate its middle and lower campus directly across Kawaihae Road, adjacent to their upper campus. Will the project incorporate this added impact on Kawaihae Road?
- The County Integrated Solid Waste Plan is currently under review. The Waimea transfer station may change in scope and function. Will the project incorporate these potential impacts?
- How will the specific impacts of Commercial/Industrial development impact the road system?
- Will the Waimea Trails and Greenways Plan be incorporated into the project?
- Will DHHL fully explore all alternate circulation patterns including connections to the proposed Waimea By-pass System and utilization of "paper roads" which could provide additional options?

In regards to the design of the internal road and lighting standards, the Community very much wants to maintain the rural nature of Waimea. Hopefully DHHL will work with the County to explore standards including road width, grass shoulders and swales, low impact lighting, etc.

We look forward to working with you on this project, which hopefully will contribute to the housing options in our Community and result in a better place for all of us to live.

Thank you for the opportunity to comment on this project.

With Aloha,

JQ B. Ray

John B. Ray
Chairman
South Kohala Traffic Safety Committee
JBR/ts

Cc: PBR Hawaii, ATTN: Ms. Yukie Ohashi
Office of Environmental Quality Control
County of Hawaii, Department of Public Works, Traffic Control Division, ATTN: Casey Yanagihara
State Transportation Division, ATTN: Stanley Tamura
County Council Member Leningrad Elarionoff

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. John B. Ray, Chairman
South Kohala Traffic Safety Committee
P. O. Box 1680
Kamuela, Hawaii96743

Dear Mr. Ray:

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo. We also thank you for the opportunities provided to my staff and consultants to meet with the various committees and organizations of the Waimea community.

We recognize the congested conditions at the Lindsay Road intersection due to funneling of traffic from the Mamalahoa Road and Kawaihae Road highway system as well as the heavy traffic conditions on Kawaihae Road near the Project vicinity.

When the Waimea ByPass system, including the Waimea-Kawaihae leg, is implemented, these conditions would be greatly alleviated. However, as you point out, there has been little progress in the status of this State project. Since the completion of the ByPass is not anticipated within the timeframe of our Lalamilo Project (2003 - 2012), the traffic impact analysis report (TIAR) does not evaluate the future roadway conditions with a completed ByPass road. The TIAR will be appended to the Draft EIS which is presently being completed.

The following are specific key points addressed by the traffic study:

- Left-turn storage and deceleration lanes on Kawaihae Road at the west and east access intersections of the project's spine road are planned and will be specified during the Design Phase.

- DHHL staff have met with State Department of Transportation Highways - Planning Section and DOT's engineering consultant to coordinate our Project and the Waiaka Bridge / Kawaihae Road realignment projects.

- In discussions between our consultant, PBR Hawaii, and Mr. Greg Mooers, consultant to Hawaii Preparatory Academy, we have learned that Hawaii Preparatory Academy has not prepared any specific plans to relocate the Lower and Middle Schools at this time. Thus, the TIAR recognizes this future relocation, however, information is inadequate at this time for an assessment.

- Our proposed Alternative A site plan shows an access onto South Kohala Distribution Road to the solid waste transfer station to at least minimize the necessary trips onto Kawaihae Road from within the project. A discussion on solid waste is included in the Draft EIS.

- The TIAR trip generation projections for the afternoon peak hour traffic addresses the need for improvements on Kawaihae Road at the South Kohala Distribution Road intersection to allow for the existing as well as the future conditions that may result from the proposed commercial and industrial uses.

- In deference to the requests of the County and the Waimea Trails and Greenways committee to utilize a portion of Parcel 10 (TMK: 6-6-01:10) for equestrian access and a trailhead, we are no longer including this parcel as part of the DHHL Lalamilo Project.

- As noted above, the implementation schedule of the Waimea ByPass is unknown at this time and our need to develop residential lots for native Hawaiian beneficiaries is immediate. Thus, our options for roadway alternatives are limited at this time.

- With regard to internal roadway and lighting standards, we will be working with the county to establish rural design standards.

Again, thank you. We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

~ Waiaka Hui ~ *P.O. Box 6882 ~ Kamuela, Hawaii ~ 96743 ~*

Yukie Ohashi
PBR Hawaii - Hilo Office
101 Aupuni Street, Suite 310
Hilo, Hawaii 96720

January 21, 2002

RECEIVED
JAN 23 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Aloha ~
The Waiaka Hui is a group of people residing in the area around the Waiaka Bridge and Lanikepu Gulch, and in the neighborhoods and homes on both sides of Kawaihae Road going makai from the Kohala Mountain Road intersection. We will be directly affected by the Lalamilo Residential Lots and Commercial/Industrial Mixed Use proposal by Hawaii Department of Hawaiian Home Lands (DHHL). This letter is to notify you that the Waiaka Hui wishes to be a consultative party in the Ch. 343 EIS process.

The Waiaka Hui advocates maintaining the rural residential character of the Waiaka area, through careful land use and transportation planning, including watershed and stream protection. The Waiaka Hui advocates establishing the Waimea Trails and Greenway corridor through this area, and creating parkways along the entire length of the area's streams. The Waiaka Hui advocates that any use of this area be compatible with maintaining the rural residential character of the Waiaka area.

We live in the higher elevation part of this Waiaka watershed, by the Waiaka bridge, Lanikepu gulch, Keanuiomanu Stream and Waikoloa Stream. As these streams flow makai, they are joined by periodic flows from the Lanikepu and other gulches, through an area with extensive rock wall complexes built by native Hawaiian cultivators, through several other neighborhoods and lands further makai; and at the coast, these waters flow as one stream into the ocean at a place just north of Mauna Kea Beach hotel. Protection of the streams' environmental quality is essential to maintain the soils and habitat of the waterways, and to prevent any polluted runoff that might contaminate groundwater or near-shore waters. Protection of the historic sites is important to perpetuate the cultural history of the Waiaka area. The proposed development is located directly in this important and environmentally sensitive area.

Even though some may assert that DHHL is exempt from county codes and state law, the Waiaka Hui believes that this development should comply with all the environmental protection laws of the state of Hawaii. The Waiaka Hui wants to help make sure this is a high quality development that will enhance the area, and provide the best to DHHL beneficiaries. The Waiaka Hui hopes that DHHL will be good neighbors and design and build the finest development, with the highest standards for design and environmental sensitivity.

One of the major reasons why the Waiaka area is the best place to live is its high environmental quality. The Waiaka Hui sincerely hopes that nothing in this development would lessen this environmental quality.

Please call me at 987-5810 if there is any further information I can provide to you to ensure that the Waiaka Hui is given every opportunity to participate in the planning process and EIS procedure for this development project. The Waiaka Hui contact information is above for your information.

Best regards,

David Tarnas
Environmental Planning Committee

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. David Tarnas
Environmental Planning Committee
Waiaka Hui
P. O. Box 6882
Kamuela, Hawaii 96743

Dear Mr. Tarnas:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo. By way of this letter and future correspondence, we will continue to inform Waiaka Hui as a consulted party of our progress.

We thank you also for sharing the vision and values of the neighboring families to our proposed Lalamilo Project. The Draft EIS, which is currently being completed has studied the natural and cultural features on the property - streams, archaeological and cultural sites, flora and fauna - and the master plan has been designed to minimize negative effects, or where unavoidable, to mitigate those effects.

It is correct that DHHL has certain exemption options from State and County zoning; however, we are still required to comply with environmental laws, thus, an EIS in compliance with Chapter 343, *Hawaii Revised Statutes*, is underway. Similarly, any alteration of the streams will require compliance with federal and State laws.

As a State agency responsible for providing homes to native Hawaiian beneficiaries, we are always challenged to meet their

needs but also to become an accepted and integral part of the community.

We thank you and appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

WAIMEA COMMUNITY ASSOCIATION
P.O. Box 1680
Kamuela, Hawaii 96743

July 2, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Re: Lalamilo residential lots and commercial ' industrial mixed uses

Dear Chairman Soon,

Thank you for coming to Waimea on June 6th, and making a presentation to the Waimea Community Association on the proposed Lalamilo Project. We look forward to working with the Department of Hawaiian Home Lands to bring much needed affordable housing to the community. and in helping to address our many infrastructure deficiencies.

In considering a project of this size and the impact on a small rural community, we need to be aware of the socio-economic background of the island and the town. The following are relevant general statistics:

- Hawaii County typically leads the State on unemployment
- Hawaii County has the lowest per capita income
- Hawaii County has the lowest median household income
- Hawaii county has the highest percentage of persons in poverty- nearly twice the state average of population living below the poverty level
- The highest percentage of people living 200% below the poverty level
- The highest percentage of teen mothers (51% higher than state average)
- The highest percentage in the state – 18 years of age without a high school diploma
- The highest illiteracy rate in the state
- The highest rate of substance abuse in the state
- An infant mortality rate 15% higher than the state average
- Hawaii County has a growing domestic violence rate
- Hawaii County has a growing child abuse and neglect rate

While these statistics represent the entire island, they are fairly consistent in North Hawaii. Five Mountains Hawaii – North Hawaii Outcomes Project – April 2001 is an excellent resource document for this information. Their research strongly correlates the relationship between the lacking infrastructure and many of our social ills.

Our community has grown enormously in the past 25 years, doubling in population in the 70's and 80's. We are struggling with substantial infrastructure needs including:

- No public high school in the South Kohala District- and none planned. This creates an enormous void in terms of community and recreational infrastructure (no playing fields, no gymnasium, auditorium, etc.). It also severely limits after school activity opportunities due to the distance from the high school in Honoka'a and the lack of public transportation.

- The Waimea Elementary and Middle School complex has been grossly overcrowded for over 10 years and has no room for expansion. The lack of classroom and recreational space is critical. While a new middle school is a possibility, it's future and development timeline are uncertain.

- The only public gymnasium is a small 50-year-old structure under the DOE jurisdiction, which greatly limits its use. Our one County park (7 acres) serves as the only site for all community passive and active uses. There is no public swimming pool, and no teen or youth centers in the community.

- Our commercial infrastructure is limited. There is no bowling alley, full-time movie theater, or other recreational opportunities.

Our understanding is that the Lalamilo Project will draw from a statewide list of applicants. Please address the dynamic of such a large population moving into the community from across the state and how that will impact the overall social and cultural character of the community.

Transportation

Mamalahoa Highway / Kawaihae Road is the chief island-wide arterial that cuts through the middle of the community. It is extremely congested and characterized by a mix of local, high-speed commuter, and heavy commercial traffic. There is no alternative route around the single intersection at Mamalahoa / Lindsey Road. The Waimea By-pass, while discussed for over 30 years, is just a dream at this point and needs to be moved up on the State DOT priority list even without the proposed DHHL project. Both the Forest Products industry (wood-chips to Kawaihae), and the County Solid Waste Plan (cross-island hauling to the West Hawaii Landfill) will soon aggravate the situation even more.

Of great concern is the Project's proposed access to Kawaihae Road at the current Solid Waste Transfer Station. This access is already hazardous due to the limited sight distance as you come out of town. Your proposed commercial / industrial development in the area is extremely inappropriate from a traffic safety standpoint. It is also contrary to the entire town character by promoting commercial sprawl in this area of the community. We strongly suggest you delete this development from your plan and seek alternative sites for commercial / industrial development. Land adjacent to Mamalahoa Highway and the new proposed Kawaihae leg of the By-pass would be much more appropriate.

We also would like you to explore some other internal road connection from the Project to Mamalahoa Highway on the Kona-side of town to facilitate traffic circulation around the Lindsey Road intersection.

Visual Impacts

We support your commitment to design guidelines, CCR's, and an open space buffer along Kawaihae Road. We have volunteered to work with Hui Kako'o Aina Ho'opulapula to help facilitate community input on design issues. We hope you will explore appropriate rural standards with the County especially regarding road widths, grass swales, and sensitive lighting.

Water

Our understanding is that your potable water source will be an additional well behind Church Row. We believe this location will necessitate an additional transmission line potentially through the middle of town on Mamalahoa Highway / Kawaihae Road. Please work to mitigate this impact by either supporting an alternative delivery route, or well site (USGS Exploratory Well by Water Tank on Kawaihae Road).

In closing, we'd like to apologize for the overly negative content and tone of this letter. While the growth and infrastructure challenges posed by this project are formidable, the community very much wants to support the DHHL initiative to develop residential lots in our community. Affordable housing is greatly needed in Waimea and in North Hawaii. Perhaps most importantly, the host Hawaiian culture and people are what makes this community special.

We look forward to working with you to develop strategies to address the overall goals and needs of the DHHL and our community.

Sincerely,

John Ray

Waimea Community Association

cc: PBR Hawaii

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

RAYMARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

August 7, 2002

Mr. John Ray, President
Waimea Community Association
P. O. Box 1680
Kamuela, Hawaii 96743

Dear Mr. Ray:

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated July 2, 2002 on the updated plans for our proposed development at Lalamilo as presented to the Waimea Community Association on June 6, 2002. As a State agency responsible for providing homes to native Hawaiian beneficiaries, we are always challenged to meet their needs but also to become an accepted and integral part of the community. Therefore, we are pleased that the Waimea Community Association wishes to work with us to resolve recognized public infrastructure deficiencies.

Through the development of this project, we will contribute towards water, wastewater, and roadway system improvements, and recreational facilities to mitigate the effects of the subject project. We expect that these improvements will potentially benefit the larger Waimea community.

The following points are in response to your comments:

1. Social Character and Infrastructure Adequacy

A social impact assessment (SIA) has been prepared for the EIS. The SIA recognizes and affirms the growth in population of the Waimea area and the less than adequate public facilities, including the overcrowded public schools and shortage in recreational facilities. The SIA also analyzes community integration of new residents into an established community and maintain and enhance the small-town environment of Waimea today.

With regard to recreational facilities for our new residents and the community, a Community Center facility including a building for community gatherings is planned on a 1.8-acre parcel which is adjacent to an 8.8-acre Park site. The development of these facilities is anticipated in Phase 2 (2006-2008). Even without our Lalamilo project, the demand on existing educational facilities continues to grow. DHHL is willing to work with the Department of Education to seek solutions that will help improve educational conditions in Waimea.

With regard to schools, DHHL and Kanu o ka Aina Charter School, are evaluating several potential school sites in anticipation of the impact of our future residents on the Department of Education's Hamakua Complex. Even without our Lalamilo project, the demand on existing educational facilities continues to grow. DHHL is willing to work with the Department of Education to seek solutions that will help improve educational conditions in Waimea.

2. Transportation

We recognize the congested conditions at the Lindsay Road intersection due to funneling of traffic from the Mamalahoa Road and Kawaihae Road highway systems as well as the heavy traffic conditions on Kawaihae Road near the Project vicinity.

When the Waimea ByPass system, including the Waimea-Kawaihae leg, is implemented, these conditions would be greatly alleviated. However, as you point out, there has been little progress in the status of this State project over the past 30 years.

The traffic impact analysis report (TIAR) for the project recommends specific roadway improvements to address existing and future conditions. These include: Left-turn storage and deceleration lanes on Kawaihae Road at the west and east access intersections of the project's spine road as well as at the South Kohala Distribution Road; these improvements are planned and will be specified during the Design Phase.

An alternative internal road connection from the Project to Mamalahoa Highway to facilitate traffic circulation around the Lindsey Road intersection would require crossing over land under other ownership and potential costs that would render this project infeasible.

3. Commercial/Light Industrial Uses

With the removal of Parcel 10 from the project we have reduced the land area for commercial and light industrial uses by approximately half. These uses will provide a buffer between the adjacent heavy industrial uses (i.e., HELCO generating plant, old landfill, and solid waste transfer station) as well as create long-term revenue generation potential for the homesteading program.

4. Visual Impacts

Appropriate buffers and open space areas, as well as archaeological preservation areas, total approximately 70 acres or 30 percent of the property. Along Kawaihae Road, a three quarters of a mile length will be kept as open space and planted with native and heritage trees and shrubs.

Our recent residential developments have integrated design standards which are enforced by conditions, covenants, and restrictions (CCRs). These include Kaniohale at the Villages of Laiopua at Kealakehe, Kalawahine Streamside in Honolulu, and recent construction at Kapolei in Ewa, Oahu.

We are working with the County on appropriate rural design standards (i.e., road widths, grass swales, and sensitive street lighting).

5. Water System Improvements

The EIS engineering study has identified potential wells in Waimea and the necessary storage and transmission requirements to service this project. A detailed feasibility study to evaluate the options is planned prior to the Design Phase. This study will analyze the various alternatives which are available.

We appreciate your participation in the environmental review process.

Aloha,

Ben Henderson

Raynard C. Soon, Chairman
Hawaiian Homes Commission

January 21, 2002
Mr.Raynard C. Soon, Chairman
Hawaiian Homes Commission
P.O.Box 1879
Honolulu, HI 96805

DEPT. OF HAWAIIAN HOME LANDS

'02 JAN 23 A8:14

Dear Mr. Soon,

Thank you for your letter of January 9th and the recent visit of your staff and PBR to the South Kohala Traffic Safety Committee and Waimea Community Association Planning and Design Review Committee, regarding the proposed DHHL subdivision at Lalamilo, Waimea, South Kohala. We know it is early in the study and DEIS process, but a number of factors warrant early discussion.

South Kohala Traffic Safety Committee will be commenting separately, but the planning committee shares the concerns with additional traffic volume and congestion at the two proposed DHHL entrances to Kawaihae Road and the already crowded and inadequate Waiaka bridge on Mamalahoa highway.

The following are concerns covered at our Planning and Design Review meeting on January 8th.

1. Potable water development does not seem to reconcile with the project time line. Waimea is presently supplied with treated surface water supplemented with deep wells. We would expect some specifics on water development in the EIS process.
2. Wastewater disposal. Individual vs. community system?
3. Ordnance identification and disposal.
4. Archeological sites. Waimea was one of 2 major agricultural field systems on Hawaii island before western contact, and the inhabited center was in the area of the proposed DHHL subdivision. We hope that significant sites will be preserved and interpreted.
5. Streams. Both Keanuimano and Waikoloa streams, bordering the proposed subdivision, are significant ecological systems, and their conservation should be an integral part of the development.
6. Location. One of our members questioned the project location, stating it would be better to site the project nearer the proposed Waimea bypass to the South, with space for adequate infrastructure.
7. Schools. Guest Mr. Jon Znamierowski, Principal, noted the overcrowded conditions at Waimea Middle School, and the need for a new, up-to-date school. Another guest, Dr. Ku Kahakalau, Principal, noted the need for a permanent campus for Kanu O Ka Aina, D.O.E. New Century Charter School. Waimea School and Kanu O Ka Aina would be serving students moving into the new subdivision.
8. Social impact. Dr. Kahakalau noted the impact of, and need to address the large number of beneficiaries not part of the local Hawaiian community relocating to the new subdivision in the relatively small Waimea community.
9. Ms. Patti Cook suggested that Waimea Hawaiian Homesteaders be part of the development process(note: Waimea Hawaiian Homesteaders Association was represented by Ms. Ardis "Hoppy" Brown).

We look forward to close communication with your staff and PBR staff in the near future.

Sincerely,

Pete Hendricks, Chairman
Planning and Design Committee
Waimea Community Association
%P.O. Box 915
Kamuela, HI 96743

Xc:John Ray, President, Waimea Community Association
Yukie Ohashi, PBR Hawai'i

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Pete Hendricks, Chairman
Planning and Design Committee
Waimea Community Association
P. O. Box 915
Kamuela, Hawaii 96743

Dear Mr. Hendricks:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo.

1. The preliminary engineering study has been completed and will be included in the Draft EIS. In addition, a revised phasing and development schedule allows for water and wastewater systems development during 2003 - 2006 followed by home occupation.

2. Two density alternatives have been prepared for the Draft EIS. The preferred Alternative A consisting of 10,000 square feet lots would require a community wastewater treatment and disposal system. Such a facility would likely be located on additional State land that DHHL would acquire to the west of the subject property.

3. The Corps of Engineers has scheduled ordnance identification and disposal in this current fiscal period (October 2002 - September 2003) prior to Phase 1 construction in 2003-2004.

4. Representative portions of the Lalamilo agricultural field system will be preserved in perpetuity (total 20+ acres), as described in the archaeology inventory survey report.

5. Research for the field study of Waikoloa and Keanuiomano Streams indicate that native oopu have been identified in the upper and lower reaches of Keanuiomano Stream. Earthwork

limits would be established outside stream and floodway limits. However, in the event that bridging is not possible or feasible and culvert crossings become necessary, the design will be coordinated with the DLNR Division of Aquatic Resources.

6. DHHL is not in a position to disband the subject property for another location it does not own.

7. With regard to schools, DHHL and Kanu o ka Aina Charter School, are evaluating several potential school sites in anticipation of the impact of our future residents on the Department of Education's Hamakua Complex. We have also indicated that we would work with the DOE in identifying suitable sites for school facilities.

8. A social impact assessment (SIA) has been prepared for the EIS. The SIA recognizes and affirms the growth in population of the Waimea area and the need for community integration of new residents into an established community and maintain and enhance the small-town environment of Waimea today.

9. The suggestion that the Waimea Hawaiian Homesteaders be part of the development process is acknowledged, and contact with the homestead community has been initiated through the Hawaii Island General Plan review process.

We appreciate your participation in the environmental review process.

Aloha,

Ben Henderson

Raynard C. Soon, Chairman
Hawaiian Homes Commission

RECEIVED
JAN 2 2 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Waimea Outdoor Circle

Via Facsimile & First Class Mail:
January 21, 2002

Mr. Raynard Soon, Chairman
Dept of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Copies also sent to:
Governor, State of Hawaii
PBR Hawaii, Consultant
Office of Environmental Quality Control

Dear Mr. Soon,

Thank you for giving us the opportunity to comment on your Environmental Assessment/ EIS Preparation Notice of December 2001 for the project you are envisioning at Lalamilo in our community.

We will be looking forward to your Environmental Impact Statement, that will most certainly address many of our concerns.

We would appreciate being included in the list of Community Organizations being notified of any new and/or additional notices, and, of course the eventual Environment Impact Statement.

We are pleased to read that the project will include approximately 32 acres of parks and open spaces. We are certain they will be well planned and will include the proper irrigation systems for this arid environment. It will be important to replant as many native plants as possible and to make sure they are well taken care of so they can flourish. Please do address your plans for care and maintenance of these parks and open spaces, who will take charge of them and who will carry the costs of maintenance, water and such.

We find it most disconcerting that more commercial and industrial uses will be mixed into this residential area. Especially since this area is located in one of the most scenic areas of our community. This mix will diminish the quality of life of the new residents.

We are most concerned about the planned infrastructure requirements. Our most serious concerns are the requirements for wastewater disposal in such a close proximity of the streams. Septic systems placed so close to the streams will not suffice to keep the wastewater from seeping into the stream. We hope a proper wastewater treatment plant will be built to satisfy the Department of Health requirements as well as the well being of the new residents. We are concerned about the quality of the water in the streams, the biological life and native species therein. The suggested fording of the stream is worrisome to us as well. Please note that the Waimea Outdoor Circle is working hard to restore Waikoloa Stream as a native habitat. As a matter of fact, five local schools are involved in scientific projects under the auspices of Waimea Watershed Partners and in partnership with the Waimea Outdoor Circle at Ulu La'au the Waimea Nature Park.

Solid waste disposal will be a problem as well with landfills already at capacity. We trust that an aggressive recycling program will be included in the solid waste disposal plans.

Waimea depends on surface water for its potable water. During years of drought this becomes a problem. Do you plan to develop a well to provide potable water for the residents of the new community?

We hope you have the vision to include underground wiring in this project for the safety of the residents and for easier future maintenance. Underground wiring has been installed in the neighboring residential areas of Sandalwood and the South Kohala View Estates, thus it is of great importance to plan this for the future. The entire community will need this vision to become reality. Your help will be an important step forward.

We are most concerned about the traffic flow of the project. As you know, we already have several traffic "bottlenecks" in our community and the additional population will increase the safety hazards. The roadways into Kawaihae Road are especially worrisome. Waiaka bridge has for years been one of the most dangerous places in Waimea and the additional traffic as per your assessment must be reviewed and addressed. It will be most important to set land aside for the connector road when the by-pass highway is being built. We noticed that in parcel 10 lands is assigned for such a connector road. We trust this will be reconfirm in your EIS.

We are glad that your report points out that the natural beauty of Hawaii is one of our most valuable assets. With tourism providing the majority of our jobs, the environment of our beautiful community must be protected for all. To have the vistas of the Kohala Mountains obstructed by an industrial development next to residences is, in our opinion, a poor choice.

P.O. BOX 6144, KAMUELA, HAWAII 96743-6144

You do address the economic and social characteristics pointing out that tourism is the leading economic sector in South Kohala. If many new residents will be located in the community, where will the new jobs be created? The resorts along the Kohala Coast have reductions in their employment opportunities and we wonder where all these people will find employment.

We hope the education opportunities will be addressed in detail. At the moment Waimea Elementary and Intermediate schools are overcrowded and the private schools in town have waitlists. The influx of many new students will need to be addressed.

We have studied this assessment with interest. We want our community to be the place where we all can live and work in harmony. The many requests from your constituents to live in Waimea tell you how special it is to live in this beautiful place. We want to make sure that our new neighbors will be moving into a good and healthy environment for their families.

The Waimea Outdoor Circle is committed to keep Hawaii clean, green and beautiful.

Aloha nui loa,

Arlene Block
President

Kathrin G. Kohler
First Vice President

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Arlene Block and Ms. Kathrin G. Kohler
Waimea Outdoor Circle
P. O. Box 6144
Kamuela, Hawaii 96743-6144

Dear Ms. Block and Ms. Kohler:

Subject: **Lalamilo Project**
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 29, 2002 on the EISPN for our proposed development at Lalamilo. By way of this letter and future correspondence, we will continue to inform the Waimea Outdoor Circle as a consulted party of our progress.

- We anticipate that there will be well over 50 acres of recreation facilities and open spaces on the project. Care and maintenance of these areas will be by the Homestead Association. The Design Phase of the project will consider an irrigation system at the community center and park. Those portions of the open space areas that would be landscaped with native and heritage plants would have portable irrigation available.

- Development of the commercial and industrial areas would be subject to design guidelines specifying rural standards to integrate the Waimea visual character. Due to the adjacency of the heavy industrial uses on the South Kohala Distribution Road (e.g. HELCO power plant, old landfill, and solid waste transfer station) the Lalamilo Project plan utilizes these commercial light industrial and recreational uses to create a buffer from the residential lots. Thus, the nearest residential lot would be approximately 600 feet from the power plant. This mix of uses is intended to transition from the adjacent heavy industrial uses and is not intended to "diminish the quality of life for the new residents." The uses which would be considered would be those which fall within the Neighborhood Commercial zoning district, similar to other areas of Waimea.

- New wastewater facilities for treatment and disposal are anticipated for the project. Such facilities would mitigate the impact normally

associated with cesspools and septic systems, and thus, minimize the effect on the streams on the property.

- The new residents at Lalamilo would be encouraged to participate in recycling programs; such programs would ideally be established at the Community Center.

- Water facilities including the feasibility of water source development is being studied and would likely be required before full-scale development can occur.

- Recent DHHL residential homestead developments have been directed by standards established in Design Guidelines. For this project we will be developing rural standards which may possibly include underground wiring.

- The State Department of Transportation is presently preparing a study of Waiaka Bridge and a realignment of Kawaihae Road to increase safety at that location. Parcel 10, which contains an easement for a future connector road to the future bypass highway, is no longer part of this project.

- As directed by departmental rules, residential lots at Lalamilo will be offered to Hawaiian Home Lands applicants who are on the Hawaii Island Residential waiting list. A large majority of these applicants are established Hawaii Island residents, hence already have employment. Further, to be eligible for a turnkey home, applicants need to verify their financial qualification to purchase a home.

- We recognize the critical nature of the crowded schools. Thus, DHHL has publicly announced that the department is working with the State Department of Education and the Kanu o ka Aina Charter School to see how we can participate in improving educational conditions in Waimea.

We appreciate your participation in the environmental review process.

Aloha,

Ben Henderson

Raynard C. Soon, Chairman
Hawaiian Homes Commission

WAIMEA TRAILS AND GREENWAYS:
ENHANCING AND CONNECTING
OUR COMMUNITY

RECEIVED
JAN 16 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

January 14, 2002

Mr. Raymond Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea St. 20th Floor
Honolulu, HI 96813

Re: Waimea Trails and Greenways and DHHL Lalamilo Project

Dear Mr. Soon,

Happy New Year! I am writing on behalf of the Waimea Trails and Greenways, a priority project of the Waimea Preservation Association dedicated to preserving and enhancing the cultural diversity of Waimea and the physical beauty of the area. DHHL's proposed project in Lalamilo will have a large presence in the community.

The Waimea Trails and Greenways will be a multi-use trail for pedestrian and non motorized vehicles to connect Waimea's living areas with its schools and commercial areas. The project is a grass roots idea that began long before the present group approached Hawaii County in 1994 to take this on as a linear County Park. It is listed on the State Department of Transportation Implementation Plan and is in its third year of drawing on both County and Federal Transportation Enhancement funds. During this time, the consultant team led by Kaz Shigezawa of Landscape Images has been defining the route of the first increment of the multi-use trail: from Imiola Church along the Waikoloa Stream down to South Kohala View Estates.

We believe the trail will be an immeasurable asset to the community of Waimea giving its residents a transportation option that will be away from the highway that now runs through the center of town. With DHHL's Lalamilo project including 400 homes, its residents may also take advantage of this amenity that will be just across the Waikoloa Stream that forms the project's southern boarder - DHHL may want to continue it's own trail system within it's project to connect to this community trail.

We have a list of several parcels of State land that the trail will cross. One in particular is TMK 6-6-01:10, a 16.588 acre parcel that is discontinuous with the rest of the Lalamilo Project, presently leased by Roy Mattos. We have been working with Mr. Mattos and the DLNR for some time now to secure this piece or a portion of it for a trail head (ie parking maybe large enough for horse trailers) and trail access. This is a strategic location for trail access for several reasons. Without an access at this point there would be a 2 1/4 mile gap between access points in a trail that is only 4 miles long. With this access point there will be 1 1/4 miles to the next access point in one direction and 3/4 miles in the other direction. This is in close proximity to many residences on the east side of Waimea. Hawaii Preparatory Academy's present Upper School and soon it's entire school will be directly across the highway from this location.

We would like to work with you so your goals can be met and that the community can also have a trail access point through this piece of State Land. As chairman of the Waimea Trails and Greenways committee I would appreciate being placed on the list of consulting parties so I can get direct information on progress of this project. The consultant, Kaz Shigezawa or one of his team will be contacting you in the near future to see what we can do to make this a win win situation. Thankyou for your consideration, we look forward to working with you.

Correspondence may be sent to:
Clemson Lam
P.O. Box 1893
Kamuela, HI 96743

(808) 885-4431
(808) 885-5745 fax

Yours truly,

Clemson Lam

Clemson Lam
Chairman, Waimea Trails and Greenways committee, Waimea Preservation Association

cc: Mr. Leningrad Elarionoff, County Councilmember
~~Ms Yukie Ohashi, PBR Hawaii~~
Glenn Miyao, County Parks and Recreation
Ms Patricia Engelhard, Director Parks and Recreation
Kaz Shigezawa, Landscape Images
Mr. Berkeley Fuller, President Waimea Preservation Association

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Clemson Lam, Chairman
Waimea Trails and Greenways Committee
Waimea Preservation Association
P. O. Box 1893
Kamuela, Hawaii 96743

Dear Mr. Lam:

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation Notice

Thank you for your comments dated January 14 on the EISPN for our proposed development at Lalamilo.

DHHL supports the community's plans for a multi-use trails system linking the residential, schools, and town areas for alternate transportation and recreational use. Thus, in deference to the requests of the County and the Waimea Trails and Greenways committee to use a portion of TMK: 6-6-01:10 (Parcel 10) for a trailhead and equestrian access area, we are no longer including this non-contiguous parcel as part of the DHHL Lalamilo Project. We have met with Mr. Roy Takemoto of the Planning Department and Mr. Glen Miyao of the Department of Parks and Recreation, as well as members of the Waimea community, and we are very optimistic that an agreeable solution can be arranged to achieve our respective goals.

It is our understanding that other portions of the trail system will be along our west boundary, then cross over Waikoloa Stream and run along the south boundary of the stream heading east to link up with the trailhead which is planned on Parcel 10.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

RECEIVED
JAN 2 3 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Dear PBR Hawaii, 1/15/02

I would like to comment on the Lalamilo: Residential Lots and Commercial/Industrial Mixed Use development project for South Kohala on the big island of Hawaii. The plan shows some nice green spaces, but no community gathering or recreational facilities. 400 house lots would imply a population increase of 1600 to 2400 for that area. (assuming a household size of from 4 – 6 people). This represents a relatively high population density. Currently the Hawaiian Homes Hall near Mana road is booked for a year in advance and seems to be maxed out physically as a result. (recent remodel – case in point). The Thelma Parker Gymnasium is enjoying consistent use, but is generally reserved for league play during after-school hours, and is also mostly run down. The Waimea Community Center is also becoming increasingly difficult to reserve for social or civic activities, and cannot be relied upon to sustain the needs of our growing community. None of these facilities is within safe walking or biking distance from the proposed development.

As a teacher in this community, I cannot advocate strongly enough for safe places for kids to attend positive activities, play sports or to simply gather and "hang out". Study after study verifies that when young people have safe places to gather for positive and healthy activities (i.e. sports and other educational programs), crime rates, community violence (including graffiti) and other negative social indicators all decrease. The payoff for providing educational and recreational facilities for communities far outweighs the initial cost.

Please include a community center, athletic facilities and/or other community education infrastructure for this upcoming, relatively high density community. Thank you for considering these comments.

Sincerely,
1/20/02
Steve Coffee, MEd

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Steve Coffee, MEd
64-5119 Kalake Street
Kamuela, Hawaii 96743

Dear Mr. Coffee:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo.

We thank you also for sharing your concern for the well-being of children and youth in the community. Our studies estimate that, based on 442 new homes, a population of 1,300 - 1,500 people would reside at our Lalamilo Project. This number includes a range of 180 - 288 students to be generated over a period of seven years as our homes become occupied.

As a State agency responsible for providing homes to native Hawaiian beneficiaries, we are always challenged to meet their needs but also to become an accepted and integral part of the community.

The project will include park facilities to meet the County's standards and will address the recreational needs of the community with provisions for playfields and courts. Also to serve the needs of the project community, a community center building is planned. This facility is envisioned to include a multi-purpose hall capable of being utilized for meetings, gatherings, and other appropriate group activities.

We thank you and appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

"Aaah, the views..."
Bed & Breakfast

January 19, 2002

RECEIVED
JAN 2 3 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street
Honolulu, HI 96813

Dear Mr. Soon,

I am writing in regard to the planned Lalamilo development in Waimea. I am a property owner located immediately across the stream from the proposed phase two portion of the development.

I have deep concerns about how this project will impact our quality of life in this small town and, more personally, my livelihood. I have invested all my life savings in this property because it offered a quiet, rural setting with spectacular, uncluttered views and dark restful nights. From what I can determine, the new development will effectively destroy all of that.

As you are surely aware, Waimea already has a major traffic problem and a serious lack of infrastructure (schools, police, fire, etc.) to serve its present population. If this new population arrives before adequate infrastructure is in place, we face serious degradation of quality of life in the entire town.

Where will there be employment in this area for the new residents? If jobs are not available, we are opening ourselves up to the kinds of problems that plague many areas of Honolulu. Has the DHHL addressed the kinds of changes this will bring to a small rural area which has struggled to keep a sense of place and community intact? I would be interested to hear how these things have been considered by the planners.

Thank you for your attention.

Sincerely,

Mare Grace
cc PBR HI

P.O. Box 6593, Kamuela HI 96743
Phone: 808-885-3455, Fax: 808-885-4031
tommare@aloha.net • www.beingsintouch.com

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Mare Grace
"Aaah, the views..."
P. O. Box 6593
Kamuela, Hawaii 96743

Dear Ms. Grace:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 19, 2002 on the EISPN for our proposed development at Lalamilo.

As a State agency responsible for providing homes to native Hawaiian beneficiaries, we are always challenged to meet their needs but also to become an accepted and integral part of the neighborhood and the community. You reside across the stream from our property and would thus, be amongst our closest neighbors.

As of June 30, 2002 there are 19,302 applicants statewide waiting for a homestead award. Roughly 1,500 have indicated their preference to reside in North Hawaii, therefore, this site, with appropriate County General Plan designation of Urban Expansion was selected as a priority tract for development. The subject property has been classified for Urban Expansion uses for more than 10+ years.

The project will be developed to conform to the rural character of Waimea with Design Guidelines that would be enforced through conditions, covenants, and restrictions (CCRs).

An important change in the project since the release of the EISPN is the revised phasing schedule. Buildout of the residential lots is now anticipated over seven years (and not two years), after water and wastewater treatment facilities are in place to support the project.

The EIS which is currently being completed discusses the issues of traffic, schools, water resources, public services (police, fire, solid waste, etc.) as well as social issues which would result from the added population and its integration into the community.

We appreciate your participation in the environmental review process.

Aloha,

Ben Henderson

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Janet Lam
PO Box 1893
Kamuela, HI 96743

January 18, 2002

RECEIVED
JAN 2 2 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Homes Lands
1099 Alakea St., 20th Floor
Honolulu, HI 96813

Dear Mr. Soon:

As Hawaiian Homes moves closer to realizing its plans for a housing community in the Lalamilo area of Waimea, South Kohala, please join the Waimea community in addressing several critical infrastructure needs.

1. Highway transportation
   The existing Kawaihae Road is the primary route for trucking all goods between Hilo, Kona, and Kawaihae. Petroleum trucks carrying gasoline from Hilo to the West Side of the Island operate on a nearly 24 hour basis. This steep two-lane road is dangerous for the cars and trucks that share it.

   The Department of Transportation has been negotiating with the Department of Hawaiian Homes Lands for many years to provide a safe, alternate route through Waimea and down to the coast. As Waimea grows, additional roads are essential.

2. Alternate transportation
   With roads becoming busier and louder, it has become very unpleasant to ride a bicycle or even walk through Waimea. The Waimea Trails and Greenways project, has been working with the County of Hawaii to plan a trail for walking, biking, and horseback riding. The proposed trail will border the new Hawaiian Homes community along the Waikoloa Stream. This is a great opportunity for residents of the new community to have a safe and beautiful two mile walk or bike ride to town. Please support this project.

   A portion of the project plan includes one trail access point through the State Land on the Waimea side of the Electric Company and transfer station. The recent DHHL plan indicates this small portion of land will also be part of the Hawaiian Homes project. If it is indeed true that the State is giving this land to DHHL, please recognize and support the need for alternative transportation in Waimea by allowing an access route to the trail on this land.

3. Commercial areas
   The Waimea Development plan urges retaining the rural residential feel of our community through providing commercial development in designated central areas. The area designated for commercial development in DHHL's plan is nearly two miles from the existing town center. Please don't further Waimea's tendency toward becoming a city of strip commercial development by building a commercial area this far from the existing center.

4. Lighting
   Waimea continues to have the feel of a quiet country town at night. It would suit the neighbors (and the observatories) just fine to have only essential streetlights at night.

5. Schools
   Our existing schools cannot accommodate the number of children who will be moving into this neighborhood. Please recognize our need for additional school facilities.

Thank you for joining us in voicing and resolving these concerns as you proceed with your plans.

Sincerely:

Janet Lam

Janet Lam

CC: Office of the Governor
✓ PBR Hawaii

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Janet Lam
P. O. Box 1893
Kamuela, Hawaii 96743

Dear Ms. Lam:

Subject: Lalamilo Project
Response to Comments on the Environmental Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 18, 2002 on the EISPN for our proposed development at Lalamilo.

1. Highway transportation - A traffic impact analysis report (TIAR) on the roadways in the project vicinity has been prepared for the EIS.

2. Alternate transportation - DHHL supports the efforts of the County and the Waimea Trails and Greenways project to establish alternate transportation to link the residential, schools, and town areas. Thus, in deference to the requests of the County and the community regarding the Waimea Trails and Greenways project, we are no longer including TMK: 6-6-01:10 as part of the DHHL Lalamilo Project. We have met with County officials from the Planning and Parks Departments, as well as members of the Waimea community regarding the use of Parcel 10 as a trailhead and we are very optimistic that an agreeable solution can be arranged to achieve our respective goals.

3. Commercial areas - The area on the project that is planned for commercial and light industrial uses is adjacent to the existing heavy industrial uses on the South Kohala Distribution Road (e.g. HELCO power plant, old landfill,

and solid waste transfer station). The proposed commercial uses and the park and community center help to create a buffer between the residential lots and the adjacent heavy industrial uses. Development of the commercial and light industrial areas would be subject to design guidelines specifying rural standards to integrate the Waimea visual character.

4. Lighting - All lighting will be in accordance with County requirements and standards.

5. Schools - We recognize the critical nature of the crowded schools. Thus, DHHL has publicly announced that the department is working with the State Department of Education and the Kanu O ka Aina Charter School to see how we can participate in improving educational conditions in Waimea.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

MOOERS ENTERPRISES, LLC
P.O. Box 1101
Kamuela, Hawaii 96743

RECEIVED
JAN 0 8 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

COPY

January 5, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Re: Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
TMK: (3) 6-6-01:10, 54 & 77; 6-6-04:12-17

Dear Chairman Soon:

I am a planning consultant in Waimea and am presently retained to assist the County of Hawaii with their Waimea Trails project. This trail abuts the subject property and is intending to request from the Department of Land and Natural Resources the use of TMK: 6-6-01:10 as part of this project.

I would like to receive a copy of the DRAFT EIS and be a consulted party.

Should you, your staff or consultants have any questions, please contact me directly.

Sincerely,

Gregory R. Mooers
President

GRM:jy
copy: PBR Hawaii

PHONE: (808) 885-6839
FAX: (808) 885-1574
EMAIL: GMOOERS@ATTGLOBAL.NET

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Mr. Gregory R. Mooers, President
Mooers Enterprises, LLC
P. O. Box 1101
Kamuela, Hawaii 96743

Dear Mr. Mooers:

Subject: Lalamilo Project
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation
Notice

Thank you for providing your comments dated January 18, 2002 on the EISPN for our proposed development at Lalamilo. By way of this letter and future correspondence, we will continue to inform Mooers Enterprises, LLC as a consulted party of our progress.

DHHL supports the community's plans for a trails system for alternate transportation and recreational use. Thus, in deference to the requests of the County and the Waimea Trails and Greenways committee we are no longer including the non-contiguous TMK: 6-6-01:10 as part of the DHHL Lalamilo Project. We have met with Mr. Roy Takemoto of the Planning Department and Mr. Glen Miyao of the Department of Parks and Recreation, as well as members of the Waimea community regarding the use of Parcel 10 as a trailhead and we are very optimistic that an agreeable solution can be arranged to achieve our respective goals.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

RECEIVED
JAN 23 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Raynard Soon

Chairman DHHL
1099 Alakea St
20th flaoor
Honolulu, Hi 96813
cc
PBR Hawaii
101 Aupuni St suite 130
Hilo, Hi 96720

Leonora M Rainbow
P.O. Box 1073 66-1768 Kawaihae Road
Kamuela, Hi 96734
808 885-7089

Aloha,
It it with great concern that I have read the article in the January 17th issue Of North Hawaii News, concerning The Lalamilo project of 400 homes to be built from East of the HELCO plant down to Ohina St with the traffic exiting and entering off of Kawaihae Road I live just below Akulani St faceing Kawaihae Road and have lived here for 18 years and in Kamuela for 26 years. The traffic that goes by my home now is far too much and very constant This past Friday it took me 8 minutes to be able to pull out of my driveway onto Kawaihae Road, the traffic at 12 45pm was intense comming up from the low road The long overdue by pass road has never been put in Kawaihae Road is suppposed to be allot getting more traffic from big truck hauling the Hamakua Ecalyptus trees down to Kawaihae They employess of The Mauna Kea Beach Hotel, The Hapuna Prince, The Orchid at Maulani The Maulani Bay Hotel , the Outtigger , the Hilton at Waikoloa, plus all the high end condos, all use the Kawaihae Road twice daily Plus some traffic to Kona, and all the trucks And you propose another 800,-1,200 cars on this road! Kawaihae Road was not built for so much traffic
There is not employment for another 400 families at this time in this area
The school is severely overcrowded There is a great need for a middle school, not to mention a high school
From what I keep reading in the paper, there is an ICE epidemic going on here as well
I don't believe our limited infrastructure such as water, police, fire dept school, transfer station, power, is capable of handelling an influx of 1,200-4,000 people It will severly tax an already overtaxed system
John Ray The president of The Waimea Community Association told me this past Friday when I call him at home, he had not known about this plan untill he read about it in the Newspaper 2 weeks ago I read about this in the Jan 17th paper and the deadline for comments is Jan 22nd
What is the rush? and what impact does reaction from the community here have to do with the rethinking of this project?
Please give is some more careful consideration And please get more input from those in the know in this community as well as us, we the people

Sincerely,
Leonora Rainbow
Leonora Rainbow
and neighbors
Kelly Dickson 66-1764 Kawaihae Rd.
Leroy Decosta " " "

CC: Mayor Hamakua.

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

August 7, 2002

Ms. Leonora Rainbow and Neighbors
P. O. Box 1073
Kamuela, Hawaii 96743

Dear Ms. Rainbow and Neighbors:

Subject: **Lalamilo Project**
Response to Comments on the Environmental
Assessment/Environmental Impact Statement Preparation Notice

Thank you for providing your comments dated January 21, 2002 on the EISPN for our proposed development at Lalamilo.

We recognize the existing heavy traffic conditions on Kawaihae Road where you reside. To mitigate the added traffic that this project would generate, DHHL will be constructing two additional access roads from extensions of Alaneo Street to Kawaihae Road. Presently only Akulani Street provides access to all of the existing homes in the Ka La Loa and Lalamilo Houselots Subdivision.

When the Waimea ByPass system, including the Waimea-Kawaihae leg, is implemented, these conditions would be greatly alleviated. However, as you point out, there has been little progress in the status of this State project.

An important change in the project is the revised development phasing schedule. Buildout of the residential lots is now anticipated over seven years (and not two years), after water and wastewater treatment facilities are in place to support the project.

The EIS which is currently being completed discusses the issues of schools, water resources, public services (police, fire, solid waste, etc.) as well as social issues of added population and integration into the community.

We thank you and appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

13 Comments and Responses on the Draft EIS

Lalamilo PROJECT

13.0 COMMENTS AND RESPONSES ON THE DRAFT EIS

The public comment period on the Draft EIS, as required by Chapter 343, HRS, resulted in 24 letters from governmental agencies, community organizations, and individuals. The comment letters and Department of Hawaiian Home Lands responses are enclosed herein.

13.1 STATE OF HAWAI'I

Department of Accounting and General Services
Department of Business, Economic Development & Tourism - Energy, Resources & Technology Division
Department of Education
Department of Health
Department of Land & Natural Resources - Land Division
Office of Environmental Quality Control
Office of Hawaiian Affairs
University of Hawai'i Environmental Center

13.2 COUNTY OF HAWAI'I

Department of Parks and Recreation
Department of Environmental Management
Department of Public Works
Fire Department
Planning Department
Police Department

13.3 COMMUNITY ORGANIZATIONS / INDIVIDUALS / CONSULTED PARTIES

Organizations
Hamakua Educational Development Committee - members of DOE schools
South Kohala Traffic Safety Committee
Waimea Community Association
Waimea Hawaiian Homesteaders' Association, Inc.
Waimea Trails and Greenways

Individuals
Alexandra N. Bernstein
Pamela Davis

Consulted Parties
Hui Kako'o 'Āina Ho'opulapula
Greg R. Mooers, Mooers Enterprises, LLC/Hawaii Preparatory Academy and Kokua Lalamilo
Roy A. Vitousek/ Hawaii Preparatory Academy

BENJAMIN J. CAYETANO
GOVERNOR

MARY ALICE EVANS
COMPTROLLER

DEAN H. SEKI
ACTING DEPUTY COMPTROLLER

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

LETTER NO. PWD02.P431

AUG 30 2002

RECEIVED

SEP 09 2002

PBR HAWAII
PHILLIPS BRANDT REDDICK

MEMORANDUM

TO: The Honorable Raynard Soon, Chairman
Department of Hawaiian Home Lands

FROM: Mary Alice Evans
State Comptroller

SUBJECT: Department of Hawaiian Home Lands
Lalamilo Project
Draft Environmental Impact Statement

Thank you for the opportunity to review the Draft Environmental Impact Statement for the subject project.

The project does not impact any of the Department of Accounting and General Services' projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Public Works Division at 586-0488.

c: Ms. Yukie Ohashi, PBR Hawaii
Ms. Genevieve Salmonson, OEQC

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Mary Alice Evans, State Comptroller
Department of Accounting and General Services

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated August 30, 2002, on the Draft EIS for our proposed development at Lalamilo. We note your comment that the subject project does not impact any of the Department of Accounting and General Services projects or existing facilities, and thus, you have no comments to offer.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comment.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
Govern—
SEIJI F. NAY
Direct-.
SHARON S. NARIMATSU
Deputy Director
DAVID W. BLAN
Director, Office of Plannin_

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM

Energy, Resources, and Technology Division
235 South Beretania Street, Leiopapa A Kamehameha Bldg., 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804-2359
Web site: www.hawaii.gov/dbedt/ert

Telephone: (808) 587-38C—
FAX: (808) 587-382

RECEIVED
AUG 2 6 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

August 20, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attn: Ms. Amy Arakaki

Subject: Draft Environmental Impact Statement (DEIS)
Lalamilo: Residential Lots and Commercial/Industrial Mixed Uses
Tax Map Keys: 6-6-01: 10, 54 & 77; 6-6-04: 12-17

Thank you for the opportunity to review the DEIS for the Lalamilo Residential and Commercial/Industrial Mixed Use site development project and for your response to our letter of December 27, 2001, regarding the EISPN. We have no further comments on the project.

Sincerely,

Maurice H. Kaya
Energy, Resources, and Technology
Program Administrator

c: OEQC
PBR-Hawaii, Hilo Office

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Seiji F. Naya, Director
Department of Business, Economic Development, and Tourism

Attn: Mr. Maurice H. Kaya, Program Administrator
Energy, Resources, and Technology Division

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated August 20, 2002, on the Draft EIS and our response to your earlier comments on the EIS Preparation Notice dated December 27, 2001. We note that you have no further comments on our project at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comment.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

PATRICIA HAMAMOTO
SUPERINTENDENT

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

OFFICE OF BUSINESS SERVICES

September 10, 2002

RECEIVED
SEP 12 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

MEMO TO: Mr. Raynard C. Soon, Chairperson
Department of Hawaiian Home Lands

A T T N: Ms. Amy Arakaki

F R O M: Raynor M. Minami, Director
Facilities and Support Services Branch

SUBJECT: Lalamilo Project - Draft Environmental Impact Statement
TMK: 6-6-01: 54 & 77; 6-6-04: 12-17, South Kohala, Hawai`i

The Department of Education (DOE) has reviewed the Draft Environmental Impact Statement (DEIS) for the Department of Hawaiian Home Lands (DHHL) Lalamilo Project. The 248.8-acre project is being planned for two different alternative densities: A preferred alternative of 442 single-family homes on 10,000 square foot lots, or a second alternative of 121 homes on one-acre lots and 34 homes on 10,000 square foot lots. The construction is scheduled in three phases from 2003 to 2012.

The DOE will restrict its comments to the preferred alternative since its impact on the public schools is more significant than the impact of the low-density alternative. If the Hawaiian Homes Commission selects the lower density plan, we assume that the impact on area schools would be reduced by approximately 65 percent.

The DEIS used a "design enrollment" statistic to compare with the 2001 actual enrollment figures to determine that Waimea schools were over enrollment capacity in 2001. The DOE relies on a "school capacity" statistic to measure whether enrollment is over or under capacity. The current school capacity figures for the schools serving the Waimea area are:

School	2002 School Capacity	2001 Enrollment
Waimea Elementary	624	590
Waimea Middle	422	501
Honoka`a High & Inter.	981	784

The estimated impact of the Lalamilo project on school enrollment remains the same as stated in the DEIS, somewhere between the two DOE estimates of 180 and 288 students. The first estimate is based on a statewide enrollment formula and the second based on actual enrollment figures from projects similar to Lalamilo, including other DHHL communities.

When the estimated Lalamilo student population at the completion of the project is added to the estimated enrollment of the schools serving the Waimea area in 2007 (the last year that estimates are available), Waimea Elementary and Waimea Middle schools have the potential to be over capacity by 146 and 131 students, respectively.

School	2002 School Capacity	2007 Est. Enrollment	2010 High Est. Lalamilo	2010 # of Students Over Capacity
Waimea Elementary	624	590	180	146
Waimea Middle	422	501	52	131
Honoka`a High & Inter.	981	784	56	-141

The DOE requests that DHHL contribute the cost of up to four portable classrooms to be built within the Honoka`a complex of schools. DHHL's donation would make a significant contribution towards the quality of education available for the youngest members of its planned homestead community.

Should you have any questions, please call Ms. Heidi Meeker of the Facilities and Support Services Branch at 733-4862.

RMM:HM:hy

cc: Patricia Hamamoto, Supt.
Alfred K. Suga, OBS
Genevieve Salmonson, OEQC
Yuki Ohashi, PBR Hawai`i

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Patricia Hamamoto, Superintendent
Department of Education

Attn: Mr. Raynor M. Minami, Director
Facilities and Support Services Branch

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated September 10, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

- We note that your comments apply to the higher density preferred Alternative A consisting of 442 single-family homes on 10,000 square foot lots. However, should the lower density Alternative B consisting of 121 homes be selected, the impact on area schools would consequently be reduced by approximately 65 percent.

- The information to clarify methods of projecting student numbers and school capacity, enrollment, and projected 2010 over capacity numbers has been included in the Final EIS. We also acknowledge your reiteration of the projected range of 180 to 288 students

for the higher density Alternative A. We note that the high estimate of 288 students is based on actual enrollment figures from projects similar to Lalamilo, including other DHHL communities.

- The Department of Education (DOE) has estimated enrollment projections up to the year 2007. Your table indicates that with the addition of our Lalamilo students in 2010, the Waimea Elementary and Waimea Middle schools would be over capacity by 146 and 131 students (under the current facility conditions) and Honokaa High School would be under capacity by 141 students.

- We will work with DOE to mitigate the impact of our students that would be served by the area schools. Upon decision between the two development alternatives and refinement of the subdivision development plan, DHHL will be able to specifically quantify impacts, and we will collaborate with the DOE and make an appropriate contribution towards school facilities.

Thank you again for your comments; we appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

SEP 26 11 33 AM '02

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

02-215/cpo

September 25, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Dear Mr. Soon:

Subject: Draft Environmental Impact Statement (DEIS)
Lalamilo Project, South Kohala, Hawaii
Department of Hawaiian Home Lands
Tax Map Keys: 6-6-001: 054 & 077; 6-6-004: 012 - 017

Thank you for the opportunity to review and comment on the subject proposal. The DEIS was routed to the various branches of the Environmental Health Administration. We have the following comments:

Clean Water Branch (CWB)

The Army Corps of Engineers should be contacted to identify whether a Federal permit (including a Department of Army permit) is required for this project. If it is determined that a Federal permit is required for the subject project, then a Section 401 Water Quality Certification would also be required from our office.

If the construction project involves any of the following discharges into State waters, a National Pollutant Discharge Elimination System (NPDES) permit coverage is required for each discharge:

a. Storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale;

(Note: After march 10, 2003, an NPDES permit will be required for discharges of storm water associated with construction activities, including clearing, grading, and excavation that result in the disturbance of one (1) acre or more. In addition, the proposed amendments to Hawaii Administrative

Rules (HAR), Chapter 11-55, require NPDES permit coverage for all construction activities that meet the disturbance area requirements, regardless if discharge is unanticipated.)

b. Hydro-testing water;

c. Construction dewatering effluent.

The CWB requires that Notices of Intent (NOI) for DPDES general permits be submitted 30 days before the commencement of the respective activities. The proposed amendments to HAR, Chapter 11-55, also require a copy of the NOI or NPDES permit application to be submitted to the State Department of Land and Natural Resources, Tate Historic Preservation Division. NOI forms can be picked up at our office or downloaded from our website at http://www.state/hi.us/doh/eh/cwb/forms/index/html.

If you have any questions please contact the Clean Water Branch at (808) 586-4309.

Safe Drinking Water Branch (SDWB)

The project is located above the Underground Injection Control (UIC) line. Areas above the UIC line are considered to overly underground sources of drinking water. There are no known drinking water wells located within ¼ mile of the project boundaries.

Drainage of the project's rainfall runoff water has not been addressed in the document. If rainfall runoff water drainage structures are proposed to be constructed, UIC regulations may apply. We recommend that the drainage design consultant contact the UIC program to discuss applicable UIC regulations.

If you have any questions, please contact Norris Uehara of the Safe Drinking Water Branch at (808) 586-4258.

Wastewater Branch (WWB)

Due to the number of lots involved, a centralized wastewater treatment works would be required. We recommend that the Department of the Hawaiian Home Lands contact the owner of the Parker Ranch Wastewater Treatment Plant to investigate the feasibility of connecting to this facility. However, if such connection were not feasible, then a wastewater treatment plant for this project would be acceptable. We recommend the reuse of the effluent for irrigation.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems". We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Wastewater Branch at (808) 586-4294.

Solid and Hazardous Waste Branch

The Office of Solid Waste Management (OSWM) acknowledges the presence of an inactive landfill in the vicinity of the eastern end of the project area. The landfill ceased operations in 1987 and was covered by approximately two feet of soil as noted in the DEIS. The landfill was operated and ceased operations before the existence of OSWM, thus, OSWM does not know the precise boundaries and extent of the landfill. Therefore, we are uncertain if the landfill is fully contained within the boundaries of the parcel indicated in Figure 10 of the subject document.

OSWM inspections in April 2001 and February 2002 revealed the presence of an active underground fire. The presence of surface cracks, fissures, sinkholes, and smoke were noted during the inspections, indicating the presences of an underground fire as well as subs-surface setting. The OSWM has received odor complaints from the Sandalwood community that is upwind of the landfill. The landfill is under the jurisdiction of the County of Hawaii. The County is currently managing the fire situation under Department of Health orders to develop and carry out a remediation and monitoring plan.

The OSWM has concerns over the Lalamilo Project's downwind location relative to the landfill site. The DEIS notes the possible impact of nuisance odors as well as potentially hazardous emissions produced by the fire. However, the DEIS does not go beyond noting the possibility of these occurrences to discuss strategies to address the situation.

If you have questions, please contact Lane Otsu, of the Solid and Hazardous Waste Branch, at (808) 586-4226.

Clean Air Branch (CAB)

In regards to mixed zoning concerns, it is recommended that an adequate buffer zone be provided for the proposed commercial/light industrial establishments to minimize the potential of impacting residents to nuisance odors, soot, vehicle exhausts, and stack emissions.

The developer must ensure that mitigative measures proposed in the DEIS are adequate for compliance with the provisions of Hawaii Administrative Rules, Section 11-60.1-133,on Fugitive Dust.

If you have any questions, please contact the Clean Water Branch at (808) 586-4200.

Environmental Planning Office (EPO)

The Total Maximum Daily Load program reviews projects involving water bodies currently listed as "impaired" under section 303(d) of the Clean Water Act. The impaired status of these waters requires that the Department of Health establish Total Maximum Daily Loads (TMDLs) suggesting how much the existing pollutant loads should be reduced in order to attain water quality standards.

Although the proposed project in the Waiulaula watershed does not appear to involve impaired waters, we suggest that the Draft EIS may not adequately address potential post-project changes in storm runoff quantity and water quality. We recommend that Section 4.0 (Assessment of the Affected Natural Environment, Potential Impacts of the Proposed Action, and Mitigative Measures), which notes that approximately 70% of the Property will require earthwork, be revised to include quantification of changes in impervious cover, human activity, and pollutant use and loading that this earthwork and subsequent development implies.

The drainage assessment presented in Appendix A only established flood boundaries on the property – we suggest that it be revised to quantify how changes in land use and impervious cover for the approximately 200 acre project would affect watershed runoff dynamics, particularly the acceleration and augmentation of peak storm flows and sediment loads. This would provide a necessary physical context for the analysis of mitigation measures listed on page 4-3 and for related discussions of construction specifications for sedimentation control; erosion potential mitigation; and riparian BMPs (page 7-6). We are concerned that details about the design and implementation of these measures will be deferred to county-level review and permitting processes and suggest that much of this detail be included in the Final EIS.

We also suggest that the incomplete sentence on Page 4-13 - "Impacts which may affect water quality will include BMPs associated with state and federal permits" – be revised to clarify the meaning of this section. While the mitigation measures discussed may minimize construction-phase, on-site drainage impacts and longer–term sediment loading, we suggest that the Final EIS include additional discussion of long-term pollutant load management over the project life-cycle, for example with regard to potential runoff or discharge of nutrient-laden water from pasture irrigation or leach fields.

If you have any questions about the Total Maximum Daily Load program, please contact David Penn at (808) 586-4337.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: CWB
SDWB
WWB
SHWB
CAB
EPO
Hawaii DHO

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attn: Mr. Gary Gill, Deputy Director
Environmental Health Administration

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated September 25, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

Clean Water Branch (CWB)

Stream Crossings. Stream crossings by bridges or culverts will be necessary to access the property from the proposed West Access. The Army Corps of Engineers will be contacted to identify whether a Federal Department of the Army permit would be required for this project. Should a Department of the Army Section 404 permit be required, the associated State Section 401, Water Quality Certification would be requested from the Clean Water Branch.

NPDES Compliance. Compliance with the National Pollutant Discharge Elimination System (NPDES) general permit coverage is anticipated for

ground disturbance (clearing and grading) and for hydro-testing waterlines. A Notice of Intent (NOI) will be filed at least 30 days prior to the commencement of any grading activities.

Construction of an area greater than one (1) acre is anticipated after March 10, 2003. An NOI will be filed for NPDES compliance the required 30 days before commencement of grading activities.

Safe Drinking Water Branch (SDWB)

DHHL will develop a specific Development Plan after the selection of the density alternative (Alternative A or B). At that time, a detailed drainage analysis will be prepared based on final subdivision and grading plans. Due to the Project's location above the Underground Injection Control (UIC) line, any drywells would require your review and approval. DHHL will contact the UIC program to discuss applicable UIC regulations.

Wastewater Branch (WWB)

A centralized wastewater treatment facility is under consideration for the project's preferred Alternative A consisting of 442 residential units.

All wastewater plans will conform to the applicable provisions of the Department of Health's (DOH) Administrative Rules, Chapter 11-62, "Wastewater Systems." Detailed plans will be submitted to the WWB for review.

Solid and Hazardous Waste Branch

We note that the Solid and Hazardous Waste Branch/Office of Solid Waste Management (OSWM) is uncertain of the precise boundaries and extent of the old landfill due to its cessation of operations prior to the existence of OSWM.

We also note that OSWM inspections of the landfill in April 2001 and February 2002 revealed the presence of an active underground fire and sub-surface settling. We further note that the County of Hawaii (County) is currently managing the fire situation under DOH orders to develop and carry out a remediation and monitoring plan.

We note OSWM's concerns about the downwind location of our Project from the landfill. While the EIS notes the possible impact of nuisance odors as well as potentially hazardous emissions produced by the fire, DHHL would expect that the County's remediation and

monitoring efforts would successfully resolve this matter prior to the occupation of the lots nearest the landfill. Homes on these lots would be constructed between 2006-2010.

The Final EIS states the following regarding the adjacent HELCO generating plant: Lalamilo Project master plan is designed with a buffer of 600 feet to 800 feet between the adjacent heavy industrial uses and the closest residential lots near the eastern boundary. Construction of these residential lots would commence in 2006 with occupancy in 2007-2008. At that time, HELCO would be required to renew its permit and it is expected that taller stacks to meet good engineering practices would be required by DOH considering the proximity of the residential lots at this Project and the surrounding area.

The Final EIS further states: Given the landfill's location relative to the project site and the wind flow in the area, odorous fumes from the landfill will likely impact the project area at times, particularly during the nighttime and early morning hours when dispersion conditions are worst and the wind flow tends to be downslope. The County, as required by DOH, already performs regular monitoring and remedial work at the landfill to cover cracks and sinkholes with soil in an effort to suppress and reduce the leakage of fumes into the air. With residences and businesses locating closer to the landfill, it may become necessary to perform this maintenance activity on a more regular basis. An additional but much more expensive solution would be to install a gas collection system to remove and burn landfill gas.

Clean Air Branch (CAB)

The 16-acre area previously proposed for commercial and light industrial uses is now planned to remain in pasture uses. Both Alternatives A and B are designed with Park and Community Center facilities and the pasture would create a buffer from the adjacent industrial uses (e.g., HELCO generating plant, County baseyard, transfer station, and old landfill) to minimize the Residential lots exposure to nuisance odors, soot, vehicle exhausts, and stack emissions.

A dust control management plan will be developed, which identifies and addresses the activities that have a potential to generate fugitive dust. Further, adequate dust control measures during all phases of construction, and including on roadways, will be implemented.

Construction activities will comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.33, Fugitive Dust.

Environmental Planning Office (EPO)

As your letter states, the Keanuiomano, Lanikepu, and Waikoloa Streams, are not listed as "impaired waters" under Section 303(d) of the Clean Water Act; thus, these streams would not fall within your Total Maximum Daily Load program.

Nevertheless, following the selection of the density alternative, and at the Development Plan design phase of the project, subdivision plans would be prepared and mitigation measures associated with a grading permit application would be prepared. These would include identifying best management practices based on calculations of sediment runoff and the erosion potential utilizing the universal soil loss equation.

At this time, it is premature to quantify changes in impervious cover, and pollutant use and loading that this earthwork and subsequent development implies. We note that in addition to the County review of the grading plans, DOH would have the opportunity to review our detailed plans in our Notice of Intent (NOI) for a NPDES general permit.

Drainage

Pg 4-13 - sentence is completed: Impacts which may affect water quality will be mitigated by measures identified in a best management practices (BMP) plan associated with County, State, and Federal permits.

We appreciate your participation in the environmental review process.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

September 24, 2002

RECEIVED
SEP 2 6 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

LD-NAV

L-1211/1514/1431/1938/1430
Ref.: DHHLLAMALILODEIS.RCM

PBR Hawaii
Yukie Ohashi
101 Aupuni Street, Suite, 310
Hilo, Hawaii 96720

Dear Ms. Ohashi:

SUBJECT: Review: Draft Environmental Impact Statement (DEIS)
Consultant: PBR Hawaii
Applicant: Department of Hawaiian Home Lands
Authority: Governor, State of Hawaii
Proposed: Lalamilo Residential Lots, Commercial and Industrial Mixed Use (Lalamilo Project)
Location: Lalamilo, Waimea, South Kohala, Island of Hawaii
TMK: 3rd/ 6-6-001: 54 & 77 and 6-6-004: 12-17

Thank you for the opportunity to review and comment on the subject Draft Environmental Impact Statement covering the subject proposed project.

A copy of the DEIS was distributed or made available to the following Department of Land and Natural Resources' Divisions for their review and comment:

Division of Aquatic Resources - Division of Forestry and Wildlife Division of State Parks - Commission on Water Resource Management - Land Division Engineering Branch - Land Division Planning and Technical Services - Land Division Hawaii District Land Office

Attached herewith is a copy of the Land Division Engineering Branch comment.

Based on the attached responses, the Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0438.

Very truly yours,

Charlene E. Unoki
for DIERDRE S. MAMIYA
Administrator

C: Hawaii District Land Office
DHHL 1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813
OEQC

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

August 21, 2002

LD/NAV
Ref.: DHHLLAMALILODEIS.COM

L-1211
Suspense Date: 9/19/02

RECEIVED
SEP 26 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Hawaii District Land Office

FROM: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT:
Review: Draft Environmental Impact Statement
Applicant: Department of Hawaiian Home Lands
Authority: Governor, State of Hawaii
Proposed: Lalamilo Residential Lots, Commercial and Industrial Mixed Uses
Location: Lalamilo, Waimea, South. Kohala, Hawaii
Tax Map Key: (3) 6-6-1 various and 6-6-4 various

Please review the Draft Environmental Impact Statement covering the **Department of Hawaiian Home Lands "Lalamilo" project** and submit your comments (if any) on Division letterhead (signed and dated) within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

Note: One (1) copy of the document is available for review in the Land Division Office, room 220.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

(X) We have no comments.

( ) Comments attached.

Signed: DOFAW Administrator

Date: 9/26/02

RECEIVED
2002 SEP 19 P 3:47

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

August 21, 2002

LD/NAV
Ref.: DHHLLAMALILODEIS.COM

L-1211
Suspense Date: 9/19/02

RECEIVED
SEP 26 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK
02 AUG 21 P2:09 WATER & LAND

MEMORANDUM:

TO: XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
Land Division Branches of:
XXX Planning and Technical Services
XXX Engineering Branch
XXX Hawaii District Land Office

FROM: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT:
Review: Draft Environmental Impact Statement
Applicant: Department of Hawaiian Home Lands
Authority: Governor, State of Hawaii
Proposed: Lalamilo Residential Lots, Commercial and Industrial Mixed Uses
Location: Lalamilo, Waimea, South. Kohala, Hawaii
Tax Map Key: (3) 6-6-1 various and 6-6-4 various

Please review the Draft Environmental Impact Statement covering the **Department of Hawaiian Home Lands "Lalamilo" project** and submit your comments (if any) on Division letterhead (signed and dated) within the time requested above. Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

Note: One (1) copy of the document is available for review in the Land Division Office, room 220.

If this office does not receive your comments on or before the suspense date, we will assume there are no comments.

( ) We have no comments. (X) Comments attached.

Signed:

Date:

RECEIVED
SEP 2 6 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

DLNR-LAND DIVISION
ENGINEERING BRANCH

COMMENTS

Please have the Department of Hawaiian Home Lands (DHHL) coordinate with the Engineering Branch, Land Division the proposed development of Waimea Well (State Well No. 6140-02). The Hawaii County, Department of Water Supply expressed an interest in having the Engineering Branch develop the subject well and turning it over to them. The Engineering Branch would do so with the understanding that part of the water from the subject well would be used to meet the water demands for State projects requiring water in the Waimea area. The total demand for these projects is 0.122 mgd.

We confirm that the proposed project site is located in Zones A and X. This is according to FEMA Flood Insurance Rate Map (FIRM) panel 162C (effective September 16, 1988) and panel 0163 (Index panel date of June 2, 1995), in addition to panel 0164D (effective July 16, 1990) mentioned in the document. Zone A is an area inundated by a 100-year flood with no base elevations determined. Zone X (unshaded) is an area determined to be outside the 500-year flood plain.

Please note that the National Flood Insurance Program (NFIP) does not have any regulations for development within Zone X, however A zones is regulated under Title 44 of the Code of Federal Regulations. Also, the Hawaii County Code (Chapter 27) has more stringent rules regarding development within Special Flood Hazard Areas (which includes A zones). If there are any questions regarding the NFIP, please contact the State NFIP Coordinator, Sterling Yong, of the Department of Land and Natural Resources at 587-0248. If there are questions regarding flood ordinances, the applicable County representative should be contacted.

Since A zone designations are developed based on approximate methods, Tom Nance Water Resources, Inc. conducted a detailed hydraulic analysis to more accurately define the flood hazard areas. The detailed study was conducted using recent (aerial) topographic survey. According to their Preliminary Engineering Report, a more accurate depiction of the 100-year flood hazard for Waikoloa Stream (previously no existent on the current FIRM), Lanikepu and Keanuiomano Streams were defined and in some areas were found to be narrower. In order to develop in these areas, which are currently shown on the effective FIRM as a special flood hazard area, a map revision is required. This is done by way of a Letter of Map Revision (LOMR). However since these streams were never studied in detail, a Conditional Letter of Map Revision should be applied for prior to construction to obtain FEMA's concurrence on the methodology used to develop the hydraulic analysis.

Please note that the DEIS summary of "Analyses of the Areas Subject to Inundation by the 100-Year Flood Event" on page 4-13 and on page ix of the Executive Summary (Drainage and Flood Hazard) differs from Tom Nance Water Resources Inc's Preliminary Engineering Report (page 12) write up, by stating that the resultant 100-year flood boundary was "***considerably***" narrower than the FEMA boundary.

Should you have any questions, please call Eric Yuasa of the Project Planning Section at 587-0229.

Signed: Andrew M. Monden
ANDREW M. MONDEN, CHIEF ENGINEER

Date: 9/18/02

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BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Gilbert S. Coloma-Agaran, Chairperson
Department of Land and Natural Resources

Attn: Ms. Dierdre S. Mamiya, Administrator
Land Division

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated September 24, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We note that the Draft EIS was distributed to the following divisions of the Department of Land and Natural Resources (DLNR):

> Division of Aquatic Resources
> Division of Forestry and Wildlife
> Division of State Parks
> Commission on Water Resource Management
> Land Division Engineering Branch
> Land Division Planning and Technical Services
> Land Division Hawaii District Land Office

The following responds to the specific comments of the following DLNR Divisions:

Land Division Engineering Branch

DHHL and its consultants met with the Engineering Branch on September 27, 2002, to coordinate the proposed development of Waimea Well (State Well No. 6240-02). As stated in your comments, the Engineering Branch would develop the State Well No. 6240-02 along with the County Department of Water Supply (DWS) with the understanding that part of the water from the subject well would be used to meet the water demands for State projects requiring water in the Waimea area.

As a follow-up, in my Memorandum dated October 24, 2002 to Chairperson Gilbert Coloma-Agaran, I have proposed use of the Waimea well as a joint State and County project with pro-rata cost sharing based on use. Based on pump test results and the practical maximum pump horsepower, our consultant has determined that the well could be outfitted with a 1,350 GPM, 800-horsepower submersible pump. By DWS's standards, such a pump would provide an average day supply of 1.296 million gallons per day (MGD) and a maximum day supply of 1.944 MGD. DHHL requested reservation of 0.6090 MGD as an average day supply from this well for our north Hawaii projects, including Lalamilo.

During the subsequent development phases, appropriate site-specific plans will be prepared including a detailed drainage plan. A letter of map revision (LOMR) or physical map revision will be obtained to reflect the changes on the flood insurance rate map (FIRM) and the subdivision plat map. In addition, a conditional letter of map revision (CLOMR) will be obtained prior to construction of the stream crossings. Further, the plans will reflect no rise in the base flood elevation, in accordance with Chapter 27 of the Hawaii County Code. The project intends to comply with rules and regulations of the National Flood Insurance Program under Title 44 of the code of Federal Regulations and all applicable County Flood Ordinances.

We appreciate your participation in the environmental review process.

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENT QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

September 9, 2002

Raynard Soon
Department of Hawaiian Home Lands
PO Box 1879
Honolulu, Hawaii 96805

Attn: Amy Arakaki

Dear Mr. Soon:

Subject: Draft environmental impact statement (EIS), **Lalamilo**, South Kohala

We have the following comments to offer:

1. Community consultation: Two community presentations are noted in section 1.2. In the final EIS include a *synopsis* of issues raised (a transcript is not necessary). The list of commenters in Section 12 does not include Leonora Rainbow & neighbors. Please add her name to this list in the final EIS.

2. Table of Contents: In the *List of Appendices*, the Wildlife Survey is listed as appendix B and Stream Survey is listed as appendix D. However, in the appendices the Stream Survey is appendix B and the Wildlife Survey is appendix D. Please correct the table of contents in the final EIS.

3. Figures and tables:

   a. **Figure 8** (*LUPAG Map*) shows areas of "intensive agriculture" and "extensive agriculture." In the section on land use patterns, explain the difference between these two designations.

   b. **Figures 5, 6 and 10**: In figures 5 and 6 (*Alternative A*, *Alternative B*) the notations in the graphs below the main diagram are too small to read. In figure 10 (*Opportunities & Constraints Map*) the figure below the main diagram appears to be a windrose, but is too small to discern clearly. In the final EIS increase the scale of these items so that they are easily readable.

   c. **Trailhead**: Where in TMK 6-6-4:10 will the trailhead be? In the final EIS show its location in Figure 1, 5 or 6 or in any other appropriate figure.

4. Cultural Impacts Assessment: In section 5.2.2. (*Findings*), the last sentence in the Waimea Water Rights Case description states that the case summary follows, but the summary is missing. In the final EIS include instead a brief synopsis of the case findings, given the lengthiness of the summary in the appendix.

5. Design Guidelines: What are the Design Guidelines mentioned in section 2.2.4? We recommend following our "Guidelines for Sustainable Building Design in Hawaii," which can be found at *http://www.state.hi.us/health/oeqc/guidance/sustainable.htm.* For a paper copy contact our office.

6. Traffic mitigation measures: In 5.4 *Roadways and Traffic*, section C, *Traffic Impact Analysis*, the subsection on "Mitigation Measures, Proposed Project Access Improvements" notes a number of measures that should be implemented. Is DHHL committed to implementing these mitigation measures? If so please list them in the final EIS as mitigation measures to which you are firmly committed.

7. Visual impacts: It is difficult to determine visual impacts from only the photos of the existing site that are included in the draft EIS. How is the final appearance of the site likely to look when the preferred alternative for this project is at full buildout? Show these impacts by superimposing a rendering of the proposed housing and landscaping onto photographs taken from public vantage points.

8. Alternatives: Were any alternative locations considered for this project? If so include in section 6 of the final EIS a discussion and reasons why locations other than Lalamilo were considered and rejected.

9. Impacts to public schools: At full buildout Lalamilo will contribute a significant number of students to the already strained facilities in Waimea. Is DHHL required to make a fair-share contribution to the Department of Education? If so discuss this in the final EIS and include this in section 8.6, *Unresolved issues,* and in the Unresolved Issues section of the Executive Summary.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Yukie Ohashi, PBR Hilo

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attn: Ms. Genevieve Salmonson
Office of Environmental Quality Control

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated September 9, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

1. Summary of Community Consultation: Presentations in the Waimea community were made on January 8, 2002, and June 6, 2002.

   South Kohala Traffic Safety Committee (SKTSC) - January 8

   A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. The project, as described in the EIS Preparation Notice, was presented (prior to completion of technical studies). In attendance were members of SKTSC and representatives of the following agencies and organizations: Waimea Hawaiian Homesteaders'

Association, Hui Kakoo Aina Hoopulapula, Waimea Community Association, Waimea Community Association Design Committee, Waimea Outdoor Circle, Waimea Preservation Association, Waimea Trails & Greenways, Waimea School Parent Teachers Students Association, Kanu o ka Aina (Principal), Waimea Middle School (Principal), Parker Ranch, Mayor's Office, and County of Hawaii Department of Public Works.

Traffic issues raised included the following: Existing congested conditions on all roadways, alternative access routes, relocation of the DHHL project site.

Waimea Community Association, Planning and Design Committee - January 8

A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. The project, as described in the EISPN, was presented (prior to completion of technical studies). In attendance were members of The Waimea Community Association, Planning and Design Committee and representatives of the following agencies and organizations: Waimea Hawaiian Homesteaders' Association, Hui Kakoo Aina Hoopulapula, Waimea Community Association, Waimea Community Association Design Committee, SKTSC, Waimea Outdoor Circle, Waimea Preservation Association, Waimea Trails & Greenways, Waimea School Parent Teachers Students Association, Kanu o ka Aina (Principal), Waimea Middle School (Principal), Parker Ranch, Mayor's Office.

Relevant issues which were raised included the following: crowded school conditions, limited water resources, wastewater concerns, project density and schedule, and social issues resulting from 400 new homesteads including social integration of newcomers into the community and crowded school conditions.

DHHL agreed to return to the community for follow-up upon completion of technical studies but before the completion of the Draft EIS.

Waimea Community Association Town Meeting - June 6

The Town Meeting was held at Kahilu Hall and attended by several hundred people from the Waimea community, including a few residents who are also on the beneficiary wait-list for a North Hawaii homestead award.

A presentation of the project was made by DHHL staff and PBR Hawaii, planning consultant to DHHL. Technical consultants in attendance included the traffic engineer, project engineer, social impact consultant, and archaeologist.

The Alternatives A and B were depicted in power point slides and technical findings were summarized, including public infrastructure impacts and the natural and cultural environment.

Issues raised included the following: water resource availability, density alternatives, whether ohana dwellings would be permitted, traffic congestion, crowded school conditions.

Section 12 has been revised to include the full list of letter writers.

2. Table of Contents: Correction has been made in the List of Appendices.

3. Figures and Tables:

   a. Figure 8: Intensive agriculture and Extensive agriculture are described in Section 3.2.1 and as follows:

      Intensive Agriculture: Sugar, orchard, diversified agriculture, and floriculture
      High: Fertile soil
      Low: Less fertile soil
      Extensive Agriculture: Pasturage and range lands

   b. Figures 5, 6, and 10: These figures have been revised with larger, more legible type.

   c. Trailhead: DHHL *will not be acquiring* TMK: 6-6-04:10 (Parcel 10) in deference to the desire of County of Hawaii and the Waimea Trails and Greenways committee to utilize this parcel for a trailhead. Figure 2 shows the location of Parcel 10.

4. Cultural Impact Assessment: Section 5.2.2 has been revised to include a synopsis of the case findings.

5. Design Guidelines: DHHL will be developing rural design standards and design guidelines for our request for proposals (RFP) process for the Lalamilo Project. These rural standards will be reviewed and approved by the County prior to the RFP process. In addition we have included additional information in Section 2.2.4 - Sustainable Building Design of the Final EIS.

   Through DHHL's request for development proposals process, DHHL will select a developer for each phase of development in accordance with State of Hawaii Administrative Rules. Requirements for proposals will include but not be limited to the submittal of a development site plan, subdivision plan, housing plan details, development schedule, and project budget.

   DHHL's criteria for the selection of a developer will include but not be limited to cost effectiveness and design parameters appropriate for the Waimea rural character. Recommended guidance documents would include the Waimea Design Plan and Guidelines for Sustainable Building Design in Hawaii.

6. Traffic Mitigation Measures: DHHL has committed to implementing the recommended offsite improvements at each of its access points and all onsite improvements. The improvements will be constructed in accordance with each phase of development.

   The traffic improvements recommended in this study are expected to mitigate the expected traffic impacts resulting from the Lalamilo Project. The improvements which will be implemented as part of the development of the Lalamilo Project are summarized below.

   Proposed Project Access Improvements

   - Alaneo Street

     Alaneo Street would be extended to the east to provide access to the 15 proposed lots on the remnant parcel in the existing Lalamilo House Lots Subdivision.

     Alaneo Street Extension would intersect to Kawaihae Road at a stop-controlled Tee-intersection to provide access to the proposed house lots and a second access point for the existing Lalamilo House Lots and Ka La Leo Subdivisions.

The west end of Alaneo Street would be extended to the West Access Road to provide a third access point to provide access to 19 proposed lots and for the existing Ka La Leo and Lalamilo House Lots Subdivisions.

- Kawaihae Road and the West Access Road

The West Access Road would provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road.

An exclusive left-turn lane would be constructed on westbound Kawaihae Road at the West Access Road to minimize the delay to westbound traffic on Kawaihae Road by separating the left-turn traffic from the through traffic.

A median shelter lane would be constructed on westbound Kawaihae Road at the West Access Road to facilitate vehicles turning left from the side street by separating the left-turn movement into two stages: crossing the eastbound lane to the median shelter lane; then merging into westbound traffic.

- Kawaihae Road and the East Access Road

The East Access Road would provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road.

An exclusive left-turn lane would be constructed on westbound Kawaihae Road at the East Access Road to separate the left-turn traffic from the through traffic and to minimize the delay to the westbound traffic on Kawaihae Road.

A median shelter lane would be constructed on westbound Kawaihae Road at the East Access Road to facilitate vehicles turning left from the side street.

7. Visual Impacts: A new Figure 21 in the Final EIS illustrates the quality of recent DHHL housing products on Hawaii, Oahu, and Maui. The homes depict the higher quality of design and construction in DHHL's recent projects. Likewise, design guidelines for our Lalamilo Project would be developed to

reflect the Waimea rural character. This responds to community concerns of inconsistent housing quality at Hawaiian homesteads.

8. Alternatives: The approved DHHL *Hawaii Island Plan* describes all of our landholdings on the island. Our detailed surveys of lands in North, East, South, West, and Central Hawaii resulted in the designation of "priority" tracts for Residential homestead development at Lalamilo and Hilo. Selection of priority tracts were based on the available infrastructure (i.e., water, roads, etc.) and the relative cost to develop the lands. This rigorous process allowed us to fully evaluate the alternative land areas to focus our development efforts. This process is noted in Section 6 of the Final EIS.

9. Impacts to Public Schools: DHHL recognizes the critical nature of the crowded conditions at the Waimea Elementary and Middle Schools and will work with the Department of Education (DOE) to mitigate the impact of the new Lalamilo Project students that will be served by the area schools. Upon decision between the two alternatives and refinement of the subdivision development plan, DHHL will be able to specifically quantify impacts, and will collaborate with the DOE and make an appropriate contribution towards school facilities.

   In addition, DHHL and Kanu o ka Aina have evaluated several DHHL properties for a permanent site for the charter school campus. The Hawaiian Homes Commission approved a 15-acre parcel at DHHL's Kuhio Village in the Puukapu area for a comprehensive native Hawaiian cultural learning center, which will include a permanent campus for the charter school. The charter school is a K-12 program.

   DHHL expects that our Lalamilo Project students will attend the area's public, charter, and private schools.

Again, thank you for your participation and facilitation of the EIS review process.

PHONE (808) 594-1888

FAX (808) 594-1865

DEPT. OF HAWAIIAN HOME LANDS
Oct 9 10 33 AM '02

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD02-730

October 1, 2002

Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Subject: DEIS - Lalamilo Project

Dear Mr. Soon:

Thank you for the opportunity to comment on the above-referenced project.

OHA has reviewed both alternatives, as outlined, with the understanding that DHHL prefers Alternative A. It is also our understanding that DHHL will not be using federal funds for this project. However, should the project involve the use of federal funds in a later phase, Section 106 of the National Historic Preservation Act may be implicated. If Section 106 is required, please submit a written request for consultation to:

Attn: Clyde Namu`o
711 Kapiolani Blvd Ste 500
Honolulu, HI 96813

Water

The DEIS should more adequately address the question of whether or not water currently diverted from the Waikoloa and Kohakohau Streams can support the additional demand for water that this development will create. Additionally, DHHL should address the cumulative impact of this and other projects such as the Lamaloa development, which will be drawing from the same source.

It is our suggestion that these projects be included in the DHHL Water Master Plan, and that the plan should be referenced in the final EIS.

OHA looks forward to reviewing the Final EIS and may offer additional comments on the project at that time. If you have any questions, please contact Leimana DaMate at 594-1944.

Sincerely,

Jalna Keala
Acting Deputy Director
Hawaiian Rights Division

JK:ld

Cc: OHA Board of Trustees
Clyde W. Namu'o, Administrator
Kona CAC
Hilo CAC

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

To: Mr. Clyde Namuo, Adminstrator
Office of Hawaiian Affairs

Attn: Ms. Jalna Keala, Acting Deputy Director
Hawaiian Rights Division

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated October 1, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

It is correct that the use of federal funds is not presently anticipated; however, in the future, should such funds be utilized for the development of this project, Section 106 consultation will be implemented and your office will be contacted.

The County's Waimea water supply is presently furnished by surface waters from the Waikoloa and Kohakohau Streams. This system has certain limitations such as adequacy of supply. We are currently coordinating with the State Department of Land and Natural Resources (DLNR) and the County Department of Water Supply to cooperatively develop the DLNR well which has a proven capacity to provide much needed water for the Waimea area, including our Lalamilo Project.

The DHHL Water Master Plan is an integral planning component of the Hawaii Island Plan; it addresses the requirements of the Lalamilo Project. The Water Master Plan will be referenced in the Final EIS.

We are not familiar with the Lamaloa Project.

We appreciate your participation in the environmental review process.

UNIVERSITY OF HAWAI'I
ENVIRONMENTAL CENTER

October 7, 2002
RE: 0729

Amy Arakaki
Department of Hawaiian Homelands
1099 Alakea Street, Suite 2000
Honolulu, HI 96813

Dear Ms. Arakaki:

Draft Environmental Impact Statement
Lalamilo Project
South Kohala, Hawai'i

The overall goal of the Lalamilo Project is to develop and deliver residential homestead awards to native Hawaiian beneficiaries who have identified their preference to reside in North Hawai'i. An additional goal is to manage a 16-acre portion of the property as revenue-producing commercial and light industrial uses to support the Department's homestead development activities.

Two residential density alternatives have been developed. These include the preferred Alternative A: 10,000 square feet lot size (442 units, includes 34 lots in the RS-10 zoned infill parcels and 408 units in the main parcel), and Alternative B: a combination of one-acre lot size (121 units) and 10,000 square feet lots in the RS-10 zoned parcels (34 units).

The construction is scheduled in three phases from 2003 - 2012. Infrastructure improvements include development of water, wastewater, and roadway facilities. Commercial and light industrial uses in Phase 3 would be developed to meet the market demand. The common elements of both residential Alternatives include the following amenities: Community Center, Park, Preservation Areas, and Open Space Buffers.

This review was conducted with the assistance of George Curtis, Natural Sciences (UH HILO) and Dave Sims, Environmental Center.

KRAUSS ANNEX 19 • 2500 DOLE STREET • HONOLULU, HAWAII 96822 • (808) 956-7361 • FAX (808) 956-3980
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION INSTITUTION

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

RECEIVED AS FOLLOWS

UNIVERSITY OF HAWAI'I
ENVIRONMENTAL CENTER

October 7, 2002
RE: 0729

Amy Arakaki
Department of Hawaiian Homelands
1099 Alakea Street, Suite 2000
Honolulu, HI 96813

Dear Ms. Arakaki:

Draft Environmental Impact Statement
Lalamilo Project
South Kohala, Hawai'i

The overall goal of the Lalamilo Project is to develop and deliver residential homestead awards to native Hawaiian beneficiaries who have identified their preference to reside in North Hawai'i. An additional goal is to manage a 16-acre portion of the property as revenue-producing commercial and light industrial uses to support the Department's homestead development activities.

Two residential density alternatives have been developed. These include the preferred Alternative A: 10,000 square feet lot size (442 units, includes 34 lots in the RS-10 zoned infill parcels and 408 units in the main parcel), and Alternative B: a combination of one-acre lot size (121 units) and 10,000 square feet lots in the RS-10 zoned parcels (34 units).

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This review was conducted with the assistance of George Curtis, Natural Sciences (UH HILO) and Dave Sims, Environmental Center.

RECEIVED AS FOLLOWS

General Comments

Although the document generally is thorough and detailed, there are a few areas that need further explanation:

- Is most of the site zoned A or RS-10 (the planned density)?
- Is a well to be drilled prior to housing construction, and will it be located to service the property area?
- Where is the sewage treatment plant to be? (It is not on the maps).
- Is a gym/community center part of the development or only a land allocation?

Fig 15 shows some current and projected Waimea school overcrowding (DOE ref), but a DOE January 3 letter on this matter claims more than adequate capacity. Letters from both school principals say otherwise. This should be cleared up in the text.

For both the well and the schools, the DHHL is said to be "working with" State and County agencies to resolve these problems. Firm plans or commitments should be cited, or it should be acknowledged that these factors have not been resolved.

An overlooked environmental factor is the dragged-out schedule for preparing the lots and infrastructure: five years to complete the first phase, one to two years for the following phases. Thus, construction work and disruption will continue for years while residents establish homes. Possibly, this makes it easier for the community to absorb the added population.

Also terms such as "fireflow" and "product types" should be defined or common English used.

Traffic

What the detailed traffic analysis actually shows is how the entrances should be designed; the traffic in the area already is bad, and additional population will only make it worse, as the state or county has made no commitment on the long-awaited bypass road.

The draft EIS illustrates the paradox the state is in and the project cannot readily solve: there are hundreds of eligible people awaiting Homeland lots or homes in the area, but until the state provides supporting facilities such as schools and roads the development will have some adverse effects.

RECEIVED AS FOLLOWS

Thank you for the opportunity to comment on this draft EIS.

Sincerely,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: OEQC
Yukie Ohashi, PBR Hawaii, Hilo Office
James Moncur
Dave Sims

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Dr. John T. Harrison, Environmental Coordinator
University of Hawaii
Environmental Center
Krauss Annex 13, 2600 Dole Street
Honolulu, Hawaii 96822

Dear Dr. Harrison:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

<u>General Comments</u>

1. We provide the following further explanations as requested:

   - *Zoning clarification.* The Final EIS includes Table 8 which provides a parcel specific description of the existing land use designations (State Land Use, County General Plan, and zoning), the planned uses, and the land use designations DHHL proposes to conform to.

Table 8. Planned Land Uses, Land Use Designations and Conformance

Parcel # (Acres)	Planned Land Use	Existing Land Use Designation	Land Use Conformance
12-17 (7.0)	Phase 1 In-fill residential (15 lots - 10,000 sf)	• SLU - Urban • GP - Urban Expansion • Zoning - RS-10	- Complies w/ SLU Urban - Complies w/ GP Low Density - Will conform w/ RS-10 zone
54 (9.8)	Phase 1 In-fill residential (19 lots - 10,000 sf)	• SLU - Urban • GP - Low Density Residential and Urban Expansion • Zoning - RS-10	- Complies w/ SLU Urban - Complies w/ GP Low Density - Will conform w/ RS-10 zone
77 (232.0)	Phase 2Residential (408 lots - 10,000 sf or 121 1-acre lots)	• SLU - Agricultural • GP - Urban Expansion • Zoning - A-5a	- Will conform w/SLU Urban - Complies w/ Urban Expansion - Residential will conform w/ RS-10 or RA-1a zoning.

- *Well development.* DHHL, the Department of Land and Natural Resources (DLNR), and the County Department of Water Supply (DWS) have initiated discussions for a collaborative effort to develop Well No. 6240-02, a DLNR well located offsite above Waimea Town. This well is already drilled but will require outfitting with a pump, connecting pipeline, and electrical improvements. This potential water source would be added to the DWS system for the Waimea Service Area with provisions for the Lalamilo Project, other DHHL developments, other State projects, and Waimea Town.

- *Wastewater treatment facilities.* The higher density preferred Alternative A would require a community wastewater treatment facility. At this time we have conceptually identified other adjacent State land to the west of the Project Site as a potential area. Use of this land and development of a sewage treatment plant and effluent reuse area would require a separate environmental assessment and review process. Our alternative plans have not mapped this site because a decision on the project's ultimate density will determine the need for a community wastewater treatment facility.

- *Community Center facility.* The EIS designates 1.8 acres for a Community Center facility. The funding source for design and construction will be determined during the Phase 2 Increments I and II period (2006 - 2008).

2. We have used the best information available at this time from the Department of Education (DOE) to describe the capacity of DOE facilities which would serve our Lalamilo students. Upon decision between the two alternatives and refinement of the subdivision development plan, DHHL will be able to specifically

quantify impacts, and will collaborate with the DOE and make an appropriate contribution towards school facilities.

3. DHHL made firm commitments to mitigate our impacts on water and school facilities. At this time, we are collaborating with the State Department of Land and Natural Resources and the County Department of Water Supply for the well development, and Kanu o Ka Aina on school facilities. DHHL will also work with the Department of Education to mitigate impacts on area schools.

4. We believe our phasing plan is a reasonable one and allows for the homestead residential development in tandem with infrastructure upgrades as expeditiously as possible. Our preferred Alternative A would commence in 2003 with a target buildout date of 2010.

5. Terms such as fireflow and product type are defined or more commonly described in the Final EIS.

Traffic

The traffic impact analysis report (TIAR) has been updated to reflect a slight decline in our trip generation with the removal of the commercial and industrial uses. We agree with your observation regarding the overall existing traffic conditions. Through our proposed mitigation improvements at our access points, we are able to address the additional traffic which would occur with development of our Project.

We thank you and appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Patricia G. Engelhard
Director

Pamela N. Mizuno
Deputy Director

County of Hawai`i
DEPARTMENT OF PARKS AND RECREATION
101 Pauahi Street, Suite 6 • Hilo, Hawai'i 96720
(808) 961-8311 • Fax (808) 961-8411

October 7, 2002

The Honorable Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Attn: Ms Amy Arakaki

Re: DHHL Lalamilo Project-Draft EIS
South Kohala, Hawaii

Dear Chairman Soon:

We sincerely appreciate your department's cooperation in excluding TMK: (3) 6-6-01:10 from your project, which we now hope to acquire and develop as a trailhead for our Waimea Trails and Greenways project.

Thank you and best wishes on your Lalamilo project.

Sincerely,

Pat Engelhard

Patricia Engelhard
Director

Cc Governor, State of Hawaii
OEQC
PBR Hawaii

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Patricia Englehard
Department of Parks and Recreation
County of Hawaii
101 Pauahi Street, Suite 6
Hilo, Hawaii 96720

Dear Ms. Englehard:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo. This letter confirms that we are no longer including Parcel 10 (TMK: 6-6-01:10) in our inventory of lands for acquisition.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comment.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We appreciate your participation in the environmental review process and look forward to further collaboration as your trail system plans develop.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Barbara Bell
Director

DEPT. OF HAWAIIAN HOME LANDS
Oct 17 11 07 AM '02

County of Hawaii

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street, Room 208 • Hilo, Hawai'i 96720-4252
(808) 961-8083 • Fax (808) 961-8086

October 14, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

Re: Title of Project: DHHL Lalamilo Project
Location: Island: Hawai'i District: South Kohala
TMK 6-6-01:54 & 77; 6-6-04: 12-17

Dear Mr. Soon,

Please accept the following County of Hawai'i Department of Environmental Management comments regarding the above subject project:

1. The county transfer station, our baseyard, and the old landfill are located in close proximity to the Lalamilo project. We have no plans to move any of these.

2. With either of the proposed alternatives, we expect a significant increase in the usage of the existing transfer station. The Waimea transfer station now services approximately 8,000 residents. An additional 1,500 people could be added with your largest alternative of 442 houselots. As the plan is clarified, we would like to discuss the proposed project's financial impacts to the County and explore DHHL's assistance to the County in this regard.

3. The area is very windy and trash is often scattered in the direction of the project because of these conditions. It is important that the County work with you to ensure that conditions do not impact the residents of your project.

Thank you for allowing me to provide you with these comments. If you need further clarification or have additional questions, don't hesitate to contact me.

Sincerely,

Barbara Bell
DIRECTOR

cc: Governor, State of Hawai'i
Office of Environmental Quality Control
415 South Beretania Street
Honolulu, HI 96713

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Barbara Bell
Department of Environmental Management
County of Hawaii
25 Aupuni Street, Room 205
Hilo, Hawaii 96720

Dear Ms. Bell:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 14, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

1) We note your comment regarding your existing facilities (transfer station, baseyard, and old landfill) and acknowledge that you have no plans to move these facilities. It is not our expectation that any of the existing uses on the South Kohala Distribution Road would need to be relocated, including your baseyard, transfer station, and the old landfill.

2) As planned, the increase in resident population will be incremental between 2003 through 2010. The development has been phased over a seven year period to minimize the impacts to the existing community and County resources. DHHL will

work with you to discuss the Project's financial impacts to the County's solid waste facilities as plans materialize during the development and subdivision process.

3) We welcome the opportunity to work with you in managing the conditions around the transfer station.

We thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Dixie Kaetsu
Managing Director

County of Hawaii

DEPARTMENT OF PUBLIC WORKS
101 Pauahi Street, Suite 7 · Hilo, Hawaii 96720-4224
(808) 961-8321 · Fax (808) 961-8630

Dennis K. W. Lee
Director

Ronald Ueoka
Deputy Director

October 7, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Homelands
1099 South Beretania Street, 20th Flr.
Honolulu, HI 96813

Subject: Draft Environmental Impact Statement
DHHL Lalamilo Project
Lalamilo, South Kohala, Hawaii
TMK: 6-6-01:054 & 077; 6-6-04: 012-017

We reviewed the draft EIS and have the following comments:

4.4 Drainage
According to the draft, new data has been obtained for Waikoloa, Keanuiomano and Lanikepu Streams. A letter of map revision (LOMR) or physical map revision must be obtained in order to reflect the changes on the flood insurance rate map (FIRM) and the subdivision plat map. A conditional letter of map revision (CLOMR) must be obtained prior to construction of the stream crossings. According to Chapter 27 of Hawaii County Code, no rise in the base flood elevation will be allowed as a result of the development.

Table 7 on p 3-6 should include the necessary submissions to FEMA for map revisions.

Any development generated runoff shall be disposed of on-site. A drainage study shall be prepared and submitted for approval. If drywells are included in the development, an Underground Injection Control (UIC) permit may be required from the Department of Health, State of Hawaii.

Table 7 on page 3-6 should include UIC permits (if applicable).

5.4 Roadways and Traffic

Please address the impact to the Linsdey Road/ Mamalahoa Highway and Lindsey Road/Kawaihae Road intersections, especially during school drop-off and pick-up periods.

The 4th para. on page 5-24 appears to contain errata.

For consistency, include extension of Alaneo Street to the West Access Road under Project Access Improvements on page 5-26.

In addition to the proposed improvements, the existing access to Akulani Street and the new access to Alaneo Street should include left turn lanes on Kawaihae Road or be restricted to right- in and right-out movements only.

South Kohala Distribution Road should be improved to commercial standards. It is the policy of our department to recommend curb, gutter and sidewalks on roads serving all commercial and industrial uses and residential uses with a density of RS-10 or higher.

In the interest or pedestrian and bicyclist safety, bike lanes should be considered throughout this project.

If you have any questions, please contact Kiran Emler of our Kona office at 327-3530; Fax 327-3533.

Galen M. Kuba, Division Chief
Engineering Division

KE

c: ENG-HILO/KONA
Planning Director
DPW-Traffic Division
PBR Hawaii ✓
OEQC

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Dennis K. W. Lee
Department of Public Works
County of Hawaii
101 Pauahi Street, Suite 7
Hilo, Hawaii 96720-4224

Attn: Mr. Galen Kuba, Division Chief

Dear Mr. Lee:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

4.4 Drainage

- During the subsequent development phases, appropriate site-specific plans will be prepared, including a detailed drainage plan. A letter of map revision (LOMR) or physical map revision will be obtained to reflect the changes on the flood insurance rate map (FIRM) and the subdivision plat map. In addition, a conditional letter of map revision (CLOMR) will be obtained prior to construction of the stream crossings.

Further, the plans will reflect no rise in the base flood elevation, in accordance with Chapter 27 of the Hawaii County Code.

- [Table 7] now Table 9. Required Permits and Approvals by Phases has been revised to include the submissions to Federal Emergency Management Agency for map revisions.

- A drainage study will be prepared prior to development and submitted to the County Department of Public Works for review and approval. Such plans shall designate that development generated runoff shall be disposed on-site. As necessary, an Underground Injection Control (UIC) permit shall be applied for with the Department of Health UIC Program.

- Table 9 has been revised to include a UIC permit for drywells.

5.4 Roadways and Traffic

- The intersection of Mamalahoa Highway and Lindsey Road is about 2 miles from the project site and was not included in the study area for the Traffic Impact Analysis Report. We have assessed that intersection using the most recent available traffic count data (Year 2000) which indicate that the intersection of Mamalahoa Highway and Lindsey Road carried about 2,000 vehicles per hour (vph), during the a.m. and p.m. peak hours of traffic. The traffic study for the Mamalahoa Highway Improvements, recently completed in Waimea town, projected the a.m. and p.m. peak hour traffic volumes at the intersection of Mamalahoa Highway and Lindsey Road at about 3,000 vph by the Year 2006. Extrapolating the peak hour volumes to the Year 2012, the Lindsey Road intersection can be expected to carry about 4,000 vph, assuming that the Waimea Bypass Road is not constructed. The project would add about 6 percent and 8 percent, during the Year 2012 a.m. and p.m. peak hours of traffic, respectively, assuming that 100 percent of the eastbound traffic generated by the subject project would pass through the Lindsey Road intersection.

- Pages 5-24 and 5-26 have been revised in the Final EIS.

- The traffic analysis indicated that exclusive left turn lanes at Akulani Street and at the new Alaneo Street intersections were not warranted at Kawaihae Road based upon the projected volumes. Delays to through traffic on Kawaihae Road are expected to be minimal due to vehicles turning left from the through lane of traffic.

- With the removal of the commercial and light industrial uses, the Lalamilo Project will no longer have access via the South Kohala Distribution Road. Therefore, any improvements associated with the Distribution Road are no longer applicable. Internal roadways for the homestead lots will be in accordance with standards for rural residential developments.

- Bicycle facilities will be considered on the major internal collector roadway.

We thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

RECEIVED
AUG 29 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

August 28, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

Attention: Ms. Amy Arakaki

Dear Mr. Soon:

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT
DHHL LALAMILO PROJECT
SOUTH KOHALA, HAWAII
TAX MAP KEY: 6-6-01: 54 & 77; 6-6-04: 12-17

This responds to your request for comments on the above-referenced Draft Environmental Impact Statement. We offer the following recommendations:

Fire apparatus access roads shall be in accordance with UFC Section 10.207:

"**Fire Apparatus Access Roads**

"**Sec. 10.207.** (a) **General.** Fire apparatus access roads shall be provided and maintained in accordance with the provisions of this section.

"(b) **Where Required.** Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access as measured by an unobstructed route around the exterior of the building.

"**EXCEPTIONS:** 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of this section may be modified.

"2. When access roadways cannot be installed due to topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 10.301 (b).

"3. When there are not more than two Group R, Division 3 or Group M Occupancies, the requirements of this section may be modified, provided, in the opinion of the chief, fire-fighting or rescue operations would not be impaired.

"More than one fire apparatus road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

"For high-piled combustible storage, see Section 81.109.

"(c) **Width.** The unobstructed width of a fire apparatus access road shall meet the requirements of the appropriate county jurisdiction.

"(d) **Vertical Clearance.** Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

"**EXCEPTION:** Upon approval vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance.

"(e) **Permissible Modifications.** Vertical clearances or widths required by this section may be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

"(f) **Surface.** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities." (20 tons)

"(g) **Turning Radius.** The turning radius of a fire apparatus access road shall be as approved by the chief." (45 feet)

"(h) **Turnarounds.** All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus.

"(i) **Bridges.** When a bridge is required to be used as access under this section, it shall be constructed and maintained in accordance with the applicable sections of the Building Code and using designed live loading sufficient to carry the imposed loads of fire apparatus.

"(j) **Grade.** The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief." (15%)

"(k) **Obstruction.** The required width of any fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under this section shall be maintained at all times.

"(l) **Signs.** When required by the fire chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both."

Water supply shall be in accordance with UFC Section 10.301:

"(c) **Water Supply.** An approved water supply capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are hereafter constructed, *in accordance with the respective county* water requirements. There shall be provided, when required by the chief, on-site fire hydrants and mains capable of supplying the required fire flow.

"Water supply may consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.

"The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be protected as set forth by the respective county water requirements. All hydrants shall be accessible to the fire department apparatus by roadways meeting the requirements of Section 10.207."

Thank you for the opportunity to comment.

Sincerely,

DARRYL OLIVEIRA
Fire Chief

RK:lk

cc: PBR Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Darryl Oliveira
Fire Department
25 Aupuni Street, Suite 103
Hilo, Hawaii 96720

Dear Mr. Oliveira:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated August 28, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

1. Fire apparatus access roads

   The design of all project roadways will be in accordance with the provisions of the Uniform Fire Code (UFC) Section 10.207 and the building plans will be provided to the County for your detailed review.

2. Water supply

   At the present time, we are coordinating with the Department of Land and Natural Resources and County Department of Water Supply for the development of an adequate water supply and

infrastructure to meet the fire flow requirements. Further, the design of our roadways will include on-site fire hydrants and mains capable of supplying the required fire flow. Provision of a water supply for the project shall be in accordance with UFC Section 10.301

We thank you and appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

DEPT OF HAWAIIAN HOME LANDS
SEP 13 10 56 AM '02

County of Hawaii

PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

September 11, 2002

Mr. Raynard Soon, Chairman
State of Hawaii
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

Dear Mr. Soon:

Draft Environmental Impact Statement (DEIS) re:
DHHL Lalamilo Project (August 2002)
Lalamilo, Waimea, S. Kohala, Hawaii Island
TMK: 6-6-001:054 & 077 and 6-6-004:012 to 017

Thank you for providing us a copy of the above DEIS. We have no further comments to add to the previously submitted remarks of January 17, 2002.

Sincerely,

CHRISTOPHER J. YUEN

EML:cps
P:\WpWin60\CZM\Letters\LDEISLalamilo'02

cc: Planning Dept. - Kona

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Christopher J. Yuen
Planning Department
County of Hawaii
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720

Dear Mr. Yuen:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated September 11, 2002, on the Draft EIS for our proposed development at Lalamilo. We note that you have no further comments to add to your previously submitted remarks dated January 17, 2002.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Harry Kim
Mayor

Lawrence K. Mahuna
Acting Police Chief

County of Hawaii
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-8869

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OCT 0 7 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

October 3, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Dear Chairman Soon:

RE: Draft Environmental Impact Statement & EIS Rules
DHHL Lalamilo Project
TMK: 6-6-01:54 & 77; 6-6-04:12-17

Our staff has reviewed the proposed DHHL Lalamilo Project and has no objections or comments to offer at this time.

Thank you for the opportunity to comment.

Sincerely,

LAWRENCE K. MAHUNA
ACTING POLICE CHIEF

THOMAS J. HICKCOX
ASSISTANT POLICE CHIEF
FIELD OPERATIONS BUREAU

RK:vta

cc: PBR Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

The Honorable Lawrence K. Mahuna
Police Department
County of Hawaii
349 Kapiolani Street
Hilo, Hawaii 96720-3998

Attn: Mr. Thomas J. Hickcox, Assistant Police Chief

Dear Chief Mahuna:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 3, 2002, on the Draft EIS for our proposed development at Lalamilo. We note your statement that the Police Department has no objections or comments to offer at this time.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comment.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

DEPT. OF HAWAIIAN HOME LANDS
Oct 2 9 11 AM '02

September 30, 2002

To: Mr. Raynard C. Soon, Chairman
Hawaiian Homes Commission

From: Hamakua Educational Development Committee
P.O. Box 2949
Kamuela, Hawaii 96743

Subject: Lalamilo Project
Comments on the Environmental Assessment/
Environmental Impact Statement Preparation Notice

Thank you so much for clarifying the student projection numbers for Waimea Elementary School and Waimea Middle School. We believe that even the "high end" numbers provided are somewhat low. However, these estimates are substantially more accurate than the initial projection. We are very appreciative of the work that went into the clarification process.

We believe that the 2001 enrollment and capacity reflects the past and current status of Waimea Middle School. The numbers shown for Waimea Elementary are in gross error. These numbers do not reflect the 2001 evacuation of our "N" building. This condemned building (capacity 270 students) has not housed students since 06/2001. Currently this building resides on the Hawaii Preparatory Academy Campus, where it is being restored.

Waimea Elementary School and Waimea Middle School share the same campus. It is imperative that all capacity and enrollment numbers are accurate and reflect the true status of our schools'. The data that is currently documented shows that we have the capacity to educate 300 more students. Both of our schools are experiencing very crowded conditions and correct data will reflect this.

Thanks so much for your help in this matter. We look forward to working together in the near future.

Sincerely,

Cindy Shiraki
Hamakua Educational Development Committee, President

John Znamierowski
Waimea Middle School Principal

Pat Rice
Waimea Middle School Co-ordinator

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Hamakua Educational Development Committee
P.O. Box 2949
Kamuela, Hawaii 96743

Dear Members of the Committee:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated September 30, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

Thank you for the acknowledgement of our effort to clarify the student projections of our Project. The Department of Education (DOE) has provided the information to clarify methods of projecting student numbers and school capacity and enrollment, in addition to 2010 projections for each grade level. DOE has noted their concurrence with the projected range of 180 to 288 students for the higher density Alternative A. DOE's calculation method for the high estimate of 288 students is based on actual enrollment figures from projects similar to Lalamilo, including other DHHL communities.

We have used the best information available at this time from the Department of Education to describe the capacity of the DOE facilities which would serve our Lalamilo students. Upon decision between the two alternatives and refinement of the subdivision development plan, DHHL will be able to specifically quantify impacts, and will collaborate with DOE and make an appropriate contribution towards school facilities.

In addition, DHHL and Kanu o ka Aina have evaluated several DHHL properties for a permanent site for their charter school campus. The Hawaiian Homes Commission approved a 15-acre parcel at DHHL's Kuhio Village in the Puukapu area for a comprehensive native Hawaiian cultural learning center, which will include a permanent campus for the charter school. The charter school is a K-12 program.

DHHL expects that our Lalamilo Project students will attend the area's public, charter, and private schools.

Thank you again. We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

SOUTH KOHALA TRAFFIC SAFETY

October 1st, 2002

RECEIVED
OCT 0 2 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

RE: Draft Environmental Impact Statement – Department of Hawaiian Homes Lalamilo Project

Dear Chairman Soon,

While the draft EIS addresses key project intersections with Kawaihae Road, it disregards larger regional traffic issues.

The Lalamilo Project will have an extremely negative impact on Waimea traffic. Please analyze the effect of this project on the Mamalahoa Highway / Lindsey Road intersection, especially during rush hour traffic.

- Two additional intersections, which will be impacted are: Wai'aka and Ohina Streets with Kawaihae Road. Both service large subdivisions in close proximity to the proposed project.
- Your proposed Kawaihae intersections with the South Kohala Distribution Road and the East Access Road appear too close together to handle the traffic load. This situation will be aggravated by the eventual relocation of the Hawaii Preparatory Academy Lower/Middle School, which will create a four-way intersection at one of these locations.
- We strongly question the State DOT draft South Kohala Regional Traffic Forecast (April 19, 2002) projecting "little growth along Kawaihae road up to the year 2005". Please support this forecast, as it is completely contrary to what's going on in Waimea, North Hawaii, and the Island today.

Finally, while we realize that the Kawaihae By-pass Road is a separate project, it's clear to everyone that DHHL is a key player in this regional highway system and it certainly would be encouraging to see some expression of support for this system in regard to your proposed Lalamilo Project.

Thank you for the opportunity to comment.

With Aloha,

John B. Ray
Chairman
South Kohala Traffic Safety Committee
JBR/ls

Cc: Office of Environmental Quality Control, ATTN: Yukie Ohashi, PBR Hawaii
Casey Yanagihara, Director of Public Works, Traffic Safety Division
Stanley Tamura, Director of Transportation, State Transportation Division
Councilman Leningrad Elarionoff

SOUTH KOHAL TRAFFIC SAFETY COMMITTEE
Post Office Box 1680 • Kamuela, Hawaii 96743
TEL: 808 / 885-5875 FAX: 808 / 885-7184

SOUTH KOHALA TRAFFIC SAFETY

October 7th, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

RE: Draft Environmental Impact Statement – Department of Hawaiian Homes Lalamilo Project

Dear Chairman Soon,

This letter is a follow-up to our comments sent last week on October 1st, 2002. We had a Waimea Community Association meeting on October 4th, and the following traffic related concerns were expressed.

First, the community strongly urges DHHL to implement some other internal road connection from the Project to Mamalahoa Highway on the Kona-side of town to facilitate traffic circulation around the Lindsey Road / Mamalahoa intersection.

Second, in regard to the proposed Project intersections with Kawaihae Road, we request that the improvements be completed prior to any occupancy of the new subdivision tract.

Thank you for the opportunity to comment.

With Aloha,

JQ B. Ray

John B. Ray
Chairman
South Kohala Traffic Safety Committee
JBR/ls

Cc: Office of Environmental Quality Control, ATTN: Yukie Ohashi, PBR Hawaii
Casey Yanagihara, Director of Public Works, Traffic Safety Division
Stanley Tamura, Director of Transportation, State Transportation Division
Councilman Leningrad Elarionoff

SOUTH KOHAL TRAFFIC SAFETY COMMITTEE
Post Office Box 1680 • Kamuela, Hawaii 96743
TEL: 808 / 885-5875 FAX: 808 / 885-7184

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Mr. John B. Ray, Chairman
South Kohala Traffic Safety Committee
P.O. Box 1680
Kamuela, Hawaii 96743

Dear Mr. Ray:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letters dated October 1, 2002, and October 7, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments (October 1, 2002):

- The intersection of Mamalahoa Highway and Lindsey Road is about 2 miles from the project site and was not included in the study area for the Traffic Impact Analysis Report (TIAR). We have assessed that intersection using the most recent available traffic count data (Year 2000) which indicate that the intersection of Mamalahoa Highway and Lindsey Road carried about 2,000 vehicles per hour (vph), during the a.m. and p.m. peak hours of traffic. The traffic study for the Mamalahoa Highway Improvements, recently completed in Waimea Town, projected the a.m. and p.m. peak hour traffic volumes at the intersection of Mamalahoa Highway and Lindsey Road at about

3,000 vph by the Year 2006. Extrapolating the peak hour volumes to the Year 2012, the Lindsey Road intersection can be expected to carry about 4,000 vph, assuming that the Waimea Bypass Road is not constructed. The project would add about 6 percent and 8 percent, during the Year 2012 a.m. and p.m. peak hours of traffic, respectively, assuming that 100 percent of the eastbound traffic generated by the subject project would pass through the Lindsey Road intersection.

- Additional traffic analyses on Waiaka Street and Ohina Street at Kawaihae Road indicate that both streets currently operate at Level of Service (LOS) "C" at Kawaihae Road. At full build-out of the subject project, Ohina Street would continue to operate at LOS "C", during both the a.m. and p.m. peak hours of traffic. Waiaka Street would operate at LOS "C", during the a.m. and p.m. peak hours of traffic. As traffic continues to increase on Kawaihae Road with or without the subject project, motorists on both side streets are expected to experience increases in delays during the peak hours of traffic.

- We have discussed the proximity of the East Access Road and the South Kohala Distribution Road intersections on Kawaihae Road with the State Department of Transportation (DOT). DOT has not raised any objections. We will continue to work with DOT during the design phase of the East Access Road. Likewise, we would coordinate our traffic improvements with the future Hawaii Preparatory Academy driveway improvements.

- In order to conform to DOT's regional transportation efforts, the TIAR was prepared within the context of the planning of the Kawaihae and Waimea Bypass Road as well as the Saddle Road improvements and Saddle Road extension.

- DHHL is continuing to work with DOT to determine whether an alignment of the Waimea Bypass Road through Hawaiian home lands is possible.

The following responds to your October 7 specific comments:

- Our property is adjacent to Kawaihae Road. It would therefore be unreasonable and illogical for us to develop a roadway approximately three miles in length to connect to Mamalahoa Highway through property we do not own.

- Improvements to Kawaihae Road at our proposed access roads would be completed prior to occupancy of each development phase.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Waimea Community Association

October 3rd, 2002

RECEIVED
OCT 07 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

RE: Draft Environmental Impact Statement – Department of Hawaiian Homes Lalamilo Project

Dear Chairman Soon.

In responding to the Lalamilo Draft EIS, our comments address two major areas of concern. The South Kohala Traffic Safety Committee has responded to traffic issues and the draft EIS seems to adequately address other topic areas.

First, our public education system. While you acknowledge current overcrowded and inadequate facilities, you fail to recognize and substantially contribute to solutions addressing the situation, especially the lack of a high school (or even plans for one) in South Kohala. I cannot stress enough the severe disadvantage this poses for a small, isolated rural community.

Second, and of overwhelming concern, the Social Impact Assessment, is totally inadequate. While you acknowledge the community's concerns and the project impacts, the Social Impact Assessment completely ignores solutions, except in a purely academic context. We have amply supplied you with social statistics for the Island and North Hawaii and referred you to the Five Mountains Hawaii organization and their research. Recent dramatic growth in our town coupled with a corresponding lack of infrastructure has created a huge burden on our community's social fabric. Your proposed Lalamilo Project will greatly stress an already aggravated environment.

Please reconsider the scale and timing of this project.

With Aloha,

JQ B. Ray

John B. Ray, President
Waimea Community Association

Cc: Office of Environmental Quality Control, ATTN: Yukie Ohashi, PBR Hawaii
Casey Yanagihara, Director of Public Works, Traffic Safety Division
Stanley Tamura, Director of Transportation, State Transportation Division
Councilman Leningrad Elarionoff

WAIMEA COMMUNITY ASSOCIATION
Post Office Box 1680 • Kamuela, Hawaii 96743

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Mr. John B. Ray, President
Waimea Community Association
P.O. Box 1680
Kamuela, Hawaii 96743

Dear Mr. Ray:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 3, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

1. Public Education System

DHHL recognizes the critical nature of the crowded conditions at the Waimea Elementary and Middle Schools and will work with the Department of Education (DOE) to mitigate the impact of the new Lalamilo Project students that will be served by the area schools. Upon decision between the two alternatives and refinement of the subdivision development plan, DHHL will be able to specifically quantify impacts, and will collaborate with the DOE and make an appropriate contribution towards school facilities.

In addition, DHHL and Kanu o ka Aina have evaluated several DHHL properties for a permanent site for the charter school campus. The Hawaiian Homes Commission approved a 15-acre parcel at DHHL's Kuhio Village in the Puukapu area for a comprehensive native Hawaiian cultural learning center, which will include a permanent campus for the charter school. The charter school is a K-12 program.

DHHL expects that our Lalamilo Project students will attend the area's public, charter, and private schools.

We recognize that the lack of a public high school in Waimea requires Waimea students to travel approximately 15 miles (30 miles round trip) to Honokaa each day. Indirectly, the effect to the Waimea community is the lack of facilities which could be used by the community such as a gymnasium, athletic field, and swimming pool.

2. Social Impact Assessment

We respectfully disagree with your remark that the Social Impact Assessment (SIA) is inadequate. The Social Impact Assessment covers the full range of social impacts and issues related to the Lalamilo project (SIA Sections 4 and 5, Appendix I). Further, SIA Sections 2 and 3 provide the baseline social context in terms of demographics and public policies related to land use plans and DHHL mandates.

The Social Impact Assessment does not ignore solutions. In accordance with Chapter 343, HRS, project impacts are fully disclosed. They are discussed in terms of population impacts; the Hawaiian Homes Commission Act of 1920, as amended; the County of Hawaii General Plan; community integration and public services and facilities. Population impacts are discussed in terms of magnitude of increase and mitigation measures are presented in discussions on public services and facilities. The sections on public policies are discussed in terms of project consistency and that information is fully disclosed in the EIS, Sections 1, 3, and 5.

Mitigation measures related to community integration are fully discussed in SIA Section 5.3.2, Achieving Social Equity and Integration with the Proposed Lalamilo Project, and EIS Section 5. Mitigation measures for police protection, fire protection, medical emergencies, and public schools are presented in SIA Sections 5.4.1 through 5.4.3, and EIS Section 5.

We reviewed the information you provided in your letter dated July 2, 2002. You provided twelve bullets of information, the source of which was not provided. The information was related to various socioeconomic conditions that reflect problems and social ills and did not provide specific statistics or correlations to the Lalamilo Project. You also referred us to a 2001 study by Five Mountains Hawaii that you state "correlates the relationship between the lacking infrastructure and many of our social ills." In our review of the Five Mountains study we do not find such a correlation.

Those suggestions imply that you believe the Lalamilo project will somehow contribute to or exacerbate these problems. Although you do not explicitly say so, your comments imply that this project will bring more poverty, more domestic violence, more illiteracy, etc., to the Waimea community. Recent DHHL developments prove there is no evidence to support these implications.

The new residents at Lalamilo are expected to share similar social and economic characteristics as existing Waimea residents. They will be similar in terms of the diversity of families with various levels of incomes and occupations. The only distinguishing factor is ethnicity in that the families are native Hawaiian beneficiaries. Even so, we note that there are several Hawaiian homestead communities in your region that do not exhibit the negative impacts which your letter implies would occur with the development of our Lalamilo Project.

DHHL is mandated to provide homestead land to our native Hawaiian beneficiaries. Thousands of Hawaiian families have homes and agricultural and pastoral lots through this program. Our neighborhoods are thriving communities, and our residents contribute to the social and cultural fabric of their respective regions. They are part of the general workforce, they participate in the general school system, and patronize local stores and services.

DHHL is making every effort to mitigate impacts related to the number of new residents. However, we do not believe that the project will bring any more social problems than would a private development project. While we will encourage the new homestead residents to contribute to community efforts, we hope that, as the leader of a major community organization, you will welcome the new Lalamilo residents with the same enthusiasm as you would the new residents of the Parker Ranch 2020 communities.

With regard to recreational facilities for our new residents and the community, a Community Center facility including a building for community gatherings is planned on a 1.8-acre parcel, which is adjacent to an 8.8-acre park site. The development of these facilities is anticipated in Phase 2, Increments I and II (2006-2008). Even without our Lalamilo Project, the demand on existing educational facilities continues to grow. DHHL will work with the DOE to seek solutions that will help improve educational conditions in Waimea and is supporting Kanu o ka Aina charter school as noted above.

3. Reconsider the scale and timing of the project

The Draft EIS describes a seven-year development period of the two residential phases. Construction of the larger Phase 2 (Increments I - IV) will be timed to follow appropriate infrastructure development (i.e., water and wastewater systems, roadways, school contributions, park facilities, etc.) in order to mitigate the impacts of our Project.

DHHL *has* responded to the concerns of the community and initially scaled back the light industrial uses (removed Parcel 10) in deference to the County of Hawaii and the community's desire for the parcel for use as a trailhead. As noted above, we have now removed all commercial and industrial uses and sixteen acres are now designated as General Agriculture land. These changes represent a significant scaling back of our project.

Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

DEPT OF HAWAIIAN HOME LANDS
Oct 10 9 01 AM '02

WAIMEA HAWAIIAN HOMESTEADERS' ASSOCIATION, INC.
P. O. Box 6753
Kamuela, Hawaii 96743
October 7, 2002

M KANANI KAPUNIAI
Pu'ukapu-Pastoral '90+
Director- **President**

N DUKE KAPUNIAI
Puukapu Agricultural '85+
Director - **Vice-President**

DOREEN KAMA
Kuhio Village
Director - **Secretary**

IRENE TORREY
Kuhio Village
Director - **Treasurer**

Puukapu-Pastoral >'90
Director

THELMA KANIHO
Pauahi
Director

Puukapu-Agricultural>'85
Director

A HOPPY BROWN
Pu'ukapu-Pastoral '90+
Director

NANCY HONDA
Pu'ukapu-Agricultural'85+
Director

LAN BANNISTER
Nienie
Director

MAXINE KAHAULELIO
Pu'u Pulehu
Director

LAN BANNISTER
Kamoku-Waikoloa
Director

Raynard Soon, Chairman
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii, 96805

RE: **DHHL Lalamilo Project; South Kohala, Hawaii - DEIS**
TMK 6-6-01:54 & 77; 6-6-04: 12-17

We would like to submit the following comments:

1) We support lower density development
2) We support ideas submitted by Hui Kako'o 'Aina Ho'opulapula
3) We support timing of this or any other development to follow already awarded accelerated projects have been completed.

Thank you very much!!

Cordially,

Marion K Kapuniai
President

Phone: 890-2311 (Res)(885-8336 (Bus)
Email: kananik@softhome.net

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Ms. Marion K. Kapuniai, President
Waimea Hawaiian Homestead Association, Inc.
P.O. Box 6753
Kamuela, Hawaii 96743

Dear Ms. Kapuniai:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

1) The ultimate density for Lalamilo will be determined by the Hawaiian Homes Commission and will be based on overall cost effectiveness and the ability to serve as many beneficiaries as possible.

2) We acknowledge your support of the ideas submitted by Hui Kakoo Aina Hoopulapula.

3) Residential accelerated awards projects on the island of Hawaii have all been completed.

We appreciate your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

September 17, 2002

Ms. Yukie Ohashi
PBR Hawaii
101 Aupuni Street
Hilo Lagoon Center, Suite 310
Hilo, HI 96720-4276

RECEIVED
SEP 1 8 2002
PBR HAWAII
PHILLIPS BRANDT REDDICK

Re: DHHL Lalamilo Project

Dear Yukie,

Thankyou for including us in the circulation of the Draft EIS for the above project.
I have several comments that I would like to present to you.

1. The Waimea Trails and Greenways is requesting from the State, use of the State land on the west and south (Waikoloa Stream) borders of the Lalamilo DHHL project. The request varies in width from 240 feet to 300 feet along these 2 boundaries so that questrian, pedestrian and non motorized vehicles can have unique, seperated corridors to use.
2. The preferred DHHL scheme is one where over 400 lots are to be developed in approximately 10,000 s.f. lot configurations. In order to achieve this number, a sewage treatment facility would have to be developed on an additional 230 acres outside of and directly west of the project site.
3. This could have an impact on our trail. In order to connect between the County Park that was donated by Henry Clark for the purposes of a park and trail head and the continuation of the trail on the south side of the Waikoloa Stream, it is imperative that the trail reside on the land bordering the west side of the DHHL land. If this is so, how would the proposed sewage treatment facility be accessed and how would sewer lines cross the trail land?
4. The proposed scenarios do not include an option where 10,000 square foot lots are developed in a number where the appropriate sized sewage treatment plant could be accommodated on the subject property and not have to

acquire land to provide for this. Is this not a viable option that would reduce the numbers of new residences, having less of an impact on existing infrastructure and contain the development within the project boundaries?

We do appreciate DHHL's consideration of dropping the request of the 16.5 acre parcel of State Land north east of the transfer station so it can be used as a trail head. Thankyou for your attention to this.

Yours truly,

Clemson Lam
Chairman, Waimea Trails and Greenways committee
Waimea Preservation Association

encls.

cc: Mr. Leningrad Elarionoff, County Councilmember
Glenn Miyao, County Parks and Recreation
Ms Patricia Engelhard, Director Parks and Recreation
Kaz Shigezawa, Landscape Images
Ms Helen Nahoopii, Executive Director Waimea Preservation Association

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Mr. Clemson Lam, Chairman
Waimea Trails and Greenways Committee
Waimea Preservation Association
P.O. Box 1893
Kamuela, Hawaii 96743

Dear Mr. Lam:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated September 17, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

We also note that DHHL will not be acquiring TMK 6-6-04:10 (Parcel 10) in deference to the County of Hawaii and the community's desire for the parcel for use as a trailhead.

DHHL continues to support the community's plans for a multi-use trails system and we look forward to continued collaboration with you and the County Parks Department to bring our projects to fruition.

The following responds to your specific comments:

1. We note your comment that the Waimea Trails and Greenways is requesting usage of State land to the west and south of our Lalamilo property to integrate the community's trails system.

2. The wastewater treatment system proposed for our preferred Alternative A would include a mechanical treatment plant and an effluent disposal area on approximately 200 acres on the adjacent State land to the west of our property. We have made a preliminary inquiry to the Department of Land and Natural Resources (DLNR) regarding these lands.

3. Access to the treatment facilities would be from the west boundary through a one-lane road. This limited use road would be locked to prohibit public use. Sewer transmission lines would be buried and aligned within the roadway and should not affect the trail.

4. The wastewater treatment facility must include a treatment plant and an effluent disposal area. The treatment plant could reasonably be located on site however, the greater land demand is for an area such as pastureland that can be irrigated with the treated effluent for its disposal. Thus, we have initiated discussions with the State DLNR for acquisition of the required land area. This action would require a separate environmental assessment and review process.

We have previously met with officials of the County Planning and Parks Departments and we will continue to work with both the County and the community as our project plans develop to assure that our respective goals can be met. Thank you again and we appreciate your continued participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

Alexandra N. Bernstein
P.O. Box 2043
Kamuela, HI 96743
808-885-1911
abernstein@hawaii.rr.com

October 7, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

RE: Draft Environmental Impact Statement – Dept.of Hawaiian Homes Lalamilo Project

Dear Chairman Soon,

Here are some suggestions for the Lalamilo Project.

1. Relocate the commercial area to the center of the housing. It would be so great for people to be able to actually walk to a store or other business. For kids to be able to walk to run an errand without being on the highway. You could have it a couple of house lots away from the archaeological reserve, and change the space in between to a community gathering place. Maybe a partially-roofed open area, with benches and tables. There are benches and other outdoor furniture made from recycled materials that will last forever and won't be easily defaced. You could locate the structural walls so that it is not just a wind tunnel, and people could gather for birthdays and picnics, enjoying the view. You could have a water outlet, and drainage gutters at the perimeter so that maintenance could be done by just hosing it down. And have bins to recycle cans and bottles. Maybe if people gather when they are young at a place that is kept clean and pretty, they will want to keep their surroundings that way.

2. Consider that 400 homes means 800 to 1200 cars additional, or maybe even more, and who knows how many children for the schools that have no capacity to accept them. We already have heavily flowing traffic all week long, starting early in the morning and backing up at peak hours. Perhaps it would be possible to reduce the Waimea project houses to half that many units, and swap some of the land for state land near a larger metropolitan center that already has the infrastructure to support that many additional people.

Someone said that the houses have to be on Hawaii Homelands land. Although there are sound reasons for this, at another level, the HH designation is a political one. Our entire island is Hawaiian home land, so any piece of it has a historical connection.

3. If you reduced the number of units, you could have some setback from the highway for plantings between the bridge and the light industrial section. And maybe even a walkway on the other side of the planting from the highway so that people could get there on foot.

4.Rather than commercial space at the dump road, you could have office space. Wouldn't it be great to encourage professional businesses to locate nearby so that there would be some opportunity for residents to walk to professional work instead of just light industrial or food service/counter help? This would also help lessen the traffic entering at the dump road. It is already not easy to turn left out of the dump road, and having a turning lane is not going to be enough to cope with a high level of traffic – which is what you would want for a successful commercial business.

5. As I was driving up Kawaihae Rd. yesterday I noticed how nicely the hills go up and down on the Lalamilo site. I hope you will build according the natural contours and not grade it all to the same level. Distinctions between houses can do a lot to help people feel like their property is special. And the less land that is torn up, the less runoff will be going into the stream and down to the ocean.

Thank you for the opportunity to comment.

Sincerely,

cc: Office of Environmental Quality Control, ATTN: Yukie Ohashi, PBR Hawaii
Councilman Leningrad Elarionoff

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Ms. Alexandra N. Bernstein
P.O. Box 2043
Kamuela, HI 96743

Dear Ms. Bernstein:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your letter dated October 7, 2002 on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project.

The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your suggestions:

1. As noted above, the commercial uses have been removed from the Project; therefore, this suggestion is not a relevant one.

2. We have addressed the issues of traffic and school capacity in Section 5 of the Draft EIS. Section 2 describes two alternative densities for residential lot development. Swapping lands is not an option for DHHL.

3. Again as noted above, the pasture uses will remain along this area, thus setbacks would not be relevant.

4. The area will remain in agricultural uses, as noted above.

5. DHHL intends to follow the natural topography to the extent practicable and best management practices will be implemented to address runoff issues.

Thank you for participating in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

RECEIVED AS FOLLOWS

oj 10/11

10/06/02

Re: DHHL Lalamilo project
S. Kohala, Hawaii
6-6-01: 54 & 77 66-04: 12-17

Ms. Amy Anakaki:

Will the fiberoptic installation going to the new Lalamilo project promote the possibility of gambling on Hawaiian Home Lands?

Pamela C. Davis
P.O. Box 764
Kamuela, HI 96743

3-6-401: 45

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Ms. Pamela C. Davis
P.O. Box 764
Kamuela, Hawaii 96743

Dear Ms. Davis:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 6, 2002, on the Draft EIS for our proposed development at Lalamilo.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comment.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

The installation of the fiber optic system by Sandwich Isles Communications, Inc. would provide essential communications services (telephone initially, and ultimately internet) to DHHL homestead areas, including the Lalamilo Project.

Your question whether the fiber optic installation would promote the possibility of gambling on Hawaiian homelands is an interesting one to which we can assuredly respond, "no."

Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

HUI KAKO'O 'AINA HO'OPULAPULA
"Let the people flourish on the land."

DEPT. HOME LANDS
OCT 9 9 06 AM '02

October 7, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, HI 96813

Re: Response to Environmental Impact Statement for Lalamilo Project

Dear Mr. Soon:

Thank you for the opportunity to comment on the Environmental Impact Statement for the Lalamilo Project dated August 2002. We would like to participate as a consulted party.

Hui Kako'o is a non-profit organization whose members include applicants for Hawaiian homestead leases. As such, we are very interested in this residential development.

We offer the following comments on the EIS.

- We urge a 20-yard setback, for open space/passive park area, along the entire length of the Waikoloa and Keau'l'omano streams, especially in parcel 77. This will mitigate the visual impact of houses close to the stream boundaries. It will put a natural resource and scenic vista (streams and the abutting lands) at the disposal of and for the enjoyment of all residents and visitors by providing passive recreational uses for picnics, walking, etc. The 20-yard setback would provide an area for planned landscaping along the Waikoloa stream to screen out the equestrian and pedestrian traffic along the trail that will be situated along the south side of the Waikoloa stream on DLNR lands. This setback area could contribute to mitigation measures for flood control and drainage.

- We feel that the criterion used for selecting historical, cultural and archeological sites for preservation should be liberally construed. And, an ample area surrounding each site should be provided for appropriate interpretive setting, design, landscaping and integration into surrounding areas.

- The selection of Community Use sites for culturally appropriate features such as a hula pa, and a facility such as a hale wa'a or a marae-like community structure should be done with the input of the potential residents and knowledgeable Hawaiians. Reserving sites

Post Office Box 37958, Honolulu, Hawai'i 96837 • Phone/Fax: (808) 262-5299 • E-mail: hui_kakoo@hotmail.com

located on the highest elevation of parcel 77 with the broadest vistas of Mauna Kea, Hualalai and Mauna Loa would be appropriated and could be integrated with the historical, cultural and archeological sites in the vicinity.

- An area must be set aside for kupuna housing. A needs assessment of the kind of residential complexes desired by kupuna must be conducted. A single story multi-unit complex may be preferred rather than the Alternative A of a 10,000 square foot lot or Alternative B a 1-acre lot. The kupuna housing area should be situated with a quiet buffer zone surrounding it and with enough space for planned amenities to be built. A community where kupuna are in close but separate proximity to their families might be the preferred mode of living for them.

- Lots of 20,000 to 40,000 square feet are adequate and consistent with the rural ambience of Waimea.

We are very supportive of this project and look forward to working with you to find strategies to address the concerns of the homestead applicants and future residents, the community and the Department.

Sincerely,

KAIPO KINCAID
Exeuctive Director

Cc: Board Directors

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

RECEIVED AS FOLLOWS

located on the highest elevation of parcel 77 with the broadest vistas of Mauna Kea, Hualalai and Mauna Loa would be appropriated and could be integrated with the historical, cultural and archeological sites in the vicinity.

- An area must be set aside for kupuna housing. A needs assessment of the kind of residential complexes desired by kupuna must be conducted. A single story multi-unit complex may be preferred rather than the Alternative A of a 10,000 square foot lot or Alternative B a 1-acre lot. The kupuna housing area should be situated with a quiet buffer zone surrounding it and with enough space for planned amenities to be built. A community where kupuna are in close but separate proximity to their families might be the preferred mode of living for them.
- Lots of 20,000 to 40,000 square feet are adequate and consistent with the rural ambience of Waimea.

We are very supportive of this project and look forward to working with you to find strategies to address the concerns of the homestead applicants and future residents, the community and the Department.

Sincerely,

KAIPO KINCAID
Exeuctive Director

Cc: Board Directors

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Ms. Kaipo Kincaid, Executive Director
Hui Kakoo Aina Hoopulapula
P.O. Box 37958
Honolulu, Hawaii 96837

Dear Ms. Kincaid:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo. By way of this letter we acknowledge your participation as a consulted party.

We would like to inform you of a significant change to the Lalamilo Project. We believe that this change is not inconsistent with your comments.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your comments:

Your concept for a setback to mitigate the visual impact along the stream boundaries will be taken under consideration during the Development Plan design phase.

The preservation areas which are shown on our two alternatives, have been developed with ample buffers in consultation with the Department of Land and Natural Resources, State Historic Preservation Division Archaeology Branch Chief, Dr. Ross Cordy. The number and extent of the sites proposed for preservation are significantly greater than the amount recommended by Dr. Cordy. Opportunities for interpretation, landscaping design, and integration into the overall project will be specified during the Development Plan design phase.

After much consideration we have placed the community use facilities (e.g. Community Center and Park) near the east end of the property to serve the new Lalamilo community. A primary benefit of this location is to provide a buffer between the residences and the adjacent industrial uses (e.g., transfer station, baseyard, old landfill, and HELCO generating plant). This location also would allow the broadest vistas you suggest of the distant mountains.

Your comment on community facilities shall be taken under consideration through the site-specific planning process by DHHL and the selected development team. Further discussion on concepts such as a hula pa or a hale waa would be appropriate during the Development Plan design phase.

Please note that DHHL has completed the development of 85 subsidized low-income kupuna units on Oahu in 2002. Even with a population of over 3,000 lessees, the Waimanalo Kupuna Housing Project remains at 75 percent vacancy with only approximately 20 units occupied. It does not appear, with a lessee population of 900, that there is sufficient market demand to develop kupuna housing in Waimea. If such a demand arises, a consolidation of lots in future undeveloped phases would readily accommodate development of a single-story cluster of multi-family kupuna dwelling units.

In order to establish study parameters for the EIS, two Residential density alternatives have been prepared. Alternative A establishes the maximum number of lots based on a minimum lot size of 10,000 square feet for consistency with the County's RS-10 residential zoning district. Alternative B establishes a minimum number of lots for the largest residential lot size of 1 acre. The standard of the 1-acre maximum lot size is derived from DHHL's types of homestead awards and land use designations.

It is important to note that these plans are conceptual and will be refined in the subsequent Development Plan design phase. Equally important is that the total number of residential lots in either alternative will not exceed the numbers described in the EIS.

We appreciate the support of our beneficiary group. Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

MOOERS ENTERPRISES, LLC
P.O. Box 1101
KAMUELA, HAWAII 96743

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October 7, 2002

Mr. Raynard Soon, Chairman
Department of Hawaiian Home Lands
1099 Alakea Street, 20th Floor
Honolulu, Hawaii 96813

Re: DHHL Lalamilo Project
South Kohala, Island and State of Hawaii
TMK: (3) 6-6-01:54 & 77; 6-6-04:12-17

Dear Mr. Soon:

I am a land use planner and 30-year resident of Lalamilo. I represent Hawaii Preparatory Academy and Kokua Lalamilo. I was a consulted party in the preparation of the Draft EIS.

I offer the following comments relative to the DEIS:

While I do believe the residential element of the project is exempt from County zoning requirements, I do not agree that the project is exempt from County requirements for the Industrial and Commercial elements of the proposed project. Certainly the proposed uses would not be approved by the County for any other developer or supported by the community as this area is totally inappropriate for these proposed uses.

The discussion of impacts to the area's infrastructure, Section 5.0, and the mitigation measures is totally inadequate. Mitigation measures discussed are vague without a timeline or funding source and inadequate to address the impacts of the project.

After reviewing the DIES I was very uncomfortable that the true impacts of the project are described accurately and that any real thought was given to mitigation measures and if they were adequate.

1. Industrial and commercial uses in the Agricultural District should require a Special Permit issued by the Hawaii County Planning Commission.
2. Project is inconsistent with elements of the General Plan, Northwest Hawaii Open Space Plan, Waimea Design Plan and policies of the Planning Department.
3. Water, source and distribution improvements are not adequately described as to funding and timing.

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4. The discussion of traffic impacts and mitigations are inadequate. To assume that the by-pass highway will solve the traffic problems is ridiculous as we have waited for this highway for decades and it is no closer to a reality today than it was twenty years ago.
5. Social impacts are discussed but no mitigations are offered other than to refer to meeting the desire of beneficiaries to live in North Hawaii. The mitigation to impacts on schools, police services are inadequate.
6. The Social Impact Assessment is totally without mitigation measures.

In summary I do not find that the DEIS adequately addresses impacts or provides reasonable alternatives or mitigations.

Sincerely,

Gregory R. Mooers
President.

GRM:sp
copy: PBR Hawaii
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Mr. Gregory R. Mooers, President
Mooers Enterprises, LLC
P.O. Box 1101
Kamuela, Hawaii 96743

Dear Mr. Mooers:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comment letter dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo. We note that you represent Hawaii Preparatory Academy and Kokua Lalamilo as a consulted party.

We would like to inform you of a significant change to the Lalamilo Project.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial (12.3 acres) uses from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture. This would allow DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

The following responds to your specific comments:

- With respect to your zoning concern, the commercial and industrial uses have been removed from the project as noted above.

- We respectfully disagree with your broad statement that the discussion of impacts to the area's infrastructure, Section 5.0, and the mitigation measures are "totally inadequate". We have described the area's infrastructure (including roadways, water, wastewater, schools, recreational facilities, etc.) in

Section 5.0 and we have provided well-developed and thoughtful mitigation measures.

- Description of impacts and mitigation measures:

  1. As noted, commercial and industrial uses have been removed from the Project; therefore, there will be no need for permits for these uses.

  2. We would like to clarify our proposed procedures for our land development process, as described in Section 3.0 of the Final EIS.

     DHHL is exempt from state and local land use permitting requirements pursuant to the Hawaiian Homes Commission Act of 1920, as amended (HHCA), and the Legal Memorandum dated May 6, 1994 by the State Attorney General. To further clarify land use, design, and operations aspects for DHHL land development on the island of Hawaii, the DHHL and the County are presently reviewing a Memorandum of Agreement (MOA) which will specify the responsibilities of DHHL and the County with regard to development matters on Hawaiian home lands.

     A parcel specific description of the existing land use designations (State Land Use, County General Plan, and zoning), the planned uses, and the land use designations DHHL proposes to conform to are summarized in Table 8 [in the Final EIS] and described further below.

Table 8. Planned Land Uses, Land Use Designations and Conformance

Parcel # (Acres)	Planned Land Use	Existing Land Use Designation	Land Use Conformance
12-17 (7.0)	Phase 1 In-fill residential (15 lots - 10,000 sf)	• SLU - Urban • GP - Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
54 (9.8)	Phase 1 In-fill residential (19 lots - 10,000 sf)	• SLU - Urban • GP - Low Density Residential and Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
77 (232.0)	Phase 2 Residential (408 lots - 10,000 sf or 121 1-acre lots);	• SLU - Agricultural • GP - Urban Expansion • Zoning - A-5a	- Will conform w/ SLU Urban - Complies with Urban Expansion - Residential will conform w/ RS-10 or RA-1a zoning.

State Land Use. Parcels 12-17 and 54 are designated within the State Urban district. With regard to Parcel 77, DHHL's exemption option from State land use zoning (e.g. Chapter 205, HRS) allows DHHL to conform to the State Urban district.

County General Plan LUPAG Map. The GP LUPAG designation (existing and proposed) for the property of Low Density Residential and Urban Expansion are in conformance with the planned residential, community center, and park uses.

County Zoning Code. Parcels 12-17 and 54, zoned RS-10, are in compliance with County zoning. The non-conformity of Parcel 77 (zoned A-5a) would be exempted from County zoning under the HHCA. Other related matters would be addressed through the MOA, which would serve as a binding guidance document between the DHHL and County. If approved by both parties, the agreement would allow the following:

- Based on its plans and DHHL land use designations, DHHL will determine the appropriate County zoning districts that would apply to the property in question. DHHL will communicate these zoning districts to the County.

- Parcel 77 would therefore be conformed to the appropriate zoning district for the residential alternative selected (RS-10 for the Alternative A 10,000 square feet lots, RA-1a for Alternative B lots which are 1-acre in size.

- All normal land use controls would be applied by Hawaii County to DHHL property according to the zoning district selected by DHHL. Except as specifically provided in the MOA, DHHL would follow all normal land use procedures, regulations, and standards applicable to the zoning district.

- The standards of the various zoning districts selected will apply to DHHL property. DHHL and its lessees would go through normal County administrative variance procedures if they seek exemptions from standards. For uses allowed in the various zoning districts that require special

permits or use permits, DHHL and its lessees would go through the applicable County permit procedures until some time when DHHL may implement its own use permit procedure for Hawaiian home lands.

3. Discussions with the Department of Land and Natural Resources and the County Department of Water Supply to cooperatively develop State Well No. 6240-02 have been initiated. The Draft EIS states that water system development will occur between 2003 - 2006. Funding is expected to be shared by the State and the County. This matter is part of the discussion by the agencies.

4. DHHL is continuing to work with the Department of Transportation to determine whether an alignment of the Bypass Road through Hawaiian home lands is possible.

5. Social impacts - In accordance with Chapter 343, HRS, project impacts are fully disclosed and mitigation measures are proposed (see Final EIS, Sections 1, 3, 5 and 7). Impacts are discussed in terms of population impacts, the HHCA, the County of Hawaii General Plan, community integration and public services and facilities. Population impacts are discussed in terms of magnitude of increase and mitigation measures are presented in discussions on public services and facilities. The sections on public policies are discussed in terms of project consistency and that information is fully disclosed.

   Mitigation measures related to community integration are fully discussed in the Social Impact Assessment (SIA) (Appendix I) Section 5.3.2, Achieving Social Equity and Integration with the Proposed Lalamilo Project. Mitigation measures for police protection, fire protection, medical emergencies, and public schools are presented in Sections 5.4.1 through 5.4.3.

   Your statement *that "mitigation* to impacts on schools, police protection are inadequate" is unfounded. Mitigation measures to impacts on schools and police protection are presented in the EIS Section 5.9. The proposed mitigation measures have been reviewed by the appropriate agencies and were not considered inadequate.

6. You state that the Social Impact Assessment is totally without mitigation measures. This statement

contradicts your comments in 5, in which you acknowledge the presence of mitigation measures in the social impact assessment. As we previously noted, in accordance with Chapter 343, HRS, project impacts are fully disclosed and mitigation measures are proposed. Impacts are discussed in terms of population impacts, the HHCA, the County of Hawaii General Plan, community integration and public services and facilities. Population impacts are discussed in terms of magnitude of increase and mitigation measures are presented in discussions on public services and facilities. The sections on public policies are discussed in terms of project consistency and that information is fully disclosed.

Your summary statement, "…I do not find that the DEIS adequately addresses impacts…." is in conflict with your earlier statement in paragraph 5 which states, "… I was very uncomfortable that the true impacts of the project area are described accurately…"

You also state, "… or provides reasonable alternatives or mitigation measures." We disagree with this conclusion. We would also note that DHHL has removed the commercial and industrial uses in the area across from Hawaii Preparatory Academy's proposed Lower and Middle School campuses. The remaining Homestead residential uses are greatly needed by our beneficiaries. We are expectant that you and your client, Hawaii Preparatory Academy, will welcome our new Lalamilo families as neighbors.

Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Mr. John R. Colson, Headmaster, Hawaii Preparatory Academy

ROY A. VITOUSEK, ESQ.
75-170 Hualalai Road, Suite B-303
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(808) 329-5811

October 7, 2002

The Hon. Benjamin J. Cayetano
Governor of Hawaii
c/o Office of Environmental Quality Control
Leiopapa A. Kamehameha, Suite 702
235 S. Beretania Street
Honolulu, Hawaii 96813

Yukie Ohashi
PBR Hawaii
101 Aupuni Street
Hilo, Hawaii 96720

Re: Environmental Impact Statement (EIS)
Lalamilo Residential Lots and Commercial/Industrial Mixed Uses
South Kohala, Island of Hawaii
TMK (3) 6-6-01:10, 54, & 77; 6-6-04: 12-17

Please accept these comments relative to the Draft Environmental Impact Statement (EIS) on behalf of the Hawaii Preparatory Academy (HPA) and the undersigned. HPA is an independent boarding and day school and provides education for 600 students in kindergarten through twelfth grade. HPA was founded in 1949 and is currently comprised of two campuses, a lower and middle school campus located in Kamuela, approximately two miles east of the project area and an upper boarding and day school which abuts Kawaihae Road and enjoins the subject property. HPA's students, faculty, and staff include many Hawaiians and native Hawaiians including a substantial number who reside on Hawaiian Home Lands.

HPA is a major employer in the Kamuela area and a major contributor to multiple social, civic, cultural, and professional activities in the community. HPA has an interest in the proposed development of adjoining property which is clearly distinguishable from the interest of the general public and which interests are special and personal. HPA will be substantially impacted by the proposed commercial, industrial, and residential development on property next to its campus.

HPA supports thoughtful and environmentally appropriate development of residential opportunities for native Hawaiians on Hawaiian Home Lands in Kamuela and the South Kohala area. At the same time, HPA opposes commercial and industrial development and is opposed to development of urban-style high-density residential properties on the Lalamilo parcel. HPA is also opposed to development of any substantial additional residential projects unless and until appropriate action has been taken by the applicant and other government agencies to develop infrastructure sufficient to support the increased population.

Undersigned is a resident of Kamuela, a graduate of HPA, and a member of the Board of Directors of HPA.

May we make the following specific comments relative to the DEIS:

1.2 Compliance with State of Hawaii and County of Hawaii Environmental Laws

The draft EIS skirts the question of whether the Department of Hawaiian Home Land (DHHL) will comply with all State and County laws relative to development of commercial, industrial, and residential structures on the project site. This is a material issue and the EIS should clearly state DHHL's position relative to compliance with County land use and building code requirements.

If DHHL is unwilling or unable to comply with County requirements, it leaves the public with little assurance that DHHL will enforce land use and building requirements which would conceivably mitigate potentially adverse environmental impacts. The EIS cannot be considered complete until a specific representation is made by DHHL and the public has had an opportunity to review the EIS in light of DHHL's representation regarding compliance with County requirements. If the public has to rely on DHHL to enforce its own rules and conditions, there is little assurance that the building requirements and environmental quality will be observed on a consistent basis.

1.4 Location

It is unclear as to whether Lalamilo is an ahupua`a or an `ili within the Kalana of Waimea, Waikoloa. If this statement is typical of the extent of cultural and historical research performed by DHHL, it leaves the balance of the EIS suspect in terms of its ability to identify and relate to cultural and historical issues.

1.5 Land Ownership

It is clear that the parcels which constitute the project area are not "Hawaiian Home Lands" as that term is used in the Hawaiian Homes Commission Act (HHC Act), specifically sections 201A-5, 203, and 204.

Consequently, there is no rationale to treat lands within the project area as "available" lands or "Hawaiian Home Lands" as those term are used in the (HHC Act).

1.8 Justification and Need for the Project

The information relative to the number of applicants who prefer North Hawaii as their "first and only" choice does not distinguish between applicants who currently reside in North Hawaii or the Island of Hawaii and applicants from other islands. It is difficult to assess a "need" as opposed to a subjective desire to live in North Hawaii. Providing Hawaiian Home Land residential opportunities for existing residents of North Hawaii is a rational and laudable goal. Providing residential opportunities to individuals who do not currently in North Hawaii or

who simply want to move to North Hawaii represents creation of additional environmental impacts on the families currently in North Hawaii and does not represent a true "need."

2.1.1 Location and Surrounding Uses

The draft EIS fails to acknowledge that Hawaii Preparatory Academy (HPA) owns the land immediately across Kawaihae Road from the subject property. HPA had acquired its land with the intention of expanding its existing campus and clearly, the use of adjoining lands should be described in this section.

2.2.1 Project Goals

The goal of using the project site as a revenue-producing property is totally inappropriate. Use of State lands for revenue-generating activity should be governed by HRS chapter 171 and open to all residents of the State of Hawaii. Further, the particular area is ill-suited for industrial and commercial use.

2.2.2 Presentation of Two Alternatives for Parcel 77

There certainly are more than two alternatives available for residential use. Another alternative which should be considered is a larger lot, agriculture ranching residential model which would allow beneficiaries sufficient land to conduct ranching and farming activities and provide their own revenue generating activity. This would continue the agricultural nature of the area, protect view planes, and provide a basis to serve the specific needs of the native Hawaiian population of North Hawaii.

2.2.3 Project Phasing

Project phasing should be reconsidered to keep pace with reasonable infrastructure development in the region.

2.2.4 Project Design

The policy of development of residential projects with turnkey homes or owner-builder or self-help may be inappropriate for the project site and the appropriate beneficiary homeowners. The developer-built turnkey homes are usually unimaginative, highly visible, and inconsistent with the types of residential structures in the surrounding communities. The Villages of Laiopua are a good example of presumably well designed homes which would cause a visual blight on the Waimea community. The homes of similar design are urban in nature and completely inconsistent with appropriate design standards for rural ranching/agricultural communities.

DHHL's apparent inability to require compliance with design guidelines, phasing, completion, and enforcement of CC&Rs means the community can have no confidence in the proposed design or that that conditions will be consistently complied with or enforced.

Discussion of alternatives and phases contained in sections 2.3 through 2.4.2.2 is inadequate and incomplete. There are other alternatives available which need to be considered.

2.5 Recreational Amenities: Community Center and Park

If recreational amenities, preservation areas, and open space are to be developed as part of the project, they should be located adjacent to Kawaihae Road and in place of the proposed commercial and industrial activities.

2.6 Commercial and Light Industrial Uses

The commercial and industrial areas are completely inappropriate for this location. The existing industrial uses, i.e., the power plant and landfill, are located there by historical accident and are completely inconsistent with reasonable and rational planning for the area. To increase the amount of commercial and light industrial uses in the area would result in the worst form of "spot zoning" which would have significant and ongoing adverse impacts on the surrounding community and on HPA. The increased traffic generated by commercial and industrial uses, the potential for noise pollution, and lack of security will cause substantial adverse impacts without resulting in substantial gain to DHHL or the project.

2.8 Development Costs

The preliminary costs for infrastructure development are significantly underestimated.

3.0 Land Use Conformance

Again, the EIS is vague and indefinite as to whether DHHL will comply with County zoning and other state and federal land use requirements relative to the development. The owner does not make a specific representation in § 3.2.2 relative to County zoning and makes no representation regarding County subdivision, grading, and building permits. Saying "The subject Residential Lots are proposed to conform to the Residential 9RS-10) zoning district . . ." is not a representation by DHHL that development on the subject property is subject to the requirements of the zoning code, subdivision code, or building code. A specific representation should be made.

4.0 Assessment of the Affected Natural Environment, Potential Impacts of the Proposed Action, and Mitigative Measures

The project site has been utilized for agricultural purposes, residential purposes, and other uses as evidenced by the archaeologic sites on the property.

Further, there has been ongoing use of the subject property by a wide range of individuals in the community for purposes including but not limited to hunting, hiking, picnicking along the stream, visiting archaeological and historical sites, other cultural uses, gathering, exercise, dog training, and the like. The cultural impact assessment attached as Exhibit F fails to assess the potential cultural impacts as required by HRS chapter 343 and Hawaii Supreme Court's opinion in Ka Pa`akai O Ka`ina v. Land Use Commission. It does not appear there has been any effort to evaluate cultural and historical uses of the property by area residents, students, and others or to conduct a full and complete cultural impact assessment.

5.1 Archaeological and Historic Resources.

The archaeological inventory of the project site is inadequate and incomplete. There is insufficient attention to the interrelationship of the archaeologic sites with human ecology of the region. The area poses an excellent example of a combination of residential, agricultural, and other cultural sites. There has been little, if any, effort to evaluate the interrelationship with these structures and whether the site is sufficiently unique to require a higher level of preservation than proposed in the mitigation measures.

The potential impacts are substantially underestimated and mitigation proposed on page 5-7 et seq. are completely inadequate.

5.2 Cultural Impact Assessment

The cultural impact assessment is inadequate and does not meet the requirements of state and federal regulations and guidelines. The cultural impact assessment does not assess impacts of the project on cultures other than native Hawaiian culture.

Further the so-called cultural impact assessment does not even attempt to assess the impacts of moving 400 "new" families to a small rural community. The purported distinction between cultural and social impacts is an artificial distinction and the cultural effects of the project include more than the impact on the land itself. A coordinated effort to assess cultural impacts and social impacts should have been undertaken in order to present a true picture of the effects on the existing community and the various cultures within the existing community that development of this project will cause.

5.3 [Explosive] Ordinance Issues

HPA is aware of ongoing ordinance problems in the subject area. HPA students hiking the area have found unexploded ordinance on more than one occasion. This is a significant issue about whether this is an appropriate location for residential development.

5.4 Roadways and Traffic

The traffic impact assessment report prepared by Traffic Management Consultant is completely in adequate and inconsistent with residents' observations of the current traffic problems in the area and the potential impacts of the project.

The section of Kawaihae Road between the town side of South Kohala Distribution Road and through the Waiaka Bridge is already problematic. The additional intersection proposed by the project will significantly increase traffic delays and safety hazards in the subject area. Further, the proposed South Kohala Distribution Road and the East Access Road are too close together to handle the traffic load. The proposed intersections will have a direct and substantial impact on the proposed expansion of HPA on properties north of Kawaihae Road in the vicinity of these intersections.

The mitigation measures proposed in the EIS are totally inadequate.

5.5 Air Quality

The assessment of present air quality fails to adequately assess emissions from the landfill which adjoins the project site. The Department of Health (DOH) has recently conducted monitoring activities in area in response to complaints from nearby residents of noxious stench emitted from the closed landfill.

There are also substantial odors emitted by the solid refuse transfer station and the HELCO generation station which are located immediately upwind from the project site.

The EIS fails to assess the potential impacts of these existing sources of air pollution relative to the proposed project.

DHHL either owns or can acquire other tracts of land which are not immediately downwind from garbage dumps and power plants. DHHL should either undertake the cost of relocating these facilities or relocate the project site.

DHHL should consult with the DOH relative to ongoing air quality issues at the closed landfill.

The project itself will result in substantial demands for energy which will result in increased air pollution in the form of increased electrical demand and solid waste disposal. These conditions will cause direct adverse impacts on HPA.

5.6 Noise

HPA will be impacted by the increased noise emission from the proposed project. The EIS fails to adequately evaluate noise generation from industrial and commercial uses and the cumulative effect of noise generated by 400 residential units and increased traffic.

Additional acceleration and deceleration of vehicles stopping and starting due to the intersections and related congestion will significantly increase traffic noise to HPA.

5.7 Public Infrastructure

HPA has already been adversely impacted by limited water resources available in the region. HPA has had to construct its own onsite fire-flow system before being granted a certificate of occupancy for additional buildings.

HPA cannot understand how DHHL can propose commercial, industrial, and up to 400 residential lots given the existing limitations on water resources and distribution facilities in the subject area. The EIS substantially underestimates the public water system requirements and impact and fails to adequately address transmission and distribution requirements sufficient to meet fire-flow requirements proposed by the County. To the extent DHHL does intend to meet County requirements, this causes substantial additional concern.

5.7.3 Wastewater Facilities

In order to avoid potential adverse impacts on groundwater, etc., the project must be connected to a wastewater treatment plant. There must be adequate assurance that the plant will be maintained in a professional state-of-the art manner. The discussion of various alternatives clearly indicates that DHHL has no idea of how it is going to treat the effluent from this substantial project. DHHL should be required to select a particular alternative and demonstrate that it will be able to put such a system in place before the public can adequately evaluate the potential adverse impacts of the significant wastewater generation resulting from the project.

5.7.5 Electrical and Communication Systems

The EIS does not refer to the significant disruption to the environment and to use of public facilities caused by Sandwich Isles Communications. There is no cost benefit analysis of telephone communications being provided by SIC vs. another provider. The reliance on SIC's communications has resulted in significantly increased adverse environmental effects.

5.8 Visual Attributes

The proposed project will cause significant adverse impact on the visual environment of South Kohala. HPA campus enjoys a view of open space in the Lalamilo area which significantly enhances the quality of the HPA experience. The proposed development will significantly impair open vistas including the view of Mauna Kea from Kawaihae Road and from the HPA campus.

In order to protect the visual character of the area, the proposed development should be significantly less dense. Further, a landscaped open space buffer should be maintained along the entire road frontage of the project. The open space buffer should extend from Kawaihae Road across from HPA's property to an approximate location of the existing solid waste transfer station. The topography slopes downward into the stream from the transfer station and all vertical improvements should be located downslope where they will not be visible from Kawaihae Road or HPA campus. Preservation of open space and the rural pastoral feeling of Kamuela will reduce the adverse cultural and social impacts caused by the project. This would result in elimination of the commercial and light industrial areas but they could be replaced by open space, park amenities, and other facilities which would actually mitigate the potential adverse impacts of this project.

5.9.1 Schools

The proposed Social Impact Assessment significantly underestimates the number of new students who would require placement at the area schools. A more reasonable means of approaching the estimates of number of school-age children in the proposed project would be to look at other similar DHHL projects such as the Villages of Laiopua. The development of 442 new homes will result in more than 180-288 students in all grades. It would be easy for DHHL to determine the number of school-age children who moved into the Kealakehe area as a result of the Villages of Laiopua Project. If those numbers are consistent with the estimates contained in

the Social Impact Assessment, then this will add credibility to that assessment. If not, a more accurate figure could be utilized for estimating the impacts on schools in the South Kohala area.

5.9.2 Recreational Facilities

An additional 442 homes will result in a significant increase in the utilization of recreational facilities in the area. The impact of the additional families on the recreational facilities is not adequately assessed in the EIS.

5.9.2 Police and Fire Protection

Again, the addition of 442 families, many of whom come from places other than South Kohala or North Hawaii, will result in a significant increase and demand for police and fire protection.

5.10 Social Characteristics

The EIS fails to adequately assess the social impacts resulting from the proposed project. The addition of 442 new families to the area will cause significant adverse impacts on the social structure and human interaction of this rural community. The existing community is extremely diverse and nonetheless very harmonious. This is no doubt why the number of families, both native Hawaiian and others, want to relocate to North Hawaii. At the same time, the rapid expansion of the community, particularly through 440+ new homes, will cause a shift in the area's population which will have adverse cultural and social impacts. These impacts will directly affect HPA.

6.0 Alternatives to the Proposed Action

The discussion of alternatives is inadequate. Further consideration to agricultural lots of 3 to 10 acres should have been performed by DHHL. These larger lots would be more consistent with the rural lifestyle and would serve the needs of the North Hawaii native Hawaiian population better than urban subdivisions.

7.0 Relationship of the Proposed Action to Land Use Plans, Policies, and Controls for the Affected Area

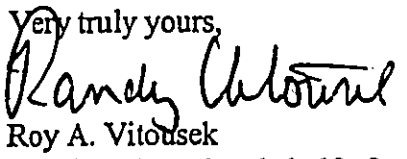
Again, DHHL needs to be clear as to the extent to which the project will be subject to County regulations. The proposed development is inconsistent with the County of Hawaii General Plan, zoning ordinances, and subdivision code.

Additional Comments

HPA must also express its concern relative to the creation of a racially-segregated, publicly-funded housing development on public lands. HPA expresses its concern that the proposed housing development may be racially discriminatory and may be subject to legal challenge. HPA would prefer to see this issue addressed and resolved fully and finally in appropriate legal entities before DHHL begins development of the project.

HPA is also concerned that the EIS does not meet NEPA requirements.

Very truly yours,



Roy A. Vitousek
Individually and on behalf of
Hawaii Preparatory Academy

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STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

November 18, 2002

Mr. Roy A. Vitousek, Esq.
75-170 Hualalai Road, Suite B-303
Kailua-Kona, Hawaii 96740

Dear Mr. Vitousek:

Subject: Lalamilo Project - Response to Comments on the Draft Environmental Impact Statement (EIS)

Thank you for providing your comments dated October 7, 2002, on the Draft EIS for our proposed development at Lalamilo. We understand that your comments are written on behalf of the Hawaii Preparatory Academy as well as yourself.

We would like to inform you of a significant change to the Lalamilo Project. This change is a direct result of our telephone discussion on November 1, 2002.

> The Department of Hawaiian Home Lands (DHHL) has removed the commercial (3.7 acres) and light industrial uses (12.3 acres) from the project due to community concerns that were raised during the review of the Draft EIS. The 16.0 acres will be designated as General Agriculture land. This allows DHHL to maintain this as a vacant lot or to lease it for agricultural purposes.

Also as we discussed on November 1, it is my understanding that with the removal of the commercial and industrial uses across from the proposed Hawaii Preparatory Academy property, we have addressed your most significant concern.

The following responds to your specific comments:

We acknowledge the background information provided on the Hawaii Preparatory Academy (HPA). We are aware that the HPA has future plans to relocate its lower and middle schools to its recently acquired property adjacent to the east end of our property. However, we also understand from Mr. Greg Mooers, consultant to HPA, that planning details are not yet available. We would reiterate our earlier

statement in our letter to you dated August 7, 2002, just as we have responded to the concerns of HPA, "we request that the Hawaii Preparatory Academy reciprocate and inform us of its relocation plans for its Lower and Middle Schools."

The HPA property has frontage on Kawaihae Road and is adjacent to our property along an approximately 500 feet length (of the total 7,000 feet) of our property. As noted above, and as we have personally discussed, DHHL is removing the commercial and light industrial uses from this Project, and thus, the Project site across from the HPA property will remain as pastureland.

We appreciate HPA's support of thoughtful and environmentally appropriate development of residential opportunities for native Hawaiians on Hawaiian home lands in Waimea. It is our full intention to create a homestead neighborhood that fits into the existing community.

1.2 Compliance with State of Hawaii and County of Hawaii Environmental Laws.

Section 1.2 of the EIS specifically pertains to compliance with *Hawaii Revised Statutes* Chapter 343, Environmental Impact Statements and Title 11, Department of Health, Chapter 200, Environmental Impact Rules.

The discussion of compliance of State and County of Hawaii (County) laws relative to the development of residential and community facility structures is provided in Section 3 of the EIS. Thus, we are responding to this matter under the heading, 3.0 Land Use Conformance which follows below.

1.4 Location

Historical documentary research for the archaeology survey (Draft EIS, Appendix E, describes the confusion between the designations of 'ili on Hawaii. We refer you to Appendix E, pages 6-7.

1.5 Land Ownership

Each of the parcels that comprise the Lalamilo Project has been acquired or is in the process of acquisition as part of the Memorandum of Understanding (MOU) which was signed by the State of Hawaii in 1994. The MOU specified the transfer of 16,518 acres of public lands into the Hawaiian home lands trust. The Final EIS clarifies the following:

> "Parcel 77 is classified as "available lands" and "Hawaiian home lands" as specified in the Hawaiian Homes Commission Act of 1920, as amended (HHCA), sections 201A-5, 203, and 204. Available land is defined as land not already under homesteading or commercial/industrial long-term dispositions. The transaction to transfer the DLNR parcels (Parcels 54 and 12-17) to DHHL is anticipated to be completed by the end of 2002."

1.8 Justification and Need for the Project

The SMS survey (February 2001) of beneficiaries was conducted in preparation of the DHHL *Hawaii Island Plan* and included two groups: 1) applicants on the Hawaii Island list, and 2) lessees who are already on Hawaii Island homesteads. Relative to the Lalamilo Project homes are those in the applicant group who are on the Hawaii Island wait list; these include applicants throughout the island of Hawaii (including North Hawaii) and other areas of the State.

The survey findings of beneficiary locational preferences indicated that the East Hawaii region was most popular, with 33 percent of all applicants preferring this region, followed by the North Hawaii region at 25 percent. About 17 percent of applicants preferred the West Hawaii region, 3 percent chose the Central Hawaii region, and another 3 percent preferred the South Hawaii region. Thus, the locational preferences distribution is island wide and not only concentrated in North Hawaii.

We contend that the need for homes for our beneficiaries is great and their choice of location of these homes is based on careful thinking and planning on the part of our applicants and we believe their decisions transcend mere "subjective desire," as you state.

The process of selecting awardees for the Lalamilo homes will include financial qualification commitments from the awardees. The Lalamilo Project homes would be marketed to beneficiary applicants who are on the Hawaii Island residential wait list. The applicants are from Hawaii County, other counties in the State of Hawaii, and from out-of-state. DHHL records indicate that Hawaii Island residents account for 58 percent of all applicants, 29 percent reside elsewhere in the State, and 13 percent reside out-of-state. An assumption is made that some of the applicants from off-island may have ties (e.g., family) to the island.

2.1.1 Location and Surrounding Uses

The following statement has been added to the Final EIS, " The Hawaii Preparatory Academy owns some property immediately across Kawaihae Road and shares adjacency with DHHL along a length of approximately 500 feet near the east boundary of the DHHL Property. The total length of the DHHL property is approximately 7,000 feet (east west direction). HPA recently purchased this property with the intention of relocating its Lower and Middle Schools to this location."

2.2.1 Project Goals

With the removal of the commercial and light industrial uses from the Project, the revenue-producing goal is no longer applicable.

2.2.2 Presentation of Two Alternatives for Parcel 77

Our presentation of the preferred Alternative A and Alternative B would be consistent with the *Hawaii Island Plan* designation of Lalamilo as a priority tract for Residential development.

The *Hawaii Island Plan* identifies other locations for agricultural and pastoral awards to accommodate agricultural and ranching pursuits. We affirm our plan that residential use at Lalamilo is compatible with the adjacent existing neighborhoods of similar lot type and size.

In addition, the Final EIS states the following:

> In order to establish study parameters for the EIS, two Residential density alternatives have been prepared. Alternative A establishes the maximum number of lots based on a minimum lot size of 10,000 square feet for consistency with the County's RS-10 residential zoning district. Alternative B establishes a minimum number of lots for the largest residential lot size of 1 acre. The standard of the 1-acre maximum lot size is derived from DHHL's types of homestead awards and land use designations.
>
> It is important to note that these plans are conceptual and will be refined in the subsequent Development Plan design phase. Equally important is that the total number of residential lots in either alternative will not exceed the numbers described in the EIS.

2.2.3 Project Phasing

The construction of all structures will be contingent on appropriate County permits and approvals. Construction will be phased along with reasonable infrastructure development in the region. These include water and wastewater systems, roadway improvements related to actual project impacts, contribution towards school facilities, and development of on-site park facilities.

2.2.4 Project Design

We believe that the statements in your first and second paragraphs represent your subjective opinions which we have noted for the record.

Two recent projects at Laiopua in North Kona and Waiehu II on Maui have been completed successfully within our policy guidelines for turnkey and owner-builder / self-help homes. At both developments, Conditions, Covenants & Restrictions have been enforced. We intend to have similar requirements at Lalamilo.

The Final EIS further states:

> "Through a request for development proposals, DHHL will select a developer for each phase of development in accordance with State of Hawaii Administrative Rules. Requirements for proposals will include but not be limited to the submittal of a development site plan, subdivision plan, housing plan details, development schedule, and project budget. The proposals would also include sales and marketing plan information.
>
> DHHL's criteria for the selection of a developer will include but not be limited to cost effectiveness and design parameters appropriate for the Waimea rural character. Upon evaluation of all proposals, selection of the developer will be made by the Hawaiian Homes Commission."

We maintain that we have adequately described the alternatives in Sections 2.3 - 2.4.2.2 to assess the significant impacts of the Project. Design details based on the Project as described in the EIS will follow in the subsequent Development Plan design phase.

2.5 Recreational Amenities: Community Center and Park

We understand your concern to be related to the commercial and light industrial uses. As noted above, those uses have been removed and the

area will remain in pasture uses. The Park and Community Center facilities will remain as planned.

The residential lots along Kawaihae Road will have setbacks and landscaping in accordance with County requirements and standards. Detailed planning will follow the outcome of the Department of Transportation's plans for the realignment of Kawaihae Road up to Waiaka Bridge.

Archaeological preservation areas must be preserved in place and are not possible to be moved at will, thus their locations are fixed.

2.6 Commercial and Light Industrial Uses

As noted above, commercial and light industrial uses have been removed from the Project and the area will remain in agricultural use.

2.8 Development Costs

As noted in the EIS, the preliminary costs for water source and transmission and wastewater treatment have been estimated at $28 million. During the Development Plan stage of the project, full costs of infrastructure development will be calculated after a detailed design plan has been prepared. The Final EIS states the following:

> "Development cost estimates for infrastructure will be refined upon completion of engineering analysis for water and wastewater treatment systems. Actual costs to develop other supporting infrastructure such as roadway, electrical, and communications system improvements will be determined upon receipt of developer proposals."

3.0 Land Use Conformance

DHHL is exempt from state and local land use permitting requirements pursuant to the HHCA, and the Legal Memorandum dated May 6, 1994 by the State Attorney General. To further clarify land use, design, and operations aspects for DHHL land development on the island of Hawaii, DHHL and the County are presently reviewing a Memorandum of Agreement (MOA) which will specify the responsibilities of DHHL and the County with regard to development matters on Hawaiian home lands.

A parcel specific description of the existing land use designations (State Land Use, County General Plan, and zoning), the planned uses, and the land use designations DHHL proposes to conform to are summarized in Table 8 [in the Final EIS] and described further below.

Table 8. Planned Land Uses, Land Use Designations and Conformance

Parcel # (Acres)	Planned Land Use	Existing Land Use Designation	Land Use Conformance
12-17 (7.0)	Phase 1 In-fill residential (15 lots - 10,000 sf)	• SLU - Urban • GP - Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
54 (9.8)	Phase 1 In-fill residential (19 lots - 10,000 sf)	• SLU - Urban • GP - Low Density Residential and Urban Expansion • Zoning - RS-10	- Complies with SLU Urban - Complies with GP Low Density - Will conform w/ RS-10 zoning
77 (232.0)	Phase 2 Residential (408 lots - 10,000 sf or 121 1-acre lots);	• SLU - Agricultural • GP - Urban Expansion • Zoning - A-5a	- Will conform w/ SLU Urban - Complies with Urban Expansion - Residential will conform w/ RS-10 or RA-1a zoning.

State Land Use. Parcels 12-17 and 54 are designated within the State Urban district. With regard to Parcel 77, DHHL's exemption option from State land use zoning (e.g. Chapter 205, HRS) allows DHHL to conform to the State Urban district.

County General Plan LUPAG map. The GP LUPAG designation (existing and proposed) for the property of Low Density Residential and Urban Expansion are in conformance with the planned residential, community center, and park uses.

County Zoning Code. Parcels 12-17 and 54 (zoned RS-10) are in compliance with County zoning. The non-conformity of Parcel 77 (zoned A-5a) would be exempted from County zoning under the HHCA. Other related matters would be addressed through the MOA, which would serve as a binding guidance document between the DHHL and County. If approved by both parties, the agreement would allow the following:

- Based on its plans and DHHL land use designations, DHHL will determine the appropriate County zoning districts that would apply to the property in question. DHHL will communicate these zoning districts to the County.

- Parcel 77 would therefore be conformed to the appropriate zoning district for the residential alternative selected (RS-10 for the Alternative A 10,000 square feet lots, and RA-1a for Alternative B lots which are 1 acre in size).

- All normal land use controls would be applied by Hawaii County to DHHL property according to the zoning district selected by DHHL. Except as specifically provided in the MOA, DHHL would follow all

normal land use procedures, regulations, and standards applicable to the zoning district.

- The standards of the various zoning districts selected will apply to DHHL property. DHHL and its lessees would go through normal County administrative variance procedures if they seek exemptions from standards. For uses allowed in the various zoning districts that require special permits or use permits, DHHL and its lessees would go through the applicable County permit procedures until some time when DHHL may implement its own use permit procedure for Hawaiian home lands.

4.0 Assessment of the Affected Natural Environment, Potential Impacts of the Proposed Action, and Mitigative Measures

We are addressing your comments on the Cultural Impact Assessment under section 5.1 below.

5.1 Archaeological and Historic Resources

We respectfully disagree with your comment that the archaeological inventory survey is inadequate and incomplete. The report contains all the information required by the draft Hawaii Administrative Rules, Title 13; Department of Land and Natural Resources, Subtitle 13; State Historic Preservation Division Rules, Chapter 276, Rules Governing Standards for Archaeological Inventory Survey Surveys and Reports.

The proposed "level" of preservation was developed in consultation with the Department of Land and Natural Resources, State Historic Preservation Division (DLNR SHPD) Archaeology Branch Chief, Dr. Ross Cordy. The number and extent of the sites proposed for preservation is significantly greater than the amount recommended by Dr. Cordy.

5.2 Cultural Impact Assessment

We respectfully disagree with your statement that "the cultural impact assessment is inadequate and does not meet the state and federal regulations and guidelines". The CIA addresses Act 50 and considers the effects the development may have on native Hawaiians as it pertains to the culture and their right to practice traditional customs. Further, guidance for the preparation included the Office of Environmental Quality Control's Guidelines for Assessing Cultural Impacts (November 19, 1997).

In addition, Ka Paaki o ka Aina vs. Land Use Commission (94 Hawaii 31, 7P. 3d 1068, September 11, 2000) set forth an analytical framework

independent of, but consistent with, the cultural impact assessment requirements set forth in Act 50. The specific findings and conclusions required in three areas include the following:

1. The identity and scope of valued cultural, historical, or natural resources in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised there;

2. The extent to which those resources - including traditional and customary native Hawaiian rights will be affected or impaired by the proposed action; and

3. The feasible action, if any, to be taken by the Land Use Commission to reasonably protect native Hawaiian rights if they are found to exist.

Much of the information gathered through the CIA process was historical and related to ranching activities, which is not derived from traditional native Hawaiian culture, but rather, an introduction of non-Hawaiians. Ranching, however, has come to define much of the culture of Waimea and has crossed ethnic lines to a diverse segment of the population. Therefore, with all due respect, we must disagree with your statement that "the cultural impact assessment does not assess impacts of the project on cultures other than native Hawaiian culture."

The cultural impact assessment process included a search for informants with any knowledge of the property. This process included contacting more than 50 individuals in the community - these individuals are listed in the Cultural Impact Assessment Table 3 beginning on page 46 (attached as Appendix F of the Draft and Final EIS). Thus we disagree with your opinion that "there has not been any effort to evaluate cultural and historical uses of the property by area residents, students, and others or to conduct a full and complete cultural impact assessment."

With regard to the activities such as hunting, gathering, hiking, picknicking along the stream, visiting archaeological and historical sites, exercise, dog training, and other uses, the following discussion and measures address these issues and would mitigate the effects of the project:

1. *Hunting*: The State DLNR lease of Parcel 77 does not allow hunting on this and other contiguous lands covered under the General Lease; thus any hunting activities at the DHHL property,

if present, would not be considered to be a lawful activity. The development of the Project would curtail any ongoing hunting activities; however, such activities would be directed to other State or private game management areas.

2. *Hiking/exercise*: The County Department of Parks and Recreation and Waimea Trails and Greenways' proposed linear trail system would border the DHHL Parcel 77 along the west boundary and the opposite bank of Waikoloa Stream and connect to Parcel 10. Parcel 10 was previously included in the Lalamilo Project but has been removed in deference to the community's efforts for this linear park system. Thus, hiking and exercise activities would be redirected onto the new trails system and not be curtailed as a result of this Project.

3. *Picnicking along stream*: The Keanuiomano and Waikoloa Streams are present on the DHHL property along the full 7,000 feet length. Both streams originate from mauka offsite areas and continue to the west where they join to form Waiulaula Stream before crossing Queen Kaahumanu Highway. Thus, with landowner permission, there would be other areas of the streams that could provide opportunities for uses such as picnicking.

4. *Visiting archaeological and historical sites:* Three preservation areas of approximately 20 acres (total area) are planned as part of the Lalamilo Project. We also understand that the DLNR SHPD is in the process of preserving a 200-300 acre portion of the expansive Lalamilo Field System on other State lands adjacent and to the south west of the DHHL property. Thus, development of the Lalamilo Project would not eliminate access to archaeological and historical sites.

5. *Dog training:* The use of this property for dog training purposes has not been previously identified in any study for the Project. Whether for individual or group training, school yards (e.g. Hawaii Preparatory Academy and public schools) and other lands could be available with landowner permission. Thus, the development of the Lalamilo Project would not curtail these activities.

6. *Gathering and other cultural uses:* The use of this property for gathering or other cultural uses have not been previously identified in any study for the Project. The DHHL portion of the Lalamilo General Lease has been under pasture uses and heavily grazed. The botanical and wildlife surveys indicated the presence of primarily non-native flora and fauna, with the

exception of a few common native plants. Other lands, which are not heavily grazed in the vicinity of the Project could be available for these uses with landowner permission.

Your comment regarding "… moving 400 new families to a small rural community…" is more accurately identified as a social impact and is addressed below in 5.10 Social Characteristics.

5.3 Ordnance Issues

DHHL recognizes the importance of the potential danger of unexploded ordnance within the former Waikoloa Maneuver Area as described in the Draft EIS Section 5.3. As noted, we are working with the US Army Corps of Engineers and we understand that funding has been appropriated in Fiscal Year 2002-2003 for pre-construction site support including surface clearance of ordnance and explosives, and subsurface clearance of ordnance to depths of detection. The work is anticipated to commence and be completed prior to the start of the Phase 1 residential development in 2003. When the Corps' work is done, the Project Site will be appropriate and safe for construction.

5.4 Roadways and Traffic

The traffic impact analysis report (TIAR) is based on Project specific traffic counts and the most recent available traffic data from the State Department of Transportation (DOT). We disagree that the Draft EIS TIAR is inadequate.

The Final EIS will include an updated TIAR to reflect the removal of the commercial and light industrial uses. With the removal of these uses, the Project's traffic impact has been reduced.

DHHL has discussed the proximity of the East Access Road and the South Kohala Distribution Road intersections on Kawaihae Road with the State DOT. DOT has not raised any objections. DHHL will continue to work with DOT during the design phase of the East Access Road. Similarly, we would coordinate our traffic improvements with the future HPA driveway improvements, if our respective development schedules permit us to do so.

With all due respect, your statement regarding our proposed mitigation measures is incorrect. We note that the mitigation measures which are proposed in the TIAR and EIS have been reviewed by DOT and the County Department of Public Works. The State and the County have not raised any objections to the mitigation measures which are proposed.

5.5 Air Quality

We disagree with your comments on the air quality assessment. The EIS adequately assesses the solid waste transfer station and HELCO matters. On the matter of the old landfill, as you suggested, DHHL has contacted the State Department of Health Solid and Hazardous Waste Branch and have the following additional description in the EIS:

Recent inspections of the old Waimea landfill by the Department of Health (DOH) in April 2001 and February 2002 confirmed the presence of an active underground fire. The presence of surface cracks, fissures, sinkholes, and smoke were noted during the inspections, indicating the presence of an underground fire as well as sub-surface settling. The 30 to 40-feet deep land fill is comprised of fuel, which historically was burned to reduce bulk and smoulders to the present day.

The landfill is under the jurisdiction of the County Department of Environmental Management. The County is currently managing the fire situation under DOH orders to develop and implement a remediation and monitoring plan with an objective to suppress the effects of the underground fire. The suppression of smoke, particulate emissions, and odor is done through layers of dirt which is applied on a regular basis.

DHHL has consulted with DOH Solid and Hazardous Waste Branch staff environmental engineer and reviewed a filed report of a recent survey prepared for Sandalwood Estates. Sandalwood Estates residential subdivision is located to the east of the old landfill and has filed complaints with DOH of odors from the landfill. The survey for sub-micron aerosol particulate matter, smoke and odor summarized that "[n]o obvious airborne toxic hazards were evident in the survey" (Michaud July 15, 2002).

We note that HPA and the adjacent Sandalwood Estates and other subdivision are equally vulnerable to the HELCO emissions. The air quality assessment recommends that HELCO raise the stack heights to meet good engineering practices to minimize their impact on the surrounding community. This action will benefit our beneficiaries, the present and future residents in the surrounding subdivisions, and your HPA students.

We believe your remarks about relocating the garbage dump and power plant must be in jest. On the matter of other land acquisition, DHHL intends to acquire additional land in Waimea for wastewater treatment and effluent disposal for the Lalamilo homesteads; no other land is planned to be acquired.

The EIS has addressed the demand for energy and solid waste disposal.

5.6 Noise

The Draft and Final EIS address your concerns about noise, as follows:

Potential Impacts

Project Construction Noise: The dominant noise sources during project construction will probably be earth moving equipment, such as bulldozers and diesel powered trucks. Noise from construction activities will occur on the property. The noise from construction activities could impact nearby residences to the north of the project site. Noise from construction activities should be short term and must comply with State Department of Health noise regulations.

Project Generated Traffic Noise: Traffic noise levels (due to the project) corresponding to the morning and afternoon peak hour travel are not expected to have a perceptible change due to the project. The minimal change in noise levels perceptible to the average listener is generally taken to be 3 decibels, therefore, the increase in traffic noise due to the project is not expected to be significant.

Residential Noise: Noise associated with residential ground maintenance equipment such as lawn mowers and other household tools could occasionally be noticeable at the nearby adjacent residential subdivisions but unlikely to be audible at the proposed Hawaii Preparatory Academy campus across Kawaihae Road.

Community Center /Park Areas Noise: Activities at the community center and park facilities could include meetings, athletic and cultural events, and parties, some of which may utilize amplified sound systems. Noise generated by such systems could cause annoyance to the nearby residents and adjacent Hawaii Preparatory Academy property. Parking lot and lawn maintenance equipment could include leaf blowers, hedge trimmers, lawn mowers, and other equipment which could occasionally affect the surrounding areas.

Stationary equipment noise: Noise from air conditioning equipment, exhaust fans, trash compactors, and any other stationary equipment at the community facilities will not exceed the levels allowable by State and County noise regulations. Noise from equipment at the various buildings will not be audible off-site.

Mitigation Measures

Compliance with existing regulations will mitigate construction noise generated by the project to acceptable levels. State and County regulations have been established to limit construction noise generation.

- Construction activities which emit noise in excess of the maximum permissible sound levels will be limited to 7:00 a.m. - 6:00 p.m., Monday - Friday; 9:00 a.m. - 6:00 p.m. on Saturday; and prohibited on Sunday.

- Construction equipment and on-site vehicles or devices whose operations involve the exhausting of gas or air, excluding pile hammers and pneumatic hand tools weighing less than 15 pounds, must be equipped with mufflers, and construction vehicles using trafficways must satisfy the DOH's vehicular noise requirements.

- The design of the community center facility will include noise mitigation measures in the planning of the location and orientation of any air conditioning equipment, exhaust fans, and other equipment, to comply with all noise regulations.

- Ground maintenance equipment will be powered by internal combustion engines with exhaust mufflers. Schedules for maintenance will be arranged so noisier operations do not occur near residences (on and off the Project area) before 7:00 a.m. or after 5:00 p.m.

- The site planning for all facilities will incorporate adequate setback distances. For community center facilities, proper sound insulation measures will be incorporated into the building design, as appropriate.

- Events at the community center and park facilities that propose the use of amplified sound outside the buildings shall be maintained at appropriate levels to meet standards established by the DOH.

5.7 Public Infrastructure

As described in the EIS, DHHL, the Department of Land and Natural Resources (DLNR), and the County Department of Water Supply (DWS) are presently discussing shared development of a groundwater source that will serve the Waimea community, other State projects (e.g. public

schools), as well as our Lalamilo development. As noted in the Draft EIS, water source development will occur prior to Phase 2 development of Parcel 77. All water system improvements associated with our development will conform to County standards.

5.7.3 Wastewater Facilities

Our EIS states that the preferred Alternative A will clearly require a wastewater treatment plant and such a facility would require additional land for the siting of the plant and for effluent disposal. We also note that a separate Chapter 343, HRS environmental assessment process is warranted once the land area is selected for this facility.

5.7.5 Electrical and Communication Systems

All impacts regarding Sandwich Isles Communications (SIC) work within the roadways to install the fiber optic lines have been fully described in the Sandwich Isles Communications, Inc. County of Hawaii, Rural Fiber Optic Duct Lines, Final Environmental Assessment and Finding of No Significant Impact (Terry June 2001).

5.8 Visual Attributes

As we discussed, DHHL has agreed to remove the commercial and light industrial uses from our Lalamilo Project; the 16-acre land area will be designated as General Agriculture land and will remain in pasture uses. By this significant action, we believe we have addressed HPA's major concerns regarding visual impacts to its proposed middle and lower schools.

The EIS acknowledges than any new development proposed to occupy vacant property would affect open vistas. However, as noted in the EIS we would remind you that our Property has been planned by the County of Hawaii for Urban Expansion uses for more than 20 years. Was HPA (and its planners and attorneys) not aware of this before the purchase of your property was recently completed?

We agree that preservation of open spaces and the rural pastoral feeling of Kamuela will reduce potential adverse impacts. Thus, ample open spaces and preservation areas are integrated into both of our alternatives.

5.9.1 Schools

As described in the EIS Section 5.0 and the social impact assessment, DHHL has worked closely with the Department of Education (DOE) to

project the number of students our Project would potentially generate. Therefore, we stand by our range of 180 to 288.

5.9.2 Recreational Facilities

The EIS more than adequately addresses the recreational facilities in the area. Furthermore, by the County's standards, approximately 7.5 acres of park and playground would be recommended. Our Project provides approximately 10 acres of park and community center facilities.

5.9.3 Police and Fire Protection

The EIS recognizes that the development of a new community will increase the need for police and fire protection services. However, we also propose mitigation measures to minimize the effects and will provide the infrastructure including County standard roadways and adequate fireflow requirements.

The Police Department has stated in a letter dated October 3, 2002, that the proposed development is not expected to affect police services and the Fire Department in a letter dated August 28, 2002, has recommended certain standards for access and water supply requirements. We will adhere to all requirements of the Police and Fire Departments.

5.10 Social Characteristics

We strongly disagree that the Social Impact Assessment (SIA) fails to adequately assess social impacts. In accordance with Chapter 343, HRS, project impacts are fully disclosed and mitigation measures are recommended (see EIS Sections 1, 3, 5 and 7). Impacts are discussed in terms of population impacts, the HHCA, the County of Hawaii General Plan, community integration and public services and facilities. Population impacts are discussed in terms of magnitude of increase and mitigation measures are presented in discussions on public services and facilities. The sections on public policies are discussed in terms of project consistency and that information is fully disclosed. Social impacts related to community integration are discussed in SIA Section 5.3.1 and related mitigation measures are discussed in Section 5.3.2 Achieving Social Equity and Integration with the Proposed Lalamilo Project. Social impacts and mitigation measures for police protection, fire protection, medical emergencies and public schools are presented in SIA Sections 5.4.1 through 5.4.3.

Your assertion that the new Lalamilo families will cause "significant adverse impacts on the social structure and human interaction of this rural community" is unfounded. While you say that "HPA's students, faculty and staff include many Hawaiian and native Hawaiians," you nevertheless strongly assert that the new project will cause "significant adverse impacts."

The new residents at Lalamilo are expected to share similar social and economic characteristics as existing Waimea residents. They will be similar in terms of the diversity of families with various levels of incomes and occupations. The only distinguishing factor is ethnicity in that the families are native Hawaiian beneficiaries. Even so, there are several Hawaiian homestead communities in the Waimea community and at Kawaihae.

Although not explicitly stated, your comments suggest that a new native Hawaiian community will negatively impact the social structure and human interaction of the community. Recent DHHL developments suggest that there is no evidence to support these implications.

You noted that HPA supports "thoughtful and environmentally appropriate residential opportunities for native Hawaiians on Hawaiian Home Lands in Kamuela and the South Kohala area." The Lalamilo project is a thoughtful and environmentally appropriate community for our beneficiaries and we assume that you include the Waimea area in your support.

The Lalamilo project is the result of thoughtful planning and consideration of beneficiary needs and desires. The plans are a direct result of the Hawaii Island Plan and a survey of DHHL beneficiaries. The implementation time frame has been extended as reflected in our project phasing, to ensure that infrastructure needs and social assimilation can occur in a timely manner.

Further, we have made several major modifications to the project to achieve environmental harmony. These modifications include relinquishing our plan to acquire the parcel adjacent to Sandalwood Estates (Parcel 10) in deference to the County and community's plan for a trailhead *and* the removal of all commercial and light industrial uses (as acknowledged by you).

DHHL is committed to our mandate to provide homestead land to our native Hawaiian beneficiaries. Thousands of Hawaiian families have homes and agricultural and pastoral property through this program. Our neighborhoods are thriving communities, and our residents contribute to the social and cultural fabric of their respective

regions. They are part of the general workforce, they participate in the general school system, and patronize local stores and services. We expect that some of our residents will attend HPA.

DHHL is making every effort to mitigate impacts related to the number of new residents. We do not believe, however, that the project will bring any more social problems than would a private development project. While we will encourage the new homestead residents to contribute to community efforts, we hope that, you and HPA, will welcome the new Lalamilo residents with the same enthusiasm as you would the new residents of other new communities such as the Parker Ranch 2020 communities.

6.0 Alternatives to the Proposed Action

We question the rationale of the suggestion that our project consist of larger lots of 3 to 10 acres when most lots in the surrounding neighborhoods conform to the RS-10 and RS-20 standards. We also question your thinking that larger lots of 3 to 10 acres "would serve the needs of the North Hawaii native Hawaiian population better than urban subdivisions".

Title 11, Section 11-200-17(f) require that the "known feasible" alternatives to the proposed project are limited to those that would allow the objectives of the Project to be met. Our primary objective for Lalamilo is a residential homestead and not a subsistence agricultural homestead. We have identified other areas of North Hawaii and the island of Hawaii for subsistence agricultural use on lots which would range from 3 to 10 acres.

Thus, we have described alternatives as required by Section 11-200-17(f).

7.0 Relationship of the Proposed Action to Land Use Plans, Policies, and Controls for the Affected Area

We have addressed these matters under the Section 3 discussion above.

Additional Comments

In response to the comment that this proposed development may be racially discriminatory and subject to legal challenge: The HHCA is a federal act that was adopted as a provision of the Hawaii State Constitution as a condition for Statehood under Section 4 of the Admission Act. The HHCA specifically set aside certain public lands to be held in trust for native Hawaiians as defined by the HHCA. The

proposed development is situated on a portion of those lands. The use of DHHL resources for this project is consistent with the provisions of the HHCA and, therefore, is consistent with state and federal law.

While federal constitutional challenges could be brought, the DHHL continues to be responsible for implementing the HHCA. We strongly believe that until a final and binding judgment orders otherwise, the DHHL is required to execute the provisions of the HHCA and work to achieve its objectives.

NEPA requirements: At this time there are no recognized triggers that would necessitate compliance with the National Environmental Policy Act.

Thank you for your participation in the environmental review process.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

c: Mr. John R. Colson, Headmaster, Hawaii Preparatory Academy

Lālāmilo
PROJECT

Appendices

APPENDICES

A Water Supply, Wastewater and Drainage Assessment for DHHL's Lālāmilo Project
Tom Nance Water Resource Engineering, April 2002

B Stream Survey of Waikoloa and Keanu'i'omanō Streams, Hawai'i Island
R.A. Englund, D.J. Preston and K. Arakaki, Hawai'i Biological Survey, Bishop Museum. January 2002

C Botanical Survey, Lālāmilo Residential Lots and Commercial/Industrial Mixed Uses, Lālāmilo, Waimea, Hawai'i
Winona P. Char, Char & Associates, February 2002

D Wildlife Survey, Lālāmilo Subdivision, Waimea, Hawai'i
Tim J. Ohashi, March 10, 2002

E Archaeological Inventory Survey, DHHL Residential Development at Lālāmilo, South Kohala District, Island of Hawai'i (TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)
A. E. Haun, Ph.D., D. Henry, B.S., and K. McGuire, B.A., Haun & Associates, February 2002

F Cultural Impact Assessment, DHHL Residential Development at Lālāmilo, South Kohala District, Island of Hawai'i (TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)
K. McGuire, B.A. and A. E. Haun, Ph.D., Haun & Associates, February 2002

G Traffic Impact Analysis Report For Lālāmilo for the Proposed Department of Hawaiian Home Lands Lālāmilo Project (TMK: 6-6-01:54,77 & 6-6-04:12-17)
Randall S. Okaneku, The Traffic Management Consultant, July 25, 2002

H Air Quality Study For the Proposed Department of Hawaiian Home Lands Lālāmilo Project
Barry Neal, B.D. Neal & Associates, July 2002

I DHHL Lālāmilo Project Social Impact Assessment
Berna Cabacungan, Earthplan, July 2002

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Appendix A

Preliminary Engineering Study

Water Supply, Wastewater, and Drainage Assessment for DHHL's Lalamilo Project

Prepared for:

PBR Hawaii - Hilo Office
Hilo Lagoon Center - Suite 310
101 Aupuni Street
Hilo, Hawaii 96720

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680 Ala Moana Boulevard - Suite 406
Honolulu, Hawaii 96813

July 12, 2002
Revised November 7, 2002

Table of Contents

List of Figures

Introduction

This report presents a preliminary engineering analysis of potable water, wastewater, and drainage requirements for the residential project proposed by the Department of Hawaiian Home Lands (DHHL) in Lalamilo, Hawaii. The location of the project site along the south side of the Waimea-Kawaihae Road is shown on Figure 1. It is comprised of a number of parcels (TMKs 6-6-01:54 and 77 and 6-6-04:12 to 17) totaling about 249 acres. Two land use plans are currently being considered. These are referred to herein as Alternatives A and B. The land use and phasing plans for Alternative A are illustrated on Figures 2 and 3. This alternative includes: 34 10,000-square foot single-family lots on RS-10 zoned remnant parcels in an existing subdivision as its first phase; 408 10,000-square foot single family lots, a park, and community center as Phase 2; and 16 acres of general agriculture for which water or other infrastructure will not be provided.

The land use and phasing plans for Alternative B are illustrated on Figures 4 and 5. Its first phase of 34 lots and its 16 acres of general agriculture are identical to Alternative A. Its second phase consists of 121 one-acre lots, park, and community center. The larger one-acre lots of this alternative would enable use of individual wastewater disposal systems. These would not be allowed with the smaller lots of Alternative A.

Potable Water Supply

Water supply for the project would be provided by the Waimea system of the County Department of Water Supply (DWS). All onsite water system infrastructure would be designed and built to DWS standards and dedicated to that agency. In addition, a number of offsite improvements to the system's source, storage, and transmission capacities will have to be made to serve the project.

Required Average Supply. Tabulated below are the project's potable supply requirements for both development alternatives based on DWS' standard water use rates. Alternative A, with the greater number of residential lots, would ultimately require an average supply of 215,100 gallons per day (GPD). Alternative B would require 98,600 GPD.

Alternative A: Average Potable Supply Requirements

Phase	Land Use	Area (Acres)	No. of Units	Use Rate (GPD/Unit or Ac.)	Req'd Supply (GPD)
1	Residential Lots	16.8	34	400	13,600
2	Residential Lots	145.1	408	400	163,200
	Community Center	1.7	--	3,000	5,100
	Park	8.3	--	4,000	33,200
	Cumulative Req'd Supply for Both Development Phases				215,100

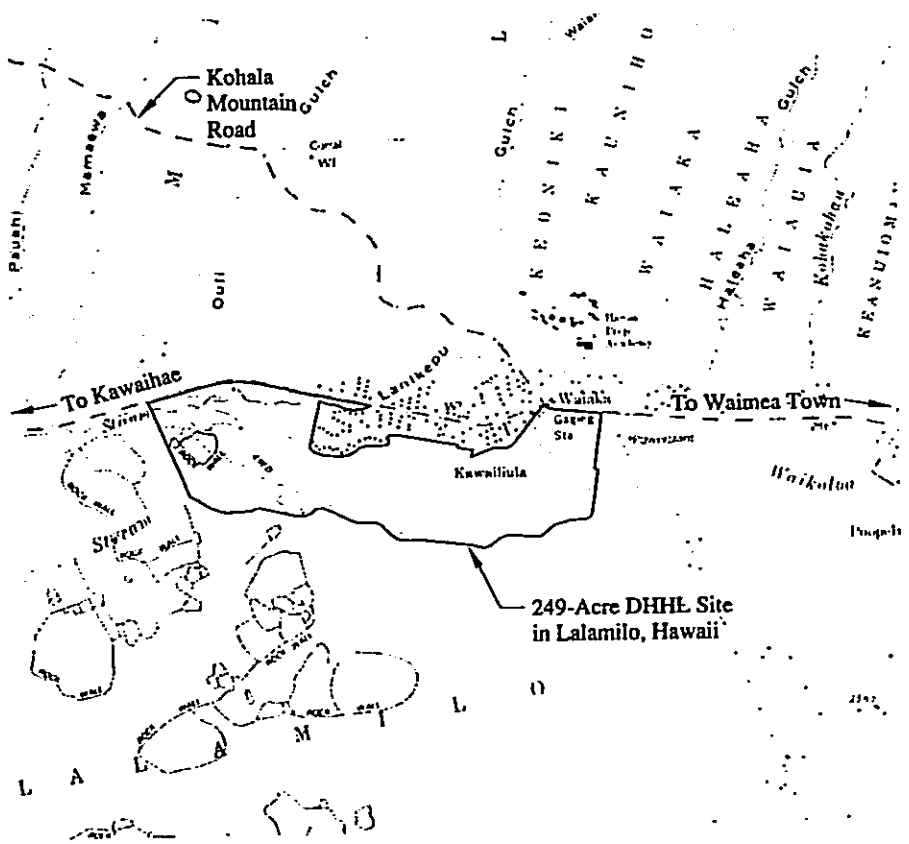
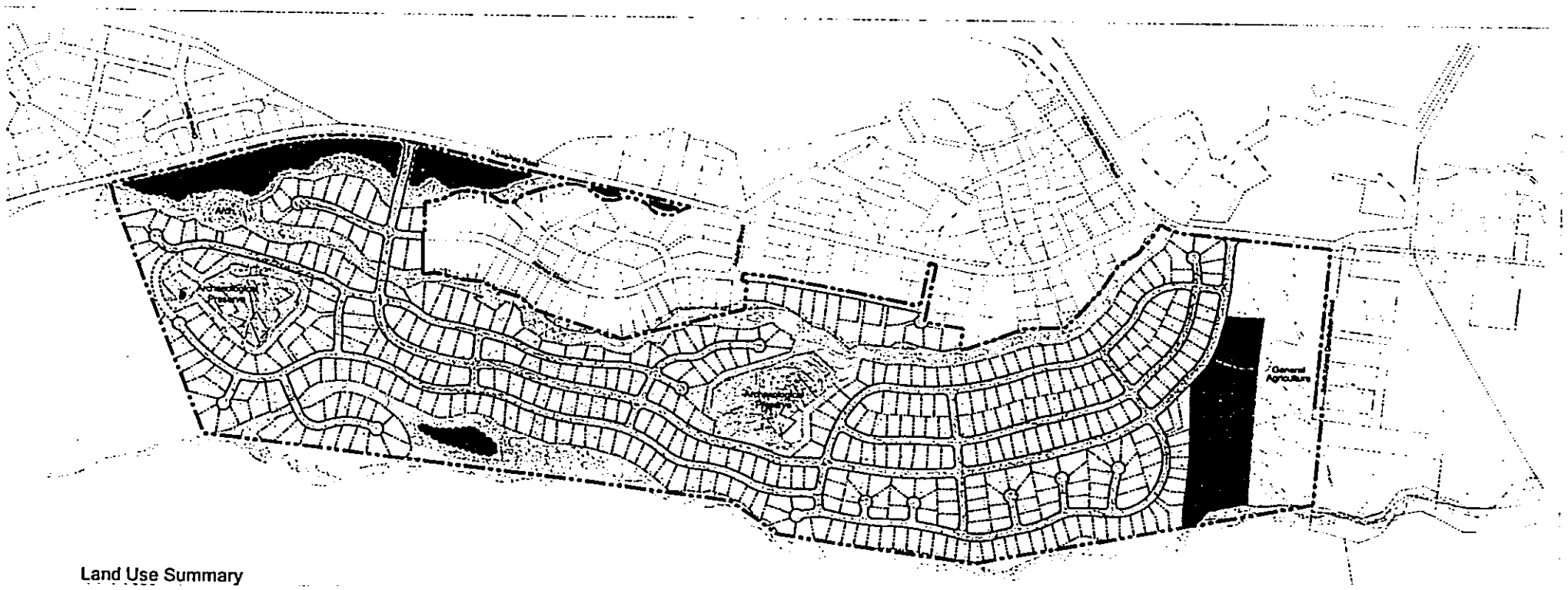


FIGURE 1
Location of DHHL's Project Site in Lalamilo, Hawaii



Land Use Summary

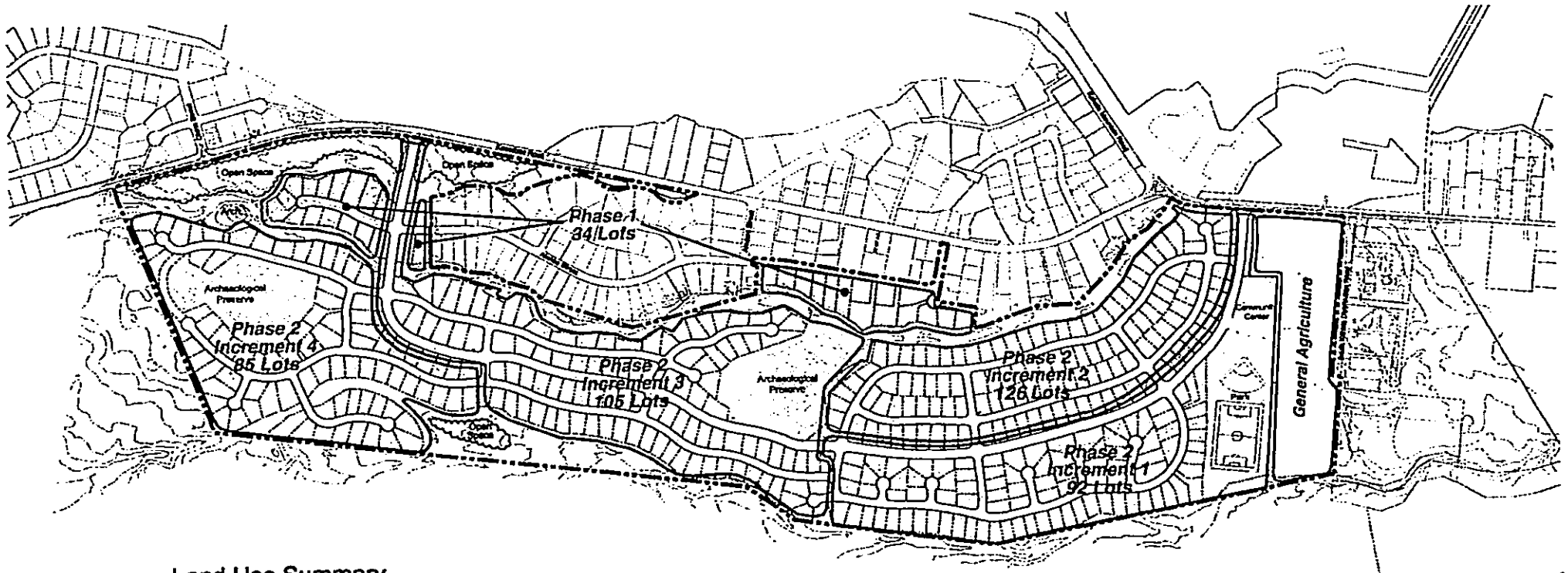
	Residential (442 Lots)	160.6 Acs.
	Community Center	1.7 Acs.
	Parks	8.3 Acs.
	Preservation Area	19.1 Acs.
	Open Space	43.1 Acs.
	General Agriculture	16.0 Acs.
	Total:	248.8 Acs.

FIGURE 2

10,000 S.F. Subdivision Plan

Lālāmilo Project

PBR



Land Use Summary

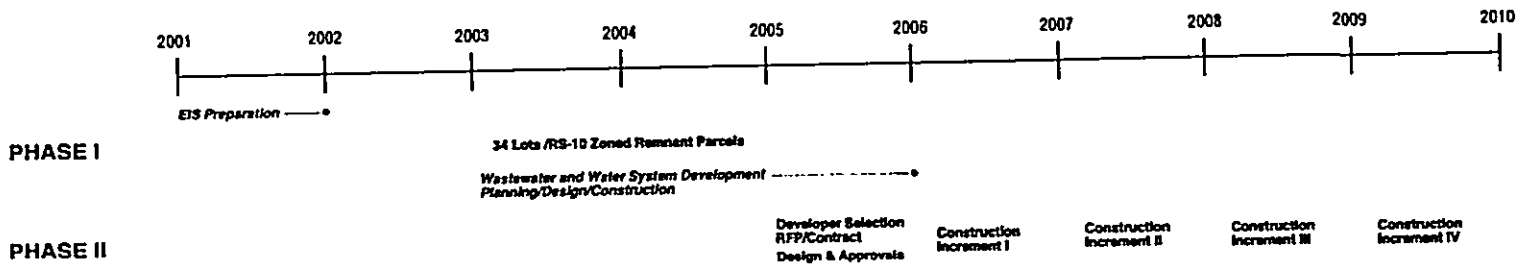
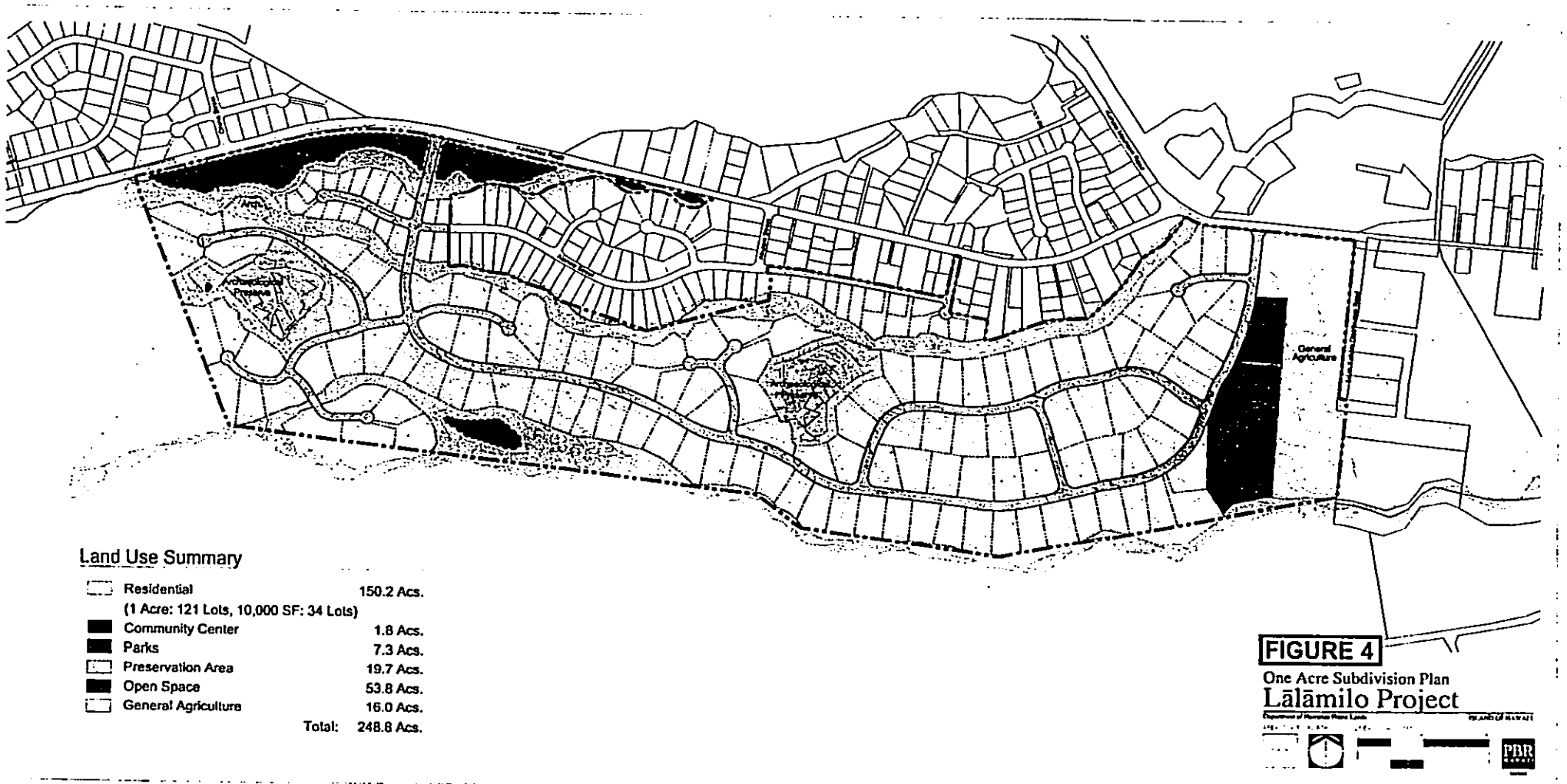


FIGURE 3

10,000 S.F. Subdivision Plan

Lālāmilo Project



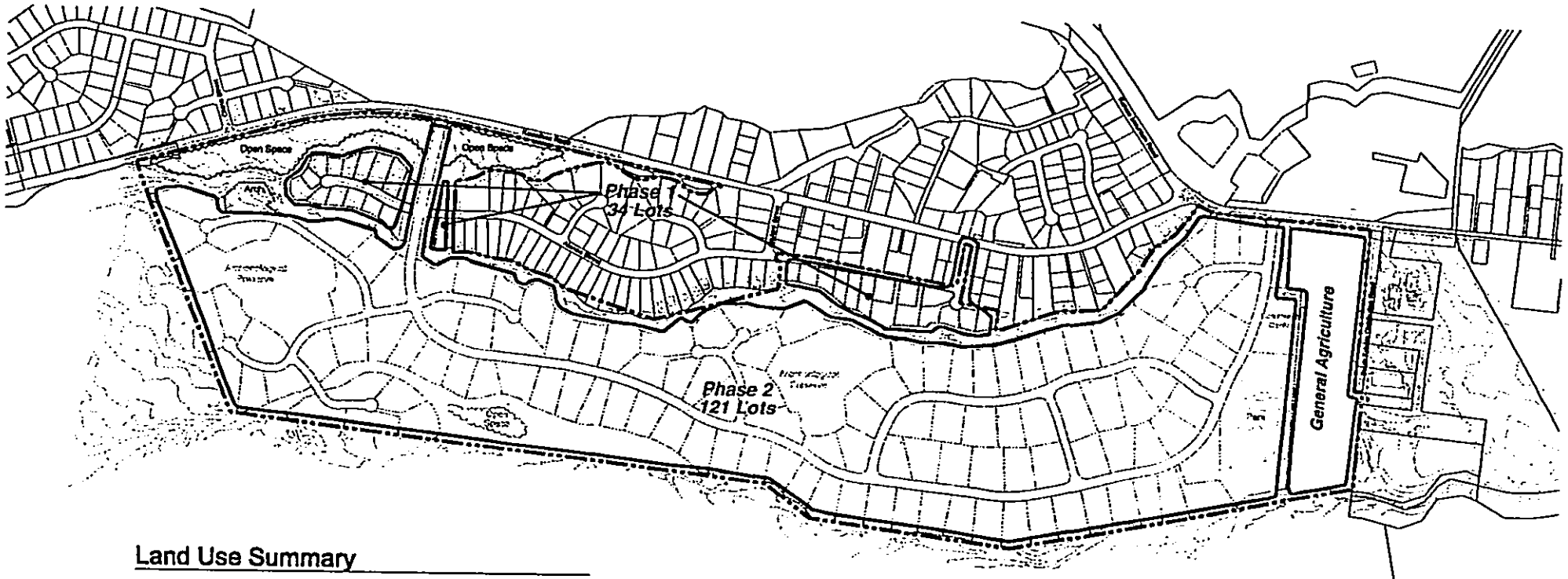
Land Use Summary

	Residential	150.2 Acs.
	(1 Acre: 121 Lots, 10,000 SF: 34 Lots)	
	Community Center	1.8 Acs.
	Parks	7.3 Acs.
	Preservation Area	19.7 Acs.
	Open Space	53.8 Acs.
	General Agriculture	16.0 Acs.
	Total:	248.8 Acs.

FIGURE 4

One Acre Subdivision Plan

Lālāmilo Project



Land Use Summary

2001 2002 2003 2004 2005 2006 2007

EIS Preparation

PHASE I

34 Lots /RS-10 Zoned Remnant Parcels

Wastewater and Water System Development
Planning/Design/Construction

PHASE II

Developer Selection
RFP/Contract
Design & Approvals

Construction
114-Acre Lots

FIGURE 5

One Acre Subdivision Plan
Lālāmilo Project

Alternative B: Average Potable Supply Requirements

Phase	Land Use	Area (Acres)	No. of Units	Use Rate (GPD/Unit or Ac.)	Req'd Supply (GPD)
1	Residential Lots	16.8	34	400	13,600
2	Residential Lots	131.0	121	400	48,400
	Community Center	1.8	--	3,000	5,400
	Park	7.3	--	4,000	29,200
	Cumulative Req'd Supply for Both Development Phases				96,600

Overview of the DWS System. At the present time, DWS' Waimea system is supplied entirely by surface water diverted from Waikoloa and Kohakohau Streams and stored in three 50-million gallon (MG) open raw water reservoirs. After treatment, water is stored in a 4 MG Clear Water Reservoir at elevation 3050 feet above Waimea Town. Distribution from the Clear Water Reservoir to customers in the Waimea service area occurs through a network of 12-, 8-, 6-, and 4-inch distribution pipelines.

Elevations of the project site range from 2160 feet at its makai end to 2420 feet in its mauka end. For DWS' established service pressure zones along the Waimea-Kawaihae Road, the portion of the site below about 2410 feet would be served from DWS' 0.10 MG Waiaka Tank which has a 2521-foot spillway elevation. It may be necessary to connect several of the highest elevation residential lots and the Community Center to the service zone above the Waiaka Tank.

Reservoir Storage Requirements for the Project. Based on DWS' design criteria, the project would require reservoir storage of 0.323 and 0.145 MG for Alternatives A and B in the service zone of the 0.10 MG Waiaka tank (the maximum day sizing criterion governs). This requirement would have to be met by acquiring land adjacent to the Waiaka tank from the State and constructing a 0.30 or 0.20 MG tank with a 2521-foot spillway elevation to match the Waiaka tank.

Source of Supply Requirements. The project's ultimate maximum day required supply is 0.323 MGD for Alternative A and 0.145 MGD for Alternative B. Expansion of DWS' surface water supply to meet either of these requirements is not a likely or practical prospect. However, with the relatively recent discovery of high level groundwater beneath the Waimea area, development of wells to supply the DHHL project and other growth in Waimea can be undertaken. There are two such possibilities to consider for the DHHL project. One of these would involve the use of existing Well No. 6240-02. It was developed by the State Department of Land and Natural Resources (DLNR) in 1999 and remains unused. It is located at 2970-foot elevation just below DWS' Clear Water Reservoir. Participating with DWS in the outfitting of this well is a realistic alternative. The well was pump tested for five days in January 2000 at 1450 GPM (2.1 MGD), demonstrating its considerable supply capability. Outfitting the well would involve installing a pump (to a depth of about 1900 feet), and construction of an 850-foot long delivery pipeline to the Clear Water Reservoir, electrical service improvements, and miscellaneous site work.

The other supply possibility would be to develop a new well at the site of DWS' 0.10 MG Waiaka tank. In 1999, the U.S. Geological Survey (USGS) completed a 4-inch diameter monitor well (State No. 6141-01) to a depth of 1507 feet. Groundwater was found approximately 1262 feet below ground (equivalent to 1243 feet above sea level). The advantage of this site in comparison to Well No. 6240-02 near the Clear Water Reservoir is the less costly pumping lift that would be required (about 1280 versus 1800 feet). The disadvantages are: it would require construction of a new well; the well would only serve the portion of DWS' Waimea system below the Waiaka tank; and additional storage at the Waiaka site would be needed to ensure proper cycle times for the well pump.

Transmission/Distribution Requirements. As indicated previously, almost all of the project site would be within the service zone of the 0.10 MG Waiaka tank. The pipeline from this tank down the Waimea-Kawaihae Road is 8-inch and most of its capacity is already committed to existing uses. Based on preliminary hydraulic analyses, there are two pipeline options to consider for this portion of the DHHL project:

- Install a 12-inch pipeline for approximately 1900 feet along the Waimea-Kawaihae Road to the main access road into the site. The pipeline through project site itself could be 8-inch and it would ultimately loop back to the existing 8-inch Waimea-Kawaihae Road pipeline when the project's connecting road at the makai end of the site is completed. The 12-inch pipeline to the site would enable all except the uppermost several residential lots to be within the Waiaka tank's service zone.

- Install an 8-inch pipe for 1900 feet along the Waimea-Kawaihae Road, through the project site, and ultimately loop back to the Waimea-Kawaihae Road. Friction losses in the 8-inch pipeline would require more of the higher elevation residential lots, possibly as many as 100 of these lots in Alternative A, to be served from DWS' service zone above the Waiaka Tank.

Summary of Required Offsite Water System Improvements. Based on the foregoing discussion, the following summarizes the required offsite water system improvements for the project:

For Phase 1:

- Based on pressure recordings undertaken at critical locations in the service zone of the Waiaka Tank and in the service zone above it (ie. the zone supplied from the Laelae Road PRV Station), it appears that DWS' system has adequate capacity to supply the 34 residential lots in Phase 1 prior to undertaking the improvements required for Phase 2.

For Phase 2:

- Construction of a 0.30 or 0.20 MG reinforced concrete tank next to the Waiaka Tank (size depends on the land use alternative).
- Outfit existing Well 6240-02 below the Clearwater Reservoir (pump, connecting pipeline, electrical improvements, and related site work), possibly to be undertaken as a joint project with DWS and the State DLNR.
- Installation of a 12-inch, 1900-foot long pipeline along the Waimea-Kawaihae Road from the Waiaka Tank to the top of the project site.
- Depending on the actual date of construction of the DHHL project relative to other ongoing development along the Waimea-Kawaihae Road corridor, it may also be necessary to install a parallel 8-inch, 3900-foot long pipeline from the Laelae Road intersection to the Waiaka Tank.

Wastewater Collection, Treatment, and Disposal

Approximately 70 percent of the projected residential and community center water use will become wastewater to be collected, treated, and disposed of in a manner acceptable to the State Department of Health (DOH). By DOH's regulations, projects with more than 50 residential units which have lot sizes less than 1-acre may not use individual wastewater treatment and disposal systems (ie. septic tanks and leach fields). Based on these criteria, some type of community treatment system would be required for Alternative A. With the 1-acre (minimum) lot sizes of Alternative B, individual septic tank-leachfield systems would be allowed. Possible wastewater treatment alternatives for Alternative A are listed below and described more fully in the paragraphs following.

- Connect to Parker Ranch's privately owned and operated Waimea wastewater treatment plant.
- Construct and operate a wastewater treatment plant at the makai end of the project site.
- Utilize a "clustering" concept of several treatment systems throughout the project.

Connection to the Parker Ranch Wastewater Treatment Plant. Parker Ranch owns and operates the only wastewater treatment plant in the Waimea area. It is located several miles south of Waimea Town and makai of Mamalahoa Highway. The wastewater system is a PUC-regulated utility. The treatment plant has a current capacity of 0.1 MGD with planned expansion capability to 1.0 MGD. Present inflow is on the order of 0.04 to 0.05 MGD. Treatment is to a primary (R-3 quality) level. The treated effluent is reused for pasture irrigation. Connection of the project to the Parker Ranch treatment plant would require the following:

- Parker Ranch's consent to the connection. The system was constructed to serve Parker Ranch projects, not the general public;
- Agreement by the PUC to the expansion of the treatment plant's service area to include the DHHL project site;
- Expansion of the treatment plant's capacity (in phases as appropriate); and
- Construction of a sewage pump station within the project site and an 18,200-foot long force main to the treatment plant.

The first 11,000 feet of the main would cross State land (TMK 6-6-01:2) and the last 7800 feet would be across Parker Ranch land (TMK 6-8-01:1). The vertical lift from the sewage pump station at the makai end of the project site to the treatment plant would be about 370 feet. The pipeline length and travel time to the treatment plant make this a problematic alternative.

Wastewater Treatment Plant at the Makai End of the Project Site. A package treatment plant capable of incremental expansion could be constructed. The logical location would be beyond the makai end of the project site, enabling gravity delivery from the entire site to the treatment plant. The treatment plant would be far inland of DOH's Underground Injection Control line, meaning that using wells for effluent disposal would not be allowed. Reuse for pasture irrigation on State land makai of the project site (TMK 6-6-01:1) would be the appropriate method of disposal. For such reuse, treatment to R-2 (secondary) standards is recommended.

Clustering Concept of Multiple Treatment Systems. Although more often used on the mainland than in Hawaii, several treatment systems of the type described herein and located throughout the site could be utilized. Their locations would be selected based on development phasing and topographic constraints (ie. to avoid pumping). Each of these systems would consist of the following:

- An appropriately sized septic tank for pre-treatment;
- A slow sand filter to receive the septic tank's effluent;
- A pumping system to recirculate a portion of the slow sand filter's effluent back through the filter (typically about 75 to 80 percent would be recirculated); and
- A leach field for disposal.

There are no regulatory limits on the maximum number of residential units that could be served by such systems as long as an R-2 quality effluent is delivered to the leach field. As such, development phasing and the site's topography would dictate the number of such systems that would need to be constructed. These systems do require monitoring and periodic maintenance and as such, may not be a practical application for this project.

Drainage

Three streams run along and delineate portions of the boundaries of DHHL's Lalamilo project site. From south to north, these three are the Waikoloa, Keanuiomano, and Lanikepu Streams. Two of these, Waikoloa and Keanuiomano, are essentially perennial despite the fact that the Department of Water Supply diverts the base flow from their upper reaches above Waimea for potable supply. The third stream, Lanikepu, is normally dry except during and immediately following significant rains.

Designation of Areas Subject to Flooding by FEMA's National Flood Insurance Program. The Federal Emergency Management Agency, on its Panel 155166 0164D of the Flood Insurance Rate Maps, has delineated areas along Lanikepu and Keanuiomano Stream which are subject to inundation by a 100-year flood. Overlaying the FIRM panel on the project's two alternative land use plans identifies those portions of the areas to be developed which lie within FEMA's delineation of areas subject to flooding.

The FIRM panel's designation of flood prone areas are Zone A. This means that the area delineated as subject to flooding is an approximation rather than the result of a detailed study. It should also be noted that there is no delineation of an area of flood inundation by Waikoloa Stream along the project's south boundary. The reach of Waikoloa Stream passing through Waimea Town has been studied in detail, but the detailed study ended mauka of the project site.

Analyses of the Probable Limits of Flood Inundation. Topographic information available for the Zone A flood delineations on the FIRM panel was limited to the USGS quadrangle map with 40-foot contour intervals. This is not sufficient to define the hydraulic capacities of the stream channels and adjacent overbank areas. As such, these flooding delineations are not of sufficient accuracy for land use planning. To provide greater accuracy for Keanuiomano and Lanikepu Streams, and to provide an initial flood delineation for Waikoloa Stream, the following steps were undertaken:

- An aerial topographic survey with 2-foot contour intervals was prepared by Towill Shigeoka & Associates.
- The 100-year peak discharge rates for Waikoloa, Keanuiomano, and Lanikepu Streams were determined.
- The areas subject to flooding by the 100-year storm peaks were computed using the HEC RAS computer program.

100-Year Flood Peak Discharge Rates. The 100-year peak discharge rates used for the flood delineations on the FIRM panels for Hawaii Island are based on regression equations developed by Charles Ewart of the U.S. Geological Survey in 1977. For the island's leeward streams, the equation for 100-year flood peak and results of applying this equation to the three streams in question as follows:

$Q_{100} = 34.3DA^{0.77} P_{24\text{-}2}{}^{2.25}$ where: Q_{100} = 100-Year Flood Peak in CFS
DA = Drainage Area in Square Miles
$P_{24\text{-}2}$ = 2-Year, 24-Hour Rainfall in Inches

Application of the USGS Regression Equation for the 100-Year Flood Peak

Stream	Area, DA (Square Miles)	$P_{24\text{-}2}$ (Inches)	Q_{100} (CFS)
Waikoloa	4.15	4.86	3860
Keanuiomano	4.69	5.90	6225
Lanikepu	2.09	4.77	2070
Confluence of Keanuiomano and Lanikopu	6.78	5.55	7210

Notes: 1. Areas were computed for the makai end of the project site.
2. $P_{24\text{-}2}$ rainfall amounts were interpolated from maps in the U.S. Weather Bureau's "Rainfall Frequency Atlas of the Hawaiian Islands" (Technical Paper No. 43, 1962).

The 1977 regression equations developed by the USGS have never been updated for FEMA, despite the fact that more streamflow data has been compiled since the USGS study was done than were available for it in 1977. To check the validity of the regression equation for leeward streams in light of the data now available, comparisons were made for four USGS gaging stations in the general vicinity of the project site. The table below compares the 100-year flood peak based on a Log Pearson Type III analysis of the annual flood peaks with the 100-year flood peak computed with the 1977 regression equation.

Comparison of Computed 100-Year Peak Discharge Rates

	Keanuiomano Stream	Luahine Gulch	Waikoloa Stream	Kohakohau Stream
USGS Gage No.	7565	7558	7580	7560
Elevation of Gaging Station (Feet MSL)	2410	3160	3460	3273
Years of Record	31	33	53	37
Log Pearson Type III Analysis of Annual Flood Peaks:				
M (Log Units)	3.0092	1.9475	2.6779	3.0102
S (Log Units)	0.2936	0.2835	0.3457	0.3057
k_{100} (at skew = -0.05)	2.2895	2.2895	2.2895	2.2895
Q_{100} (CFS)	4801	395	2947	5130
Application of the 1977 Regression Equation:				
DA (Square Miles)	4.30	0.32	1.18	2.51
$P_{24\text{-}2}$ (Inches)	6.00	4.40	6.20	6.20
Q_{100} (CFS)	6050	406	2407	4304

- The regression equation provides a conservative (ie. safe) estimate for the Keanuiomano Stream gage. Since this gage is located immediately above the mauka end of DHHL's project site, the regression equation result can be used for this stream.
- The regression equation also provides a conservative estimate for Luahine Gulch. This gulch has the same orientation relative to rainfall patterns as Lanikepu Stream and both waterways are normally dry. For this reason, it appears reasonable to use the regression equation for Lanikepu Stream.
- The regression equation significantly underestimates peak runoff for the gaging station site on Waikoloa and Kohakohau Streams. However, both these gaging stations are at high elevations in the watershed where the stream channels are relatively deeply dissected. The channel of Waikoloa Stream makai of Waimea Town has less topographic definition. This means that there would be a significant amount of overbank flow during the 100-year flood event, resulting in significant attenuation of the peak discharge rate. In other words, the regression equation is considered to be a reasonable predictor of peak flowrates in the reach of Waikoloa Stream that passes along the south boundary of the project site.

Analyses of the Areas Subject to Inundation by the 100-Year Flood Event. Areas subject to inundation by a 100-year flood were determined for Waikoloa, Keanuiomano, and Lanikepu Streams based on the following:

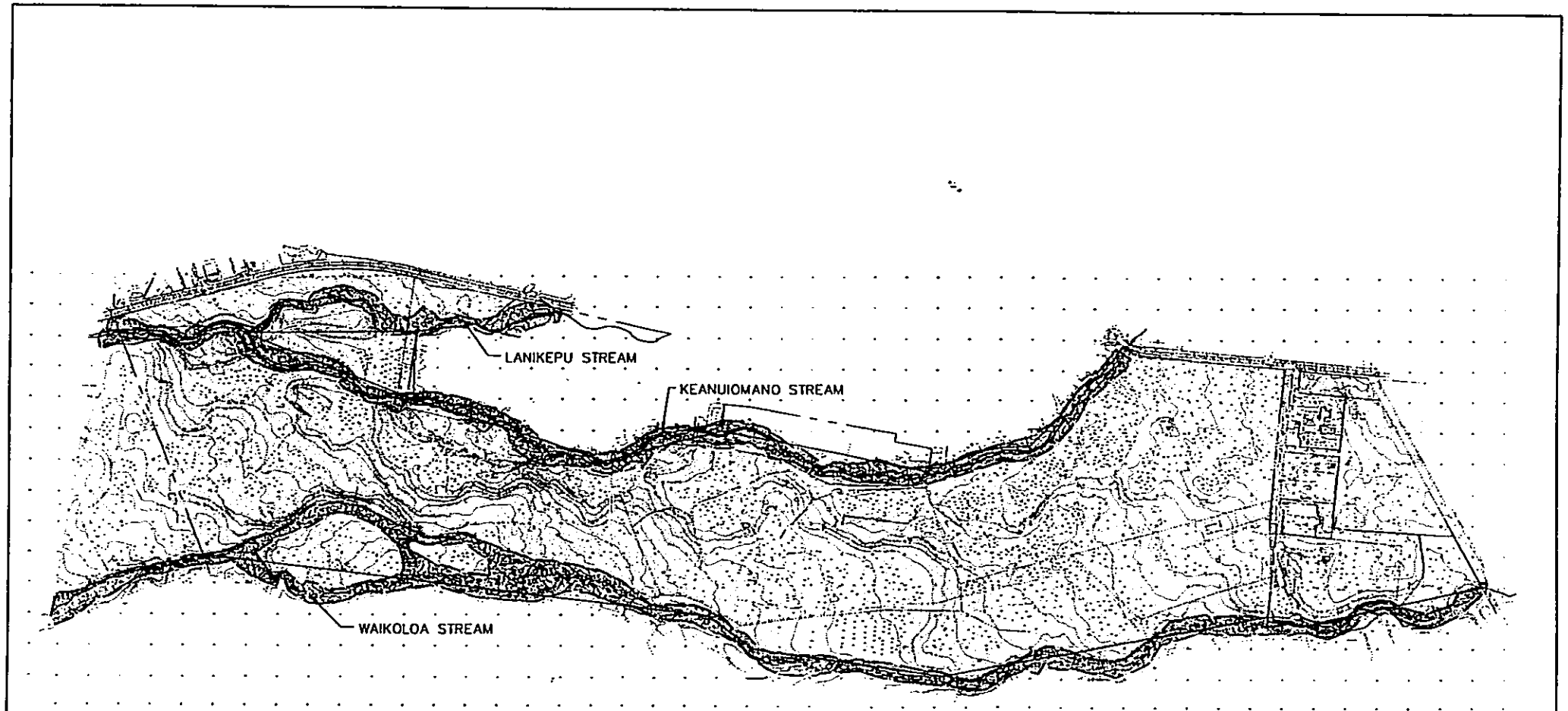
- Peak discharge rates were as computed from the 100-year regression equation (these rates are tabulated above).
- The aerial topographic map recently prepared by Towill Shigeoka with 2-foot elevation contours was used.
- HEC-RAS computer software was used to calculate flood water levels. Both subcritical and supercritical analyses were undertaken. The subcritical analyses produced more consistent

results and also more conservative (ie. higher) water levels. The subcritical results are used herein.

- Manning's "n" values of 0.075 in the stream channels and 0.105 for overbank areas were used.

Resulting flood-inundated areas are presented on Figure 6. More detailed results, both graphically and in tabular form, can be found in the appendix. For Lanikepu and Keanuiomano Streams, the areas subject to inundation by the 100-year flood are narrower than shown on FEMA Panel 155166 0164D. Waikoloa Stream's inundated area, with the single exception where the flow splits into two channels, is also relatively narrow. In other words, the capacities of the stream channels are generally sufficient to contain most of the flood waters.

These results are considered to be of sufficient detail and accuracy for initial land use planning. However, to develop in the portions of the project site which are presently within FEMA-designated flood areas but which are not actually subject to flooding, hydraulic analyses using ground surveyed cross sections will have to be undertaken and FEMA would then have to approve amending the boundaries of the flood prone areas.



NORTH

GRAPHIC SCALE:

600' 300' 0 600' 1200'

FIGURE 6
AREAS INUNDATED BY THE 100-YEAR FLOOD
ON LANIKEPU, KEANUIOMANO, AND WAIKOLOA STREAMS

Appendix A

HEC-RAS Hydraulic Analyses of Keanuiomano and Lanikepu Streams

KEAHUIOMANO

HEC-RAS Plan: Plan 03 River: Stream Centerli Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1.42	6225.00	2403.03	2412.85		2414.59	0.023430	10.69	620.98	121.21	0.73
Reach 1	1.41	6225.00	2402.00	2411.76	2410.16	2413.41	0.017126	10.86	703.56	131.72	0.65
Reach 1	1.39	6225.00	2400.79	2408.12	2407.99	2410.76	0.041697	13.10	487.03	96.28	0.95
Reach 1	1.37	6225.00	2398.00	2404.98	2404.98	2407.52	0.047106	12.81	489.75	102.58	0.99
Reach 1	1.34	6225.00	2390.95	2398.75		2400.69	0.032835	11.18	556.93	99.06	0.83
Reach 1	1.31	6225.00	2386.51	2394.05		2395.64	0.029148	10.12	615.26	117.18	0.78
Reach 1	1.30	6225.00	2384.00	2392.12		2393.57	0.021037	9.67	652.53	113.16	0.68
Reach 1	1.27	6225.00	2380.22	2389.82		2391.01	0.015814	9.70	822.01	145.68	0.61
Reach 1	1.26	6225.00	2380.00	2387.85		2389.64	0.029721	12.66	668.18	138.58	0.83
Reach 1	1.25	6225.00	2378.32	2385.71	2385.71	2387.83	0.032853	13.97	670.53	146.94	0.88
Reach 1	1.22	6225.00	2374.00	2382.58		2383.86	0.015565	9.41	742.79	123.35	0.61
Reach 1	1.20	6225.00	2370.00	2379.25		2381.43	0.025152	13.09	622.44	107.43	0.79
Reach 1	1.17	6225.00	2366.00	2374.42	2374.42	2376.96	0.048883	16.52	575.51	115.19	1.07
Reach 1	1.14	6225.00	2358.00	2369.54		2371.06	0.012575	10.65	721.66	93.17	0.58
Reach 1	1.13	6225.00	2358.00	2367.64		2369.33	0.019531	12.04	700.95	107.18	0.70
Reach 1	1.12	6225.00	2356.00	2364.91	2364.91	2367.52	0.034478	15.16	592.00	113.04	0.91
Reach 1	1.10	6225.00	2352.00	2360.74	2360.48	2363.16	0.030782	14.21	612.51	121.17	0.86
Reach 1	1.08	6225.00	2350.00	2357.73	2357.07	2359.44	0.040380	14.24	665.03	130.52	0.94
Reach 1	1.06	6225.00	2348.00	2354.70	2354.07	2356.21	0.053249	13.99	671.01	146.53	1.04
Reach 1	1.05	6225.00	2344.00	2350.70	2350.70	2352.79	0.039957	13.64	643.18	145.47	0.95
Reach 1	1.04	6225.00	2340.00	2346.92		2350.76	0.021298	11.39	646.06	122.14	0.71
Reach 1	1.01	6225.00	2336.00	2344.38	2344.38	2347.15	0.035830	13.91	522.31	99.71	0.91
Reach 1	1.00	6225.00	2332.00	2341.74		2344.17	0.024524	13.03	559.38	89.96	0.77
Reach 1	0.99	6225.00	2328.47	2338.32	2338.32	2341.81	0.047777	15.00	415.06	60.67	1.00
Reach 1	0.98	6225.00	2326.00	2335.55		2337.44	0.026794	11.03	564.56	86.89	0.76
Reach 1	0.96	6225.00	2322.00	2330.64	2330.64	2333.37	0.036647	14.14	531.24	96.67	0.92
Reach 1	0.93	6225.00	2320.00	2326.96	2326.96	2328.93	0.040062	11.96	621.60	157.38	0.92
Reach 1	0.92	6225.00	2315.85	2322.10		2323.43	0.033364	10.93	705.52	132.41	0.83
Reach 1	0.90	6225.00	2312.00	2320.94		2321.66	0.011308	8.67	1015.40	147.21	0.52
Reach 1	0.88	6225.00	2312.00	2317.26	2316.78	2318.97	0.049974	13.39	553.05	144.76	1.03
Reach 1	0.87	6225.00	2308.00	2315.63		2316.86	0.022918	10.91	627.18	168.52	0.73
Reach 1	0.85	6225.00	2306.32	2314.03		2315.10	0.026963	11.95	581.67	196.36	0.79
Reach 1	.84	6225.00	2304.25	2311.41	2311.41	2313.57	0.039939	12.99	613.87	153.00	0.93
Reach 1	0.83	6225.00	2302.00	2310.06		2311.08	0.018419	10.20	883.06	156.18	0.66
Reach 1	0.82	6225.00	2299.82	2306.49	2306.49	2308.89	0.043183	13.43	562.88	116.96	0.96
Reach 1	0.81	6225.00	2296.00	2304.42		2306.53	0.029367	12.83	647.87	137.12	0.82

HEC-RAS Plan: Plan 03 River: Stream Centerli Reach: Reach 1 Profile: PF 1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.78	6225.00	2292.43	2300.12		2302.13	0.040292	13.41	601.65	112.57	0.94
Reach 1	0.77	6225.00	2288.00	2296.44	2296.21	2300.42	0.026557	12.63	678.97	144.16	0.78
Reach 1	.76	6225.00	2287.93	2296.75	2296.75	2299.08	0.030959	14.22	636.37	129.10	0.87
Reach 1	0.75	6225.00	2282.33	2292.71	2292.71	2295.07	0.030684	13.62	622.81	136.41	0.84
Reach 1	0.74	6225.00	2278.34	2288.04		2288.87	0.013550	9.10	977.09	166.49	0.56
Reach 1	0.72	6225.00	2272.00	2283.87	2283.87	2287.08	0.030786	15.08	509.75	91.53	0.86
Reach 1	0.71	6225.00	2271.71	2281.18		2282.33	0.014252	9.92	830.98	126.65	0.59
Reach 1	0.70	6225.00	2270.00	2279.91		2281.27	0.017272	11.23	810.30	140.81	0.66
Reach 1	0.69	6225.00	2268.00	2278.91		2280.55	0.017023	11.34	733.71	127.73	0.65
Reach 1	0.68	6225.00	2266.00	2276.54	2276.54	2279.27	0.029774	14.75	583.19	111.58	0.85
Reach 1	0.67	6225.00	2264.00	2274.62		2276.70	0.017459	11.51	631.61	89.63	0.66
Reach 1	0.65	6225.00	2262.00	2274.25		2275.41	0.009463	8.89	786.64	105.16	0.49
Reach 1	0.64	6225.00	2262.00	2271.52	2271.52	2274.21	0.039494	14.92	558.61	107.80	0.95
Reach 1	0.63	6225.00	2260.00	2269.81	2269.81	2272.13	0.036949	14.81	633.11	129.68	0.92
Reach 1	.62	6225.00	2260.00	2267.56		2268.37	0.016823	8.68	940.22	159.28	0.61
Reach 1	0.61	6225.00	2258.00	2267.29	2262.74	2267.69	0.006378	6.22	1334.60	168.78	0.39
Reach 1	0.60	6225.00	2258.00	2265.02	2264.90	2266.78	0.043775	12.83	696.57	168.44	0.96
Reach 1	0.59	6225.00	2254.72	2263.46	2263.46	2265.24	0.035072	12.38	721.60	183.83	0.87
Reach 1	0.58	6225.00	2250.00	2260.66	2260.66	2262.63	0.033906	12.04	656.83	168.53	0.85
Reach 1	0.57	6225.00	2248.00	2258.13		2259.27	0.016552	8.60	749.39	134.63	0.60
Reach 1	0.56	6225.00	2246.05	2255.36	2255.36	2258.06	0.047394	13.21	477.88	95.83	0.99
Reach 1	0.55	6225.00	2244.00	2253.27	2253.17	2255.86	0.046531	12.92	481.70	89.31	0.98
Reach 1	0.54	6225.00	2242.00	2251.57		2253.70	0.035338	11.73	530.84	92.10	0.86
Reach 1	0.53	6225.00	2240.00	2250.19	2250.19	2252.39	0.029691	12.66	639.44	185.12	0.82
Reach 1	0.52	6225.00	2238.00	2246.34	2246.34	2248.30	0.029701	13.23	718.92	171.43	0.84
Reach 1	0.51	6225.00	2238.00	2243.71	2243.71	2245.77	0.044452	12.77	610.86	146.21	0.95
Reach 1	0.50	6225.00	2230.00	2241.17		2242.59	0.015626	10.58	771.45	126.61	0.61
Reach 1	0.49	6225.00	2228.00	2240.42		2241.76	0.012181	10.18	801.60	121.45	0.56
Reach 1	0.48	6225.00	2226.00	2237.73	2237.73	2240.50	0.031963	14.59	562.68	110.32	0.87
Reach 1	0.47	6225.00	2226.00	2235.98	2235.98	2238.76	0.034150	14.88	560.86	107.90	0.90
Reach 1	0.46	6225.00	2223.26	2233.96		2235.78	0.017821	11.26	651.93	103.48	0.66
Reach 1	0.45	6225.00	2220.00	2231.25	2231.25	2234.51	0.032918	16.16	523.88	85.42	0.89
Reach 1	0.43	6225.00	2218.00	2228.10	2228.10	2231.46	0.032568	16.05	506.41	80.68	0.90
Reach 1	0.41	6225.00	2214.00	2223.89		2224.96	0.014853	9.39	830.42	127.21	0.59
Reach 1	0.40	6225.00	2210.87	2221.46	2219.82	2223.38	0.018467	11.80	632.74	92.21	0.68
Reach 1	0.38	6225.00	2210.00	2218.52	2218.30	2221.17	0.032072	14.19	560.45	103.48	0.87

HEC-RAS Plan: Plan 03 River: Stream Centerli Reach: Reach 1 Profile: PF 1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.36	6225.00	2205.03	2214.39	2214.39	2217.39	0.038044	14.35	491.72	91.15	0.94
Reach 1	0.35	6225.00	2204.00	2213.68	2213.68	2216.43	0.038097	14.31	538.80	105.06	0.91
Reach 1	0.34	6225.00	2202.00	2210.02	2210.02	2212.67	0.040433	13.32	511.68	108.36	0.94
Reach 1	0.33	6225.00	2198.00	2207.65		2210.01	0.030747	14.15	568.30	88.88	0.86
Reach 1	0.32	6225.00	2196.00	2206.35		2208.64	0.023720	13.46	610.46	97.52	0.76
Reach 1	0.30	6225.00	2194.59	2205.26		2206.51	0.014166	11.03	818.94	114.16	0.61
Reach 1	0.29	6225.00	2192.00	2201.76	2201.76	2204.62	0.038779	16.48	577.42	105.93	0.95
Reach 1	0.27	6225.00	2188.00	2196.21		2197.83	0.026535	11.67	687.05	123.79	0.77
Reach 1	0.25	6225.00	2186.00	2194.66	2193.67	2196.24	0.019841	10.75	768.26	136.18	0.68
Reach 1	0.23	6225.00	2184.00	2190.99	2190.99	2193.07	0.044978	14.60	637.65	143.26	1.00
Reach 1	0.22	6225.00	2180.00	2189.49		2190.25	0.013896	9.13	1019.15	173.66	0.57
Reach 1	0.21	6225.00	2177.61	2186.75	2186.75	2189.41	0.038784	14.11	536.27	108.85	0.93
Reach 1	0.20	6225.00	2174.10	2184.43		2186.35	0.022621	11.15	575.83	92.70	0.72
Reach 1	0.19	7210.00	2170.00	2183.67	2180.31	2185.27	0.012957	10.30	752.92	96.85	0.56
Reach 1	0.18	7210.00	2169.10	2179.74	2179.74	2183.72	0.044474	16.03	455.52	62.72	0.99
Reach 1	0.16	7210.00	2166.00	2176.40	2175.95	2179.35	0.039258	13.79	522.66	74.80	0.92
Reach 1	0.14	7210.00	2163.24	2171.93	2171.93	2175.17	0.044102	14.46	505.40	83.25	0.99
Reach 1	0.13	7210.00	2160.84	2171.75		2173.28	0.015759	10.32	813.20	133.20	0.62
Reach 1	0.11	7210.00	2156.00	2167.73	2167.73	2170.97	0.027434	15.58	642.82	137.59	0.82
Reach 1	0.10	7210.00	2155.07	2165.86		2168.16	0.020812	12.49	645.90	92.74	0.72
Reach 1	0.09	7210.00	2152.34	2165.69		2167.29	0.013681	10.54	779.38	101.58	0.59
Reach 1	0.08	7210.00	2152.00	2164.65		2166.16	0.010730	10.45	821.81	91.63	0.53
Reach 1	0.06	7210.00	2150.00	2163.74		2165.30	0.010747	10.80	838.17	99.45	0.54
Reach 1	0.04	7210.00	2148.00	2163.19		2164.06	0.007063	9.35	1305.61	192.33	0.43
Reach 1	0.02	7210.00	2146.00	2163.25		2163.56	0.001910	5.36	1914.24	172.06	0.24
Reach 1	0.00	7210.00	2146.92	2159.61	2159.61	2162.73	0.053827	14.18	508.43	82.89	1.01

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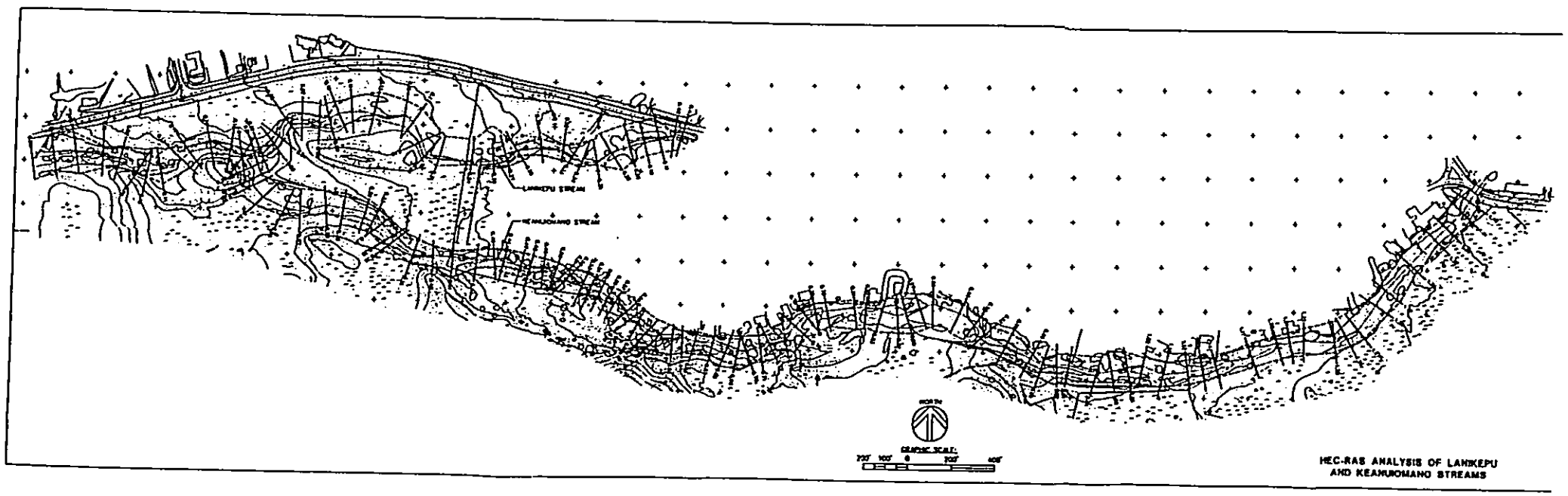
HEC-RAS Plan: Plan 01 River: Stream Center Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.43	2070.00	2261.90	2269.03	2268.72	2270.41	0.027780	11.16	277.99	74.22	0.77
Reach 1	0.42	2070.00	2262.00	2266.15		2269.34	0.031640	10.56	288.54	81.44	0.80
Reach 1	0.41	2070.00	2256.00	2265.44		2266.99	0.035921	12.72	297.75	110.53	0.82
Reach 1	0.40	2070.00	2254.00	2263.76	2263.76	2264.70	0.025479	10.72	392.30	157.67	0.68
Reach 1	0.38	2070.00	2252.74	2260.94	2260.94	2261.91	0.024725	10.39	389.66	165.57	0.71
Reach 1	0.37	2070.00	2250.00	2257.34	2256.59	2257.74	0.024129	7.77	462.22	175.59	0.58
Reach 1	0.35	2070.00	2248.00	2253.87	2253.82	2254.84	0.063183	11.24	304.67	136.01	1.00
Reach 1	0.34	2070.00	2244.56	2253.02		2253.36	0.009280	6.53	547.08	147.67	0.43
Reach 1	0.33	2070.00	2244.00	2251.21		2252.49	0.032856	11.98	303.49	95.99	0.82
Reach 1	0.32	2070.00	2242.00	2248.94		2250.66	0.038390	11.69	232.87	65.03	0.87
Reach 1	0.30	2070.00	2238.00	2245.23	2245.23	2247.01	0.034756	12.65	250.28	71.27	0.86
Reach 1	0.28	2070.00	2230.00	2237.85	2237.85	2239.98	0.034132	13.86	220.83	52.04	0.91
Reach 1	0.27	2070.00	2226.00	2233.72	2233.72	2234.82	0.025690	10.12	351.92	145.32	0.72
Reach 1	0.26	2070.00	2226.00	2232.47		2232.96	0.015627	7.90	493.18	179.19	0.57
Reach 1	0.24	2070.00	2222.00	2229.48	2229.48	2230.68	0.033958	12.32	325.90	113.10	0.83
Reach 1	0.21	2070.00	2218.75	2224.77		2225.40	0.022099	9.11	414.65	138.18	0.68
Reach 1	0.20	2070.00	2217.46	2223.96		2224.37	0.012356	7.42	472.75	116.57	0.52
Reach 1	0.19	2070.00	2215.80	2221.71		2223.06	0.036998	11.02	292.82	116.98	0.87
Reach 1	0.17	2070.00	2212.00	2218.02		2219.38	0.036574	11.49	302.40	119.42	0.86
Reach 1	0.16	2070.00	2209.60	2216.38	2216.38	2217.83	0.033053	11.89	324.21	123.71	0.84
Reach 1	0.13	2070.00	2206.00	2213.08		2213.71	0.017170	8.82	407.82	116.52	0.60
Reach 1	0.11	2070.00	2204.00	2210.60		2211.52	0.027516	10.40	341.91	108.44	0.75
Reach 1	0.10	2070.00	2202.00	2207.99	2207.99	2209.35	0.049405	12.82	272.33	96.34	0.98
Reach 1	0.09	2070.00	2195.39	2204.60	2203.21	2205.71	0.016456	9.62	307.52	65.50	0.60
Reach 1	0.08	2070.00	2196.00	2202.88		2204.57	0.032182	11.59	229.23	51.17	0.83
Reach 1	0.07	2070.00	2192.00	2199.29	2199.29	2201.62	0.040639	13.80	203.48	46.11	0.92
Reach 1	0.05	2070.00	2184.11	2195.08	2195.08	2197.70	0.043305	15.10	195.95	38.53	0.88
Reach 1	0.04	2070.00	2180.00	2191.71		2193.23	0.019204	10.51	249.14	50.49	0.61
Reach 1	0.03	2070.00	2176.33	2189.46	2189.46	2192.00	0.044908	13.20	181.41	43.34	0.88
Reach 1	0.02	2070.00	2176.00	2185.73		2187.40	0.027855	10.42	203.70	37.56	0.72
Reach 1	0.01	2070.00	2174.00	2183.50	2183.50	2186.19	0.051626	13.21	163.26	37.75	0.95
Reach 1	0.00	2070.00	2170.00	2176.21	2176.21	2177.70	0.028779	10.44	268.06	101.72	0.77



HEC-RAS ANALYSIS OF LAHKEPU
AND KEAHUOMANO STREAMS

Appendix B

HEC-RAS Hydraulic Analyses of
Waikoloa Stream

WAIKOLOA 1

HEC-RAS Plan: Plan 02 River: Stream Center6 Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.23	3660.00	2113.72	2121.61	2120.42	2122.93	0.022764	9.25	403.47	82.90	0.59
Reach 1	0.21	3660.00	2110.01	2116.57	2116.57	2118.68	0.052454	11.66	313.87	74.54	1.00
Reach 1	0.19	3660.00	2099.94	2108.55	2108.55	2110.94	0.051739	12.41	294.87	62.05	1.00
Reach 1	0.17	3660.00	2091.49	2100.95	2100.95	2104.13	0.050538	14.33	259.02	47.09	0.98
Reach 1	0.15	3660.00	2088.29	2095.06	2095.06	2097.22	0.050652	11.81	313.78	79.83	0.99
Reach 1	0.13	3660.00	2069.72	2081.01	2080.39	2083.30	0.039780	12.14	301.54	50.84	0.88
Reach 1	0.11	3660.00	2068.68	2078.61	2078.41	2079.07	0.044694	12.60	291.30	55.53	0.95
Reach 1	0.09	3660.00	2067.44	2074.37	2073.30	2075.58	0.022969	8.88	426.50	95.46	0.69
Reach 1	0.08	3660.00	2064.99	2070.43	2070.43	2072.28	0.049326	11.04	349.14	102.06	0.97
Reach 1	0.06	3660.00	2059.80	2065.55	2065.55	2067.43	0.048730	11.36	358.60	102.55	0.96
Reach 1	0.04	3660.00	2057.11	2064.56		2065.14	0.008137	6.20	662.67	133.50	0.43
Reach 1	0.02	3660.00	2055.38	2064.56		2064.71	0.001620	3.42	1330.44	193.73	0.20
Reach 1	0.00	3660.00	2054.42	2061.72	2061.72	2064.01	0.056952	12.16	301.08	68.10	1.00

HEC-RAS Plan: Plan 01 River: Stream Center6 Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.02	3660.00	2122.00	2127.44		2127.95	0.014362	5.79	656.11	206.18	0.52
Reach 1	.01	3660.00	2120.98	2125.88	2125.88	2127.36	0.046754	9.97	401.51	151.87	0.93
Reach 1	0.00	3660.00	2113.72	2121.61	2120.40	2122.92	0.022588	9.21	405.21	83.34	0.69

HEC-RAS Plan: Plan 06 River: Stream Center6 Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	.58	2700.00	2195.00	2199.70		2200.59	0.042397	10.59	428.81	166.76	0.91
Reach 1	0.57	2700.00	2192.57	2197.98		2196.78	0.037360	9.30	438.95	164.78	0.83
Reach 1	0.56	2700.00	2191.01	2196.33		2197.04	0.030263	8.20	443.52	148.73	0.75
Reach 1	0.55	2700.00	2189.89	2194.79	2194.10	2195.59	0.038873	8.80	409.14	139.07	0.84
Reach 1	0.52	2700.00	2182.64	2189.65	2188.83	2190.78	0.021190	7.83	376.87	126.45	0.65
Reach 1	0.51	2700.00	2181.41	2187.60	2187.60	2189.09	0.042505	9.98	302.09	128.95	0.89
Reach 1	0.49	2700.00	2180.30	2186.26		2186.53	0.011579	5.54	722.38	219.45	0.47
Reach 1	0.48	2700.00	2177.57	2184.41		2185.18	0.021182	8.12	447.21	133.80	0.65
Reach 1	0.46	2700.00	2173.66	2180.32	2180.32	2182.06	0.035913	11.76	311.95	94.90	0.88
Reach 1	0.44	2700.00	2169.78	2176.00	2176.00	2177.71	0.042130	11.20	294.80	90.61	0.91
Reach 1	0.42	2700.00	2164.39	2171.43		2173.01	0.035857	10.10	274.06	70.63	0.84
Reach 1	0.41	2700.00	2161.85	2170.25		2171.23	0.015265	8.03	352.54	73.24	0.57
Reach 1	0.40	2700.00	2160.79	2167.64	2167.64	2169.51	0.046755	11.06	256.86	77.86	0.95
Reach 1	0.38	2700.00	2156.72	2163.44		2164.49	0.021118	8.46	360.04	94.17	0.66
Reach 1	0.36	2700.00	2154.12	2161.03		2162.18	0.025103	8.97	367.82	134.65	0.72
Reach 1	0.34	2700.00	2152.16	2158.50	2158.43	2160.09	0.038820	10.54	310.83	120.37	0.88
Reach 1	0.33	2700.00	2148.68	2155.96	2155.96	2157.63	0.039056	11.91	324.03	101.76	0.89
Reach 1	0.32	2700.00	2143.89	2151.63	2151.63	2153.78	0.046810	11.83	238.24	82.90	0.96
Reach 1	0.31	2700.00	2139.88	2148.41	2148.41	2150.67	0.053231	12.06	224.35	82.12	1.00
Reach 1	0.30	2700.00	2130.45	2138.69	2138.69	2140.63	0.055667	11.16	241.97	83.13	1.00
Reach 1	0.28	2700.00	2127.89	2132.94	2132.25	2133.89	0.045323	9.31	358.53	106.66	0.89
Reach 1	0.27	2700.00	2122.84	2128.78	2128.78	2130.15	0.036772	10.23	346.28	127.85	0.85

WAIKOLOA 2

HEC-RAS Plan: Plan 01 River: Stream Center6 Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.09	3660.00	2218.00	2224.57	2224.51	2225.87	0.056507	9.16	400.30	149.28	0.98
Reach 1	0.08	3660.00	2218.51	2221.99	2221.85	2223.05	0.053304	8.26	442.95	180.51	0.93
Reach 1	0.06	3660.00	2210.21	2217.07	2216.61	2216.01	0.047178	7.76	475.10	200.93	0.87
Reach 1	0.04	3660.00	2205.30	2211.30	2211.30	2212.29	0.070388	8.27	477.97	260.37	1.03
Reach 1	0.02	3660.00	2200.40	2206.84	2206.05	2207.29	0.022490	5.41	686.23	300.19	0.61
Reach 1	0.00	3660.00	2197.27	2202.70	2202.70	2203.79	0.057891	8.84	469.59	217.06	0.98

HEC-RAS Plan: Waikoloa2 River: Stream Centerli Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1.21	3660.00	2441.15	2448.68	2448.68	2450.94	0.050017	12.08	304.63	71.27	0.99
Reach 1	1.20	3660.00	2438.01	2446.15	2446.15	2448.48	0.039195	13.03	342.05	79.67	0.92
Reach 1	1.19	3660.00	2434.00	2441.43	2441.43	2443.82	0.047175	12.43	302.60	72.33	0.98
Reach 1	1.18	3660.00	2428.46	2435.31	2435.31	2437.40	0.042114	12.04	347.18	90.16	0.93
Reach 1	1.17	3660.00	2423.99	2432.73		2433.51	0.014021	7.36	555.43	119.61	0.55
Reach 1	1.16	3660.00	2421.63	2429.18	2429.18	2431.16	0.053540	11.26	324.56	82.58	1.00
Reach 1	1.14	3660.00	2419.31	2427.53		2428.57	0.017671	8.19	455.26	93.60	0.61
Reach 1	1.13	3660.00	2418.65	2427.18		2427.85	0.009264	6.67	578.38	105.91	0.46
Reach 1	1.12	3660.00	2417.23	2426.22		2427.16	0.012556	8.00	510.15	98.11	0.54
Reach 1	1.11	3660.00	2413.46	2424.65	2423.14	2425.97	0.018727	9.76	481.16	122.93	0.62
Reach 1	1.09	3660.00	2410.39	2420.65	2420.65	2423.23	0.048972	12.90	287.73	66.41	0.98
Reach 1	1.08	3660.00	2409.26	2420.30		2421.23	0.012991	7.77	472.11	77.58	0.53
Reach 1	1.06	3660.00	2407.92	2419.33		2420.24	0.010676	7.70	496.24	102.44	0.49
Reach 1	1.04	3660.00	2406.49	2415.88	2415.88	2418.56	0.047302	13.18	285.78	60.20	0.98
Reach 1	1.02	3660.00	2401.99	2412.94		2414.44	0.020299	9.92	395.45	75.67	0.66
Reach 1	1.01	3660.00	2401.67	2411.85		2413.25	0.019974	9.52	399.23	77.74	0.65
Reach 1	1.00	3660.00	2401.77	2411.41		2412.28	0.012060	7.52	500.16	95.08	0.51
Reach 1	0.99	3660.00	2397.61	2410.78		2411.60	0.010226	7.40	534.15	98.59	0.47
Reach 1	0.98	3660.00	2396.00	2410.21		2410.90	0.008779	6.73	564.83	95.72	0.44
Reach 1	0.97	3660.00	2396.00	2409.78		2410.49	0.007828	6.77	557.67	87.44	0.41
Reach 1	0.96	3660.00	2396.02	2408.98		2410.20	0.016098	8.94	434.01	79.49	0.58
Reach 1	0.95	3660.00	2395.19	2406.68	2406.68	2408.71	0.032920	12.53	396.27	106.11	0.82
Reach 1	0.94	3660.00	2394.07	2404.20	2404.20	2406.20	0.050491	14.00	387.16	101.14	0.97
Reach 1	0.93	3660.00	2391.53	2401.87		2403.88	0.028646	12.96	408.19	90.67	0.80
Reach 1	0.92	3660.00	2389.92	2399.94	2399.94	2402.21	0.035616	14.25	381.98	86.15	0.88
Reach 1	0.91	3660.00	2387.87	2396.66	2396.66	2398.65	0.032110	12.75	466.34	107.57	0.85
Reach 1	0.89	3660.00	2382.48	2388.17	2388.17	2389.76	0.050409	12.09	422.79	133.79	1.00
Reach 1	0.88	3660.00	2377.64	2385.31	2385.31	2386.96	0.039948	12.11	435.54	126.38	0.91
Reach 1	0.85	3660.00	2371.23	2378.39		2380.06	0.039728	12.66	430.67	117.50	0.92
Reach 1	0.84	3660.00	2367.29	2375.27	2375.27	2377.07	0.035906	13.00	440.09	124.26	0.89
Reach 1	0.82	3660.00	2363.61	2370.06	2370.06	2371.66	0.044267	10.94	366.19	115.95	0.93
Reach 1	0.80	3660.00	2357.85	2367.51		2368.27	0.010147	7.52	621.67	130.88	0.49
Reach 1	0.78	3660.00	2356.36	2365.84		2367.10	0.016462	10.09	499.44	101.46	0.62
Reach 1	0.77	3660.00	2354.38	2363.52	2363.52	2366.17	0.036404	14.51	339.47	69.17	0.92
Reach 1	0.76	3660.00	2353.03	2360.94		2362.35	0.024831	11.08	473.77	113.68	0.74
Reach 1	0.74	3660.00	2351.89	2359.29		2360.76	0.031970	11.18	451.73	121.21	0.81

HEC-RAS Plan: Waikoloa2 River: Stream Centerli Reach: Reach 1 Profile: PF 1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.72	3660.00	2347.66	2354.63	2354.63	2356.66	0.040599	11.99	362.95	99.12	0.92
Reach 1	0.71	3660.00	2346.25	2353.55		2354.14	0.012969	7.73	655.26	126.04	0.54
Reach 1	0.70	3660.00	2344.00	2350.98	2350.98	2352.83	0.054022	13.40	384.04	103.59	1.04
Reach 1	0.69	3660.00	2337.44	2345.07		2346.89	0.032250	12.14	396.02	91.34	0.85
Reach 1	0.68	3660.00	2335.66	2343.94	2343.44	2345.57	0.027404	11.39	423.50	97.71	0.78
Reach 1	0.66	3660.00	2334.20	2341.06	2341.06	2343.08	0.039586	11.81	358.39	98.32	0.91
Reach 1	0.64	3660.00	2330.86	2339.71		2340.57	0.012249	8.06	588.14	133.48	0.53
Reach 1	0.63	3660.00	2329.16	2338.49		2339.28	0.013457	9.21	640.17	133.72	0.56
Reach 1	0.62	3660.00	2328.69	2338.15		2338.91	0.013205	8.33	618.14	127.87	0.54
Reach 1	0.61	3660.00	2327.47	2335.49	2335.49	2337.46	0.056156	13.43	370.63	99.69	1.04
Reach 1	0.60	3660.00	2325.71	2334.17	2332.72	2335.56	0.017733	10.16	456.81	87.08	0.65
Reach 1	0.59	3660.00	2323.26	2331.51	2331.51	2333.92	0.037063	13.98	352.26	75.51	0.92
Reach 1	0.57	3660.00	2318.12	2326.46	2326.46	2328.90	0.038304	13.25	330.19	71.02	0.92
Reach 1	0.54	3660.00	2310.83	2321.03		2322.22	0.015487	10.10	503.02	90.91	0.61
Reach 1	0.52	3660.00	2306.37	2320.57		2321.29	0.006068	7.00	581.54	74.18	0.39
Reach 1	0.51	3660.00	2307.21	2317.57	2317.57	2320.52	0.038240	14.43	301.73	57.05	0.91
Reach 1	0.49	3660.00	2304.83	2312.61	2312.61	2315.02	0.040690	13.01	325.28	72.18	0.94
Reach 1	0.48	3660.00	2301.70	2311.42		2312.63	0.014362	9.75	493.29	88.39	0.59
Reach 1	0.45	3660.00	2299.00	2308.35		2310.21	0.028203	13.17	416.05	84.74	0.80
Reach 1	0.43	3660.00	2295.74	2306.20		2307.60	0.017607	10.91	492.44	103.66	0.64
Reach 1	0.42	3660.00	2294.53	2304.06		2305.72	0.025640	12.47	456.26	104.15	0.76
Reach 1	0.39	3660.00	2291.11	2301.00		2302.49	0.016855	10.93	457.40	83.86	0.64
Reach 1	0.38	3660.00	2289.42	2298.73	2298.73	2301.31	0.034724	13.71	336.78	75.10	0.87
Reach 1	0.36	3660.00	2288.00	2295.28	2295.28	2297.63	0.035217	13.39	355.77	81.63	0.89
Reach 1	0.34	3660.00	2284.29	2292.10		2292.96	0.018625	9.18	574.26	125.32	0.63
Reach 1	0.33	3660.00	2281.82	2290.38		2291.54	0.025823	10.99	524.79	132.43	0.73
Reach 1	0.32	3660.00	2280.57	2289.72		2290.73	0.020868	9.37	538.84	131.53	0.66
Reach 1	0.30	3660.00	2277.11	2287.17		2288.58	0.021425	10.86	501.45	132.41	0.69
Reach 1	0.28	3660.00	2275.71	2286.08		2286.97	0.010414	8.38	625.15	150.60	0.50
Reach 1	0.27	3660.00	2274.71	2283.76	2283.76	2285.75	0.032555	12.82	411.64	109.54	0.85
Reach 1	0.25	3660.00	2267.97	2277.74	2277.74	2280.31	0.032069	13.48	335.96	76.96	0.84
Reach 1	0.23	3660.00	2264.00	2272.61	2271.56	2274.05	0.024792	9.72	395.49	84.32	0.71
Reach 1	0.20	3660.00	2260.00	2268.61		2270.48	0.029925	11.65	390.18	95.03	0.80
Reach 1	0.19	3660.00	2258.99	2268.09		2268.99	0.011397	8.46	578.86	111.69	0.52
Reach 1	0.17	3660.00	2257.34	2265.95		2267.22	0.026479	12.15	498.61	118.60	0.80
Reach 1	0.15	3660.00	2255.02	2262.56	2262.56	2264.31	0.040715	13.23	431.59	118.83	0.94

HEC-RAS Plan: Waikoloa2 River: Stream Centerli Reach: Reach 1 Profile: PF 1 (Continued)

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.14	3660.00	2251.04	2258.65	2258.65	2260.51	0.036064	12.51	409.73	107.50	0.88
Reach 1	0.12	3660.00	2247.60	2253.58	2253.58	2255.53	0.041404	11.86	370.99	103.76	0.92
Reach 1	0.11	3660.00	2240.07	2247.64	2247.64	2249.85	0.054768	13.83	338.65	78.49	1.03
Reach 1	0.10	3660.00	2234.98	2241.72	2241.72	2244.29	0.044766	13.05	298.29	61.72	0.97
Reach 1	0.08	3660.00	2229.59	2236.83		2238.06	0.021490	9.17	444.00	99.81	0.67
Reach 1	0.07	3660.00	2227.96	2234.94	2234.94	2236.69	0.033742	12.29	435.31	121.88	0.86
Reach 1	0.06	3660.00	2226.22	2232.92	2232.92	2234.37	0.039312	12.68	485.37	150.47	0.92
Reach 1	0.04	3660.00	2222.86	2229.97		2230.72	0.017433	8.11	622.15	162.27	0.61
Reach 1	0.03	3660.00	2221.38	2228.95		2229.84	0.020626	9.92	610.32	162.82	0.68
Reach 1	0.02	3660.00	2219.89	2227.15	2226.80	2228.34	0.034430	10.95	508.41	155.96	0.84
Reach 1	0.00	3660.00	2217.57	2224.57	2224.10	2225.56	0.021966	9.62	582.42	171.63	0.69

WAIKOLOA 3

HEC-RAS Plan: Plan 02 River: Stream Centerli Reach: Reach 1 Profile: PF 1

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	0.36	960.00	2198.76	2200.54		2200.89	0.045187	5.59	211.60	148.01	0.80
Reach 1	0.35	960.00	2195.49	2199.07		2199.53	0.027420	5.75	200.45	125.27	0.66
Reach 1	0.34	960.00	2193.93	2197.45	2197.43	2198.23	0.042807	7.45	159.54	118.64	0.84
Reach 1	0.33	960.00	2191.56	2194.68	2194.68	2195.56	0.062390	7.56	132.42	86.04	0.97
Reach 1	0.32	960.00	2188.36	2191.56		2192.23	0.034458	6.70	155.42	79.11	0.75
Reach 1	0.31	960.00	2185.74	2189.15	2189.15	2190.19	0.053774	8.33	125.69	69.82	0.94
Reach 1	0.30	960.00	2183.33	2187.40		2188.00	0.021676	6.26	160.90	62.52	0.62
Reach 1	0.28	960.00	2179.76	2184.46	2184.03	2185.39	0.030959	8.08	138.09	54.47	0.75
Reach 1	0.26	960.00	2176.30	2179.75	2179.75	2180.88	0.058817	8.62	117.07	54.64	0.98
Reach 1	0.25	960.00	2168.75	2172.31	2172.27	2173.50	0.060162	8.75	109.68	46.22	0.98
Reach 1	0.23	960.00	2164.46	2167.20		2167.79	0.050866	7.03	169.56	98.81	0.88
Reach 1	0.21	960.00	2160.35	2163.19	2162.75	2163.79	0.031877	6.29	160.49	81.63	0.72
Reach 1	0.19	960.00	2155.63	2159.03	2158.69	2159.88	0.048603	7.43	134.33	70.56	0.88
Reach 1	0.18	960.00	2152.80	2156.44		2157.03	0.034787	6.20	155.62	75.48	0.74
Reach 1	0.17	960.00	2151.85	2155.86	2154.72	2156.29	0.014632	5.34	193.30	72.80	0.51
Reach 1	0.15	960.00	2150.06	2152.83	2152.83	2153.82	0.062576	8.03	122.65	67.21	0.98
Reach 1	0.14	960.00	2145.44	2149.08		2149.56	0.022339	5.57	176.43	76.03	0.61
Reach 1	0.13	960.00	2143.07	2148.43		2148.69	0.014032	4.34	238.22	85.17	0.48
Reach 1	0.12	960.00	2145.77	2147.24	2146.41	2147.58	0.035304	3.38	206.75	105.75	0.64
Reach 1	0.11	960.00	2143.56	2146.20		2146.49	0.027655	4.43	222.89	108.27	0.62
Reach 1	0.10	960.00	2141.58	2145.11		2145.40	0.022829	4.94	231.99	112.48	0.60
Reach 1	0.09	960.00	2140.16	2143.73	2143.09	2144.14	0.024856	5.79	207.23	95.58	0.64
Reach 1	0.08	960.00	2138.26	2140.95	2140.95	2142.03	0.058800	8.64	122.74	60.28	0.98
Reach 1	0.06	960.00	2127.02	2130.73	2130.73	2132.05	0.062224	9.21	104.27	39.93	1.00
Reach 1	0.05	960.00	2124.00	2130.25		2130.45	0.005649	3.63	264.80	68.22	0.32
Reach 1	0.04	960.00	2125.91	2128.62	2128.62	2129.47	0.071119	7.40	129.80	78.10	1.01

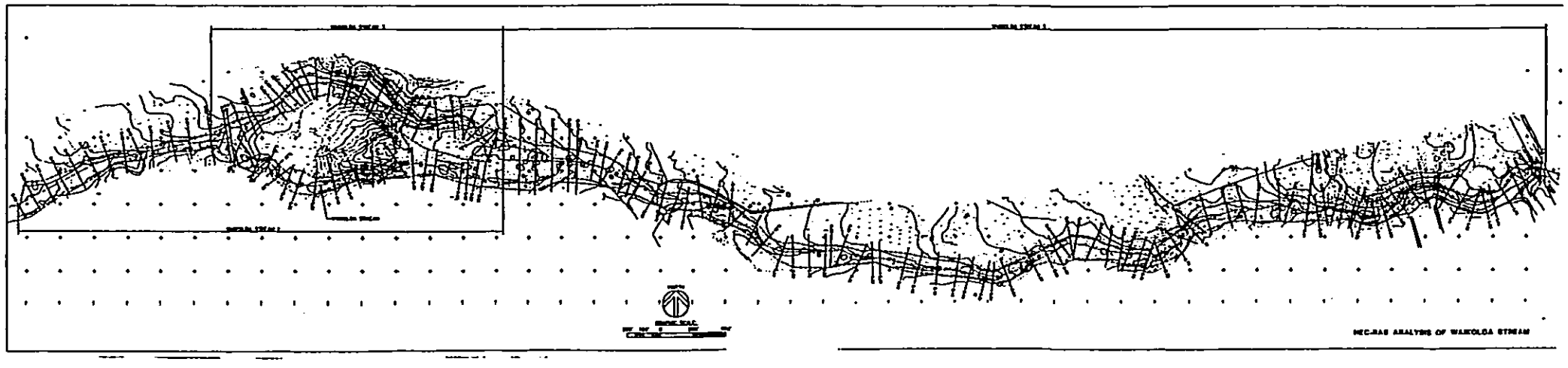

HEC-RAS ANALYSIS OF WAIKOLOA STREAM

FIGURE 15. NET INFLOW TO KAWAIHAE
BREAKER NO. 2 TANK, JAN 26 TO 29, 2002

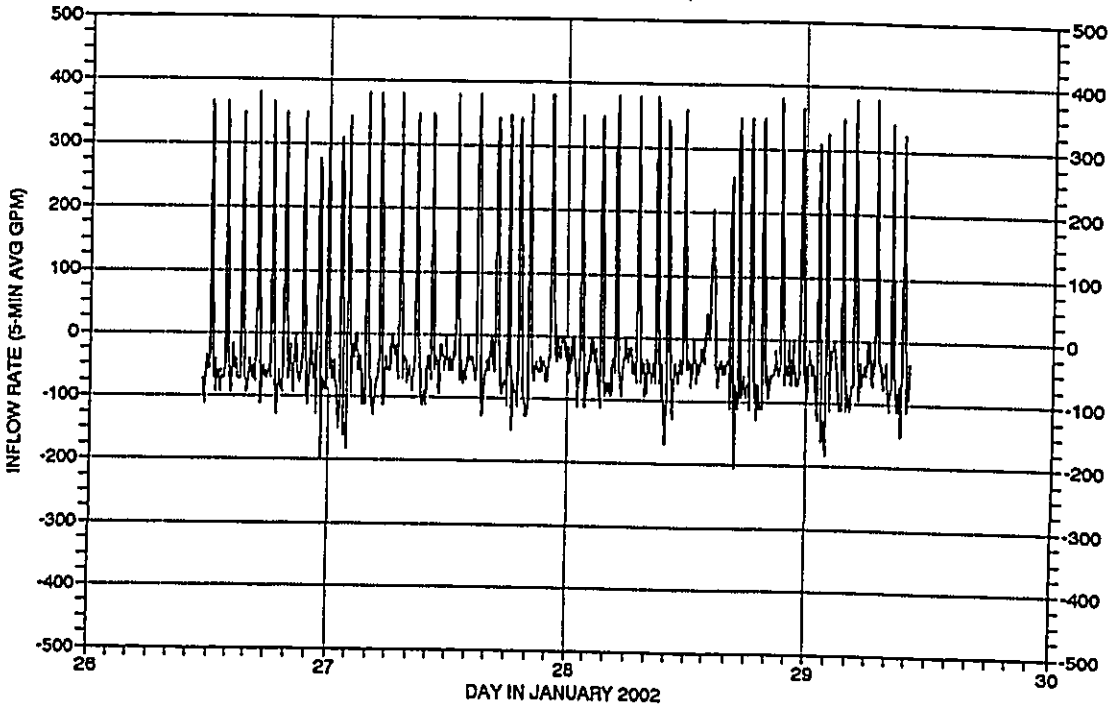


FIGURE 13. RECORDED WATER LEVELS IN
THE MAKAI TANKS, JANUARY 26 TO 29, 2002

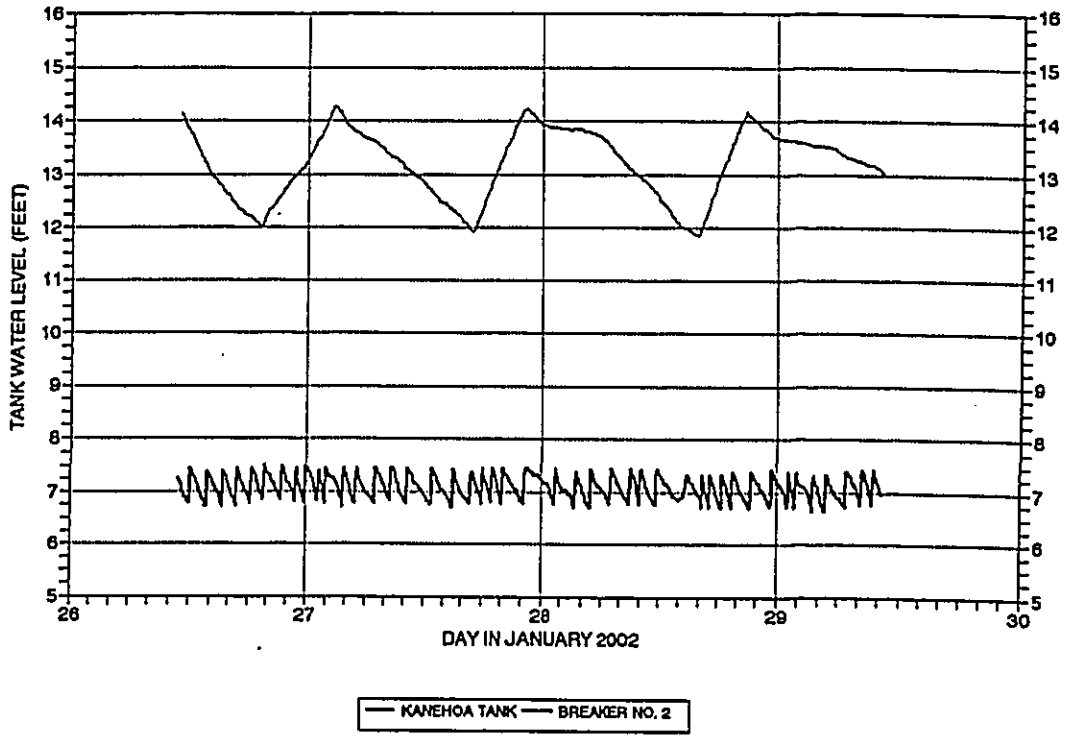


FIGURE 14. NET INFLOW TO THE 0.10 MG
KANEHOA TANK, JAN 26 TO 29, 2002

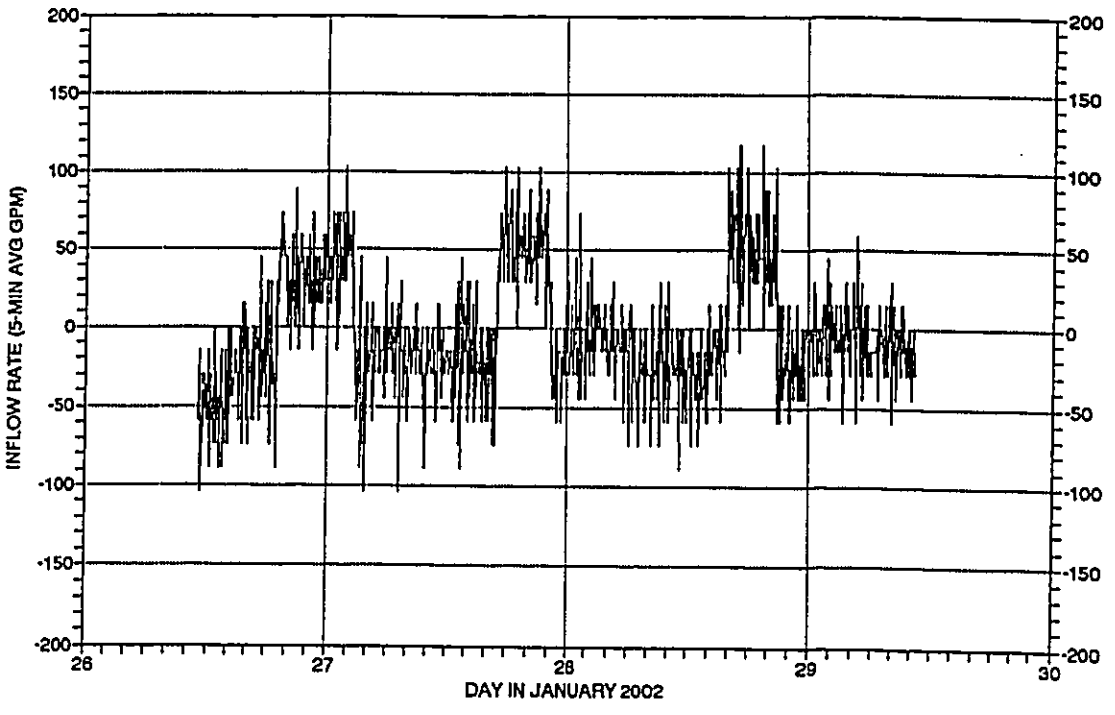


FIGURE 11. RECORDED WATER LEVEL IN THE
0.10 MG WAIAKA TANK, JAN 22 TO 29, 2002

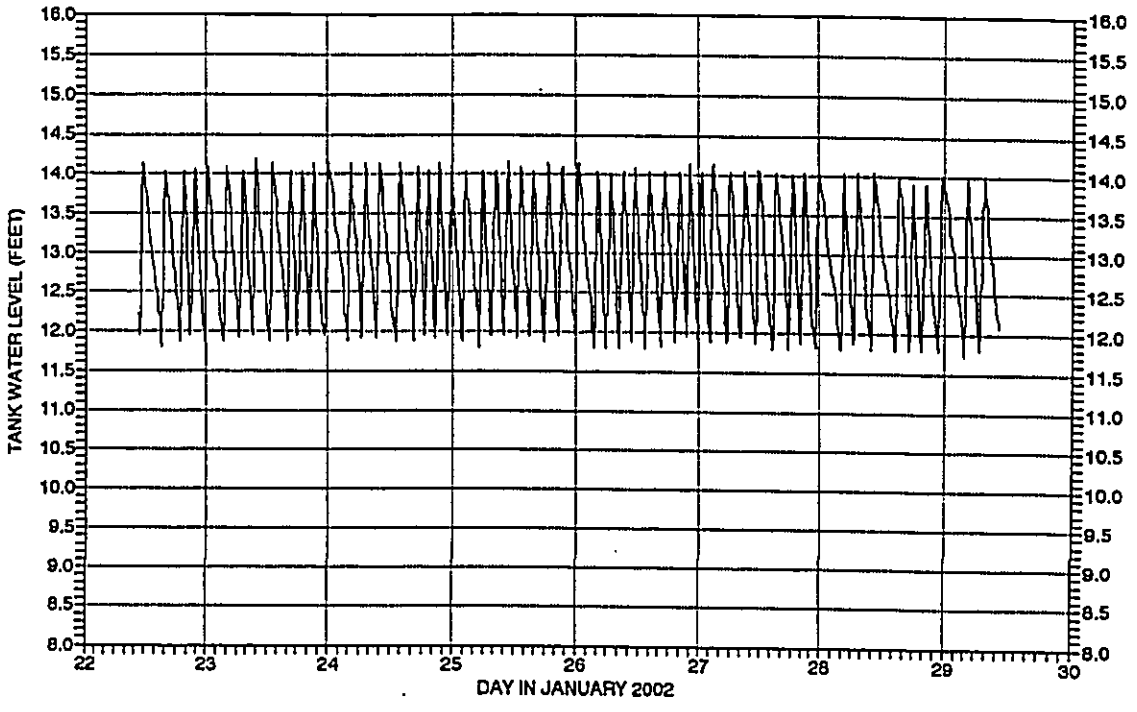


FIGURE 12. NET INFLOW TO THE 0.10 MG
WAIAKA TANK, JAN 22 TO 29, 2002

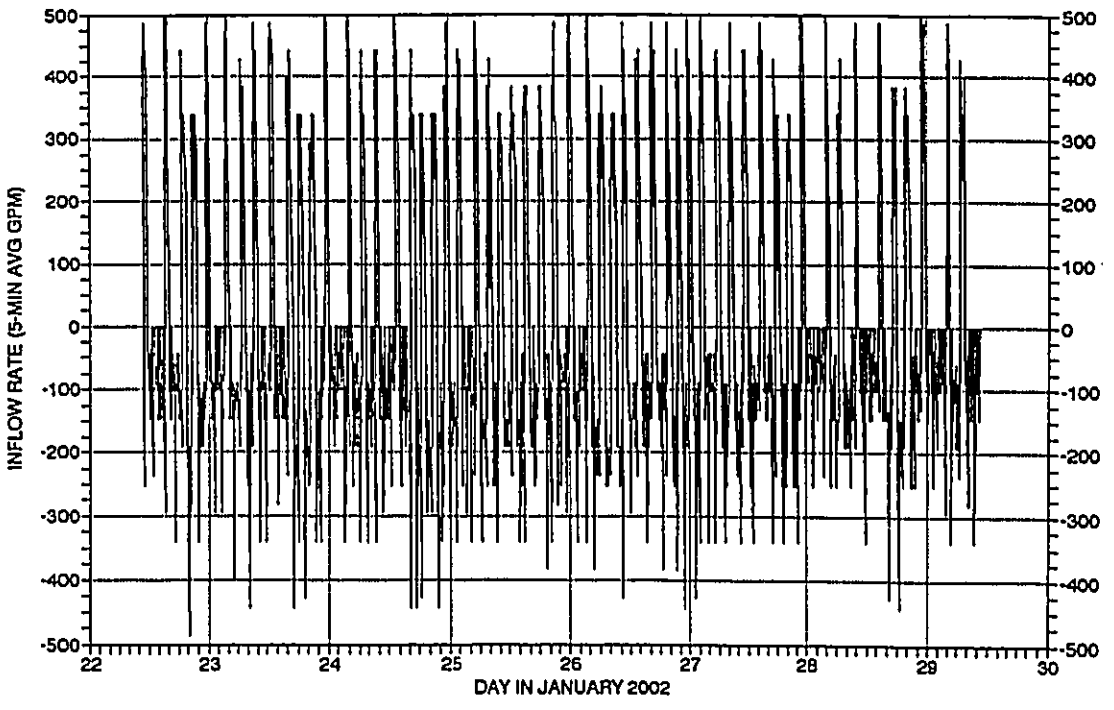


FIGURE 9. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON SUNDAY, JANUARY 27, 2002

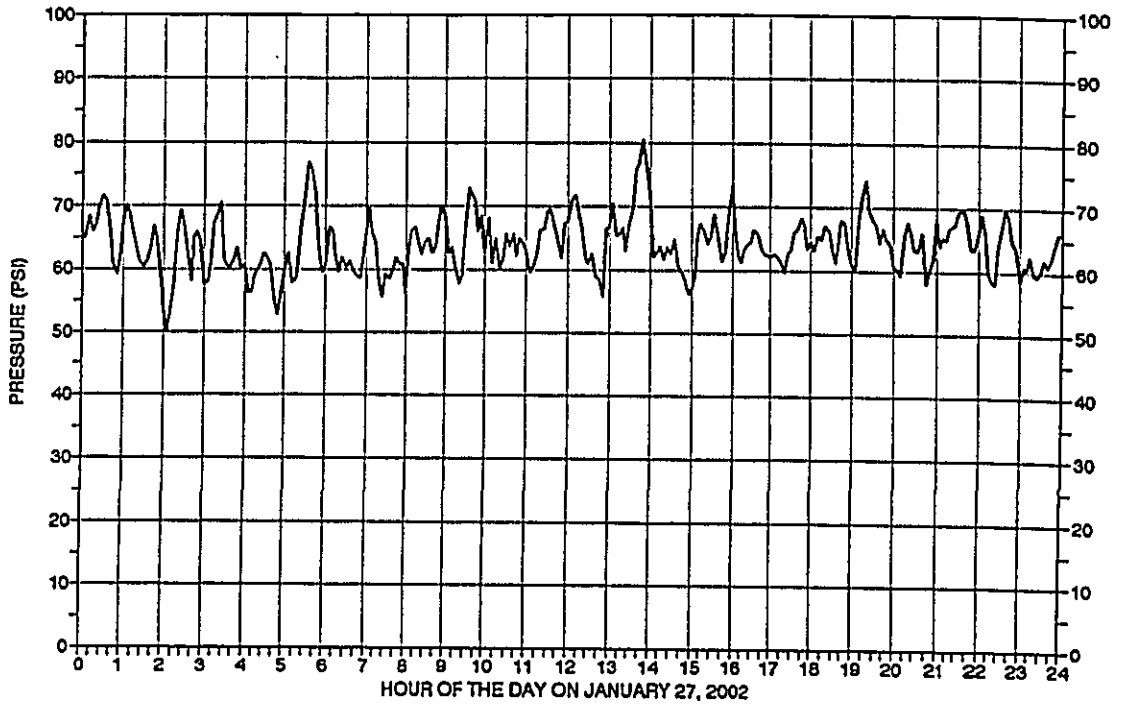


FIGURE 10. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON MONDAY, JANUARY 28, 2002

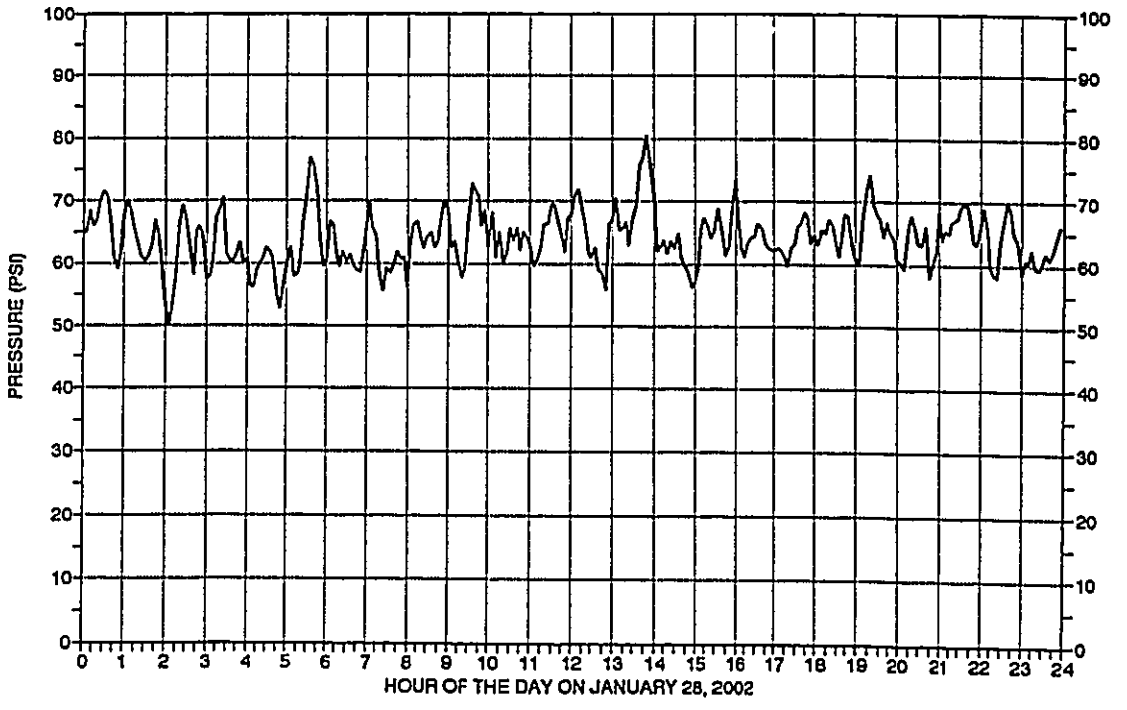


FIGURE 7. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON FRIDAY, JANUARY 25, 2002

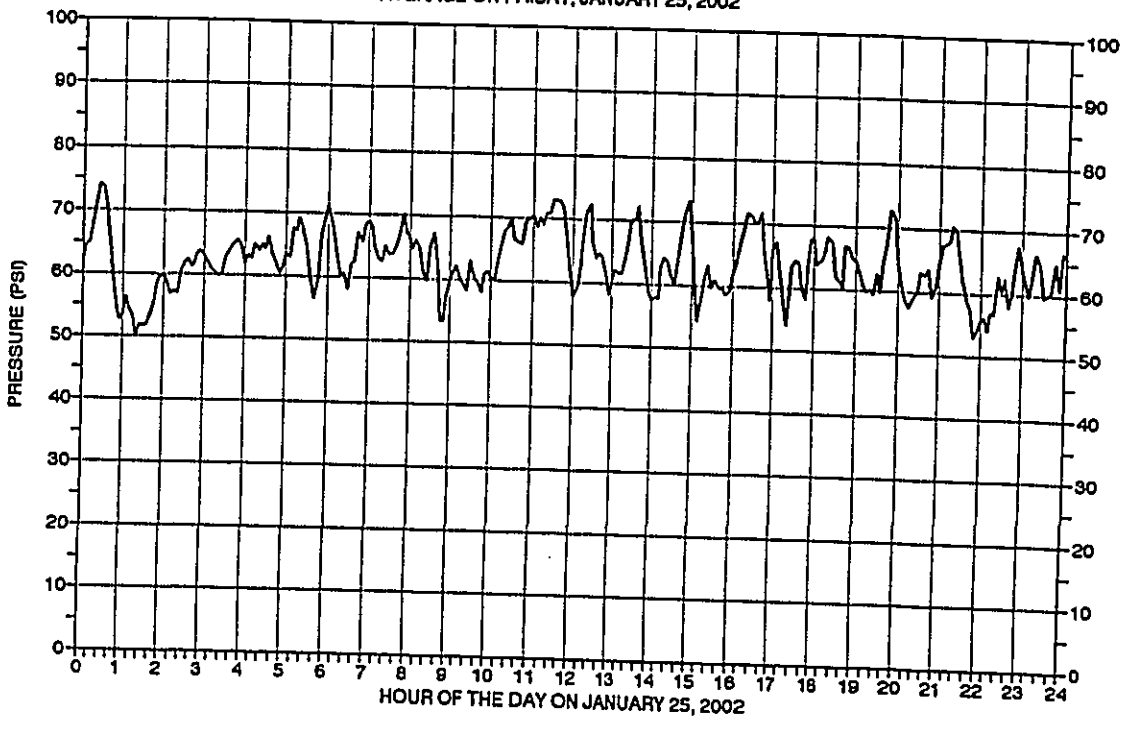


FIGURE 6. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON SATURDAY, JANUARY 26, 2002

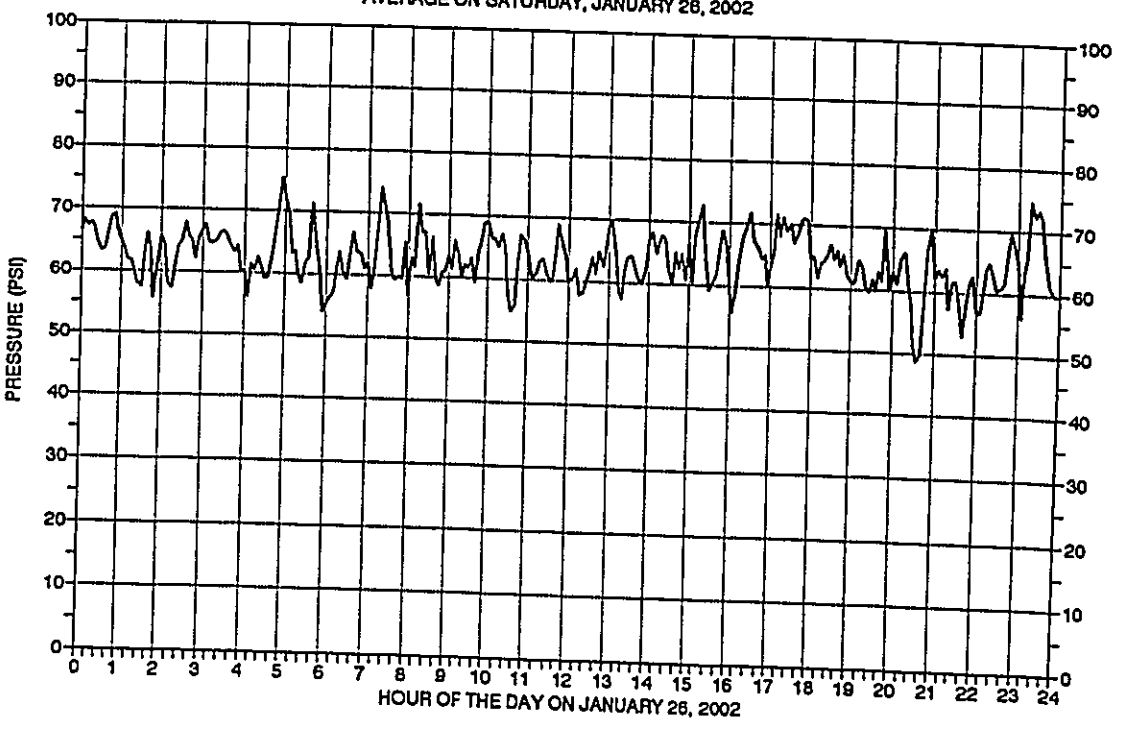


FIGURE 5. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON WEDNESDAY, JANUARY 23, 2002

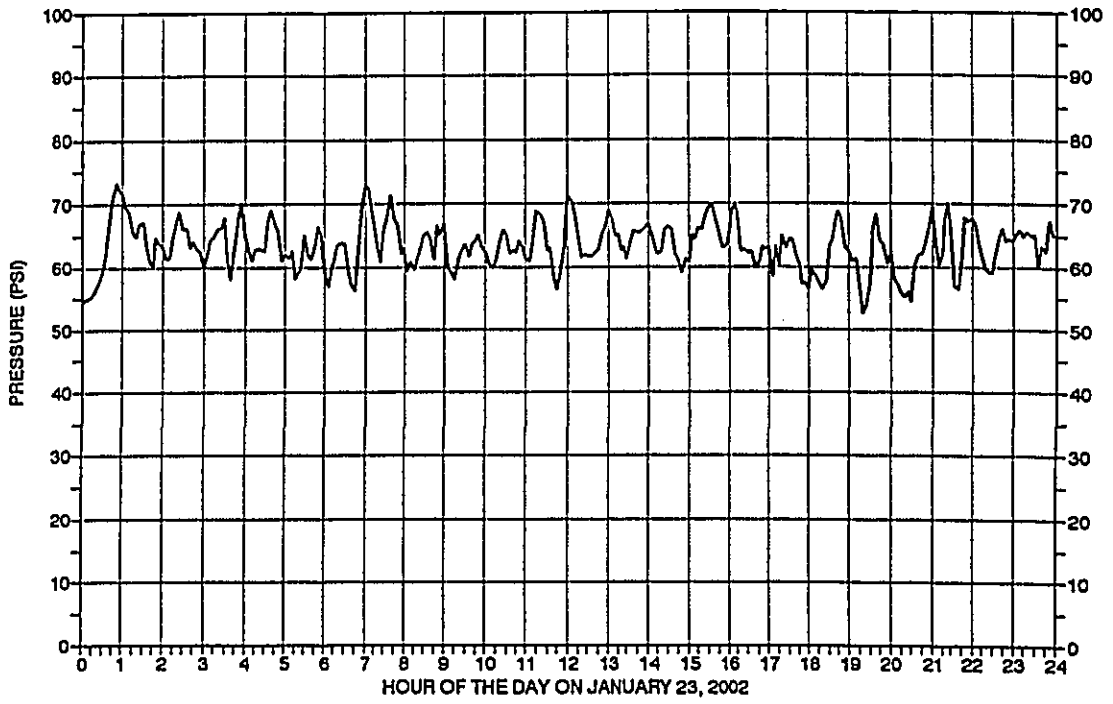


FIGURE 6. HYDRANT 3-68 30-MIN. MOVING AVERAGE ON THURSDAY, JANUARY 24, 2002

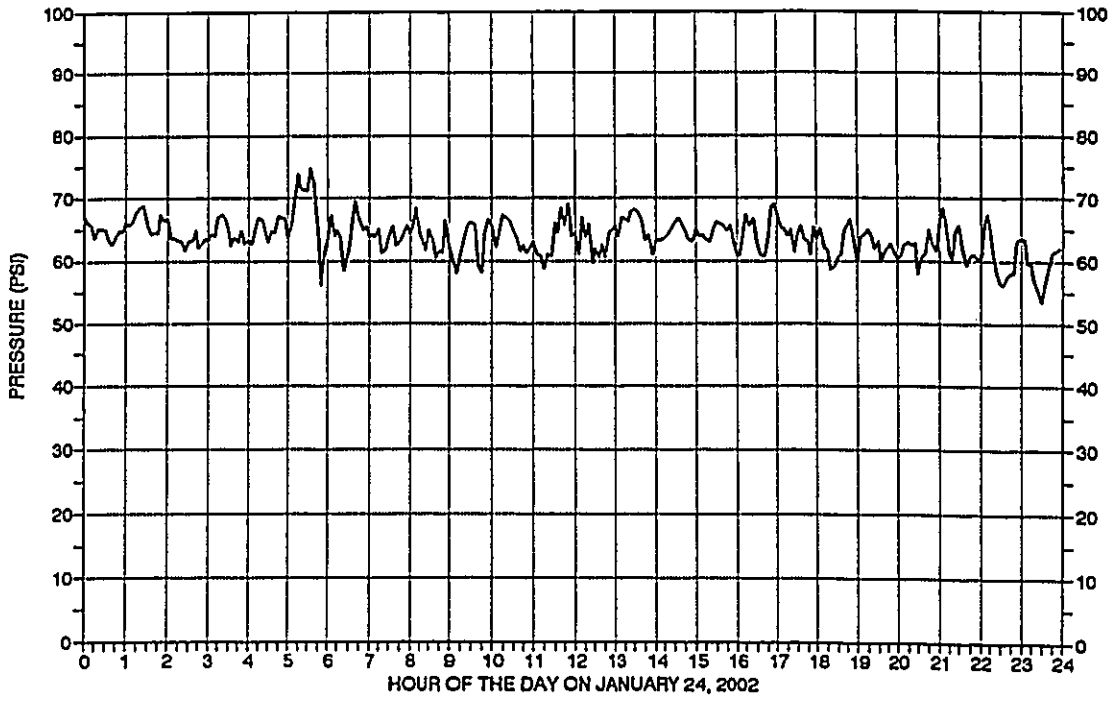


FIGURE 3. COMPARATIVE MOVING 15-MIN.
AVERAGES AT HYDRANTS 3-68 AND 3-76

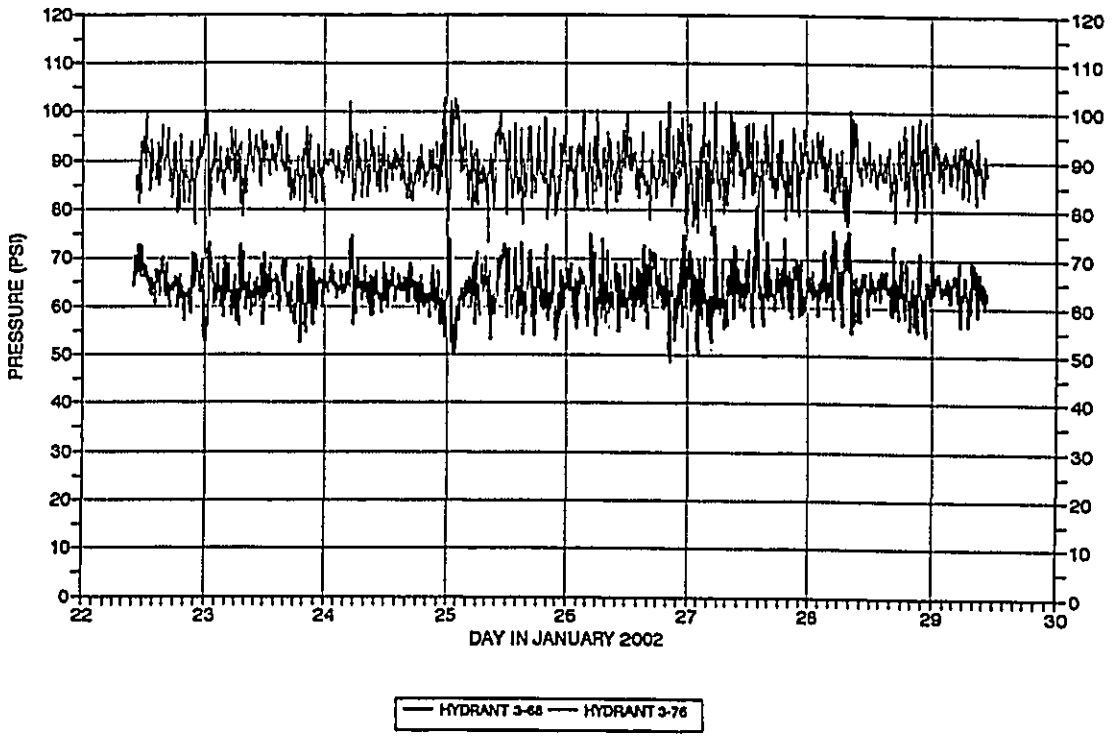


FIGURE 4. COMPARATIVE MOVING 30-MIN.
AVERAGES AT HYDRANTS 3-68 AND 3-76

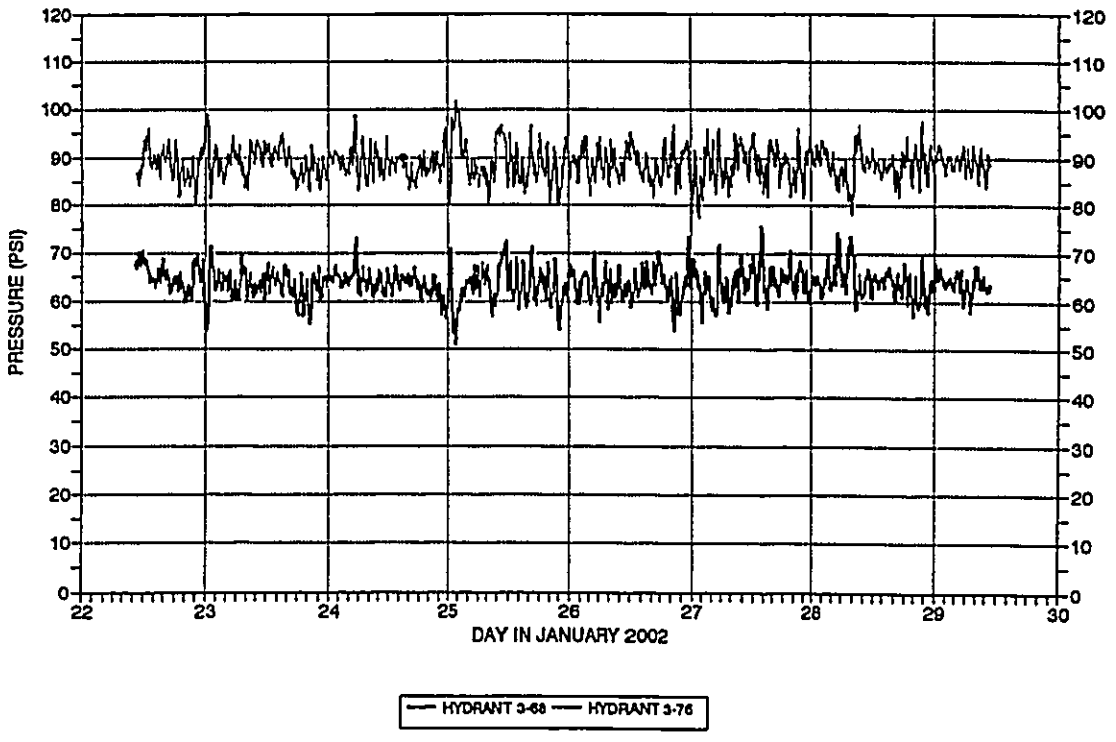


FIGURE 1. PRESSURE AT HYDRANT 3-68 AT
5-MINUTE INTERVALS, JAN. 22 TO 29, 2002

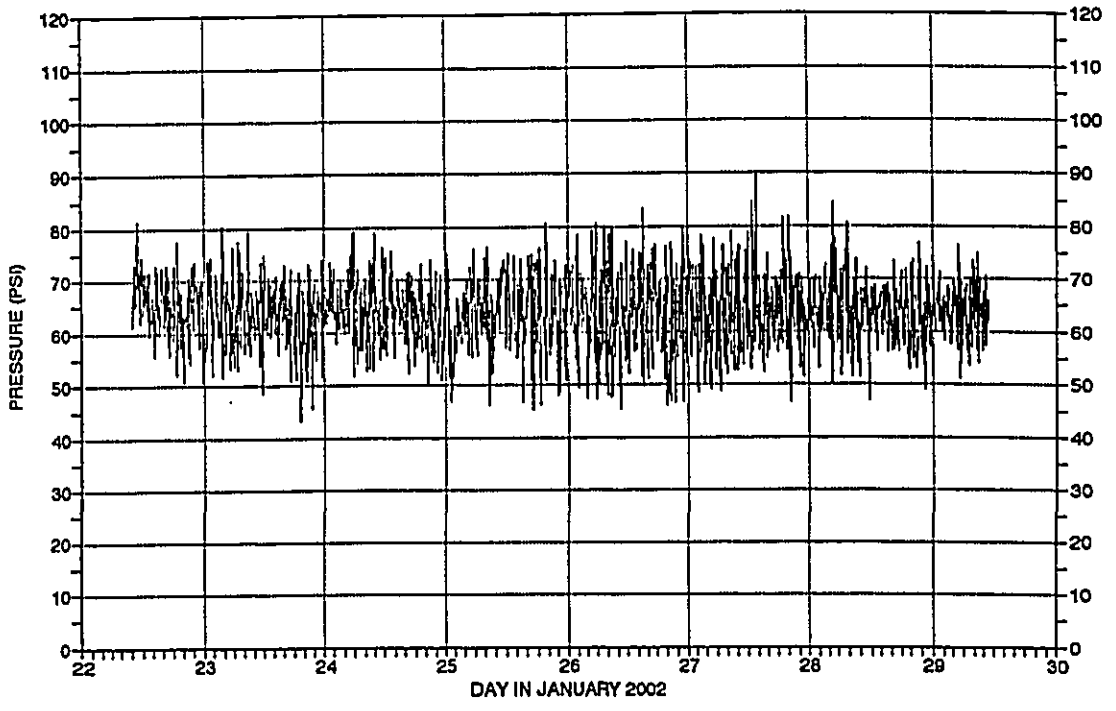
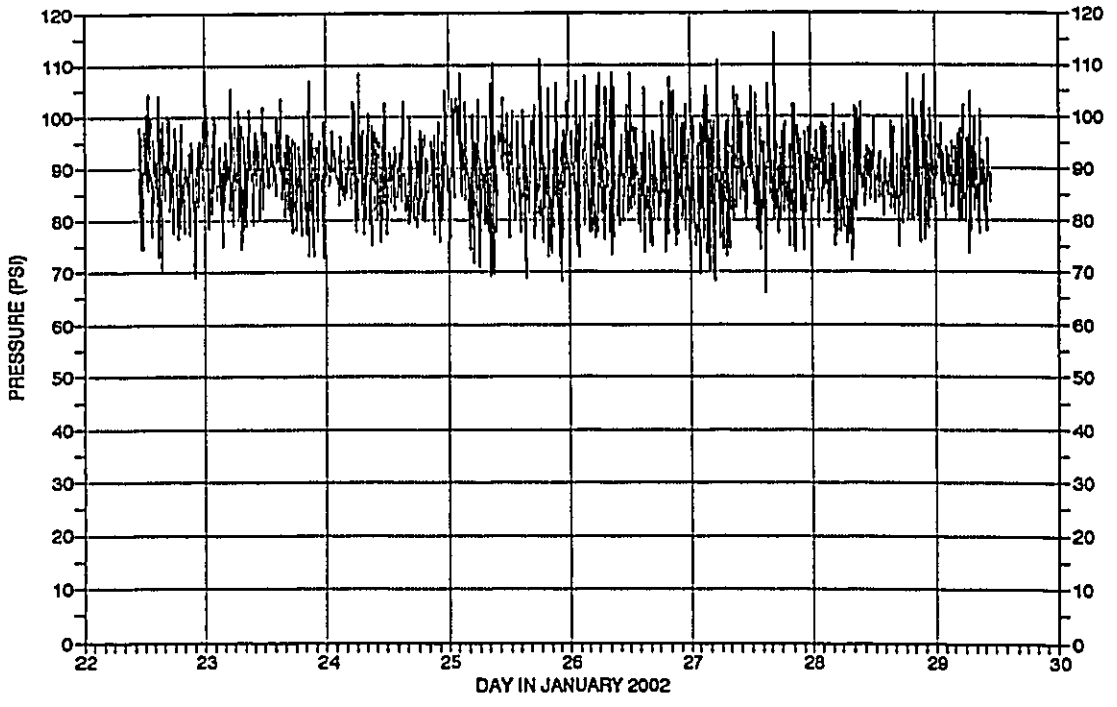


FIGURE 2. PRESSURE AT HYDRANT 3-76 AT
5-MINUTE INTERVALS, JAN. 22 TO 29, 2002



APPENDIX A-1

TNWRE
Tom Nance Water
Resource Engineering

January 30, 2002
02/040 (02-09)

Mr. Milton D. Pavao, P. E.
Department of Water Supply
County of Hawaii
345 Kekuanaoa Street - Suite 20
Hilo, Hawaii 96720

Attention: Gary Kawasaka

Dear Mr. Pavao:

Results of Pressure and Water Level Recording in the
Service Zone of the 0.10 MG Waiaka Tank in Waimea, Hawaii

This letter and its attachments present the results of pressure and water level recording in the service zone of the 0.10 MG Waiaka Tank in Waimea. For the week of January 22 to 29, 2002, pressure recorders were installed on Hydrants 3-68 and 3-76 and a level recorder was installed in the Waiaka Tank. In addition, water level recorders were installed in the two lower elevation tanks fed from the Waiaka Tank, the 0.10 MG Kanehoa Tank and the Kawaihae Breaker No. 2 tank. These two were recorded for a shorter period from January 26 to 29.

Pressure at the Fire Hydrants

Figures 1 and 2 show the pressures at the two hydrants as recorded at 5-minute intervals. To eliminate some of the "noise" in the recordings, they are plotted as 15- and 30-minute moving averages on Figures 3 and 4. Pressures at Hydrant 3-68, which is the closest to the problem area identified by your staff, were generally between 60 and 70 psi. There are short-term drops to near 50 psi, however. These primarily occurred in the hours around midnight on several of the days.

To see if a diurnal pattern of water use could be identified in the recording of Hydrant 3-68, the daily pressure over 24 hours for the six complete days of record are presented on Figures 5 through 10. The typical within-day pressure variation is on the order of 10 psi, but sometimes is as much as 20 psi. The typical morning and evening periods of peak use aren't discernable, however. Most of the variation appears to be from draws by the lower elevation Kanehoa and Kawaihae Breaker No. 2 tanks.

Water Level in the 0.10 MG Waiaka Tank

Figure 11 depicts the water level in the Waiaka Tank. There were between seven and nine fill cycles per day as the water level varied between 12 and 14 feet. On Figure 12, the change in water level at 5-minute intervals have been converted to equivalent net inflow (and outflow) rates based on an inside diameter of the tank of 35.5 feet. I timed the flowrate into the tank at 500± GPM and this is reasonably reflected in inflow rates during the fill cycles on Figure 12. Maximum outflow from the tank appeared to be on the order of 400 GPM (allowing for some "noise" in the level recording, hence in the computed net flowrates).

680 Ala Moana Boulevard, Suite 406 • Honolulu, Hawaii 96813-5411 • Phone: (808) 537-1141 • Fax: (808) 538-7757 • E-mail: tnwre@hcx.com

Water Levels in the Two Lower Elevation Tanks

Recorded water levels in the two lower elevation tanks are shown on Figure 13. As with the Waiaka Tank, the similar-sized Kanehoa Tank level varied between 12 and 14 feet. However, there was just one fill cycle each day. The water level in Kawaihae Breaker No. 2 tank, which is a 10.5-foot diameter cylinder laying on its side, only varied between 6.6 and 7.5 feet over the three days of recording. It had very rapid fill cycles (the nearly vertical level rises on Figure 13).

Net inflow to the Kanehoa Tank is depicted on Figure 14. The fill rate into the tank was timed at 85± GPM. The maximum net outflow rate was on the order of 75 GPM. Both rates are relatively modest. Net inflow rate to the Kawaihae Breaker No. 2 tank is presented on Figure 15. Allowing for "noise" in the recorded water level and in the computed net flowrates, the typical outflow from the tank was in the range of zero to 100 GPM. However, the tank fill rate was in the range of 300 to 400 GPM, by far the largest draw in the service zone of the Waiaka Tank.

Analysis and Conclusions

1. Despite the complaints from one resident, the pressures appear to be satisfactory. They were generally in the range of 60 to 70 psi at Hydrant 3-68 and possibly about 5 psi lower at the complaining residence.

2. The 500 GPM inflow rate to the Waiaka Tank is comfortably handling all draws in the system below this tank.

3. The 85 GPM inflow rate to the Kanehoa Tank is easily handling the supply requirements and not imposing a burden on the delivery system to the tank.

4. The 300 to 400 GPM delivery rate into the Kawaihae Breaker No. 2 tank is far greater than the 100 GPM or less draft rate from this tank.

5. It would be worthwhile to reduce the delivery rate into the Kawaihae Breaker No. 2 tank to 100 or 150 GPM and run the same series of recordings to see the improvement in pressure at Hydrant 3-68. It would appear that such a flowrate reduction would be greater than the peak hour flowrate created by the first 50 units of the proposed DHHL Waimea project, possibly indicating that such development prior to storage and transmission improvements would be possible.

Sincerely,

Tom Nance

Tom Nance

cc: Yukie Ohashi - PBR
Amy Arakaki - DHHL

Attachments

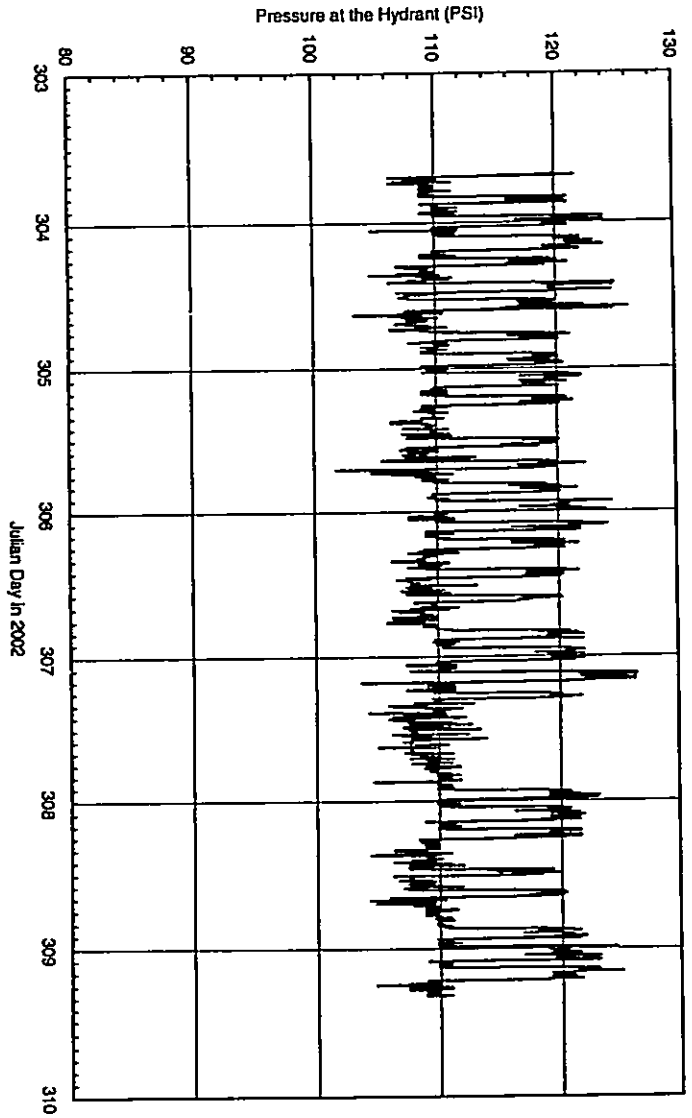


Figure 1. Pressure at the Fire Hydrant in the Ohia Ku Subdivision, October 30 to November 5, 2002

APPENDIX A-2

November 8, 2002
02/507 (02-54)

TNWRE
Tom Nance Water
Resource Engineering

Mr. Milton D. Pavao - Manager
Department of Water Supply
County of Hawaii
345 Kekuanaoa Street - Suite 20
Hilo, Hawaii 96720

Dear Mr. Pavao:

DHHL's Lalamilo Residential Project,
South Kohala, Hawaii

Following a meeting with Glenn Ahuna and Bruce McClure of your staff, pressure and water level recordings were undertaken in the service zone of the Laolae PRV station to determine if supplying the 34 residences of DHHL's first phase of its Lalamilo project would cause problems in this service zone. An expressed concern was possible low pressure in the higher elevation service connections such as above the Hawaii Preparatory Academy in the new Ohia Ku subdivision.

A pressure recorder was installed on the fire hydrant in the Ohia Ku subdivision. A level recording was also installed in the Waiaka Tank to correlate pressure drops in the service zone above the tank with periods when discharge into the tank was occurring. The period of recording was from October 30 to November 5, 2002 (Julian days 303 to 309). Results can be summarized as follows:

- As shown on Figure 1, pressure at the Ohia Ku subdivision fire hydrant typically was in the range of 110 to 120 psi.
- The Waiaka Tank's water level is shown on Figure 2 and changes in its level have been converted to the net inflow and outflow rates shown on Figure 3. Inflow to the tank was timed on November 5th at 290 GPM. This is notably less than the 500 GPM measured previously in January and February 2002.
- Figures 4 and 5 correlate the 10± PSI pressure drop at the hydrant in Ohia Ku with the Waiaka tank inflow cycles on November 1st and 3rd.

Based on these results and data and analyses previously submitted regarding DHHL's Lalamilo project, it does appear that the hydraulics of your system in the service zones of the Waiaka Tank and Laolae PRV station can accommodate the 34 lots of DHHL's first development phase of its Lalamilo project. Offsite improvements in source (outfitting Well 6240-02), storage (a new tank next to the Waiaka Tank), and transmission would be completed to accommodate Phase 2. Your review and comment on these findings and conclusions would be appreciated.

Sincerely,

Tom Nance

cc: Amy Arakaki - DHHL
Yukie Ohashi - PBR

Attachments

680 Ala Moana Boulevard, Suite 406 • Honolulu, Hawaii 96813-5411 • Phone: (808) 537-1141 • Fax: (808) 538-7757 • E-mail: office@tnwre.com

Figure 2. Water Level in the 0.10 MG Waiaka Tank,
October 30 to November 5, 2002

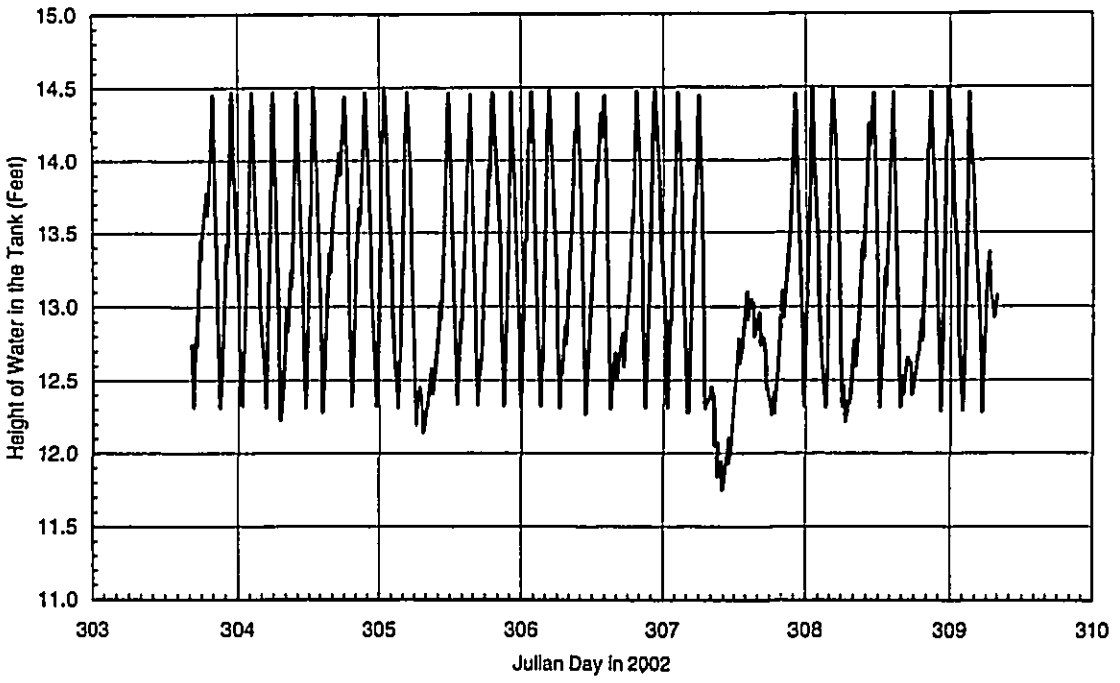


Figure 3. Net Outflow from the 0.10 MG Waiaka Tank,
October 30 to November 5, 2002

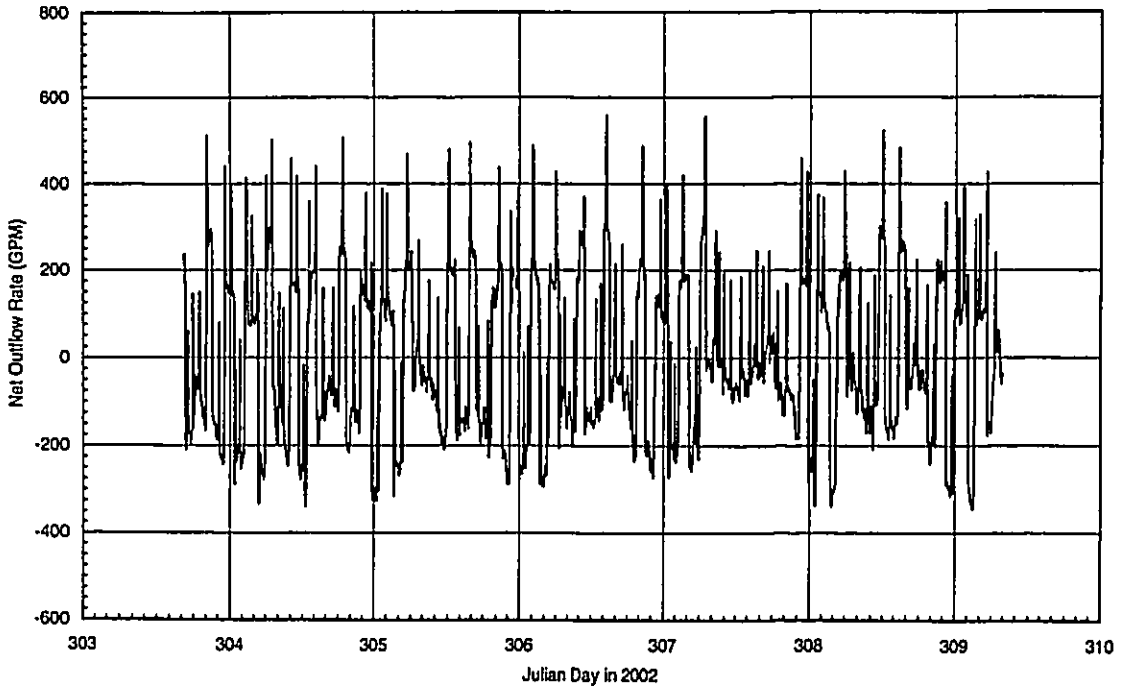


Figure 4. Correlation of Hydrant Pressure with Tank Inflow on November 1, 2002

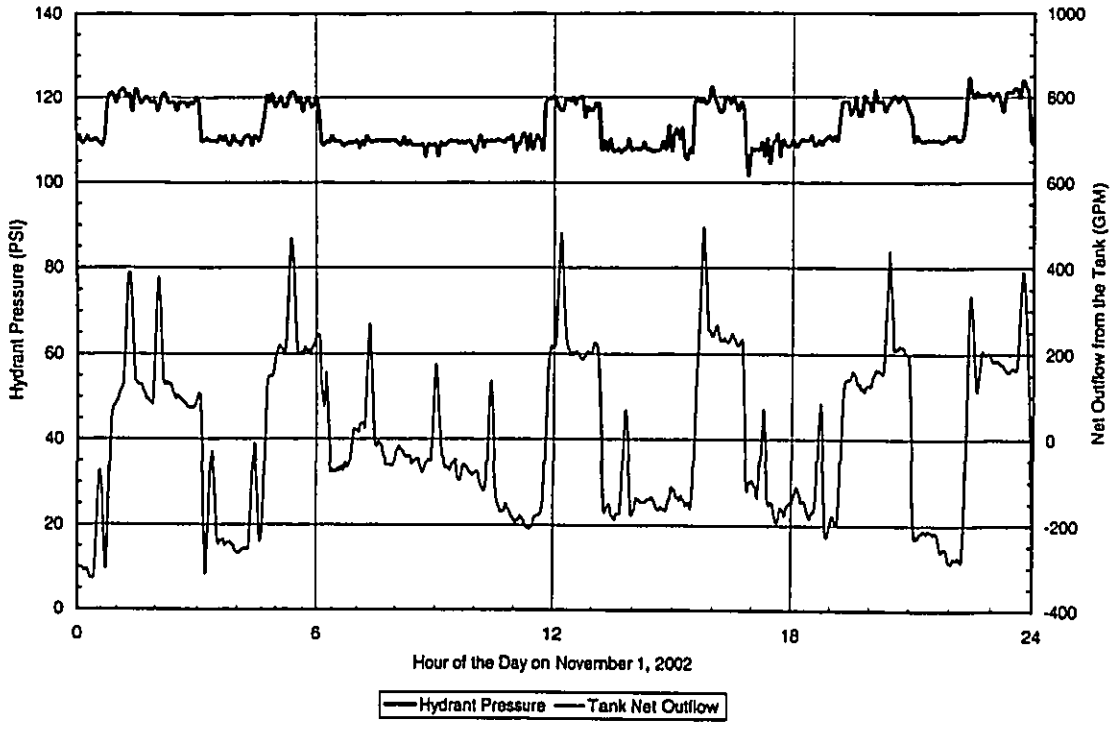
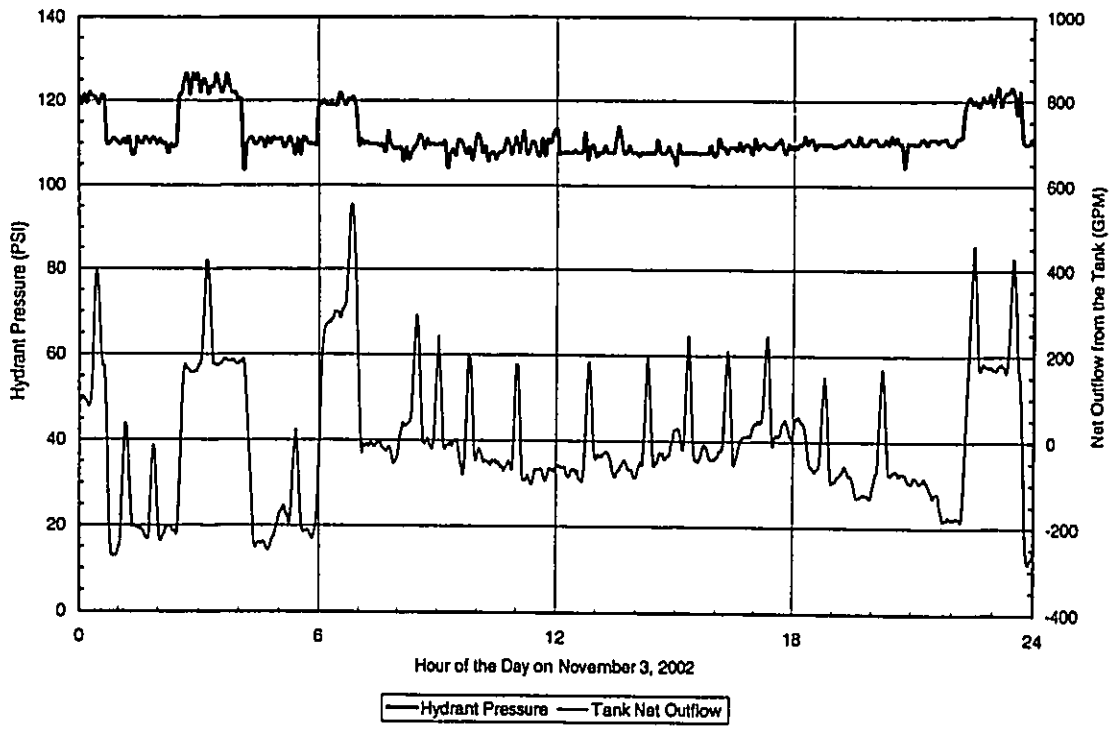


Figure 5. Correlation of Hydrant Pressure with Tank Inflow on November 3, 2002



Appendix B

Streams Survey

FINAL REPORT

Stream Survey of Waikoloa and Keanu'i'omanō Streams, Hawai'i Island

Prepared for:

PBR Hawaii

101 Aupuni Street, Hilo Lagoon Center, Suite 310

Hilo, Hawai'i 96720-4276

Prepared by:

R.A. Englund, D.J. Preston, and K. Arakaki

Hawaii Biological Survey

Bishop Museum

Honolulu, Hawai'i 96817

January 2002

Contribution No. 2002-004 to the Hawaii Biological Survey

Table of Contents

Tables

Executive Summary

The Hawaii Biological Survey of the Bishop Museum conducted a biological assessment of native and introduced aquatic animals at Waikoloa and Keanu'i'omanō Streams, Hawai'i Island from 20–22 December 2001. No federally Threatened, Endangered, rare, or imminently threatened, or sensitive native species of aquatic animals were found in or around the areas of Waikoloa and Keanu'i'omanō Streams within the Lālāmilo Project area. Both streams examined within the Lālāmilo Project area contained very similar aquatic faunas and, during this study, had similar flows and aquatic habitat characteristics. An undeveloped aquatic insect fauna indicated that most sections of both streams examined within the project area are naturally intermittent, or at least do not have long enough stretches of flowing water to maintain a diverse aquatic insect population

Although the watershed within and around the Lālāmilo Project area has been heavily disturbed by grazing and development for over 150 years, aquatic habitats and biota contained within this area remain relatively pristine, albeit apparently intermittent. However, efforts should be made to avoid impacting the stream channel during construction as Hawaiian migratory (amphidromous) native stream animals (fish and crustaceans) use these stream channels to access the permanently flowing upper reaches of Waikoloa and Keanu'i'omanō Streams. Best management practices should be employed during construction to prevent soil erosion into the stream channel that would eventually make its way into nearshore ocean areas.

Introduction

A biological assessment of native and introduced aquatic animals at Waikoloa and Keanu'i'omanō Streams, Hawai'i Island was conducted from 20–22 December 2001 by the Hawaii Biological Survey of the Bishop Museum. This assessment was conducted for the Department of Hawaiian Homelands (DHHL) Lālāmilo Project in the Waikoloa area at Waimea, Hawai'i. This survey searched for sensitive native aquatic species and communities, assessed if federally listed Species of Concern were found, and documented the constituents of the aquatic fauna found within the proposed project area. We also went considerably downstream and upstream of the proposed project area, although we did not go to the uppermost stream headwaters in the Kohala Mountains above the town of Waimea. Additionally, the impacts of proposed culvert located in Keanu'i'omanō Stream, on the western edge of the project area were assessed. In summary, the areas we assessed included candidate endangered damselflies, native and introduced fish, aquatic insects, crustaceans, and aquatic mollusks.

Study Area

Stream names were taken from USGS topographic quads. The Lālāmilo Project encompasses 265.388 acres near the town of Waimea, and the project area is bordered by two major streams, Waikoloa and Keanu'i'omanō Streams. Flowing through mostly cattle pastures at the time of this study, these streams are situated in close proximity to each other (generally within 1,000 to 2,000 ft of each other in the Lālāmilo Project area). Both of these streams were fully flowing between 20-22 December 2001 during our biological assessment. Waikoloa and Keanu'i'omanō Streams originate in the rolling hills of the upper Kohala Mountains near the northern tip of Hawai'i Island. Keanu'i'omanō Stream originates from approximately 3600 ft to 4000 ft with two smaller named intermittent tributaries, Wai'aka (which later becomes Lanikepu) and Hale'aha Gulches, while the third larger tributary, Kohākōhau Stream is perennial. Kohākōhau Stream originates at over 5000 ft, and has a USGS gaging station located on it.

Waikoloa Stream originates above Pu'u Iki at approximately 4000 ft and has numerous diversions and reservoirs upstream of Waimea town. It is unclear whether Waikoloa Stream is now intermittent, with perhaps some occasional permanent pools downstream of Waimea, because of these numerous diversions and reservoirs. Waikoloa and Keanu'i'omanō Streams flow parallel to each other throughout the project area and downstream to 1440 ft elevation, where they then join to form Wai'ula'ula Stream that then flows to the ocean. The Hawaii Stream Assessment (1990) mentions only Waikoloa Stream, and classifies it as

intermittent with year-round flow in the upper portions and intermittent flows in the lower elevations. The elevations surveyed ranged from 2405 ft in the upper most section of the Lālāmilo Project to 2225 ft in the downstream end of the proposed project area.

An additional, lower area of Waikoloa Stream at 1280 ft was also surveyed to further assess if native amphidromous (migratory Hawaiian) aquatic species were found in the stream. This area flowed through incised bedrock with stairstep pools and much less substrate than in the upper areas. A few small pools in this area apparently contain enough water year-round at this elevation to support a few hardy introduced fish (see Results). However, the main stream channel at 1280 ft elevation appears to be intermittent as evidenced by the lack of algae and little permanent aquatic insect fauna in this area.

Stream habitat in both Waikoloa and Keanu'i'omanō Streams was fairly similar and quite uniform during our assessments, with the mostly scoured, bedrock channels containing some moderately sized cobble in the upper reaches of the project area, with occasional large boulders. Favorable habitats such as relatively large waterfalls and cascades were common, and the water appeared to be slightly tannic but clear. At the upper 2400 ft elevation sites the water temperature was measured at 62 °F, while a slightly warmer 65 °F was recorded at 1280 ft elevation on Waikoloa Stream.

The primary riparian vegetation included common alien species such as Christmas berry (*Schinus terebinthifolius*) and an assortment of grasses. Christmas berry was so dense that, in some areas, access to the stream was difficult. A large, native great bulrush, *'aka'akai* (*Schoenoplectus lacustris* (L.) Palla ssp. *validus* (Vahl) T. Koyama) was found growing in many areas of Waikoloa Stream, and the roots of this plant provided habitat for native dragonfly larvae such as *Anax* spp.

Methods

Sampling took place during a period of sunny weather and good conditions, with occasional cloud cover occurring only for a brief period on 20 December 2002. Clear conditions prevailed for the remainder of sampling. The entire stream corridor was hiked within the Lālāmilo Project area along both Waikoloa and Keanu'i'omanō Streams. Additionally, we hiked several hundred yards up and downstream of the Lālāmilo Project boundary area, and also sampled approximately 250 yds of stream corridor at the lower 1280 ft site on Waikoloa Stream.

Fish, Crustacean, and Mollusk Sampling

Above-water observation, hand-netting, and small seines were used to assess aquatic species composition at the various study sites. The small stream size and good water clarity at the study areas sites provided good success during netting and when conducting visual observations. Attempts to capture fish, crustaceans, and mollusks were conducted with similar methods used to collect benthic aquatic insects; that is, mainly above-water visual observations, benthic sampling, seining, and hand-netting. Netting allowed confirmation of visual above-water observations, with particular emphasis on netting in and under vegetation, rootwads, and disturbing the rock substrate.

Aquatic Insect Sampling

Aquatic insect sampling methodology followed Englund and Preston (1999). The sampling of damselflies (Odonata) was emphasized because 12 endemic Hawaiian species are currently listed as Candidate Species or Species of Concern on the Federal Register under the United States Endangered Species Act (USFWS 2000). In addition, native Hawaiian damselflies are good indicators of the relative 'health' of a stream system because they do not typically occur in highly disturbed areas (Polhemus and Asquith 1996).

Collections of both immature and adult specimens were conducted with aerial nets, dip nets, and benthic samples. Visual observations of aquatic insects were conducted as we hiked along and in the streambed. Sampling effort was focused on habitat suitable for native insects: splash zones around riffles and cascades, and wet rock faces associated with springs and seeps, cascades, waterfalls, wetland areas, and benthic sampling of stream substrates. All aquatic habitats encountered were sampled.

General collections were conducted in prime native aquatic insect habitats, with numerous aerial net sweeps taken around riffle splash-zones, cascades, seeps, and waterfall areas. Repeated benthic sampling was conducted at each sampling station by one person holding an aquatic dip net, while another person disturbed rocks upstream of the net. Benthic sampling also included collecting individual rocks and using a toothbrush to sweep off immature aquatic insects and other aquatic invertebrates from the stream rocks. All aquatic insect specimens were stored in 75% ethanol and subsequently transported to the Bishop Museum entomology laboratory for curation and identification. Voucher specimens are currently housed in the Bishop Museum collection.

Results and Discussion

No federally Threatened, Endangered, rare, or imminently threatened species of aquatic animals were found in or around the areas of Waikoloa and Keanu'i'omanō Streams assessed during the present study. Both streams examined within the Lālāmilo Project area contained very similar aquatic faunas, and during this study had similar flows and aquatic habitat characteristics. Surveys of these streams in the project area by botanists (W. Char, personal communication) found several species of algae growing in stream side-pools in mid-October 2001. Their surveys were conducted prior to heavy rains that started later in the fall of 2001. However, most of the filamentous algae appeared to have been flushed out of the stream channels by the time our survey was conducted in late December 2001. Although the streams appear to have some permanent pools down to at least 1280 ft elevation, an undeveloped aquatic insect fauna indicated that most sections of stream examined within the project area are naturally intermittent, or at least do not have long enough stretches of flowing water to maintain a diverse aquatic insect population.

Fish, Crustacean, and Mollusk Results

Only one species (Table 1) of introduced fish, guppies (*Poecilia reticulata*), was found in low densities at the lower 1280 ft elevation site on Waikoloa Stream during the present survey. No other introduced or native species of fish, crustacean, or mollusk were observed or collected in the areas of Waikoloa and Keanu'i'omanō Streams surveyed during this study. The upper, permanently flowing reaches of these two streams were not in the scope of this project, and were not surveyed. However, the native endemic Hawaiian stream fish *Lentipes concolor* are found both upstream and downstream of the project area, inhabiting permanent pools downstream of the project area and permanently flowing sections of Keanu'i'omanō Stream (at 3000 ft elevation) above the project area (D. Kuamo'o, Hawaii Division of Aquatic Resources, pers. comm.). Therefore, native fish do use the intermittent stream channel in the areas we surveyed as an access corridor to the headwater regions of upper Keanu'i'omanō Stream.

Aquatic Insect Results

A total of 14 species of aquatic insects were collected at the 3 study sites assessed during this survey (Table 1). With 9 native species collected, 64% of the overall aquatic insect taxa found during this survey were native. This reflects the relatively undisturbed nature and high quality of the aquatic habitats examined,

even though the areas where our surveys occurred were in obviously intermittent sections of the examined streams. The collected aquatic insects were all species with great dispersal capabilities and the ability to

Table 1. Results of Hawaii Biological Survey, Bishop Museum surveys conducted in December 2001 for aquatic species in Waikoloa and Keanu'i'omanō Streams, Hawai'i Island. See Study Area for a description of site locations.

Taxon	Waikoloa 1280 ft	Waikoloa 2300 ft	Keanu'i'omanō 2300 ft	Geographic Status
Fish				
Gambusia affinis	X			Introduced
Aquatic Insects				
Anisoptera (Dragonflies)				
Aeschnidae				
Anax strenuus		X	X	Endemic
Anax junius	X	X	X	Indigenous
Libellulidae				
Crocothemis servilia		X	X	Introduced
Orthemis ferruginea		X	X	Introduced
Pantala flavescens	X	X	X	Indigenous
Zygoptera (Damselflies)				
Coenagrionidae				
Enallagma civile		X	X	Introduced
Coleoptera (Beetles)				
Dytiscidae				
Rhantus gutticollis		X	X	Introduced
Diptera (Flies, gnats)				
Ceratopogonidae				
Forcipomyia hardyi		X		Endemic
Chironomidae				
Chironomus sp.		X	X	Endemic (prob.)
Cricotopus bicinctus	X	X	X	Introduced
Orthocladius grimshawi		X	X	Endemic
Ephydridae				
Scatella bryani		X	X	Endemic
Scatella clavipes		X	X	Endemic
Muscidae				
Lispe sp.		X	X	Endemic
Total Species	4	14	13	
Total Native Aquatic Species	2	9	8	
Percent Native Aquatic Species (%)	50%	64%	62%	

exploit ephemeral and intermittent aquatic habitats. For example, the highly vagile dragonflies are strong flyers and even exploit ephemeral rain puddles in Hawaiian forests. The smaller native insect species found, such as the native ephydrid flies are also early colonizers of Hawaiian streams, and indicative of the ephemeral nature of the sampled habitats. The introduced species of aquatic insects found within the Lālāmilo Project area are also highly dispersive, and all were species that are also found in the most remote, high quality aquatic habitats. The presence of these alien species does not necessarily indicate degraded or impaired aquatic habitats. For example, the introduced aquatic beetle *Rhantus gutticollis* was common in the Lālāmilo Project area, but is also found in bogs on Oahu's Mt. Ka'ala, one of the most important conservation areas in the Hawaiian Islands (R. Englund, Bishop Museum unpub. database).

The relatively high 64% overall native aquatic species found within the three study areas is very comparable to other high quality streams such as the Hanalei River (69%), Kaua'i and Hakalau Stream (68%), Hawai'i Island (Polhemus 1995).

Recommendations

Although the watershed within and around the Lālāmilo Project area has been heavily disturbed by grazing and development for over 150 years, aquatic habitats and biota contained within this area remain relatively pristine, albeit apparently intermittent. However, efforts should be made to avoid impacting the stream channel during construction as Hawaiian migratory (amphidromous) native stream animals, especially *Lentipes concolor* use these stream channels to access the permanently flowing, upper reaches of Waikoloa and Keanu'i'omanō Streams (D. Kuamo'o, Hawaii Division of Aquatic Resources, pers. comm.). Additionally, *L. concolor* is also found in several permanent spring-fed pools downstream of the project area in Keanu'i'omanō Stream (D. Kuamo'o, Hawaii Division of Aquatic Resources, pers. comm.). If a culvert is required in Keanu'i'omanō Stream, it is recommended that the culvert be completely flush with the streambed. This will ensure native migratory (amphidromous) aquatic animals continued access to upper areas of Keanu'i'omanō Stream, because any free space between the culvert pipe and streambed would potentially be an impassable obstacle.

Best management practices should be employed during construction to prevent soil erosion into the stream channel that would eventually make its way into nearshore ocean areas, having the potential to impact coral reef areas. If any work needs to be done in or around the stream channel during construction of the

Lālāmilo Project, it is recommended that this be conducted during the dry season when the streams are not flowing. Additionally, best management practices should be employed if a culvert crossing is required in Keanu'i'omanō Stream, and it is recommended that culvert construction take place during the dry summer months.

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Appendix C

Vegetation Survey

BOTANICAL SURVEY
LALAMILO RESIDENTIAL LOTS AND
COMMERCIAL/INDUSTRIAL MIXED USES
LALAMILO, WAIMEA, HAWAI'I

by

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February 2002

BOTANICAL SURVEY
LALAMILO RESIDENTIAL LOTS AND
COMMERCIAL/INDUSTRIAL MIXED USES
LALAMILO, WAIMEA, HAWAI'I

INTRODUCTION

The Department of Hawaiian Home Lands (DHHL) is proposing to develop Residential Homestead Lots on approximately 265 acres of land at Lalamilo, near Waimea Town, island of Hawai'i. Four hundred Residential Homestead Lots are planned for the site. Approximately 33 acres of the property will be managed for revenue producing commercial and light industrial uses to support homestead development activities.

The ±265-acre project site is bounded by Kawaihae Road and the Ka La Loa and Lalamilo Houselots Subdivisions to the north; the proposed Waimea Bypass Highway to the east; Waikoloa Stream to the south; and pasture lands to the west. The project site is currently used for grazing cattle and horses.

Field studies to assess the botanical resources on the Lalamilo property were conducted on 25 and 26 October 2001 by a team of two botanists. Field studies were also made on 05 February 2002 following several periods of heavy rainfall in December 2001 and January 2002. The primary objectives of the field surveys were to:

1) provide a general description of the vegetation on the site;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps, tax maps, and soil maps (based on aerial photographs) were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points.

A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, drainage, exposure, disturbances, topography, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium at the Bishop Museum (Botany Department), and for comparison with the recent taxonomic literature. The survey focused on the areas along the streams and on rocky outcroppings as these areas were more likely to harbor native plant communities and, perhaps, rare plants.

The species recorded are indicative of the season ("rainy" vs. "dry") and the environmental conditions at the time of the survey. A survey taken at a different time of the year and under varying environmental conditions would no doubt yield slight variations in the species list, especially of the weedy, annual plants.

DESCRIPTION OF THE VEGETATION

Soils on the project site consist of Waimea very fine sandy loam, 6 to 12 percent slopes; "WMC" on the soil maps (Sato *et al.* 1973). This dark-brown to very dark-brown soil is found at intermediate elevations on the leeward side of Mauna Kea and the Kohala Mountains. Depth to bedrock ranges from 36 to 55 inches. In places, the surface is extremely stony. Permeability is moderately rapid, runoff is slow, and the erosion hazard is slight. The soil is used for pasture and for irrigated truck crops.

Two vegetation types are recognized on the Lalamilo project site. Pasture scrub covers the majority of the site and consists of mixed grass pasture with scattered trees and shrubs. Rocky outcrops are occasional and usually support a somewhat denser cover of shrubs. Along the streams, which cross and border the site, there is a band or belt of vegetation varying in width from 50 to 100 feet. Because of the steady source of water, streamside vegetation is denser and supports a large number of species throughout the year. The streams have been eroded down to the hard basalt

bedrock in most places. A more detailed description of the two vegetation types follows. An inventory of all the plants observed on the project site is presented in the checklist at the end of the report.

Pasture Scrub

A mosaic of different grass species characterizes the pasture lands on the project site. Buffel grass *(Cenchrus ciliaris)* and Bermuda grass *(Cynodon dactylon)* are widespread throughout the site, while Kikuyu grass *(Pennisetum clandestinum)* is associated with low lying swale areas with deeper soil. Areas with rocky outcrops support stiff clumps of fountain grass *(Pennisetum setaceum)* and loose mats of Natal redtop grass *(Melinis repens)*. A number of weedy herbaceous species and small shrubs or subshrubs are associated with this vegetation type. These include pepperwort *(Lepidium virginicum)*, fireweed *(Senecio madagascariensis)*, butterfly weed *(Asclepias curassavica)*, coat buttons *(Tridax procumbens)*, hedge mustard *(Sisymbrium officinale)*, fennel *(Foeniculum vulgare)*, golden crown-beard *(Verbesina encelioides)*, 'uhaloa *(Waltheria indica)*, 'ilima *(Sida fallax)*, and indigo *(Indigofera suffruticosa)*.

Woody components occur as scattered individuals or small stands of plants. Olive *(Olea europaea)*, silk oak *(Grevillea robusta)*, and black wattle *(Acacia mearnsii)* are the most commonly observed trees, while Christmas berry *(Schinus terebinthifolius)* is the most commonly encountered shrub. Other woody components which occur here in smaller numbers include jacaranda *(Jacaranda mimosifolia)*, wiliwili *(Erythrina sandwicensis)*, lantana *(Lantana camara)*, panini *(Opuntia ficus-indica)*, and eucalyptus *(Eucalyptus* spp.). 'Akia *(Wikstroemia pulcherrima)*, a native shrub with orange, marble-sized fruits and fragrant clusters of yellow flowers, is locally common on rocky outcroppings.

When the field studies were conducted in late October 2001, areas with barren soil were common because of prolonged drought conditions. In early to mid-December 2001 and January 2002, several storms brought heavy rainfall to the area. Since then many of the grasses and weedy, annual herbaceous species have sprouted or increased in biomass, and areas with barren soil are rare. Clumps of fireweed, a member of the daisy family with clusters of yellow flowers, are abundant; fireweed is poisonous to horses, cattle, and other livestock (Evenhuis and Eldredge, editors, 1999).

Members of the mustard family *(Brassicaceae)* are abundant to locally common, forming fair-sized patches and many of the plants with clusters of bright yellow flowers. Other species which also occur here in large numbers during the wetter months include cheese weed *(Malva parviflora)*, pin clover *(Erodium cicutarium)*, *Chenopodium carinatum*, black medic *(Medicago lupulina)*, and scarlet pimpernel *(Anagallis arvensis)*. Sweet alyssum *(Lobularia maritima)*, often cultivated in flower gardens, is sparingly naturalized throughout the pasture scrub.

Streamside Vegetation

The streamside vegetation is characterized by lush, thick mats of Kikuyu grass with scattered thickets of Christmas berry and stands of black wattle trees. In some places, lantana may be locally abundant. Species richness and abundance is greater along the streams then on the adjoining areas with pasture scrub vegetation because of greater water availability. Most of the herbaceous species are found here throughout the year, while they are seasonal within the pasture scrub vegetation, appearing during the rainy season or winter months. Some of the more commonly observed plants include narrow-leaved plantain *(Plantago lanceolata)*, fireweed, Vasey grass *(Paspalum urvillei)*, castor bean *(Ricinus coinmunis)*, Glenwood grass

(Sacciolepis indica), molasses grass *(Melinis minutiflora)*, allseed *(Polycarpon tetraphyllum)*, 'aheahea *(Chenopodium murale)*, weed verbena *(Verbena litoralis)*, and Cuba jute *(Sida rhombifolia)*.

In areas with shallow water and small mudflats, species which prefer a wetter habitat are found. These include several members of the sedge family (Cyperaceae) such as aka'akai or great bulrush *(Schoenoplectus lacustris)*, kyllinga *(Kyllinga brevifolia)*, *Carex longii*, *Fimbristylis dichotoma*, and *Cyperus haspan;* also found here are scattered clumps of the bog rush *(Juncus ensifolius)*. Other plants found along the water's edge include honohono *(Commelina diffusa)*, marsh purslane *(Ludwigia palustris)*, knotweed *(Persicaria glabra)*, elephant grass *(Pennisetum purpureum)*, and jungle rice *(Echinochloa colona)*. All nine fern species found during this study are associated with the moist, shaded stream banks.

Two ornamental species which have escaped cultivation and established small populations along the streams are a gladiolus *(Gladiolus dalenii)* and zephyr flower *(Zephyranthes* sp.). A large clump of Spanish bayonet or yucca *(Yucca gloriosa)*, another ornamental species, is found along Waikoloa Stream; plants were flowering and had produced a number of woody fruit.

RARE PLANTS

Portulaca sclerocarpa, a listed endangered species (U.S. Fish and Wildlife Service 1994a, 1999a) is known from the Waimea area. Plants were found on three pu'u on Parker Ranch lands in the early 1980s (U.S. Fish and Wildlife Service 1996). The

Hawaiian names for this *Portulaca* species are po'e, 'ihi, and 'ihi makole (Wagner *et al.* 1990).

Portulaca sclerocarpa is a member of the purslane family (Portulacaceae). It is a perennial with a fleshy tuberous taproot which becomes woody. Stems are succulent with dense tufts of yellow-brown hairs. The stalkless, succulent, grayish-green leaves are almost circular in cross-section, 0.3 to 0.8 inch long and about 0.06 to 0.1 inch wide. Flowers are white, pink, or pink with a white base, about half an inch wide with many stamens. The fruit is a thick, hardened capsule about 0.2 inch long which opens very late or not at all; seeds are glossy, dark reddish-brown. It is known from the islands of Lana'i and Hawai'i. On Hawai'i, populations are found on the Kohala Mountains, the northern slopes of Hualalai, the northwestern slopes of Mauna Loa, and near Kilauea Crater (U.S. Fish and Wildlife Service 1994a, 1996).

Although an intensive search was made for this species during our field studies, we did not find any plants on the project site. The nearest population can be found on Pu'u Pa (D.R. Herbst, Bishop Museum, pers. comm.).

Hibiscus brackenridgei or ma'o hau hele, a listed endangered species (U.S. Fish and Wildlife Services 1994) is located southwest of the project site on Department of Land and Natural Resources (DLNR) property near a stonewall enclosure. No plants of *Hibiscus brackenridgei* were observed on the project site during field studies.

Ma'o hau hele is the State flower and is a member of the mallow family (Malvaceae). It is a sprawling to erect shrub or small tree up to sixteen feet tall. The leaves are generally heart-shaped in outline, 2 to 6 inches long and equally wide with 3 to 7 lobes. Beneath each leaf stalk is a pair of very thin leaf-like appendages (stipules), 0.2 to 0.6 inches long, which fall off early in development. Flowers are borne singly or in small clusters. The yellow petals are 1.4 to 3.1 inches long, usually with a maroon spot in the center of the flower. Seven to 10 bracts are attached to each triangular clayx lobe. The fruit is a somewhat round to oval capsule, 0.4 to 0.8 inches long, It is currently known from O'ahu, Lana'i, Maui and Hawai'i; it may possibly occur on Kaua'i (U.S. Fish and Wildlife Service (1994b, 1999b). On Hawai'i, it is known from two populations on state land: 5 plants at Lalamilo on land leased for pasture, and 4 adult plants with close to 100 seedlings at Pu'u Anahula (U.S. Fish and Wildlife Service 1999b).

The koai'a *(Acacia koaia)* is considered a Federal species of concern (U.S. Fish and Wildlife Service 1999a). About two dozen plants, 5 to 12 feet tall, have been planted on TMK 6-6-01: 54 (Lot B), between Kawaihae Road and Lanikepu Stream. Four naturally occurring koai'a trees, 15 to 18 feet tall, can be found outside of the project site along its southern boundary on the banks above Waikoloa Stream.

The koai'a, a member of the pea family (Fabaceae), is closely related to koa *(Acacia koa)*. Koai'a is found in drier and more open habitats on Moloka'i, Lana'i, Maui,

Hawai'i and, perhaps, O'ahu. It can be distinguished from the much more common koa by its small gnarled habit, shorter and straighter "leaves" (phyllodes), and narrower pods with the seeds longitudinally arranged (Wagner *et al.* 1990; Wagner and Herbst 1999).

Species of concern are not protected by Federal and State endangered species laws. Species of concern means that there is a need for more biological and/or taxonomic information regarding whether a species might require conservation action in the future. *Acacia koaia* is not considered a high priority candidate (U.S. Fish and Wildlife Service 1999a) as the plants number in the thousands, occur on several islands, and a large population is protected at the State's Koai'a Sanctuary located near the Kohala Mountain Road.

DISCUSSION AND RECOMMENDATIONS

Two general vegetation types are recognized on the Lalamilo project site. Pasture scrub covers the largest area; its general physiognomy is open with low mats of various grasses and herbaceous species, and widely scattered trees and shrubs. Streamside vegetation is denser and green all year round because of a steady source of water. It consists of thick mats of Kikuyu grass and scattered thickets of Christmas berry and stands of black wattle trees.

The vegetation on the Lalamilo project site is dominated by introduced species. Introduced species are all those plants which were brought to the Hawaiian Islands by humnas, intentionally or accidentally, after Western contact, that is, Cook's arrival in the islands in 1778. Many of the grasses such as Kikuyu grass, Bermuda grass, and elephant grass; and legumes such as Spanish clover *(Desmodium incanum), Neonotonia wightii,* wild bean *(Macroptilium latyroides),* and common vetch *(Vicia sativa)* were originally introduced as fodder plants to improve range lands.

A total of 139 species were inventoried on the Lalamilo site. Of these, 122 (88%) are introduced; 1 (1%) is originally of Polynesian introduction; and 16 (11%) are native. Of the natives, 10 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and 6 are endemic, that is, they are native only to the Hawaiian Islands. The endemic species are: 'aweoweo *(Chenopodium oahuense),* koai'a *(Acacia koaia),* wiliwili *(Erythrina sandwicensis),* 'ohi'a lehua *(Metrosideros polymorpha),* pua kala *(Argemone glauca),* and 'akia *(Wikstroemia pulcherrima).* Most of these plants occur in low numbers on the site except for the 'akia which can be locally common on the rock outcroppings scattered throughout the site.

None of the plants found during the field studies is a threatened and endangered species (U.S. Fish and Wildlife Service 1999a; Wagner *et al.* 1999). The koai'a, a species of concern, occurs on the site; about two dozen plants have been planted on the parcel located between Kawaihae Road and Lanikepu Stream.

Given these findings, the proposed development of the Lalamilo site for residential lots and commercial/industrial mixed uses is not expected to have a significant negative impact on the botanical resources.

It is recommended that the lots bordering the streams be landscaped/revegetated as quickly as possible to prevent soil erosion and discharge of sediments into the streams. Native plants should be used for landscaping common areas whenever possible. Subdivision residents should also be encouraged to plant native species. Some natives such as the 'akia, 'a'ali'i *(Dodonaea viscosa),* wiliwili, koai'a, 'ohi'a lehua, and pua akala are attractive and easily cultivated. The State's Division of Forestry and Wildlife, Kamuela Tree Nursery, should be contacted for planting material, and also for recommendations for other suitable native species.

The parcel with the two dozen or so planted koai'a trees could be set aside as a small park or open space area. If this is not feasible, then the plants should be transplanted and reused for landscaping the common areas.

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PLANT SPECIES LIST

The following checklist is an inventory of all the plants observed on the proposed Lalamino Residential Lots and Commercial/Industrial Mixed Uses project site. The plant names are arranged alphabetically by family and species into each of three groups: Ferns, Dicots, and Monocots. The taxonomy and nomenclature of the Ferns follow Lamereux (1988), while the flowering plants, Dicots and Monocots, are in accordance with Wagner *et al.* (1990), and Wagner and Herbst (1999). The few recent name changes for the flowering plants follow those recorded in the Hawaii Biological Survey series (Evenhuis and Eldredge, editors, 1999-2000).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following information is provided:

   E = endemic = native only to the Hawaiian Islands.

   I = indigenous = native to the Hawaiian Islands and also elsewhere.

   I? = questionably indigenous = data not clear if dispersal to the islands by natural or human-related mechanisms, but weight of evidence suggests probably natural/indigenous.

   P? = questionably a Polynesian introduction = may have been introduced by the Polynesians prior to Western contact (1778), or possibly introduced soon after Western contact.

   X = introduced or alien = all those plants brought to the islands by humans, intentionally or accidentally, after Western contact; that is, Cook's arrival in the Hawaiian Islands in 1778.

4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized on the project site (see text for discussion):

   p = Pasture Scrub

   s = Streamside Vegetation

Scientific name	Common name	Status	Vegetation Type	
			D	S
FERNS				
ADIANTACEAE (Maidenhair fern family)				
Adiantum hispidulum Sw.	Australian maidenhair	X	-	+
Adiantum raddianum Presl	maidenhair fern, 'iw'iwa	X	-	+
ATHRYIACEAE (Athyrium family)				
Deparia petersenii (Kunze) M. Kato		X	-	+
BLECHNACEAE (Blechnum family)				
Blechnum occidentale L.	blechnum	X	-	+
HEMIONITIDACEAE (Gold fern family)				
Pityrogramma calomelanos (L.) Link	gold fern	X	-	+
LINDSAEACEAE (Lace fern family)				
Sphenomeris chinensis (L.) Maxon	pala'a, pala-pala'a	I	-	+
NEPHROLEPIDACEAE (Swordfern family)				
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy swordfern, 'okupukupu	X	-	+
SINOPTERIDACEAE (Cliffbrake family)				
Pellaea ternifolia (Cav.) Link	lau-kahi, kalamoho	I	-	+
THELYPTERIDACEAE (Downy wood-fern family)				
Christella parasitica (L.) Levl.	wood-fern, oakfern	X	-	+

Scientific name	Common name	Status	Vegetation Type	
			D	S
FLOWERING PLANTS				
DICOTS				
ACANTHACEAE (Acanthus family)				
Dicliptera chinensis (L.) Juss.	dicliptera	X	-	+
AMARANTHACEAE (Amaranth family)				
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	+	+
ANACARDIACEAE (Mango family)				
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	+	+
APIACEAE (Carrot family)				
Foeniculum vulgare Mill.	fennel	X	+	-
Petroselinum crispum (Mill.) A.W. Hill	wild parsley	X	-	+
ASCLEPIADACEAE (Milkweed family)				
Asclepias curassavica L.	butterfly weed, laulele	X	+	-
ASTERACEAE (Daisy family)				
Ageratum riparia (Regel) R. King & H. Robinson	Hamakua pamakani	X	-	+
Bidens pilosa L.	Spanish needle, ki, ki nehe	X	+	+
Conyza bonariensis (L.) Cronq.	hairy horseweed, ilioha	X	+	+
Cotula australis (Sieber ex Spreng.) J.D. Hook.	Australian brass buttons	X	-	+
Emilia fosbergii Nicolson	flora's paintbrush, pualele	X	+	+
Gamacheta purpurea (L.) Cabr.	purple cudweed	X	-	+
Osteospermum calendulaceum L.f.		X	+	-

Scientific name	Common name	Status	Vegetation Type	
			D	S
Senecio madagascariensis Poiret		X	+	+
Sonchus oleraceus L.	sowthistle, pualele	X	+	+
Spagneticola trilobata (L.) Pruski	wedelia	X	-	+
Tridax procumbens L.	coat buttons	X	+	-
Verbesina encelioides (Cav.) Benth. & Hook.	golden crownbeard	X	+	-
BIGNONIACEAE (Bignonia family)				
Jacaranda mimosifolia D. Don	jacaranda	X	+	-
BRASSICACEAE (Mustard family)				
Brassica rapa L.	field mustard	X	+	-
Coronopus didymus (L.) Sm.	swinecress	X	-	+
Hirschfeldia incana (L.) Lagr.-Foss.	mustard	X	+	+
Lepidium virginicum L.	pepperwort, peppergrass	X	+	+
Lepidium sp.		X	-	+
Lobulari maritima (L.) Desv.	sweet alyssum	X	+	-
Raphanus sativus L.	wild radish	X	-	+
Sisymbrium altissimum L.	tumble mustard	X	+	+
Sisymbrium officianale (L.) Scop.	hedge mustard	X	+	-
CACTACEAE (Cactus family)				
Opuntia ficus-indica (L.) Mill.	panini, papipi	X	+	+
CARYOPHYLLACEAE (Pink family)				
Polycarpon tetraphyllum (L.) L.	allseed	X	-	+
Silene gallica L.	small-flowered catchfly	X	+	+
CASUARINACEAE (She-oak family)				
Casuarina sp.	ironwood	X	-	+

Scientific name	Common name	Status	Vegetation Type	
			D	S
CHENOPODIACEAE (Goosefoot family)				
Chenopodium album L.	goosefoot, pigweed	X	+	+
Chenopodium carinatum R. Br.		X	+	+
Chenopodium murale L.	'aheahea	X	+	+
Chenopodium oahuense (Meyen) Aellen	'aweoweo, 'aheahea	E	-	+
Salsola tragus L.	Russian thistle, tumbleweed	X	+	-
CONVOLVULACEAE (Morning glory family)				
Ipomoea indica (J. Burm.) Merr.	koali 'awa, koali 'awahia	I	+	-
CRASSULACEAE (Orpine family)				
Kalanchoe tubiflora (Harav.) Raym.-Hamet	chandelier plant	X	-	+
CUSCUTACEAE (Dodder family)				
Cuscuta campestris Yuncker	Western field dodder	X	+	+
EUPHORBIACEAE (Spurge family)				
Chamaesyce hirta (L.) Millsp.	hairy spurge, garden spurge	X	+	+
Chamaesyce thymifolia (L.) Millsp.		X	-	+
Euphorbia peplus L.	petty spurge	X	+	+
Ricinus communis L.	castor bean, koli, pa'aila	X	-	+
FABACEAE (Pea family)				
Acacia koaia Hillebr.	koai'a	E	-	+
Acacia mearnsii De Wild.	black wattle	X	+	+
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	+	+
Crotalaria incana L.	fuzzy rattlepod, kukaeholi	X	+	-
Desmodium incanum DC	Spanish clover, ka'imi	X	+	+
Erythrina sandwicensis Degener	wiliwili	E	+	-
Indigofera suffruticosa Mill.	indigo, 'iniko	X	+	-

Scientific name	Common name	Status	Vegetation Type p	s
Leucaena leucocephala (Lam.) de Wit	koa haole, ekoa	X	-	+
Macroptilium latyroides (L.) Urb.	wild bean, cow pea	X	+	+
Medicago lupulina L.	black medic, nonesuch	X	+	+
Neonotonia wightii (Wight & Arn.) Lackey		X	-	+
Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X	+	-
Vicia sativa ssp. nigra (L.) Ehrh.	common vetch, spring vetch	X	+	+
GERANIACEAE (Geranium family)				
Erodium cicutarium (L.) L'Her.	alfilaria, pin clover	X	+	+
LYTHRACEAE (Loosestrife family)				
Cuphea carthagenensis (Jacq.) Macbr.	tarweed, Colombian cuphea	X	-	+
MALVACEAE (Mallow family)				
Malva parviflora L.	cheese weed	X	+	+
Sida fallax Walp.	'ilima	I	+	-
Sida rhombifolia L.	Cuba jute	X	-	+
MENISPERMACEAE (Moonseed family)				
Cocculus orbiculatus (L.) DC	huehue, hue	I	+	+
MORACEAE (Mulberry family)				
Ficus sp.		X	-	+
MYRTACEAE (Myrtle family)				
Eucalyptus spp.	eucalyptus, gum tree, 'eukalikia	X	+	+
Metrosideros polymorpha Gaud.	'ohi'a, 'ohi'a lehua, lehua	E	-	+
Psidium cattleaianum Sabine	strawberry guava	X	-	+

Scientific name	Common name	Status	Vegetation Type p	s
Psidium guajava L.	guava, kuawa	X	-	+
NYCTAGINACEAE (Four-o'clock famiy)				
Bougainvillea spectabilis Willd.	purple bougainvillea	X	-	+
Mirabilis jalapa L.	four-o'clock, marvel of Peru, nani ahiahi	X	+	+
OLEACEAE (Olive family)				
Olea europaea L. ssp. europaea	olive, 'oliwa	X	+	-
Olea europaea ssp. cuspidata (Wall. ex G. Don) Ciferri	olive, 'oliwa	X	+	+
ONAGRACEAE (Evening primrose family)				
Ludwigia palustris (L.) Elliott	marsh purslane	X	-	+
OXALIDACEAE (Wood sorrel family)				
Oxalis corniculata L.	yellow wood sorrel, 'ihi 'ai	P?	-	+
PAPAVERACEAE (Poppy family)				
Argemone glauca (Nutt. ex Prain) Pope	pua kala, kala, naule, Hawaiian poppy	E	+	-
PLANTAGINACEAE (Plantain family)				
Plantago lanceolata L.	narrow-leaved plantain, English plantain	X	+	+
POLYGONACEAE (Buckwheat family)				
Persicaria glabra (Willd.) Gomez de la Maza	knot weed, kamole	X	-	+
Rumex crispus L.	curly dock, yellow dock	X	-	+

Scientific name	Common name	Status	Vegetation Type: D	S
PORTULACACEAE (Purslane family)				
Portulaca oleracea L.	common purslane, pigweed, 'ihi	X	+	-
Portulaca pilosa L.		X	+	-
PRIMULACEAE (Primrose family)				
Anagallis arvensis L.	scarlet pimpernel	X	+	+
PROTEACEAE (Protea family)				
Grevillea robusta A. Cunn. ex R. Br.	silk oak, 'oka kilika	X	+	+
RUBIACEAE (Coffee family)				
Richardia brasiliensis Gomes		X	-	+
SAPINDACEAE (Soapberry family)				
Dodonaea viscosa Jacq.	'a'ali'i, 'a'ali'i ku makani	I	+	-
SOLANACEAE (Nightshade family)				
Solanum americanum Mill.	popolo, glossy nightshade	I?	-	+
Solanum linnaeanum Hepper & P. Jaeger	apple of Sodom, popolo kikania	X	+	-
STERCULIACEAE (Cacao family)				
Waltheria indica L.	'uhaloa, hi'aloa, kanakaloa	I?	+	+
THYMELAEACEAE ('Akia family)				
Wikstroemia pulcherrima Skottsb.	'akia	E	+	-
VERBENACEAE (Verbena family)				
Lantana camara L.	lantana, lakana	X	+	+
Stachytarpheta australis Moldenke	owi, oi	X	-	+
Stachytarpheta jamaicensis (L.) Vahl	Jamaica vervain, owi, oi	X	+	-
Verbena litoralis Kunth	weed verbena	X	+	+

MONOCOTS

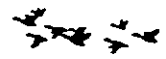
Scientific name	Common name	Status	Vegetation Type: D	S
AGAVACEAE (Agave family)				
Agave sisalana Perrine	sisal, malina	X	+	-
Furcraea foetida (L.) Haw.	Mauritius hemp	X	-	+
Yucca gloriosa L.	Spanish bayonet, yucca	X	+	+
CANNACEAE (Canna family)				
Canna indica L.	Indian-shot, ali'ipoe poloka	X	-	+
COMMELINACEAE (Spiderwort family)				
Commelina diffusa N.L. Burm.	honohono	X	-	+
CYPERACEAE (Sedge family)				
Carex longii Mackenzie		X	-	+
Cyperus haspan L.		X	-	+
Cyperus polystachyos Rottb.		I	-	+
Cyperus rotundus L.	nutgrass, nut sedge	X	-	+
Cyperus sanguinolentus Vahl		X	-	+
Fimbristylis dochotoma (L.) Vahl		I	-	+
Kyllinga brevifolia Rottb.	kyllinga, kili'o'opu	X	-	+
Schoenoplectus lacustris (L.) Palla	'aka'akai, great bulrush	I	-	+
IRIDACEAE (Iris family)				
Gladiolus dalenii Van Geel	gladiolus	X	-	+

Scientific name	Common name	Status	Vegetation Type: P	S
JUNCACEAE (Rush family)				
Juncus ensifolius Wikstrom	bog rush	X	-	+
LILIACEAE (Lily family)				
Zephyranthes sp.	zephyr flower	X	-	+
POACEAE (Grass family)				
Axonopus fissifolius (Raddi) Kuhlm.	narrow-leaved carpetgrass	X	-	+
Bothriochloa bladii (Retz.) S.T. Blake		X	-	+
Brachiaria mutica (Forssk.) Stapf	California grass, Para grass	X	-	+
Cenchrus ciliaris L.	buffelgrass	X	+	+
Chloris barbata (L.) Sw.	swollen fingergrass, mau'u lei	X	+	+
Chloris virgata Sw.	feather fingergrass	X	+	+
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	+	+
Digitaria sp.	crabgrass	X	+	+
Echinochloa colona (L.) Link	jungle rice	X	-	+
Eleusine indica (L.) Gaertn.	wiregrass, manienie ali'i	X	-	+
Eragrostis amabilis (L.) Wight & Arnott	lovegrass	X	+	+
Eragrostis pectinaceae (Michx.) Nees		X	+	+
Melinis minutiflora P. Beauv.	molasses grass	X	-	+
Melinis repens (Willd.) Zizka	Natal redtop, Natal grass	X	+	-
Panicum maximum Jacq.	Guinea grass	X	+	+
Paspalum urvillei Steud.	Vasey grass	X	-	+
Pennisetum clandestinum Chiov.	Kikuyu grass	X	+	+
Pennisetum purpureum Schumach.	elephant grass, Napier grass	X	-	+
Pennisetum setaceum (Forssk.) Chiov.	fountain grass	X	+	+
Sacciolepsis indica (L.) Chase	Glenwood grass	X	-	+
Sporobolus africanus (Poir.) Robyns & Tournay	smutgrass, African dropseed, rattail grass	X	+	+

Scientific name	Common name	Status	Vegetation Type: P	S
Vulpia bromoides (L.) S.F. Gray	brome fescue	X	-	+
ZINGIBERACEAE (Ginger family)				
Hedychium coronarium J. Konig	white ginger, 'awapuhi ke'oke'o	X	-	+

Appendix D

Wildlife Survey



Wildlife Survey
Lalamilo Subdivision
Waimea, Hawaii, Hawaii

Prepared for:
PBR Hawaii

Prepared by:
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March 10, 2002

1.0 Introduction

A field survey was conducted on December 28, 2001 to assess the wildlife resources found on 265 acres of land at Lalamilo, Waimea, Hawaii. The objectives of the survey were to provide a record of wildlife on the site and determine whether the project would adversely impact any important wildlife resources in the area.

2.0 Site and Habitat Description

The proposed project site is situated between Kawaihae Road and Waikoloa Stream, about 1.85 miles west of Waimea town at the base of the Kohala Mountains. The site is being used to graze cattle, however forage quality appears to be poor with a variety of unpalatable forbs in the eastern portion and mainly fountain grass (*Pennisetum setaceum*) in the west. The property runs from an elevation of about 2100 to 2500 ft elev. A residential subdivision lies between Kawaihae Road and Keanuiomano Stream, which is on the property, north and parallel to Waikoloa Stream. Char (2002) describes the site as pasture scrub with mixed grass pasture with scattered trees and shrubs, rocky outcrops which support a denser cover of shrubs, and stream side vegetation. Uhaloa (*Walteria indica*) and ilima (*Sida fallax*) were present and are important seed producers for seed eating birds. Christmas berry (*Schinus terebinthifolius*) was a common shrub throughout the property but especially dense along the streams.

3.0 Method

The survey was conducted between 06:41 a.m and 08:08 a.m. Six count stations were established approximately 0.25 mile apart, along a dirt road between the two streams. Observations were made for eight minutes at each station. All birds seen and heard were recorded. In addition to the counts at the stations, searches for wildlife signs and incidental observations were made both in upland sites and along the streams that run through the property.

4.0 Results

Birds

Nine species of birds were identified on station counts; they are listed in order of abundance (count totals in parentheses, I = introduced, N = native):

European skylark (*Alauda arvensis*) (25) I
Gray francolin (*Francolinus pondicerianus*) (12) I
Common myna (*Acridotheres tristis*) (9) I
Black francolin (*Francolinus francolinus*) (5) I
Northern mockingbird (*Mimus polyglottos*) (4) I
Zebra dove (*Geopelia striata*) (6) I
Spotted dove (*Streptopelia chinensis*) (2) I
Northern cardinal (*Cardinalis cardinalis*) (1) I
Pacific golden plover (*Pluvialis fulva*) (1) N

In addition to the species encountered during count stations, the introduced Japanese White-eye (*Zosterops japonicus*) and Yellow fronted canary were seen between stations. The introduced gamebirds: California Quail (*Callipepla californica*) and Chukar (*Alectoris chukar*) were found on site by Winona Char (pers. comm.) during a recent botanical survey.

Other species of introduced birds, such as Ring-necked pheasant (*Phasianus colchicus*), Common barn owl (*Tyto alba*), House finch (*Carpodacus mexicanus*) and Nutmeg mannikins (*Lonchura punctulata*) were expected to be seen on the property but were not encountered during the survey.

Of the species found during the survey, only the Pacific golden plover is considered native. Pacific golden plovers are migratory. They are present in the Hawaiian islands from August through April where they typically establish feeding territories on flat open land to feed on insects.

No native short-eared owl or pueo (*Asio flammeus sandwichensis*) was seen during the survey but are expected to occur in the area. Pueo inhabit grasslands, shrublands and mountain parklands throughout the Big Island. Unlike the common barn owl, the pueo is active during the day and can be readily observed at mid-day. This species is widespread on all the main islands except Oahu where the population on that island is listed by the State of Hawaii as endangered. The Hawaii island population is not endangered or threatened. Short-eared owls feed extensively on house mice (*Mus musculus*) and Polynesian rats (*Rattus exulans*).

The endangered koloa or Hawaiian duck (*Anas wyvilliana*) was reestablished on the island of Hawaii between 1976 to 1982, when captive-bred birds were released in the Kohala Mountains (USFWS 1999). They have been observed using stock ponds in the Kohala Mountains, stream habitats of Pololu, Waimanu and Waipio Valleys (USFWS 1999). No koloa were seen on the Lalamilo property during the survey. Todd Lum (pers. comm.), a wildlife biologist for the Department of Land and Natural Resources, said that the streams running through the site could be used by koloa, but there are no records of such use.

Hawaiian hawks (*Buteo solitarius*) occur in the Kohala Mountains but they are virtually absent from areas with few or no trees (Scott et al 1986). No hawks were observed during the survey and the site is near the edge of the known range of the species for the Kohala Mountains (Scott et al 1986).

Mammals

Trapping is usually required to adequately survey an area for small mammals. No trapping was conducting for the survey but the following mammals could be expected for the area:

Small Indian mongoose (*Herpestes auropunctatus*)
Feral cat (*Felis cattus*)
Rats (*Rattus* sp.)
House mouse (*Mus musculus*)

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native terrestrial mammal found in Hawaii. It is a federally listed endangered species. Bats are more commonly observed at dusk (Kepler and Scott 1990), but early morning foraging can be observed (Jacobs 1994). Bats were sighted along the coast at Kawaihae and near Honokaa, between 10 and 15 miles away, but no bats were found in the vicinity of Waimea by Jacobs (1994). Kepler and Scott (1990), however, do report a sighting in the vicinity of Waimea.

No bats were observed during the current survey. Kawaihae Road was not sampled by Jacobs (1994), who conducted a survey of bats to determine the island-wide distribution, using a bat detector instrument. The omission of this major section of highway in his survey, suggests that Jacobs did not expect the area to produce any bat detections. The upper portion of the property near the

Kohala Road junction was surveyed by Jacobs, but produced no detections (Jacobs 1994).

5.0 Conclusion and Summary

The project site does not support native plant communities. No threatened or endangered wildlife were observed. The Koloa or Hawaiian duck, a federally listed endangered species, was released in the Kohala Mountains and could be expected to use the streams that run through the property but there are no recent records of such use. The Hawaiian hoary bat, another federally listed endangered species has been observed in the vicinity of Waimea but no bats were observed on the property at Lalamilo and the omission of the Kawaihae Road in the island wide survey by Jacobs (1994) suggests that there is a low probability of encountering a bat on the property which runs along Kawaihae Road. The property is on the edge of the known range of the federally listed endangered Hawaiian hawk, that prefer habitat with more trees. No pueo were observed but they are expected in such grassland habitat. Pueo nest on the ground, usually in the grass but no pueo signs were present during the survey. Pacific golden plovers were present, however, they may be able to adapt to the new lawns of the housing development.

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Appendix E

Archaeology Study

Report 118-120101

ARCHAEOLOGICAL INVENTORY SURVEY
DHHL RESIDENTIAL DEVELOPMENT AT LĀLĀMILO
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'I
(TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)

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ARCHAEOLOGICAL INVENTORY SURVEY
DHHL RESIDENTIAL DEVELOPMENT AT LĀLĀMILO
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'I
(TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)

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SUMMARY

At the request of PBR Hawaii on behalf of their client the Department of Hawaiian Home Lands (DHHL), Haun & Associates conducted an archaeological inventory survey of a TMK: 6-6-01: 10, 54 & 77; and TMK: 6-6-04: 12-17, a 266.4-acre parcel situated in the Land of Lālāmilo, South Kohala District, Island of Hawai'i. The objective of the survey was to satisfy historic preservation regulatory review inventory requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules.

The inventory survey identified 75 sites with 818 features. Subsurface testing was undertaken at 33 features at 24 sites. The features consist of twenty formal feature types including terraces, mounds, enclosures, field boundaries, stone walls, irrigation ditches, platforms, walled terraces, C-shapes, U-shapes, modified outcrops, surface hearths, L-shapes, cairns, pond fields, and several miscellaneous types. Feature function includes agriculture, permanent habitation, temporary habitation, burial, marker, military defensive position, historic foundation, storage, and quarry.

The identified sites and features conform to the site/feature types expected in Clark's (1987) Kula Zone of the Waimea-Kawaihae region based on previous archaeological work and historic documentary research. Probable late prehistoric to historic agricultural features, consisting of modified outcrops, mounds, terraces, field boundaries and irrigation ditches, are distributed across much of the project area. The terraces and field boundaries define over 300 discrete fields covering 28.7 hectares (70.93 ac). Other areas were also cultivated as evidenced by clusters of mounds of stones cleared from cultivation plots. Two probable pondfields were documented indicating that cultivation of wet taro was also practiced on at least a limited scale. The field system includes nearly three miles of irrigation ditches. Another characteristic of the field system is the extensive network of walls, most of which form large enclosures that apparently where built to keep cattle out of the fields..

Other traditional Hawaiian sites consist of burials and numerous permanent and temporary habitations. The permanent habitation features primarily consist of walled terraces and enclosures. Many permanent habitation sites have enclosed yards, a typical early historic form that served to keep free-ranging cattle out. Burials were identified at nine sites including an historic cemetery. More than half of the burial features show evidence of disinterment.

The combined evidence from radiocarbon dating, artifact assemblages, and historic documentary research documents traditional Hawaiian utilization of the project area beginning as early as the 1500s. This use continued until at least the mid-1800s. Military ordnance fragments and impact craters scattered across the project area evidence the project areas use for military training in the 1940s. Ranching-related infrastructure including wire fences, corals, and water troughs are scattered across the project area and document the longstanding and current use of the area for grazing.

All seventy-five sites are assessed as significant under Criterion "d". The sites have yielded information important for understanding late prehistoric to historic land use in the project area. Nine sites are also assessed as culturally significant because probable Hawaiian burials are present. Four of these culturally significant sites and six sites are additionally assessed as significant under Criterion "c" as a well-preserved example site types including the agricultural field complex, an historic cemetery, a basalt quarry, and several permanent habitation sites. The agricultural field complex (Site 22632) is also assessed as significant under Criterion "a" because it is associated with the broad pattern of traditional and early historic agricultural intensification in Hawaii.

The mapping, written descriptions, photography, and test excavations at six sites adequately documents them and no further work or preservation is recommended. Ten sites, including four with burials, are recommended for preservation. The remaining sites, except the sites with burials and representative portions of the Site 22632 agricultural complex, could be mitigated through data recovery. The landowner intends to preserve two clusters of sites that include examples of the Site 22632 agricultural features. The remaining sites outside of the preservation clusters and remaining features of Site 22623 are recommended for data recovery. The plans for preservation of sites and data recovery would be detailed in a Mitigation Plan prepared for DLNR-SHPD review and approval. The specific plans for preservation and maintenance of the nine sites with burials would be detailed in a Burial Treatment Plan prepared for DLNR-SHPD and the Hawaii Island Burial Council (HIBC) review and approval.

CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS (cont.)

ILLUSTRATIONS (cont.)

TABLES

INTRODUCTION

This report presents the results of an archaeological inventory survey conducted of TMK: 6-6-01: 10, 54 & 77; and TMK: 6-6-04: 12-17 located in the Land of Lalamilo, South Kohala District, Island of Hawai'i (*Figure 1*). The objective of the survey was to satisfy current historic preservation regulatory review inventory requirements of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules (DLNR 1998).

The survey fieldwork was conducted November 2-23, 2001 under the direction of Dr. Alan Haun. This report includes the project scope of work, project area description, field methods, background information relevant to the project area, survey findings, site significance assessments and recommended treatments.

Scope of Work

Based on DLNR-SHPD rules for inventory surveys the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing archaeological and historical documentary literature relating to the project area and its immediate vicinity--including examination of Land Commission Awards, *ahupua'a* records, historic maps, archival materials, archaeological reports, and other historical sources;
2. Conduct a high intensity, 100% pedestrian survey coverage of the project area;
3. Conduct detailed recording of all potentially significant sites including scale plan drawings, written descriptions, and photographs, as appropriate;
4. Conduct limited subsurface testing (manual excavation) at selected sites (a) to determine the presence or absence of potentially significant buried cultural deposits or features, and (b) to obtain suitable samples for radiocarbon age determination analyses;
5. Analyze background research and field data; and
6. Prepare and submit Final Report.

Project Area Description

The project area occupies a total area of c. 266.4-acres within two parcels. The main portion of the project area is comprised of a c. 248.8-acre parcel that is bordered by Waikoloa Stream to the south, by a paved road leading to the county transfer station, by undeveloped land to the west, and by Kawaihae Road and Keanuiomano Stream to the north. This portion of the project area ranges in elevation from 2,120 to 2,450 ft, with the terrain sloping slightly to moderately to the west.

There are three named drainages and a small unnamed seasonal drainage associated within this portion of the project area. The named drainages all contained flowing water at the time of the survey. Lanikepu and Keanuiomano Streams partially bisect the parcel in an inland/seaward direction. Lanikepu Stream extends through the northwestern portion of this parcel, entering the project area at the 2,240 ft elevation and extending in a roughly westerly direction for c. 510 m, to where it empties into Keanuiomano Stream at the 2,185 ft elevation.

Keanuiomano Stream enters the project area at 2,415 ft elevation, at the intersection with Kawaihae Road (Highway 19) and the Waimea-Hawi Road (Highway 250). The stream extends in a roughly

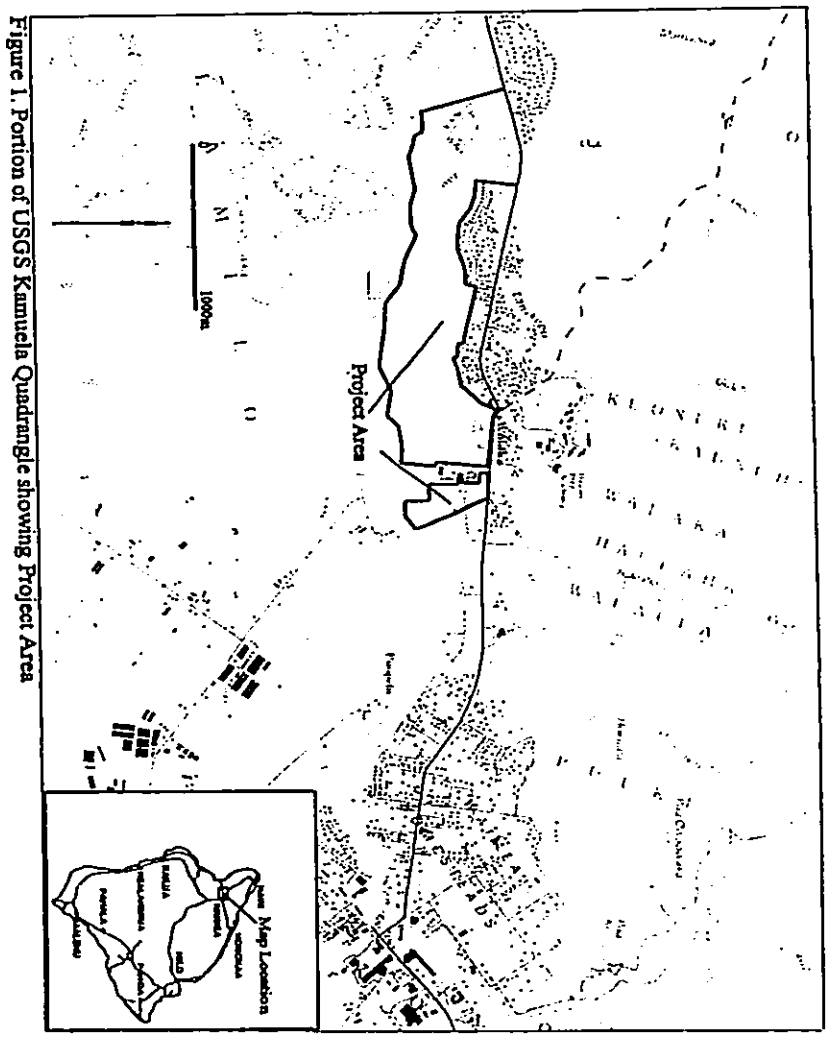


Figure 1. Portion of USGS Kamuela Quadrangle showing Project Area

westerly direction, forming a portion of the northern project area boundary. A housing development is situated outside the parcel to the north on the northern side of the stream. The stream continues to the west, exiting the parcel at the 2,140 ft elevation.

Waikoloa Stream forms the southern project area boundary. It enters this portion of the project area at the 2,385 ft elevation and extends downslope to the west, exiting the parcel at the 2,105 ft elevation. A small, dry seasonal drainage is located in the southwestern portion of this parcel, c. 130 m north of Waikoloa Stream. This drainage originates in a broad level area at c. 2,220 ft elevation and extends c. 400 m to the west, ending in a swale to the north of Waikoloa Stream.

A discontinuous ridge located south of Keanuiomano Stream extends through this portion of the project area in an inland/seaward direction. A second ridge is located north of Keanuiomano Stream and south of Lanikepu Stream. A third ridge is situated in the southwestern portion of the parcel, north of Waikoloa Stream and south of the small, seasonal drainage.

The smaller project area parcel is 17.6 acres in area and is separated from the main parcel by the county transfer station, an electrical power plant, and the Waimea Base Yard. This parcel varies in elevation 2,420 to 2,481 ft and slopes slightly to moderately to the west and southwest. It is bordered on the north by Kawaihae Road, on the south by Waikoloa Stream, on the east by the planned Waimea Bypass road corridor, and on the west by the transfer station, the power plant and the base yard. Barbed wire and chain-link fences extend around the north, east and west sides of this parcel.

The project area has been impacted by historic/modern ranching activity. Cattle were grazing in the main parcel during the study and several horses were present in the smaller parcel. Most of the vegetation in the smaller parcel consisted of low grasses with scattered *panini* (cactus; *Opuntia megacantha* Salm-Dyck) at the northern end. The main portion of the project area was characterized by sparse low grasses with scattered *panini*, sisal (*Agave sisalana* (Engelm.) Perrine), and *kiawe* (*Prosopis pallida* [Humb. & Bonpl. Ex Willd.] HBK.). Vegetation in this portion of the study area is illustrated in *Figures 2* and *3*.

The main parcel is bisected by a series of dirt roads and barbed wire fences. A trash dump comprised of rusted abandoned vehicles, machinery, metal, and debris is located in the east-central portion of this parcel, north of a barbed wire fence and south of the main ridge that extends through the parcel (*Figures 4* and *5*).

The soil throughout the project area consists of Waimea very fine sandy loam (6-12% slopes), which is located at intermediate elevations along the leeward slopes of Mauna Kea and the Kohala Mountains (Sato et al. 1973:54). This soil series is characterized by a surface layer of dark brown sandy loams above a dark brown silt loam subsoil. Hard, weathering basalt is situated below the subsoil. The Waimea series soils evidence a moderately rapid permeability, slow runoff and slight erosional hazard, and is listed as suitable primarily for pasturelands. Rainfall in the general vicinity of the project area averages 15 to 20 inches per year with the mean annual temperature varying from 65 to 70 degrees (Armstrong 1983).

Field Methods

The project area was subjected to a 100% surface examination with the surveyors spaced at 15-20 m intervals. The transects were oriented in a north-south direction or roughly perpendicular to the long axis of the project area. The identified sites and features were flagged with pink and blue flagging tape, or with yellow pin flags in areas with little or no vegetation to attach flagging tape. The numerous identified agricultural features were subjected to minimal recording. This consisted of recording length, width, height, and shape. Photographs were taken of representative feature types.

Non-agricultural sites were subjected to detailed recording consisting of the preparation of scaled plan maps, the completion of standardized site/feature forms, and photographic documentation. A metal site tag was placed at each site and the tag's location was plotted on the site plan map. The location of all sites and features was determined by using a Garmin Global Positioning System (GPS) III+.

Subsurface testing during the survey consisted of the excavation of 33 test units at 24 sites. The units were excavated in arbitrary levels within stratigraphic layers and were terminated either on bedrock,

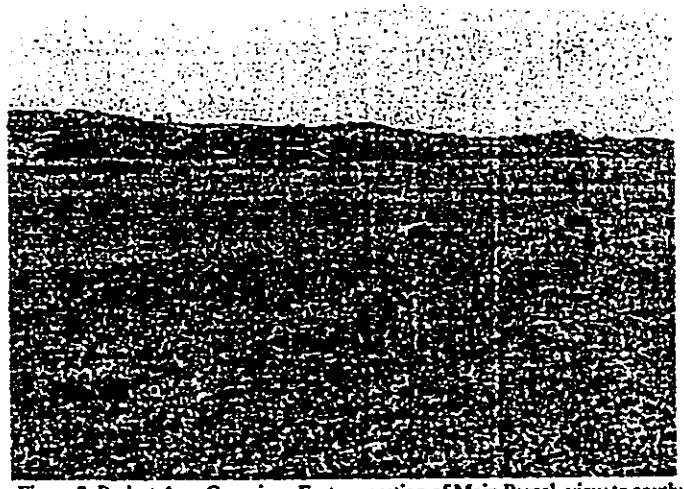


Figure 2. Project Area Overview, Eastern portion of Main Parcel, view to southwest

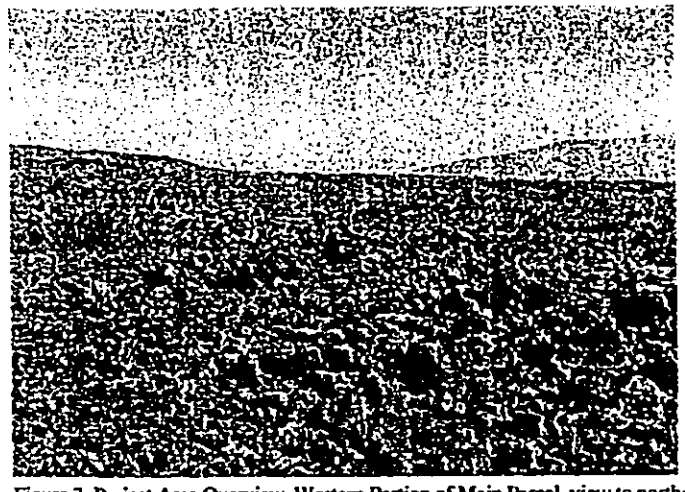


Figure 3. Project Area Overview, Western Portion of Main Parcel, view to northeast

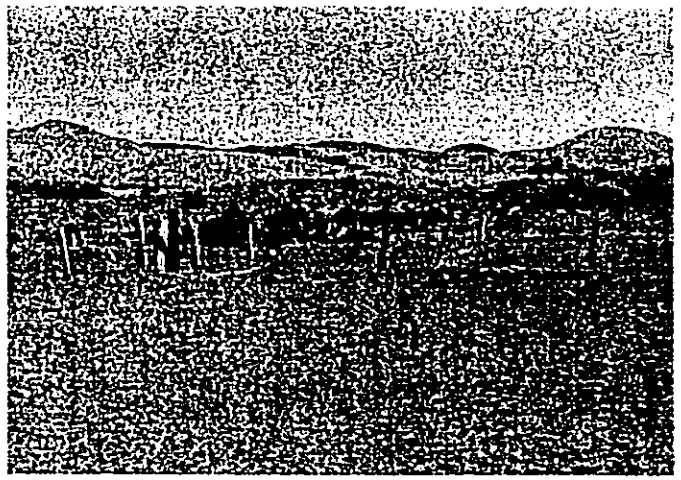


Figure 4. Wire fences and trash dump, view to northeast

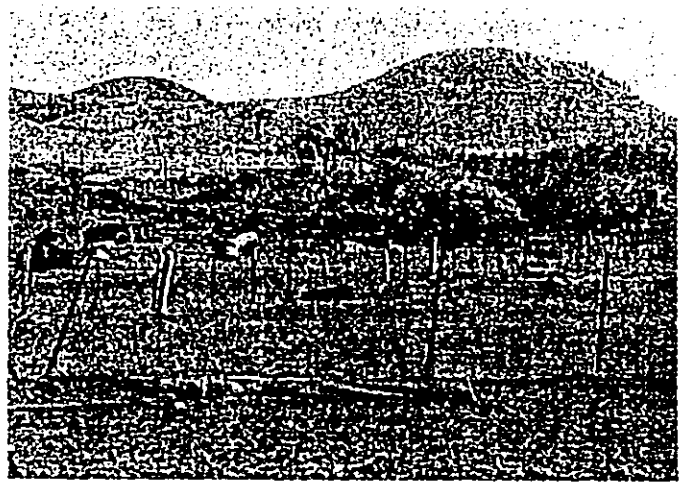


Figure 5. Wire fences and trash dump, view to northeast

culturally sterile soil, or upon identification of human remains. Standardized excavation records were prepared after the completion of each stratigraphic layer. The soil removed during excavation was screened through ¼" mesh. Portable remains collected were placed in paper bags labeled with the appropriate provenience information. Recovered charcoal samples were carefully removed from either in situ locations or collected during the screening process. These samples were deposited in aluminum foil pouches and placed in properly labeled paper bags. Following the excavation, a section drawing depicting the stratigraphy was prepared, post-excavation photographs were taken, and the units were backfilled. Recovered cultural remains were transported to Haun & Associates' office for analysis.

Burials were encountered during the excavation of ten test units. The remains were carefully exposed to determined general age, degree of articulation and orientation. The remains were recorded and their locations plotted on the excavation unit profiles, then the units were carefully backfilled

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Historical Documentary Research

At the time of the Mahele, there seemed to be some confusion of the different Hawaiian land classifications and use of the terms differed slightly from island to island (e.g., *kalana, 'okana*) (Barrere 1983:25). An 1893 article published in the Hawaiian newspaper illustrates this.

> The island of Hawaii is divided into six districts, Kohala, Hamakua, Hilo, Puna, Ka'u and Kona. The chiefs appointed by the *ali'i* 'ai-aupuni over these districts were called 'ai-moku such as were mentioned in the days of Keawe-nui-a-'Umi. The very last of these were in the days of Hikikaukoli'I (Kamehameha III). Thus were they placed on Hawaii. It was not the same on other islands, because Maui was all cut up into moku, kalana and ahupua'a, which was not so on Hawaii, for its kalana and ahupua'a were within the moku (district). It is difficult now to distinguish the various kalana within the six districts of Hawaii. (Hawai'i Holomua, May 13, 1893)

There was also confusion between the designations of different types of *'ili*. According to Curtis J. Lyons, surveyor and son of Lorenzo Lyons, *'ili* of the *ahupua'a* (*'ili 'aina*, according to Pukui & Elbert 1986: 97) belonged to the *ahupua'a* and were an integral part of the *ahupua'a*. *'Ili kupono* were nearly politically independent of the *ahupua'a*. In other words, when an *ahupua'a* changed hands to a new chief, the *'ili kupono* did not change hands as well -- the main difference being, who taxes were paid to -- the king or the *ahupua'a* chief.

The history of Waimea as a land unit is unclear. In earlier times, Waimea may have been its own district, separate from Kohala (Nakamura 1981: 29). This is alluded to in the Boundary Commission records (No. 1: 6) which indicate that "Waimea is an *ahupua'a* of Waimea, which is a *kalana*, with eight divisions." One native witness (Mi 1st) who testified for George Davis on the boundaries of Waikoloa described Waimea as being a *kalana* ". . . which is the same as an island divided into districts -- there are eight Okana in Waimea. In those Okana are those lands said to extend out (*lele ma waho*)" [running to the sea] (Boundary Commission No. 1: 7).

C. J. Lyons, considered Waimea an *ahupua'a* comprised of predominantly ("Nine-tenths") two larger independent *'ili kūpono* of Waikoloa and Pu'ukapu and as well as smaller *'ili* (Lyons 1875: 119). Boundary Commission records and Land Commission Awards (LCAs) for Hawai'i Island indicate the lands of Waikoloa, Wai'aka 1st and 2nd, and 'Ōuli were considered *'ili* of Waimea rather than separate *ahupua'a*. The State of Hawai'i, in an attempt to clarify the matter determined that South Kohala District comprised only three *ahupua'a*: Kawaihae 1, Kawaihae 2 and Waimea (Kelly & Nakamura 1981: 29).

Likewise, Lālāmilo was designated an *'ili*, but in the early land records, Lālāmilo does not seem to be attached to any larger land unit such as an *ahupua'a*. It only appears as a land name, "The 'Ili of Lalamilo and Waimea" within the "District of South Kohala" (Boundary Commission, Hawai'i, Vol. A, No. 1: 298). However, Lālāmilo seems to have shared a special relationship with Puako on the coast. The

Boundary Commission records indicate Lālāmilo shared fishing rights with Puako. Testimony for Puako Ahupua'a from Kauwewahine who lived at Lalamilo since the time of Kamehameha II indicate Puako had "Ancient fishing rights in the shallow waters near shore [and] the sea outside belongs to Lālāmilo" (*Ibid.*: 297). It is interesting to note that Charles Kanaina claimed the "'*ili* of Lālāmilo in South Kohala" as part of his claim for Puako Ahupua'a (*Ibid.*: 456; Volume B: 298). An additional note follows the boundary testimony: "Note: His Honor, C. Kanaina only claims the beach and fishing rights. Lālāmilo had ancient fishing rights extending out to sea" (*Ibid.*: 298).

At the *Mahele*, Waikoloa was deemed Crown land of which Isaac Davis received a large portion. Waikoloa was sometimes referred to as "Waikoloa Nui" and "Waikoloa Iki", differentiating between the Crown land and Davis' land respectively (Boundary Commission No. 1: 11). Dorothy Barrere explains: "Later, the greater portion of the king's Waikoloa became known as the *ahupua'a* of Lālāmilo and the smaller portion as the *'ili 'aina* of Waikoloa-iki [Davis' portion] . . . It is not known when the name Lālāmilo was extended to most of the king's Waikoloa (1983:29). Most people today seem to consider Lālāmilo as an *ahupua'a* within the South Kohala District, the other *ahupua'a* being Kawaihae 1, Kawaihae 2, 'Ouli, Waimea, Kalāhuipua'a, Waikoloa and 'Anaeho'omalu (*Figure 6*).

Traditional and Legendary Associations

Following is a brief summary of the traditional and legendary associations of Waimea, to give the project area a frame of reference for cultural importance and use during traditional times. Although place names around and near Lālāmilo are mentioned in traditional sources, archival and historical research did not reveal any legends specific to Lālāmilo and, in particular, the project area. This does not denote a lack of importance but rather shows the incompleteness of the historic record.

"In the early days Waimea meant all the plateau between the Kohala Mountains and Mauna Kea, inland from Kawaihae. This area is from eight to ten miles long and from three to five miles wide" (Judd: 1932:14). The name Waimea means "reddish water" (Pukui, et al., 1974:226) due to the discoloration of the water from the rich fertile soil found there. Albert Lyons described Waimea's water as ". . . no sweeter or purer water anywhere on earth, despite the sherry-like tint it has taken from the forest morass at its source" (Lyons *in* Doyle 1945:45).

Traditionally, Waimea is renowned for its strong gusty winds and its chilly rain. The two famous winds of Waimea are the *Kīpu'upu'u* and the *Kolo 'āpu'upu'u*. The *Kīpu'upu'u* is the name of a rain as well. The *Kolo 'āpu'upu'u* (*Lit.*, rough creep) is a wind usually accompanied by rain and common to the Waimea area (Kent 1986:440; Pukui & Elbert 1986:163). In *mele* (song/chant), *Waimea i ka ua Kīpu'upu* (Waimea, land of the Kīpu'upu'u rain) is a famous reference to Waimea and the cold drenching rain which pelts the skin (Pukui 1983: 319; O.N. #2913). In fact, Kamehameha had a trained army of spear fighters and runners from Waimea who called themselves the Kīpu'upu'u after the cold wind and icy rain of their homeland (*Ibid.*:169; O.N. #1571

Another reference to the elements is the *'e'elekoa*, a storm which approaches Waimea from the northeast (Kent 1986:438). From this storm name comes the saying *Kū 'ia ka mālama 'e'elekoa* which is an allegory for enduring hardships (stormy weather) (Pukui & Elbert 1986:37). The *mālana* rain of Waimea is a fine rain that "comes from the northeast, as it moves along before the trade wind" (Kent 1986: 441). The *mālana* was also the name of one of Kamehameha's regiments (Desha 2000: 191). The *mumuku* is the renowned wind of Kawaihae. However, this fierce wind accompanied by a misty rain is said to originate near the Waimea area and blows over the land between the Kohala mountains and Mauna Kea, as if cut off from the main wind, especially in the late afternoons (*Ibid.*: 441; Cordy 2000:23). An 1840 description of this wind was given by the Charles Wilkes of the U. S. Exploring Expedition:

> The trade wind is exceedingly strong, bringing with it a mist toward sunset. It rushes furiously down between the mountains which bound the valley of Waimea and becomes very dangerous to shipping in the bay. It is called by the natives "*mumuku*" and is foretold by them from an illuminated streak that is seen far inland. This is believed to be

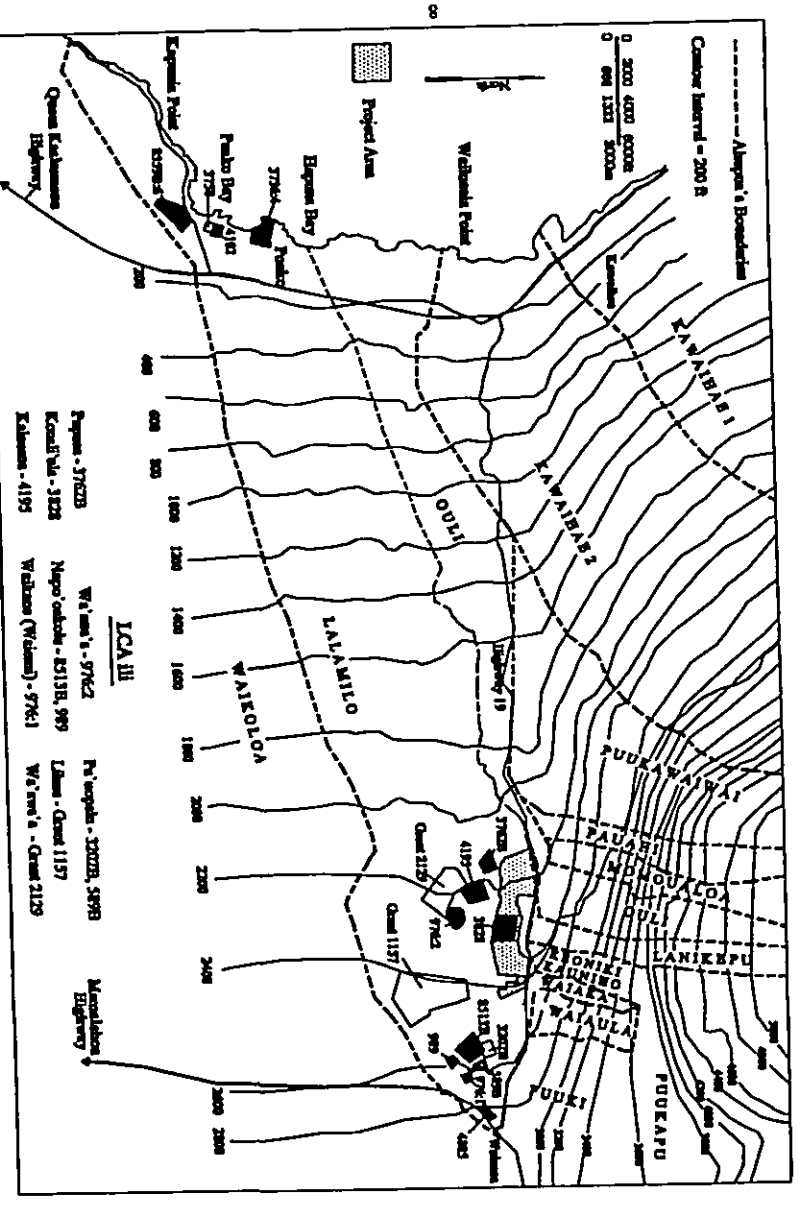


Figure 6. Ahupua'a Boundaries and Land Commission Awards

caused by a reflection of the twilight on the mist that always accompanies this *mamuku* . . . (Wilkes *in* Doyle 1945:50)

From ancient times, Waimea has been associated with royalty and chiefly lineages. Waimea was one of the lands which was highly valued by the *ali'i* (chiefs) and traditional stories indicate they maintained a dominant presence there. After the death of Kalani'ōpu'u, Keawema'uhili, acting on behalf of Kīwala'ō, divided the lands of Hawai'i Island. In doing so, he reserved the best and largest portions for himself and the rest he apportioned out to the other chiefs and warriors. Upon hearing this, Keoua Kuahu'ula went to his brother Kīwala'ō and asked, "Waipi'o and Waimea are ours?" Kīwala'ō answered, "They have been given away; they are not ours . . . You and I are left without land in this division. Our uncle has taken it . . ." (Kamakau 1992:120).

Native testimony from Lucy Peabody, the grand-daughter of Hā'eo, reveals that "The land where the Waimea Village lots now are was known as "Laualii" - meaning *Many Chiefs* . . . presumably because there were many chiefs living at that place at the time the name was given" (Waimea Water Rights Case: 1914-1915).

Besides being associated with royalty, Waimea was a renowned training ground for young chiefly warriors from ancient times. In the battle at Kakanilua between Kahekili of Maui and Kalani'ōpu'u of Hawai'i, the Hawai'i armies were defeated. Kalani'ōpu'u's armies were made up of the 'Ālapa and Pi'ipi'i regiments and were "chosen from the chiefs of the land who had been instructed in the profession of war and who were ready for battle" (Desha 2000:37). Desha gives a colorful description of these chiefly warriors numbering 800 strong, "These men were of equal height and were garbed in feather cloaks of various colors. They were those of whom King Kalani'ōpu'u thought a great deal, for they were skilled in the martial arts of those days (*Ibid.*: 34). Of the battle at Kakanilua Desha writes:

> Those persons who had been slain and whose bones were laid in the sand dunes of Wailuku and Waikapō were of the chiefly blood of Hawai'i. It was also said that half of those people were the young chiefs of Waimea, who had been most carefully selected by King Kalani'ōpu'u. They were persons accomplished in performing warlike deeds . . . Pi'ipi'i armies were the foremost warriors of Kalani'ōpu'u, chosen from amongst the chiefs of the entire island of Hawai'i. Half of them were from the famous land of Waimea. (*Ibid.*: 43-44)

The story of Kekūhaupi'o (Desha 2000) sheds much light on Waimea as a center of training for Kamehameha's best and fiercest warriors. But, in fact, Desha reiterates that Waimea was a famous "battlefield for numerous *ali'i* from ancient times" (*Ibid.*: 192).

Kekūhaupi'o, was an expert in the art of war and weaponry and was especially skilled in *lua* (a bone-breaking form of wrestling). He was Kamehameha's mentor and trainer during his youth and became his trusted advisor later on during his rise to power. It was during this time that Kamehameha sent his most skilled warrior, Kekūhaupi'o to Waimea for the purpose of training the men there and

> ". . . to instruct the young men of that place in the ancient ways of preparedness for battle. The land of Waimea was one of the lands where there were many warriors from ancient times. That place, Waimea, furnished Kamehameha with armies of men trained in battle. Under this war instructor of Kamehameha, those young men were taught proficiency in whirling spears and also in defending against the enemy's spears. At this same time Kekūhaupi'o instructed in defense against the *mākini* type of fighting of the Maui people. This type of fighting encountered by the people of Hawai'i at the Battle of Kepaniwai o 'Iao became as *wai 'au'au* [bath water] to Hawai'i's young warriors. (Desha 2000: 188)

This special group of warriors called themselves the Kīpu'upu'u, a group of runners and messengers, known for their speed who were trained in warfare and in "body-strengthening". They were particularly adept in spear fighting as well as using various other types of weaponry such as the *olonā* bow strings, slings and battle-adzes. (*Ibid.*: 191-192, 197). The traditional chant, *Hole Waimea*, makes reference to these *Kīpu'upu'u* warriors of old (Elbert & Maboe 1970: 52).

Hole Waimea i ka ihe a ka makani	Waimea is stripped by the spear of the wind
Hao mai nā 'ale a ke Kīpu'upu'u	Blown by the gusts of the Kīpu'upu'u
He lā'au kala'ihi ia na ke anu	A staff made still in the cold
'O'ō i ka nahele o Mahiki.	Pierced is the forest of Mahiki.

(Translation follows Frazier *in* Desha 2000: 192)

Desha explains his understanding of this chant:

> There is a hidden meaning in this old *mele*, as that forest of Mahiki was a place for making spears for the warriors in ancient times. In times of peace, the *ali'i* and the men would go there to prepare for the times of war to come.
>
> When Kamehameha was staying at Kawaihae, he went with his many warriors to that forest for the making of spears. Some of his court accompanied them, in other words, the chiefly women. At this place of the story, the writer conceals the hidden meaning of the "stripping of Waimea by the spear of the wind" and it is for the reader to guess the meaning. (*Ibid.*) [An allusion to love-making.]

The story of Kekūhaupi'o lists some of the famous battles either fought in Waimea or fought by Waimea warriors, as follows:

1. The battle of 'Umi and Hākau, his *hoahānau*, at a certain time of their lives.
2. Battle of 'Umi and Holoboloku, the *ali'i* of Waimea, when 'Umi was victorious.
3. Rebellion of Mahi'ololi against Mahiaee, the *ali'i* of Kona, also known as Mahiua I.
4. Battle of Kuahu'ia, the *ali'i* of Hilo against Keakealaniwahine. This was a battle joined in by all of Waimea.
5. Battle of Kanauanuimahi [Kanauaamahi] against Mokulani, the *ali'i* of Hāmākua. This was the battle at Kahuenaha. This was a very long-fought war lasting five years. It was said that the warriors were scattered from Hokuula, down to Mahiki, ascending up Mauna Kea, and descending seaward of Kalaieha, ascending up Mauna Loa, and going down seaward at Manukā, and as far as Kapu'a in Kona. This war was called "The House of Fragmented Warriors (*He Hale Māmala Koa*)."
6. The war of Alapa'inui which went to Moloka'i and as far as O'ahu. However, this fight was not begun on the Waimea battlefield, but his warriors were from Waimea, together with those from Kohala.
7. The battle between Keawe'ōpala and Kalani'ōpo'u, which was started by Ke'eaumoku, the war-loving father of Ka'ahumanu, later of one of Kamehameha's great generals. Ke'eaumoku supported Keawe'ōpala and they were put to flight by Kalani'ōpo'u. Keawe'ōpala was killed and Ke'eaumoku fled to Maui.
8. From Waimea also came numerous warriors of Kalani'ōpo'u when he went to battle with Kahekili on Maui. Waimea had brave warriors in those days.
9. Battle at Hakalau with Kahekili's warriors, nicknamed Kahekili's Black. This battle was described in a past issue of this story. Most of Kamehameha's men were from Waimea and Kohala in that battle.

10. The famous battle of Moku'ōhai when Kamehameha was victorious over his *hoahānau* Kīwala'ō. Most of Kamehameha's men came from Waimea, Kohala, and the Kona districts.

11. The battle at Pā'ie'ie and Pua'aloa, previously described, called the Bitter Rain. Most of Kamehameha's men were from Waimea.

12. The very last Battle of Hīpu'u. Most of Kamehameha's warriors were from Waimea in this battle with the intruders from Maui. (*Ibid.*: 192-193)

Another battle of note is the war between Kamalālāwalu of Maui and Lonoikamahakihi from Hawai'i (ca. late 16th to early 17th century). There are several varying accounts of this story as told by Kamakau (1992) and Fornander (1918-1919). Encouraged to battle by two old men who were spies of Lonoikamakahi, Kamalālāwalu and his forces landed at Kawaihae. Ignoring his own counselors, he followed the advice of the two old men to carry the war canoes inland and remove the outriggers to prevent the escape of Lonoikamakahiki's troops should they try to escape by the sea route.

Kamakau's version places the battle of Pu'oa'oaka (Pu'u'owā'owaka Hill) on the "grassy plain of Waimea" where the Maui warriors could not find water except for rain water caught in the hollows of rocks in Lanimaumau Stream (Kamakau 1992: 58-60). In the Fornander version, the battle occurs at Hōkū'ula. The Hawai'i warriors were placed in various strategic positions across Waimea: the Kona warriors were at Pu'upā to Haleopia, the Ka'ū and Puna troops spread out from Holobolokū to Waikoloa, while Hilo and Hāmākua covered the area from Mahiki to Pu'ukanikanihia, and those of Kohala were stationed at Momoualoa to Waiaka (Fornander 1916: IV, 344). In this particular battle, the Hawai'i forces were the victors over the invaders from Maui (*Ibid*: 348).

Waimea's warrior background presents a picture of people who were not only skilled in warfare, but were brave and fearless in fighting and were trustworthy and loyal to their *ali'i* during times of war. A natural response to the economic support of warfare and the support of numerous troops and chiefly personages during the pre-historic period probably led to the development of the large agricultural field systems still evident in Waimea today. This field system can be seen on a clear day from the top of Kohala Mountain Road as one looks down over the plains below -- especially in the Lālāmilo and Waikoloa areas. On this subject, Barrere writes:

> It may well have been that during the times of Alapa'inui and of Kalani'ōpu'u that the cultivating places at Waimea were first expanded to supply the chiefs' needs while they sojourned there and at Kawaihae. The abandoned cultivated patches, so often attributed to the decrease in the Hawaiian populations, were, in fact, as much the result of this practice of chiefs of traveling about their domains, feeding off the land until supplies were exhausted, then moving off to another. (Barrere *in* Clark & Kirch 1983: 27)

Although sparse, there is some mention of *heiau* in traditional and early historic accounts. One of the earliest legends tells of a *heiau* dedicated to training young virgins in the healing arts. This *heiau* is attributed to Hoopiliahae, the wife of Keawenui a'Umi and daughter of Pae a Molenole -- *kahuna* to Lloa. There are two similar versions of the story in the Edgar Henriques Collection [n.d.].

> Hoopiliahae, the Alii of Waimea, built and dedicated a heiau at Ouli, a little mauka of where Spencer's residence now stands at Puuiki, and called it Haleino. Hoopilihae had five children and named them after the rains of this Heiau (Edgar Henriques Collection: [n.d.]).

The second version adds more detail to the legend.

> On the way from Kawaihae, some two miles before reaching the village of Waimea, Hawaii, are the Lanikepu hills in the Ahupuaa of Ouli. The home of the High Chiefess Kaoanaeha grandmother of her late Majesty Queen Emma, near the old Spencer premises Puuiki. Directly back of this place was once a beautiful forest where the Heiau of Haleino was located.

The only Heiau ever founded, dedicated and consecrated by a woman, the High Chiefess Hoopiliahae, an ancestor of the sovereigns of Hawaii and the ruling High Chiefs of Waimea.

Haleino noted for the red rain and vivid rainbow symbols of the sacredness of this locality, was exclusively for girls of the age of purity who performed the duties of dedicating and participating in the different ceremonies, in which the spirit of love, purity of body and mind was imbued; also the science of healing was taught, thus consecrating their lives for the betterment of others.

Haleino today, although neglected still stands as a memorial to the High Chiefess Hoopiliahae, to which her descendants and off-spring of her subjects point with pride to the travelers who visit the Waimea plains (Edgar Henriques Collection: [n.d.]).

There is reference to another *heiau*, built on a nearby ridge by:

> . . . another Akua or God, named Makuakuamana who came with Paao the High Priest from Tahiti. He also built a Heiau. While he was building his heiau, he noticed a fine red rain called uakoko or blood, falling in front of Hokuula on the land of Waiaka. Noticing this rain every day, accompanied by a very brilliant rain-bow, one day he flew to a high mountain ridge to get a better view, to try to find out the cause of this beautiful sight. To his great surprise he beheld a beautiful goddess, whose only clothing was a great quantity of very long and silky hair. He was so entranced with her great beauty, he immediately flew down to where she was. He was pleased to learn it was the High Chiefess Wao being greatly impressed by his handsome face and Apollo form, and learning that he was the great Akua from Tahiti, she could not refuse him. The marriage ceremony was performed before all the High Chiefs of the surrounding country, and a great concourse of their followers. After the ceremonies, which lasted for days, were over, they with all their followers went to reside at Hokuula. Often would Wao go to Laelae, the hill above Kohakohau Falls on the land of Waiaka, where she would give birth to her children. For that reason the hill was called Palikapu o na 'lii o Waimea or sacred hill of the Chiefs of Waimea.
>
> The servants of Wao would roll a stone down the hill to a flat of land and wherever the stone would stop, that would be the tabu line, and no one would be allowed to pass. Especially would it be a sign for the people who lived below the hill called Pekepekelani who were a class known as Kauas or low born.
>
> At night Wao would change her servants to stone and would then return to the spring where she spent the night; a little before the dawn of day, she would return and turn them back to their human selves.
>
> It is said that Wao can be seen when any of the Waimea Chiefs or Monarchs die at this same spring, to this day (Edgar Henriques Collection: [n.d.]).

In 1867, Kamakau wrote about a *heiau* being restored at Uli in Waimea sometime between the years of 1797 - 1811.

> While Kamehameha was living with the chiefs of Waimea [he] was engaged in restoring the old heiaus. When the fence of images (*paehumu*), the oracle tower (*anu'unu'u*), and the pavement (*Kipapa*) of the heiau of Uli had been restored, all the people had to go down to Puako after coconuts. When each had taken up his load to return there remained still 480 nuts unhusked. All had gone except Kamehameha and one other to whom the chief was unknown. Kamehameha turned to him and said, "It looks as if there would not be enough coconuts for the dedication in the morning." It is possible that the man recognized the chief for he replied, "They will all be there." The two put the nuts into nets and fastened them together into a huge load that stood taller than either of them. The road

from Puako to Waimea is twenty miles in length. Occasionally when the man seemed tired Kamehameha took a turn at the load. At dusk as they neared their destination, and it came time for evening prayer, Kamehameha left the man, saying, "When you get to the heiau spend the night with the people of that place, but do not tell them that Kamehameha helped to carry the load on his back." Because of this feat of strength and another later, when he took up two hogs each more than a fathom long and carried them without help, this Ku-i-helani, as his name was, became a great favorite of the chief and held an important office under him. He was allowed to have ten wives, an honor allowed to no other chief besides, and there was no home happier than his, no governor of a district to be compared with Ku-i-helani (Kamakau 1992:183).

This is the same *heiau* Thrum (1908:42) recorded as being opposite the church in Waimea. This *heiau* had already been destroyed at the time of his visit but Thrum was able to glean a few details from local informants. Initially, this *heiau* had been dedicated by Hakau and rebuilt by Kamehameha.

Early Historic Accounts of Waimea (1778-1848)

Descriptions from early visitors, *Māhele* records, and native testimony (Carter vs. Territory of Hawai'i:1914-1915) indicate the native forest once extended much lower into the upland plains than it does today. Portions of the project area were probably comprised of sandalwood forest up until the early 1800s. Depletion of the forest zone no doubt affected general rainfall and precipitation patterns as well as the notoriously strong *mumuku* winds that originate in the Waimea area and blow down to Kawaihae. This is evident from reading native testimony from the Waimea Water Rights Case (1914-1915).

One of the earliest glimpses of Waimea from a distance was given in 1793 by Archibald Menzies, the British naturalist who traveled with Captain Vancouver's expedition. Landing at Kawaihae, Menzies took a short excursion inland in the hopes of collecting plants. He wrote:

> I traveled a few miles back . . . through the most barren, scorching country I have ever walked over. A little higher up, however, than I had time to penetrate, I saw in the verge of the woods several fine plantations, and my guides took great pains to inform me that the inland country was very fertile and numerously inhabited. Indeed, I could readily believe the truth of these assertions, from the number of people I met loaded with the produce of their plantations and bringing it down to the water side to market, for the consumption was now great, not only by the ship, but by the concourse of people which curiosity brought into the vicinity of the bay (Menzies 1920: 55-56).

Vancouver's trip had monumental impacts for Waimea and the Hawaiian Islands. It was on two separate trips 1793 and 1794 that Vancouver presented Longhorn cattle, along with some sheep to Kamehameha as a gift. At the request of Vancouver, Kamehameha put a ten-year *kapu* on the cattle. They were not to be touched or hunted, but were left to breed and multiply. The cattle were taken to a large penned area in upland Waimea which was ". . . very rich and productive, occupying a space of several miles in extent, and winding at the foot of . . . lofty mountains far into the country. In this valley is a great tract of luxuriant, natural pasturage, whither all the cattle and sheep . . . were to be driven, there to roam unrestrained, to "increase and multiply" far from the sight of strangers" (Vancouver *in* Kuykendall 1965:28, 40-41). Along with cattle, other early western visitors introduced goats, horses, a new pig breed, and new vegetable, fruit and plant varieties. Kawaihae and its port became the impetus for the development of trade and commerce. Waimea provided much of the produce and later on, salted beef, to refurbish supplies for foreign ships.

Though the sandalwood trade did not really accelerate until 1810 or 1811, sandalwood was imported on a small scale as early as 1790 (on Kaua'i). In the early 1800s, Hawai'i began exporting sandalwood to the Orient. The early records say the first shipments were of poor quality and therefore unsellable. However, in 1811, three American entrepreneurs signed a contact with Kamehameha to have exclusive rights to export sandalwood from Hawai'i. In return, Kamehameha received one fourth of the net profits. Thus, trade in sandalwood became the strict monopoly of the *ali'i*. At the height of the sandalwood boom,

Kamehameha bought foreign ships, including six vessels between 1816 to 1818, in order to transport his own wood to the Orient (Kuykendall 1965: 87). After Kamehameha's death in 1819, Liholiho (Kamehameha II) allowed his chiefs to share in the sandalwood trade, resulting in an unrestricted demand on the stocks of the wood and upon the commoners who did the harvesting. As a result, the common people of the land suffered many hardships to meet the demands of the *ali'i*. Kamakau writes:

> The chiefs, old and young, went into the mountains with their retainers, accompanied by the king and his officials, to take charge of the cutting, and some of the commoners cut while others carried the wood to the ships at the various landings; none was allowed to remain behind. Many of them suffered for food; because of the green herbs they were obliged to eat they were called "Excreters-of-green-herbs" (*Hilalele*), and many died and were buried there. The land was denuded of sandalwood by this means. (1992:252)

At Kawaihae, John Young supervised royal warehouses that were the central depository for the wood brought in from the surrounding district, including Waimea. A description of the magnitude of labor involved was witnessed by Rev. William Ellis during an 1823 visit to Kawaihae. He wrote:

> Before daylight on the 22d [*sic.*], we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku [Kalanimoku], by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach [at Kawaihae], for the purpose of its being shipped to O'ahu. There were between two and three thousand men, carrying each from one to six pieces of sandal wood, according to their size and weight. It was generally tied on their backs by bands made of *ti* leaves, passed over the shoulders and under the arms, and fastened across their breast. When they had deposited the wood at the storehouse, they departed to their respective homes. (Ellis 1969:397)

The commerce flourished until the supply dwindled in the mid-1830s and by early 1840s the industry came to a stand still. Wilkes reported that "there are now no trees left larger than mere saplings" (1845:217).

Actual early descriptions of Waimea come from early missionary accounts. In March of 1820, the first company of American missionaries arrived at Kawaihae and the first mission station in the district was established there for a brief period. In 1823, William Ellis wrote about the village of Waimea through the eyes of his fellow missionary peers who walked there from the Hāmākua Coast. Messrs. Bishop and Goodrich described the fertile countryside through which they passed: "Here a number of villages appeared on each side of the path, surrounded with plantations, in which plantains, sugar cane, and taro were seen growing unusually large" (Ellis 1969: 354).

Soon after, Asa Thurston walked to Waimea from Kawaihae. He stopped at Kalaloa, the home of Kumookapiki, a chief of Waimea (*Ibid.*: 399). He goes on to say,

> Leaving Kalaloa, we walked on to Waiakea [Waiaka], from thence to Waikoloa [Waikoloa], Pukalani, and Punkapu, which is sixteen or eighteen miles from the sea-shore, and is the last village in the district of Waimea . . .
>
> The soil over which he had traveled was fertile, well watered, and capable of sustaining many thousands of inhabitants. In his walks he had numbered 220 houses, and the present population is probably between eleven and twelve hundred (*Ibid.*).

A few years later, the missionary Hiram Bingham visited Waimea and made these observations:

> When we had . . . reached the height of about 2,000 feet, we were met by a chilly wind, which made our muscles shiver, though covered with a cloak . . . The clear rippling streams that wind their way along the verdant plain, through the alternating plats of shrubbery, grass, *kalo*, sugarcane, bananas, flowering bushes, and wild vines, occasionally crossed my path. Beyond the scattered cottages, the wild cattle were grazing unrestricted on their own territories bordering on the mountain. The green hills and moun-

tains of Kohala, covered with trees and shrubbery, and their sides partly cultivated and partly covered with grass of spontaneous growth, rose on the north side of the plain. (Bingham 1969:374)

In 1832, the Reverend Lorenzo Lyons and his wife Betsy settled in Waimea to start a mission station. His territory included the broad districts of Waimea, Kohala and Hämäkua. Lyons kept a detailed diary of his daily activities and impressions. Of their arrival at Waimea he wrote in his diary:

> 22 natives accompanied us. Our wives were carried in rocking chairs, there being no other way. The others carried our light baggage. Mr. Baldwin and I had an old worn out horse between us, and I walked most of the way. It is all up hill, some pretty steep up hill too. We soon came to where it was cool and rainy. We passed a stream, and a waterfall and also cultivated ground.
>
> About 11 AM we reached the place that is to be our home for a while at least, a grass house surrounded by shrubbery, a very comfortable place for us. Rain and wind soon set in and made it dismal indeed . . . (Doyle 1945:41)

A September 24th entry of the same year in Lyons' diary indicates that he traveled to an area called Kekula, four to five miles away. There he found a group of Hawaiians salting beef for drying. Of cultivation, he noted seeing watermelons, beans and corn as well as *wauke* and *mamaki* for making *kapa*. He also commented on the presence of prickly pear growing in the *kula* area (*Ibid.* 63). Testimony from Lucy Peabody, sheds some light on this area visited by Lyons in 1832.

> The lands below Lihue were known generally as Ke Kula and it was down here on Ke Kula that the people who lived mauka at Waimea used to do the most of their planting as this locality was much warmer than at Waimea. There were people living at Ke Kula and she thinks these people got their water from auwais. She remembers seeing water running in the ditches makai of Lihue . . . (Waimea Water Rights Case, 1914-1915)

In September 1837, Lyons reported on a famine due to an insect which was attacking and damaging the crops.

> Something like a famine has been raging for about a year. The common food of the people has failed and they have been compelled to resort to the use of roots such as grow wild in woods and mountains, and yielding but very little nourishment, just enough to prevent starvation and enable the people to walk about some and attend to some of their ordinary business. The famine does not arise from the indolence of the people, but from the ravages of a worm that abounds in Waimea. As soon as food begins to sprout the worm commences the work of destruction. The famine does not prevail in all parts of the field. But the people are very poor. (Doyle 1945:101)

Ironically, the California Gold Rush impacted the economy of Waimea as well as other parts of the Hawaiian Islands. There was a shortage of Irish potatoes and vegetables on the West Coast. Traditionally, Hawaiians had always grown sweet potatoes and had been supplying provisioning ships since contact (1778). Prior to the Gold Rush craze, Irish potatoes were already being grown in Waimea on a small scale. With the demand of early settlers in California, Waimea farmers were able to quickly benefit by increasing their production and shipping barrels of sweet potatoes and Irish potatoes to California. Other vegetables, along with sugar, molasses and coffee were also exported during this same time (Kuykendall 1965: 313-314; 322-321). In December 1849, Lyons wrote:

> A great call for potatoes from California. Never so much cash before! Large quantities of sweet potatoes brought to light, hitherto concealed - growing wild for years unknown. The demands have revealed them. People took to it like good fellows to get a few dollars each. Some have never had so much cash before - never had any before! Many natives growing rich. Potatoes bring 4 or 5 $ cash per bbl. (Doyle 1945: 151)

Under the protection of the *kapu*, the Longhorn cattle left by Vancouver in 1793 and 1794 rapidly multiplied beyond manageable control. Left to roam the surrounding lands on their own, the cattle were undomesticated and feral. Less than ten years after their arrival in the islands, a visitor wrote that the *kapu* ". . . was most rigidly preserved till that time expired . . . Though the inhabitants themselves have frequently suffered thus severely from their [the cattle's] incursions, they have closely adhered to the condition of the original gift . . . The animals have become so wild, that none of the natives dare approach them; so that, ranging at their full liberty, they have destroyed the fences, trampled down the crops and done much other damage (Turnbull 1813: 243). By 1858, the wild cattle on Mauna Kea were estimated to number 10,000 (Doyle 1945:49).

The cattle caused havoc for Hawaiian farmers who traditionally did not put up fences around their gardens and who kept non-contiguous agricultural plots scattered here and there. To combat the problem after the 10-year *kapu* was lifted, Kamehameha I hired bullock catchers to hunt the cattle and shoot them. As the cattle were originally a gift to Kamehameha I, they technically belonged to the Crown. Thus bullock hunting was controlled by the king and his chiefs. Selling salted beef to provisioning ships at Kawaihae became another economic market for the government. In 1831, Kuakini (Governor Adams) hired William Hughs, a foreigner, to act as his bullock catcher. In the 1830s cattle were hunted to such an extent that in 1841 the Government placed a five-year *kapu* on killing cattle only for their hides and tallow (Brundage 1971: 9). This suggests perhaps that some underhandedness on the part of the bullock hunters was taking place. The Government continued to be involved in the cattle business. In 1847, William Beckley was responsible for branding the Government cattle. In 1848, John Needles was employed by the Government to slaughter, butcher, pack and sell cattle for the Government. His pay was $40 per month plus 25 cents for each head killed and the offal to pay his work help (*Ibid.*). Lorenzo Lyons commented on the problem of cattle in Waimea:

> "Pilikia" enters cattle history in 1847 . . . two thirds of Waimea has been converted into government pasture land. People are compelled to leave their cultivated spots and seek distant corners of the woods beyond the reach of the roaming cattle, sheep and goats. But the cattle follow, and soon destroy the fruit of their labors. "There is a despairing spirit among my people, and great suffering among them."

One of the renowned bullock hunters was John Palmer Parker who settled in Hawai'i in 1815. He became friends with John Young and spent much of his early years at Kealakekua, where Kamehameha held court. After the death of Kamehameha in 1819, Parker moved to Waipuka in Kohala with his *ali'i* wife, Kipikane and their new-born daughter (Wellmon 1970: 20-26).

An 1823 account describes a visit to Waimea and Mauna Kea where John Parker was found shooting wild cattle.

> . . . several herds of wild cattle, which are very numerous in the mountains and inland parts of the island . . . became so wild and ferocious that the natives are afraid to go near them. Although there are immense herds of them, they do not attempt to tame any and the only advantage they derive is by employing persons, principally foreigners, to shoot and salt the meat in the mountains and bring it down to the shore for the purpose of provisioning the native vessels. But this is attended by great labor and expense. They first carry all the salt to the mountains. When they have killed the animals, the flesh is cut off their bones, salted immediately and afterwards put in small barrels which are brought on men's shoulders, ten or fifteen miles to the seashore (Ellis 1963: 291).

Several other methods were employed for capturing the wild cattle: bullock pits and pens. A description of a bullock pen was given in the *Sandwich Island Gazette*.

> Pens for catching the bullocks on the southward side of the plain of Waimea . . . are built of strong posts of hardwood with cross bars of the same, strongly lashed together with strips of rawhide; they are all varying dimensions. From the entrance of the pen are two diverging fences built of the same materials, extending from a quarter to half mile in length; through this funnel a herd of wild cattle are driven by a number of horsemen and propelled on until they enter the pen, the entrance of which is immediately closed . . . The

bulls are mainly killed for their hides and tallow, the flesh is generally wasted; part of the cows are slaughtered but their flesh is either eaten or jerked for the Oahu market or packed in barrels for ship use; the rest of the cows and calves are sent by ship loads to Honolulu (September 17, 1836).

An 1840 account by Francis Olmsted gives a very colorful description of these notorious and somewhat mysterious bullock hunters.

> In front of the door a bright fire was blazing in a cavity in the earthen floor displaying in strong light the dark features of the natives congregated around it in their grotesque attitudes. Immediately back of these a group of fine looking men in a peculiar costume were leaning against the counter of the store. Some of them were Spaniards from California and they were all attired in the poncho, an oblong blanket of various brilliant colors having a hole in the middle through which the head is thrust. The pantaloons are open from the knee downwards along the outside seam. A pair of boots armed with prodigiously long spurs completed their costume. They were bullock hunters that roam the mountains and had just returned from an expedition of eight or ten days in which they had been very successful (Olmsted 1841:230).

In 1837 James Jarves noted that there were sixty foreigners in Waimea, "mostly mechanics and bullock hunters" (Jarves *in* Brundage 1971: 7). On the subject of foreigners, Lorenzo Lyons also reported to the A.B.C.F. M. (1839-1840), "In my field are sixty or seventy foreigners, from seven or eight different nations. They are beef catchers, sugar manufacturers, shoe makers, merchants, masons, doctors, farmers, and what not" (Doyle 1945: 118)

Bullock hunting was directly related to several other entrepreneurial pursuits -- tanning hides for leather and making tallow to supply factories in California and New England (Kuykendall 1938: 317; Judd 1932: 17). Despite the lack of proper facilities, Waimea had a reputation for the fine and durable leather it produced. Although ecologically, the tanning business had a negative impact to the landscape. The bark from native trees was used to tan hides. Lyons reports that the "*Konohiki*s demanded high prices for bark gathering permits; and *koa* and *ohia* were used more than scarcer trees that made handsomer leather . . . "Kukui was richest in tannin" (Doyle 1945:50). Lyons' comment implies there had already been loss of the native forest besides sandalwood. The tanneries no doubt contributed to more loss of the native forest. There were several tanneries in operation during the 1840s and 1850s. One tan works was "under the direction of Chinamen" ; one owned by James Fay; and two others were at Waiemi and Pukalani, owned and run by William Burke (Olmsted 1841:233; Barrera & Kelly 1974: 45; Native Testimony, Waimea Water Rights Case 1914-1915).

The first sugar mill at Waimea is thought to have been established in the late 1820s (c. 1827) by a Chinese man named Laukī . However, research by Dorrance and Morgan (2000) indicate the first documented date of a mill at Lihu'e was 1835. The earlier date is based on a story told by Alfred W. Carter about his grandfather, Captain Joseph Carter. In 1825, Captain Carter, commandeered a brigantine that sailed from Boston to China via California. The following anecdote was told by Alfred Carter.

> On his [Captain Carter's] first trip to China, he brought to Honolulu a Chinese who afterwards became known as Lau Ki (Kalauki). My grandfather was a wonderfully skilful [*sic*] navigator and jovial company. He knew the Premier at that time (I think the King was in England) and took Lau Ki to the Palace to present tea to the rulers. They had never seen tea before. It was the first tea, I think, ever brought to Hawaii and hence the bearer was dubbed Lau Ki (Tea Leaf). (*In* Brundage 1971:30)

Sometime afterward [date uncertain] Laukī ended up in Waimea and established a mill at Lihu'e in Lalamilo. Prior to this, the Hawaiians had grown sugar cane at Lihu'e for their own use only. Laukī took on two Chinese partners, 'Aiko and Apokani. He had a few native Hawaiians working for him as well. The mill was quite primitive, with the cane being ground by mule power. After the boiling process, the sugar was dried on mats and then bagged. The Lihu'e mill had the advantage of a water wheel utilizing water from Waikoloa Stream. The Hawaiians in the surrounding Waimea area and Kamaloo also grew cane for the mill in the hopes of making a profit. Laukī's business venture at Lihu'e was unsuccessful

probably due to the variety of cane he was planting and after a number of years he gave up. He made two other unsuccessful attempts at starting sugar plantations before getting out of the sugar business completely (Brundage 1971: 30-31).

The mill at Lihu'e was known to operate until at least 1843 (Dorrance & Morgan 2000: 13), although it is uncertain if Laukī and his partners were still the ones running the mill then. Testimony from Kaina Pau states the following:

> Aiko and Kalauki were together planting cane. I knew Lihue before Aiko planted cane there. The Chinese went to Kohala after leaving here and later to Hilo . . . My aunt was Aiko's wife (Kaaopea). I remember when Aiko married my aunt. I did not know my aunt before she lived with Aiko. The cane was ground three times and then Aiko stopped and Aiko went to Kohala. I saw the cane ground all three times . . . Got married in 1852. Aiko had gone some time before I got married. (Testimony of Kainapau; Waimea Water Rights Case, 1914-1915)

Based on Kainapau's testimony, the normal growing cycle of cane (24 to 36 months to maturity), and the last known date of operation (1843), suggests that Laukī and his friends had the mill for a period of about 6 to 10 years, placing the beginnings of the mill in the early to mid-1830s.

The ending date of 1843, when Laukī and his partners moved on to North Kohala, seems to fit in with an agreement between Kuakini and A. H. Fayerweather to plant cane and produce sugar and molasses at Waimea. The agreement, which was to be effective in 1844, stated that Kuakini would supply the cane and the firewood while Fayerweather would furnish the machinery and labor. The agreement was for five years. However, these plans were foiled when Kuakini died in 1844. George Macy and James Louzada (Grant 1157) also unsuccessfully attempted to plant cane at Lihu'e (Judd 1932: 23-24). Testimony from Macy's son, Samuel indicated his father went to Lihu'e in 1846 or 1847 and that he bought the place from Fairweather (Waimea Water Rights Case, 1915-1915).

After several unsuccessful attempts to run the Lihu'e Sugar Mill by subsequent owners, cultivated sugar on a large scale was more or less abandoned in the Waimea area. Historically, the sugar industry did not really gain momentum until the latter half of the 19th century and North Kohala dominated the sugar industry rather than South Kohala.

Early 19th Century Impacts and Changes to Hawaiian Culture

There were many changes that impacted the traditional lifestyle of the Hawaiians in the early half of the 19th century. Introduced cattle were allowed to overpopulate the land. Undomesticated and left to roam at will, the cattle destroyed and ate crops, knocked down fences and disrupted traditional agricultural practices. Sheep and goats left their mark on the land as well. The traditional lifestyle was further disrupted by the sandalwood trade which was controlled by the king and, after 1819, the chiefs. The working people were ordered to leave their fields to go to the mountains to cut sandalwood. The sandalwood trade was another main contributor to the loss of the native forest in the Waimea area.

Following is an observer's description of the Waimea plains in 1856:

> [The Waimea plains is an] . . . elevated plateau some ten miles long, four or five miles wide and perhaps four thousand feet above the level of the sea. At each end they are bounded by a steep slope towards the sea. On one side of the plains is Mauna Kea and on the other side, the Kohala range of hills . . . Some twenty-five or thirty years ago, woods extended over the whole of the plains and to the very edge . . . It is in the memory of many foreigners now living there, when the whole of these plains were covered with a thick wood. Where now hardly a tree is to be seen for miles, we were informed by an old resident that twenty-five years ago he lost himself with his team in the woods. This clearing of land has been almost entirely effected by the cattle. (*Sandwich Islands Monthly Magazine* February, 1856)

Another old-time Waimea resident concurred with the above.

> There were lots of trees, except immediately in Waimea, but some distance out and around the locale were mostly ohia and mauka were found mamane, pua, koa, aaka and naio. Makai grew kouei and wiliwili. Cactus [later to become a pest] was used for fencing around gardens to protect them from the cattle which roamed everywhere. (*In* Brundage 1971: 68)

What was once forest became pasture land which was further impacted by the cattle. In the 1840s, large tracts of land in Waimea were designated Government pasture lands. Any one who pastured "cattle, hogs, sheep, goats, horses" were taxed per head (Doyle 1945: 150). People were forced to relocate, not to mention the extra burden put on the people who had very little cash income. Additional changes were noted by Lyons in two 1845 diary entries:

> Feb. 8, 1945: Many moving from Waimea on Account of change of land holders. Waimea has fallen to the hands of a half foreigner, Mr. [William] Beckley.
>
> Dec. 5, 1845: People are driven to the mountains to cultivate secure from cattle. Koele days have ceased. Population of Waimea rapidly diminishing by death and removal . . . (Doyle 1945: 140, 141)

The ending of *kō'ele* days, when native tenants were required to work on the *konohiki* or chief's farm land, is an indication that the traditional lifestyle had undergone dramatic changes and was coming to an end.

The following excerpt from a Hawaiian newspaper in 1867 aptly describes the many changes that took place in their homeland.

> News of the Mountain Land
>
> What the Land is Like: There is a great change in the land these days because there is something here to change it, that is, the increase of wild animals. So the grass is gone and the earth is bare instead. The sheep does most to put an end to low growing plants and therefore the sheep has done enough to hurt Waimea.
>
> The Way People are Living: Most of the natives are with the whites, working by the year (ku-makahiki_ and some by the month. They work hard for the whites and are called shepherds [*sic*] (kahu hipa), cow herders (kahu bipi), cowboys (paniolo boobei), livery men (kahu kaa), and many other names. They work hard through the long wintry nights, bearing with patience the cold and chills that stiffen (koekoe maeele) in the pelting Kipuupuu rain of this land.
>
> Farming: The young people of this land do not farm much because their time is taken up by the whites. When I lived as a stranger in this land, I did not see any of the natives of the place farming except the old men who attempt to do as much as they are able to. For this reason, the land is left untilled. It isn't because the plants will not grow but because the hands do not work. The hands are occupied with the burdensome task of the whites and there they work with all their might.
>
> Where Food Comes From: Most of the food (poi) of this place is obtained from Waipio. Those who work for the whites receive their food from the whites, but they get it from Waipio. Some people buy their own but the price is high. A short time ago, it was only a quarter for a bundle of hard poi weighing forty pounds or more but now it ranges from ten to twenty-five pounds for half a dollar. It seems that the time will come when this place will have no poi to eat and the children are to be pitied. (Signed, Imiola) (Nūpepe Kū'oko'a, 4/13/1867)

The Mid-1800s

The most memorable event of this period was the *Māhele*. During this time span traditional land tenure changed from a feudal system to the privatization of land ownership. This new system was implemented through a series of government acts from the late 1840s to the mid-1850s.

The Waiboua 'Aina Mahele Database (Waiboua 'Aina Corp. 2000); which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); does not list any Land Commission Award (LCA) claims for Lalamilo; however, examination of current tax maps and other historic maps discussed below identified thirteen awarded claims in Lalamilo for which most list the *ahupua'a* as Waimea. The database also lists four claims that were not awarded in Puako. There are probably other claims within Lalamilo that were not awarded, but it is not possible to distinguish them from the over 140 claims that are listed as being in the *ahupua'a* of Waimea. *Table 1* summarizes the testimony given in support of the claims and *Figure 6* shows the locations of awarded parcels.

Out of a total of twenty-five claimed parcels, fourteen parcels were awarded to thirteen claimants. The awarded parcels range from 0.37 to 48.0 acres in area with an average of 17.44 acres; however, if the small house lot parcels are omitted, then the average awarded parcel was 23.05 acres in area.

The testimonies refer to eight *ili* land divisions in Lalamilo: Puupelu, Waikani, Napooskolu, Puukapu, Puako, Keanuiomano, Koaliula, and Kaluaana. The awarded parcels are concentrated in two areas, at the coast and inland between 2,100 ft and 2,900 ft elevation. House lots are described in the testimonies for coastal parcels. House lots and cultivation are described for the inland parcels. Fourteen claims included house lots with at least 28 houses. A slaughter house, an unspecified number of grass houses, four salt ponds, and a cookhouse are also mentioned in the testimony. Evidence of agriculture in the testimony includes references to two farms, a patch, ten fields, a taro farm, 6 patches of taro and *mamaki*. Specifically mentioned crops include taro, coconuts (19 to 26 trees), hala trees (2), *mamaki*, and two trees of unspecified types.

Testimony from the Native Register for Waimea indicate that many of the *kuleana* house lots already had enclosure walls built around them at the time of the Māhele. If there was no wall, most of the native tenants indicated they were either building or were planning to build a wall to enclose their house lot. No doubt, this was a response to dealing with the cattle problem.

Within the project study area, one LCA (3828) was awarded to J. A. Palea. The following testimony of Kauhini for LCA 3828 to J. A. Palea (also listed as I. A. Palea in the Native Register) described his claim for two house lots and a land claim. One of the house lots was at Puako. Palea's testimony indicated he received it from Kuakini and the lot was "35 fathoms by 35 fathoms and is enclosed by a stone wall" (Native Register Vol. 8:380).

> I have seen/it/in three sections, two house-lots and one land section. The land section is in the ili land of Waikoloa [Waikoloa Nui or Lilāmilo] in Waimea, Hawaii. It had a fence at one time; it has fallen apart at this time. Two houses for Palea are in there. He had built them and the boundaries are:
>
> Mauka, Wahe, also Makai by Hoeu's land
> Kohala, by Wiliama Pekele's [Beckley's] land
>
> Palea received this land in 1847 from Hoeu.
>
> This is an old place on which Palea has lived since 1829. He is living there at the present time.
>
> The land lot is in the ili land of Koaliula in Waimea, Hawaii. It has not been enclosed and the farms are not known. One house is there for Palea.

Table 1. Land Commission Award Claims

LCA	Claimant	Apana claimed	Apana awarded	Ahupua'a	Ili	Section No.	Land Use	Boundary Marks	*Boundary Waimea/Kawa	Boundary Makai	*Boundary Kawaihae/ Kohala	Date Rec'd	Given/ Seller	Acreage	Royal Patent	Sources	Comment
8858	Nahaolewa	1	1	Waimea	Puupehi		house lot and 2 kalo	konohiki	konohiki	konohiki	konohiki	1848	Beckley	4.89	6882	FT 65-6	
979	William Beckley	2	2	Waimea	Waikuni		house lot and kula	konohiki	konohiki	konohiki	konohiki	N/D	Kam. III	28.59	5085	NR 57-2, FT 201-3, 62-6	awarded 2 apana
898	John Davis	1	1	Waimea	Napoopoiwi		enclosed house lot with 2 houses and 3 kalo	konohiki	konohiki	stream	konohiki	1839	Mr. Gardner	4.83	4487A	NR 130-2, FT 68-6	
22719	Maiahi	1	0	Waimea	Puukapu		N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.00	none	NT 148-4	
32039	Jane Bowers	1	1	Waimea	Puupehi		house lot and 2 kalo	N/D	N/D	N/D	N/D	N/D	N/D	7.8	6443	FT83-4	
3873	Ioloke Mahoe	1	0	Waimea	Puaka		house lot, enclosed with 2 houses	konohiki	konohiki	Bokoke (Beckley)	Bokoke (Beckley)	N/D	parents/ konohiki	0.00	none	NR 378-6, NT 147-4	
3736	Wahaikama	1	1	Waimea	Puaka		house lot, enclosed with 2 houses	Waha	Pokoke (Beckley)	Pokoke (Beckley)	Pokoke (Beckley)	1834	Manoa	1.06	8010	NR 82-6, NT 19-4, 177-4	testimony also refers to Lokomoku as ili of Puaka
3756	Akahi (wahine)	1	1	Waimea	Puaka		house lot, enclosed with 4 houses	Ulioma	Ulioma	Huou	Pokoke (Beckley)	N/D	N/D	0.37	3606	NR 82-6, NT 20-4	Ulioma described as konohiki
3782	Aaveai	1	1	Waimea	Keanuamano		taro farm	Bokio (Beckley)	Bokio (Beckley)	Bokio (Beckley)	Bokio (Beckley)	N/D	N/D	26.00	3782	NR 47-6, 36-4	awarded 2 apana; one in Waikahoa
3825	Paokuloa	1	0	Waimea	Puaka		12 or 15 awapuhi trees	N/D	N/D	N/D	N/D	time of Kam. II	N/D	0.00	none	NR 380-6, NT 148-4	land taken by konohiki
3838	LA. Paloa and wife	3	1	Waimea								1847	Huou	46.00	8448	NR 380-6, NT 31-4	William Beckley described as konohiki
					Puaka	1	house lot, formerly enclosed with 2 houses	Huou	Huou	Huou	Beckley						
					Kaohulu	2	kalo and house lot	konohiki	konohiki	konohiki	konohiki						
					Wailehua	3	house lot, partially enclosed	konohiki	konohiki	konohiki	konohiki						
4098	Kaneakuloa	2	0	Waimea	Puaka							before Kam. I	grand-parents	0.00	none	NR 346-6, NT 147-4	
						1	house lot, enclosed with 3 houses, 7 awapuhi, 2 kalo trees, salt pond	Beckley	Beckley	Huou	Huou						
						2	4 salt ponds, awaal potato patches	konohiki	konohiki	konohiki	konohiki						
4102	Kamahoi	1	1	Waimea	Puaka		house lot with 3 houses and 2 trees	N/D	N/D	N/D	N/D	N/D	N/D	0.36	7137	NR 66-6	

*Inland parcel boundaries are Waimea/Kawaihae and coastal parcels are Kona/Kohala
N/D= No data

Table 1. Land Commission Award Claims (cont.)

LCA	Claimant	Apana claimed	Apana awarded	Ahupua'a	Ili	Section No.	Land Use	Boundary Marks	*Boundary Waimea/Kona	Boundary Makai	*Boundary Kawaihae/ Kohala	Date Rec'd	Given/ Seller	Acreage	Royal Patent	Sources	Comment
4186	Kanahalua	3	1	Waimea	Kaluaono							1848	Ulioma Pokoke (Wm. Beckley)	35.20	7882	NR 81-6, NT 17-4	
						1	1 house, 45 awapuhi	Ulioma Pokoke (Wm. Beckley)	Ulioma Pokoke (Wm. Beckley)	Ulioma Pokoke (Wm. Beckley)	Ulioma Pokoke (Wm. Beckley)						
						2	1 pond	"	"	"	"						
						3	6 patches of taro and awapuhi	"	"	"	"						
4666	William French	2	1	Waimea	N/D		house and slaughter house with enclosure, grass house, coalhouse	N/D	N/D	N/D	N/D	1840	Wm. Hughes	21.80	97	FR 9-2, FT 197, 177-2; NT 483-2	also had claims in Honokahu and Kawaihae, claimant built a wharf and was a bullock catcher
85138	Hookalu	1	1	Waimea	Napoopoiwi		field	konohiki	konohiki	konohiki	konohiki	1848	Wm. Beckley	28.44	8082	FT 84-6	
85668	Wm. C. Lunalilo	1	1	Puaka	N/D		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	8547	FT 861-3, 82-10, NT 480-10, 82-10	many other claims elsewhere
10280	Makaka	1	0	Waimea	Puaka		N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.00	none	NR 119-6	

Mauka is the land Pohakuloa for the konohiki, W. Pekele, and the same is for all sides.

This is an old land and Papai, the wife of Palea, has lived there during the lifetime of Keaumoku, before the coming of the missionaries here to the present time; no one has objected to this day.

Section III is the house-lot in Puako, Waimea, Hawaii, and Palea's interest is known. Two sides have been enclosed and one house in there which Waimea had trimmed is for Kuakini. Palea has no house there and the enclosure was built as if it were for the konohiki. I have not heard Palea has a lease at this time of the house and lot which belong to W. Bekele, the konohiki, at this time. This lot is directly with this konohiki; the entire boundary is for the konohiki only. Papai had requested of William Bakle to allow her to live under his protection and that he may have the house and lot interest.

Papai, sworn and stated, I have known these two sections all for us/two/and the third section at Puako is for William Bekele while he affords us both protection. No one has objected for the two sections. The third section has been opposed by William Backle; however, this is in order because of the konohiki status (Native Testimony Vol. 4: 31-32).

Palea was awarded 48 acres at Koaliula, Waimea, South Kohala. The award description follows:

Land Commission Award 3828 to Palea

Helu 3828 Palea Koali`ula,Waimea, K. Hawai`i

`Āina ma Koali`uli [*sic*],Waimea, Hawai`i

E ho`omaka ana ma ke kihi `Ākau ma kahi kumu lā`au, e pili ana ma ka `auwai a e holo ana Hem. 26° Hik. 10.30 kaula [illegible word] Hem. 2 ½° Kom 9.63 kaul. ma Pōhakuloa a hiki ma kahawai o Waikoloa. A laila ma ia kahawai, Komohana 18.85 kaul. Alaila `Ākau 62° Kom 8.66 kaul. ma Amiikea. A laila Ak. 1¾° Kom. 16.50 kaula. ma Haleapuna a hiki ma kahawai o Waiaka. A laila ma ia kahawai Hem. 85 ½° Hik. 22.15 kaul. a hiki ma kahi i ho`omaka ai. Ma kēia `āina, 48 eka.

C. J. Lyons, Surveyor
Feb. 18, 1851

[Document signed/dated: May 12, 1851]
[Liber 5:46]

Translation:

No. 3828 Palea Koali`ula, Waimea, K[ohala], Hawai`i

Land at Koali`uli [*sic*], Waimea, Hawai`i

Commencing at the North corner at the tree, along the ditch:

South 26°	East 10.30 chains
South 2 ½°	West 9.63 chains along Pōhakuloa to the Waikoloa Stream. Then at the stream, west 18.85 chains. Then,
North 62°	West 8.66 chains along Ami`ikea. Then,
North 1 ¾°	West 16.50 chains along Haleapuna to Wai`aka Stream. Then, at this stream,
South 85 ½°	East 22.15 chaines to the point of commencement.

Within this land [is] 48 acres.

Papai apparently either died or she and Palea parted ways and Palea remarried. In July of 1880 Palea sold half of his land (24 acres) at Koali`ula to Antone Allen from Waimea, South Kohala for the sum of ten dollars. Kaluhia, identified as the spouse of Palea, (*'O Kaluhia (w) mare a Palea*) signed away her dower rights to the land. (Liber 64: 474-475)

On October 17, 1880, Palea and his wife Kaluhia (*ka`u wahine mare*) sold a little piece (*kauwahi*) of their land at Koali`ula to one Emalia. The land is described as a 'house lot, enclosed by a stone wall and a cultivated plot within the enclosure, as well as one acre outside of the aforementioned enclosure that Emalia desired, separate from the land conveyed to A. D. Kamaihui (*'Oia ke kahua hale i pā `ia i ka pā pōhaku a me kahi mahi i loko o ua pā lā a me ho`okahi `eka ma waho a`e o ia pā ma kahi a Emalia e makemake ai, `a`ole na`e mai loko mai o ka `āina i ho`olilo `ia iā A. D. Kamaihui.*) (Liber 65:491).

A. D. Kamaihui is the same person as Antone Allen, also known as "Bull" Allen, who lived at Wai`aka, just *mauka* of the project area (Waimea Water Rights Case; Notley: 4). On July 20, 1881, a deed was filed between Palea and J. W. Pa. The document was very revealing as to Palea's predicament at the time of the sale and the disposition of the 48-acre parcel at Koali`ula.

> . . . Know all men by these presents that I. Palea (k) of Waimea, South Kohala, Hawaii, for and in consideration of the sum of one Dollar to me in hand paid this 20th day July, A. D. 1881 by J. W. Pa of Waimea aforesaid, the receipt whereof is hereby acknowledged, and for a further consideration, namely that the said J. W. Pa shall provide me the said Palea with proper food & lodging during my life and provide my remains with decent burial, when it pleases God to take me from this world. For the above considerations I do hereby sell and convey unto the said Pa, his heirs and assigns, all my interest in one half of a piece of land granted to me by Royal Patent, the same land being number 3828 in Book 5 page 46 and situated at Koaliali [Koaliula] Waimea aforesaid, containing forty-eight acres more or less. My son Kamuela retains the other half, my wife Kaluhia having deserted me without just cause to live with a Hawaiian named Kaleo at Puako, Hawaii aforesaid, from the year 1873 till this date and the said J. W. Pa relieving [*sic*] me when in a destitute condition and finding me in food, clothing and lodging till this day. For this and my love and affection towards said J. W. Pa and for the said sum of One Dollar and for the further consideration of said J. W. Pa his heirs or assigns to provide me with proper food, clothes and lodging do sell & convey with all the rights and appurtenances thereunto in the said forty-eight acres, twenty-four acres, to have and to bold unto the said J. W. Pa his heirs and assigns forever. And I the said Palea for myself my heirs and assigns do covenant with the said J. W. Pa his heirs and assigns that I will warrant and defend him in the said number of acres in said land forever against the lawful claims and demands of all persons and that the said piece of land is now free of all encumbrances. In witness whereof, I the said Palea do hereunto set my hand and seal this 20th day of July, A. D. 1881. Signed: Palea (his "X" mark) (Liber 68:425-426.)

Apparently, Kaluhia and Palea had gone their separate ways seven years prior to the sales transactions to Antone Allen and Emalia.

The above deed to J. W. Pa is especially interesting because it states Pa was to give Palea a proper burial. Traditionally, the *mako`āinana* Hawaiians buried their dead where they lived. On the subject of burials, Bowen wrote that graves were ". . . either simply pits dug in the earth, or large enclosures . . . Occasionally they buried their dead in sequestered places at a short distance from their habitations, but frequently in their gardens and sometimes in their houses" (Bowen 1961:142). In one 1847 claim for a houselot, the claimant states, "It was from Kamehameha I to my *kupuna*, who have all died, and I have inherited it. I think my cousins are buried there" (LCA #3674 to Berenaba). The claim infers that this was the usual custom – to be buried where you lived. It is very likely that Palea was buried within the confines of his house lot on LCA 3828.

On July 14, 1898, J. W. Pa, along with Mahikulani Lindsay and James F. Lindsay sold their interest to the twenty-four acres (of the original 48-acres) in LCA 3828 to a Norah and Wilmot Vredenburg.

The deed does not state the relationship between J. W. Pa and Mahikulani Lindsay, although an educated guess would be that they were father and daughter. James Lindsay was married to Mahikulani Lindsay and he agreed to renounce and quitclaim all of his dower rights as part of the sale (Liber 183: 254-255; Liber 189: 159). Thus, the lands of Palea passed out of Hawaiian ownership in the hands of foreigners.

Lalamilo lies within the former Waikoloa Maneuver Area, an area of 91,000 acres acquired by the U.S. Navy in December 1943 through a license agreement with Richard Smart of Parker Ranch. The training area extends from the ocean to the Pohakuloa Training Area, and from the Waimea-Kawaihae Road to south of the Waikoloa Road. The area was used for military exercises including the use of live ammunition and other explosives. The land was returned to Parker Ranch in September 1946.

Late 1800s

The sugar industry did not really gain momentum prior to 1850 for several reasons. Prior to the *Māhele*, all land was owned by the Kingdom. Leases were uncommon and growers depended on Hawaiian farmers to supply them with cane. The Māhele aided sugar growers by allowing them to purchase land in fee simple to grow their own cane. California became a viable market for sugar export when homesteaders settled there in the 1830s. This market was further expanded by the1849 Gold Rush. However, when California became a state in 1850, they imposed a strict sugar tariff which lowered profit margins and made it impossible for Hawai'i growers to compete with sugar imported to America from Manila or China. By 1857, there were only five sugar plantations in Hawai'i, none of them in South Kohala. During the Civil War (1861-1865), another market opened up for Hawaiian sugar planters (Dorrance & Morgan 2000: 11, 13). It was not until the Reciprocity Treaty of 1876 that the sugar industry made real strides. But the locus of the sugar industry became North Kohala rather than South Kohala.

In the early 1900s (1903-1913), Robert and John Hind started Puakō Plantation, which proved to be disastrous. The Hinds hoped to get water from a flume (*Figure 7*) that was built eight miles *mauka* (upland). The water supply was irregular and any rainfall quickly evaporated due to frequent heavy windstorms. Production peaked in 1909 and the mill closed after the last harvest in 1913 (Dorrance & Morgan 2000: 90).

Though the era of sugar continued into the latter half of the 20th century, Waimea was not to figure prominently in this epic. The Lands at Lihu'e had long been converted to ranch lands by George Macy (Testimony of Samuel Macy; Waimea Water Rights Case, 1914-1915). By 1878, the Lihu'e lands were part of what was to become the Parker dynasty. A note in Lorenzo Lyons' diary reads, "Learned that Lihue ranch lands, cattle and all have gone into the hands of John and Sam Parker (Doyle 1945: 218).

Though the actual date when the Spanish *vaquero* (cowboy) first arrived in Waimea is not known, it is thought they were here by no later than 1830 (Kuykendall 1938:318). The *vaquero* or *paniolo* [from *paniola* after *espanol*], as they came to be called, brought their culture with them -- the art of saddle making, rawhide lariats, as well as their traditional garb of ponchos, leggings, spurs and wide-brimmed hats. By 1832, the Hawaiians were being taught to rope wild cattle in the mountains by three Mexican cowboys, Kossuth, Louzada and Ramon (Brundage 1971: 6).

The development of Waimea's ranching history in the second half of the 19th century was directly linked to the introduction of cattle and the outgrowth of economic pursuits (salted beef, tanning, tallow making, slaughterhouses) resulting from the overpopulation of cattle. The humble beginnings of Parker Ranch began when John Parker essentially started his first herd from taming wild cattle sometime during 1837-1838 (Brundage 1971: 7).

In the early 1850s, ranchers began to see that Hawai'i cattle were of inferior quality due to inbreeding. Organized ranching methods were spearheaded by the Royal Hawaiian Agricultural Society who recommended fencing to contain the wild cattle (1851) and that owners castrate their bulls or keep their bulls contained on their own land. The Society also recommended improving the stock and to this effect, several new breeds were imported from Australia and later Scotland, the British Colonies and America. The Society also stressed against overstocking the land. Several other factors were important to the development of organized ranching. The Society realized there was a potential market to sell quality beef if it could be produced and they determined that Hawai'i had a higher percentage of grazing lands than arable

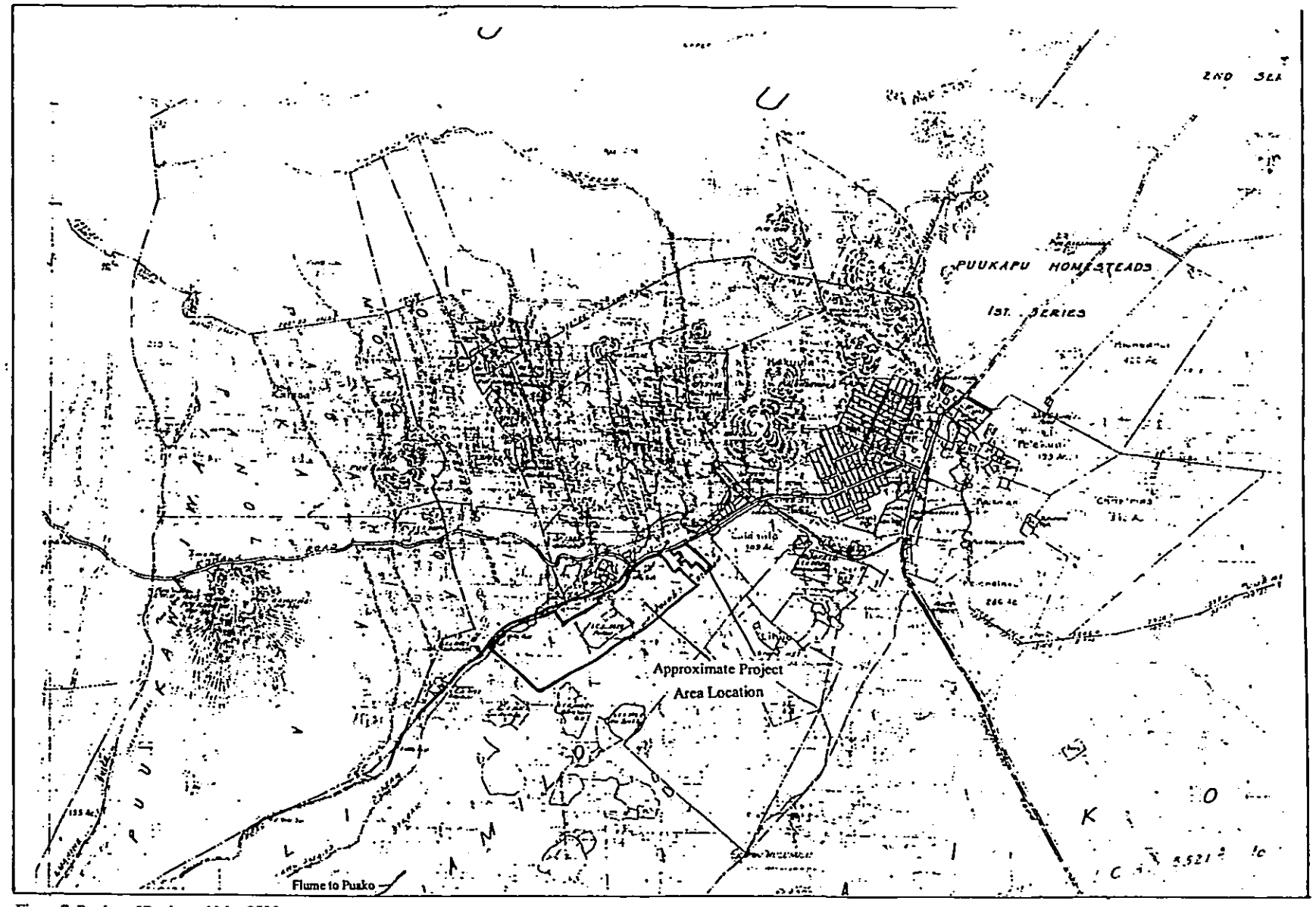


Figure 7. Portion of Registered Map 2785

lands. The Waimea Grazing Company (Janion & Green) began to acquire and lease acres of land in Waimea which they converted to pasture land. They also contracted with the Hawaiian Government to catch all unbranded wild cattle on public lands. Prior to this, the Government had claimed all wild cattle (Brundage 1971: 11-12). Waimea Grazing Company remained in business until 1878 (Wellmon 1970:136). Their closure was probably a direct result of the big drought of 1877 wherein hundreds of cattle died.

Also of note is the rise of the Parker dynasty in Waimea. In 1850, John Parker purchased 640 acres of land at Manā from the Hawaiian Government. The following year, Parker purchased an additional 1,000 acres. In 1852, Kamehameha III granted a lease to Parker for the lands of Waikoloa, giving Parker the competitive edge to control the developing ranching industry (Wellmon 1970: 75). In 1877, Rev. Lyons wrote to his son, Albert about the changes occurring in Waimea.

> Waimea has changed some since you left. It is mostly owned by J. P. Parker, Old Man Parker's son. He is a Noble in the Legislature, and one of the richest men on the Islands. But there are few people here. Very few foreigners, not more than ½ dozen. (Doyle 1945: 218)

In the early 20th century, the Parker family acquired Waikoloa and ʻŌuli in fee-simple, giving them 100,000 acres of grazing land (Wellmon 1970: 175). Today Parker Ranch is the State's second largest private landowner with lands comprising 139,000 acres (Juvik and Juvik 1998:22).

The Missionary Census

When Rev. Thurston visited Waimea in 1823, he estimated the population to be somewhere between eleven to twelve hundred, based on his count of 220 houses (Ellis 1963: 289).

Upon Lorenzo Lyons' arrival at the Waimea mission station in 1832, he estimated his whole district (including Kohala and Hāmākua) had a population of about 16,000 (Doyle 1945: 58). It is not clear how he came by this number. An 1833 diary entry noted that he had attended yet another funeral – the fourth in three weeks. Deaths were more numerous than births and the population was decreasing. Three years later in 1835, he wrote, "During the past year I have taken a census of the population of this district and find it to be as follows: Waimea, 1,396; Kohala 6,175; Hamakua 4,015; total 11,586 from which it appears there has been a diminution of the people 3,500 within three and a half years (*Ibid.* 82). In 1839, Lyons noted that the population census actually showed an increase because the census taken some years ago was incorrect (*Ibid.* 107).

In 1843, Lyons indicated the count for Waimea was 1,012; Hāmākua 3,820, Puakō and Kawaihae combined was 734; totaling 5,576. Of the total amount, 1,507 were children. He noted there was a "decrease in population of four hundred in two year (*Ibid.*: 124). By 1845, Lyons' diary indicated that the "Population of Waimea [was] rapidly diminishing by death and removal [displacement from the land] (*Ibid.*: 141).

By 1850, the native population had already been severely reduced due to introduced diseases (Bushnell 1993). The smallpox epidemic of 1853 had devastating effects on all the islands, including Hawai`i. Bushnell writes:

> No one ever knew how many people sickened, how many died. Official government figures released in 1854 declared "between 5,000 and 6,000 fatalities," in a total population of about 84,000. Comparison census counts taken in 1850 and 1855 indicate much greater losses. Estimates range from 10,000 to 15,000. "Nearly all the victims were Hawaiians" . . . (Bushnell 1993: 210)

In 1853, Lyons noted there was one case in of small pox in Waimea and "very many at Kawaihae" (Doyle 1945:157.)

Lyons noted noticeable change in population movement during 1859 due to displacement and changes in land tenure:

> Visited Puukapu. What changes in four months! All the people are leaving in consequence of the land being leased to Luzada and Co. A few remain. Cabbages, bananas, kalo are grown. The women make kapa, catch small fish, make mats, or sew. The land holders will allow no hogs, hence all are killed. Some of the men own horses and bullocks. (*Ibid.*: 161)

Another entry in 1860 noted that "there is much sickness . . . I notice a diminution of population since the census of 1854" (*Ibid.*: 175-176).

It seems that by 1865 the situation had worsened. Lyons commented that "Waimea is going downwards, population diminishing, those who remain sickly. How few well bodied are left! It will perhaps not be long before Waimea becomes a desolation. (*Ibid.*: 194)

Indeed, by 1867, Lyons wrote in his diary, "The whole population of Waimea is now about four hundred" (*Ibid.*: 195). Lyons made several entries, one in 1869 and one in 1872, that he was vaccinating people as a precaution due to smallpox outbreaks in Honolulu (*Ibid.*: 199, 201).

The picture of population diminution is one of a gradual decline, but also one that fluctuated depending on the activities of the general population (Clark 1983: 51). During the pre-historic and early historic period, shifts in population were due to demands imposed on the people by the chiefs such as building a major *heiau* like Puʻukoholā which involved massive amounts of labor and supplies; or seasonal movements – going to the coast to gather salt and fish during cooler seasons in the uplands. Lyons made several comments about people being gone from their homes for extended periods of time and the hardship it imposed on them.

> Most of the people have gone to the mountains after canoes (Hollowed from forest trees), and will be gone 2 or 3 weeks. Hence we are rather lonely. The Governor must be obeyed whatever else must suffer. A thousand people will probably be employed in drawing five large and heavy canoes from Mauna Kea, to somewhere near the shore, a great work. The man who refuses to engage in it is to have his house burned down. (Doyle 1945: 73-74)
>
> Parents and children are taxed for articles not obtained in the neighborhood. They *must* go in search of them, at a distance from home. That means an absence of several weeks . . . Men and women are ordered by the chief to build a stone wall ten or twenty miles distant from their residence. Children must leave school to accompany their parents. (Doyle (1945: 88)

In the early historic period the sandalwood trade was a major impact on population shifts. People were forced to abandoned their fields and spend weeks in the mountains cutting sandalwood to meet the quotas of the chiefs. By the 1820s and 1830s bullock hunting and salted beef was another commerce controlled by the chiefs. The people were obliged to carry out their wishes. A notation from Lyons' diary follows:

> To carry beef, hides, and horns to the shore to ships sent by the king, requires much of the time of the natives . . . Besides, when they find they can procure beef for food by carrying certain quantities of it, they neglect to cultivate the ground. (Doyle 1945:64)

As cattle became an increasing problem, people moved their agricultural plots to places farther away where the cattle could not harm them.

> Passing through a wilderness where are many majestic *ohia* trees, one of the elders with me directed me to his plantation. It consisted of Irish potatoes, corn, onions, sugar cane, tomatoes, mulberries, *kapa* trees, figs, and *kalo*. He has his plantation in the remote wil-

derness that it may be protected from the ravages of cattle, for native gardens are generally without fences (*Ibid.*: 126).

Some threw up their hands in despair and gave up farming all together.

In the 1850s, the *pulu* trade sent people into the forest once more, many abandoning their homes and fields for weeks at a time.

Beginning in the 1830s and 1840s, Hawaiians began to be employed by the influx of foreigners cashing in on hunting cattle and related business pursuits such as tanneries, shoemaking, etc. However, Hawaiians often traded labor for food rather than getting paid with money. As cash crops failed, Hawaiians became even more dependent on foreigners for money. In 1849, there seems to have been a slight shift in the foreign population as quite a few left for California in hopes of striking it rich in the Gold Rush (*Ibid.*: 137). Changes in land tenure initiated by the *Māhele* also contributed to changing agricultural practices and population shifts. By the 1860s, the *pulu* business was failing. Many Hawaiians, having already abandoned their fields, were increasingly dependent on foreigners for cash. In 1860, Lyons lamented about the constantly fluctuating foreign population on whom the Hawaiians depend on for money (*Ibid.*: 176). By the 1860s there was also "very little demand for Irish potatoes" and Kawaihae Uka potatoes were "few, and poor and dear" (*Ibid.*:176, 194).

It seems by 1860 the Hawaiian population at Waimea had shifted to a near cash-based economy and taxes were being required in money rather than in goods. This was probably an outgrowth of selling a variety of cash crops to provisioning ships since the early 1800s -- vegetable produce, sweet potatoes, Irish potatoes and *pulu*. An 1860 notation from Rev. Lyons' diary is very revealing and shows the difficulty some people had in meeting the cash-based tax requirements put on them. As a result many sold their lands in order to pay taxes or, being unable to pay, their lands were auctioned off. Displacement from the land was the sad result.

> Here is the Government Tax Collector. He goes over the district and collects on the first tour -- say ten dollars of the $1600, whole sum. He has taken all the money there is. He notifies the people that he shall be around again in two weeks, and they must be ready. He makes a second and third, or fourth, or fifth, or sixth tour, collecting sometimes more, sometimes less. Meanwhile the people are working with all their might, selling their property, going off to other Islands to beg money of friends, or to sell property in time to pay the tax. Then for unpaid taxes property must be attached, and sold at auction at great sacrifice. (Doyle1945: 177)

The 1870s heralded several new businesses in Waimea which now had five stores and a hotel as well as the company of Spencer, Green & Macfarlane who raised sheep (*Ibid.*: 200, 204, 218). An 1870 diary entry by Lyons gives the passing away of traditional lifestyle in Waimea a sense of finality -- Papa, the last grass thatcher in Waimea, passed away (*Ibid.*: 206).

Early-Mid 1900s

Someone who was a guiding force in the ranching industry in the early 1900s was Alfred W. Carter, guardian of Thelma Parker and manager of Parker Ranch. Mr. Carter did much to aid ranching by improving cattle stock, conserve tree-less ranch lands by planting new and better grasses and organizing the Hawai'i Meat Company to provide ranchers an outlet to market their beef and beef products (Brundage 1971: 59, 28). Being a strong leader, Carter was able to facilitate networking among the different ranches so that everyone could learn from each other and help each other when problems arose. Mr. Carter managed Parker Ranch until 1937 when he was forced to step down because of health problems. His son, Hartwell Carter took over the position of ranch manager and remained in that capacity for the next twenty-five years.

Figure 8 shows Parker Ranch lands in Lalamilo immediately south of the project area in 1915. The dark shaded areas are listed as waste lands. The map shows a network of walls and irrigation ditches. Two corn fields and a cattle pen are shown to the south of Waimea town.

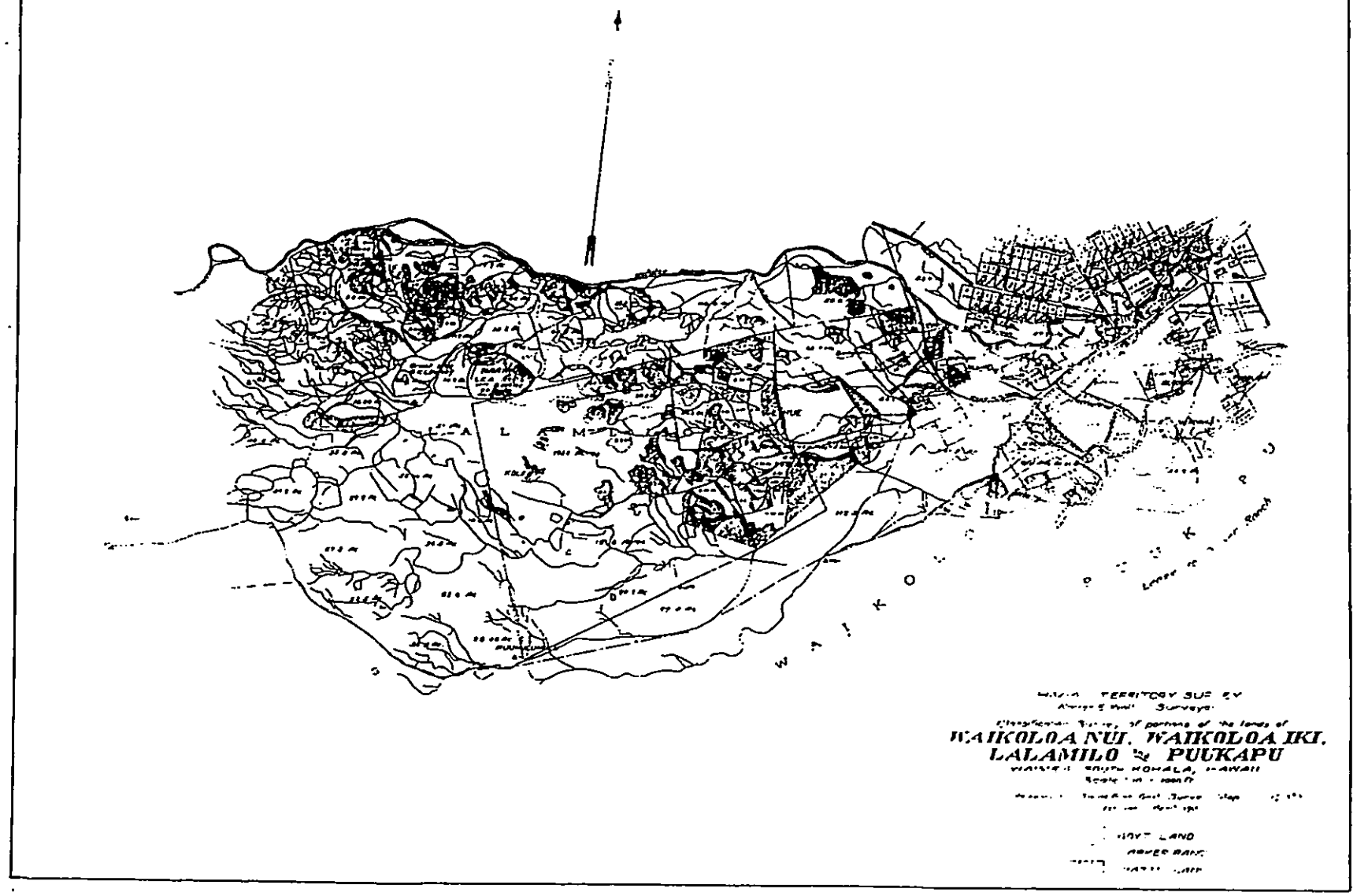


Figure 8. 1915 Hawaii Territory Survey Map

The Waimea Water Rights Case

In the year 1914, Alfred Carter, on behalf of his trustee, Thelma Parker, filed a petition against the Territory of Hawai'i and 62 individuals over appurtenant water rights to Waikoloa Stream for the purposes of irrigation. Carter alleged that in 1905 the Territory wrongfully diverted water from Waikoloa stream when it constructed a dam and ran connecting pipe-lines from the stream above the lands of the petitioner (Carter) to Waimea Village (Hawaiian Reports Vol. 24: 49). In essence, Carter was protecting the interests of Parker Ranch and their right to utilize water from Waikoloa Stream for purposes other than normal household use (e.g., irrigation for pasturelands). The majority of the respondents did not show up and the Territory of Hawai'i was the only one to contest Carter's claim. The "Hawaiian Report" summarized the case as follows:

> This is a proceeding . . . for the purpose of determining water rights in the Waikoloa stream, at Waimea, Island of Hawai'i . . . In the petition the petitioner's ownership of certain lands was alleged and the right to the quantities of water claimed as appurtenant thereto for irrigation purposes by immemorial custom was stated as follows: An area of 94.3 acres at Kaomaloo, within and a part of the ili of Waikoloa, through the ditch known as the "Lyons" ditch, not less than 940,000 gallons per day; three *kuleanas* in the government land of Waikolomiki, comprising an area of about nine acres, through a ditch (called Lanakila), not less than 95,000 gallons per day; five *kuleanas* in the government land of Lalamilo (adjoining Waikoloa), and a grant (R. P. 1157) of a parcel of land containing an area of 250 acres at Lihue (stipulated to be a portion of the "land or so-called ahupuaa" of Waimea), not less than 2,000,000 gallons per day through the ditch known as the "Akona" ditch. Also water for domestic use upon a parcel of land described in a deed from Kamehameha IV to Waimea Grazing Co., adjoining Waikoloa stream; and the right to the surplus freshet water of the stream as it flows into and upon the *ahupuaa* of Ouli (adjoining Lalamilo) was claimed. (*Ibid.: 49-50*)

The record seems to suggest that this was the first modernization of a water system in the South Kohala district. Prior to the dam being built, Waimea residents received their water from the streams and from a series of ancient *'auwai* (ditches) which had been in use from "time immemorial" (Nakamura 1982:19; Carter vs. Territory of Hawai'i: 17-18). Handy, Handy and Pukui described the utilization of the ditch system by the Hawaiians.

> . . . With farms along the water system upon which all depended, a farmer took as much as he required and then closed the inlet so that the next farmer could get his share of water -- and so it went until all had the water they needed. This became a fixed thing, the taking of one's share and looking after his neighbor's rights as well, without greed or selfishness (1972: 58).

What is remarkable about this case is the native and foreign testimony, where there would otherwise be none, from informants with first-hand knowledge of the *'auwai* system and agricultural practices in the Lālāmilo/Waikoloa area. The testimonies describe the various land areas and provide glimpses into the lives of Hawaiians living during that time. Most of the informants were born around the mid-19th century, around the time of the *Māhele*. Many of the informants recalled seeing the water run through the ditches to various lands where people were living or seeing the remnant ditches no longer in use of settlements long gone. An important point made clear by the testimonies was that the water was used for domestic household use and not for large-scale irrigation. The point being made that in the "old days" there was no need to irrigate on a large scale because there was usually enough rainfall -- even on what local residents today consider the "dry" side of Waimea. However, if there was water to spare and plants needed watering, they were irrigated. Lucy Peabody, grand-daughter of Hō'eo and born in 1840 testified that, "There was very little, if any, irrigation at Waimea in the old days as it rained more or less nearly every day and there was an abundance of water. The rainfall in the old days was much heavier than it is now and the forest came much farther down. The cattle have been causing the forest to recede". This was also recognized by the State Supreme Court when Carter appealed the 1915 decision.

> The evidence is to the effect that there were a very few *lois* of taro in the locality in question. It was shown that the Hawaiians habitually raised in their house-lots dry land taro, bananas and vegetables as well as sugar cane which they cultivated for human consumption as well as for food for their animals. And it is a fair inference from the evidence that the ditch system at Waimea was constructed for the purpose of supplying water to the inhabitants for household purposes and for the irrigation, when the natural rainfall was insufficient, of their crops (Hawaiian Reports Vol. 24: 59).

Barry Nakamura (1982) aptly discusses the ancient *'auwai* system in detail and it is briefly summarized here. The main sources of surface water for this *'auwai* system were the streams of Lanimaumau, Waikoloa (also known as Paliilii) and Kohākōhau. According to the testimony, Kohākōhau was known by several names: Wai'auia, Keanu'i'omanō and Wai'aka. Depending on which part of the stream being referred to, this still holds true for local residents today. At the time of the lawsuit, it was determined the main *'auwai* feeding off of Waikoloa Stream were the Lyons, Akona and Lanakila ditches. Off of these three ditches was a network of smaller ditches that watered the lands below (south) of the project area. What was evident from the testimony was that these ditches were very old networks developed by the Hawaiians long ago and that portions of the *'auwai* were used up until the late 19th to very early 20th century.

Relative to Lālāmilo, the Akona *'auwai* watered the lands of Lihu'e below the project area (Grant 1157 to G. Macy and J. Lourzada) and continued west toward Kolea where it turned south and was said to flow as far as Pu'ubululubulu and Pu'upā. In addition to Grant 1157, the Akona *'auwai* watered the following five *kuleana* in Lālāmilo (*see Figure 6*):

LCA 4885 to William French
LCA 976, Apana 1 to William Beckely
LCA 3202-B to Jose Bowers
LCA 589-B to Nabolowaa
LCA 8513-B to Kuamuu [Kuamoo] Ho'olulu
(Carter vs. Territory of Hawai'i: 774)

The testimonies indicate that in previous times there was a very large settlement on the *makai* lands of Lālāmilo, especially below Lihu'e and even spreading across toward Wa'awa'a, Papuaa and beyond toward Kona. By the mid-19th century when most of the informants were born, these settlements were gone. But, many informants reported hearing this from grandparents or older *kama'āina* and most recalled seeing outlines of remnant ditches on the landscape. Martin Campbell, born in 1864 and whose wife used to live at Papuaa said, "I was told there was a large settlement makai on Lalamilo and was told they got water from the stream going through Lihue. I was told that the people living there had a village of nearly 10,000" (Waimea Water Rights Case, 1914-1915; Campbell: 3).

Waimea's warrior tradition was recalled by Charles Notley who was born at Lanikeapu'u, Waimea in 1861.

> The land down in behind [below] Puopelu and LCA 8513-B [to Kuamoo Hoolulu] was thickly populated in the old days. Kamehameha got the flower of his army from these lands round about. In the old days the most populous portion of the land was below Puopelu and below Lihue. I knew this from the kamaainas. The signs of the old kuaunas or patches were evident in the old days. I have seen them. The people makai of Puopelu would get their water from the Akona auwai and from Waikoloa Stream. There were pools in the solid rock in the Waikoloa Stream which would hold water for a long while, in dry season . . .
>
> I heard that they only stayed there one or two seasons, and then moved to Kohala. . . In the olden days there were auwais running through Lihue down to the settlement makai. I was told that in the old days the residents below Lihue would use the water from these auwais. In dry times they would go to Waikoloa and Waiaula streams. Times that I have gone beyond Lihue down makai looking for cattle, I have seen water running in the artificial auwais. When there would be an average flow in the stream I have seen the water

down in the ditches makai of Lihue -- down into the settlement makai -- I don't know how far makai they go (Waimea Water Rights Case, 1914-1915; Notley:).

Of interest is Notley's comment about the lands *makai* being occupied for "one or two seasons" inferring that perhaps there was a specific intent for the occupation of these lands. This possibly gives substance to the theory that agricultural expansion in this marginal area was due to the construction of Pu'ukoholā *heiau* (ca. 1790) by Kamehameha I (Reeve 1983: 236).

The "pools in the solid rock" that Notley referred to were well known among the *kama'āina* who lived there. During drought and dry spells when the streams did not flow, the large rocks in the streams held remnant water where the people would draw water from for domestic use. This practice was also mentioned by Kamakau in reference to Lanimaomao [Lanimaumau] Stream in the battle between Loonikamakahiki and Kamalālāwalu (1992: 60).

Paul Jarrett, a non-native informant related that though he never saw people living there, he was told "that in the olden days there was quite a settlement below Lihue . . . The part in between Lihue and Waawaa and Papuaa and way towards Kona side, and all around there was cultivated. I was told this by the kamaainas. I was told that there was a large settlement there. (Nui kanaka oia wahi). . . The only places where I heard of the settlements makai of Lihue were on Lalamilo and mauka of Ouli. Jarrett was manager of Parker Ranch from 1888-1901.

By the early 1850s when Samuel Macy was growing up, there were not very many people living at Lihu'e itself. Still, there were about "50 of us altogether living at Lihue." At that time, there were still 25 or 30 thatched houses. Many of the cowboys lived there as well. Macy's recollection was that when he was a boy, "the forest used to go from Puukapu over to Waipio." Samuel Macy was the son of George W. Macy (Grant 1157) and he was born in 1848 (Waimea Water Rights Case; Macy: 2-3). Macy also recalled going to Waiemi (also know as Waikane) to catch plover in a pond there (*Ibid.*).

Another informant born in 1858, told about cultivation practices when he was a child.

> The Hawaiians in Lihue and in the remainder of the district of Waimea, when I was a little boy, cultivated their lands only in the old Hawaiian fashion, that is to say, they planted a few holes with sugar cane, sufficient for themselves and their friends who called, and a few mounds of sweet potatoes and sometimes, also, Irish potatoes, but all such planting depended in the main, upon rainfall; it was only in dry times that these plants were watered; sometimes they were so watered by running water from the auwais to them, but most of the time the water was carried in buckets by the old Hawaiians. There was no such watering on a large scale as is done nowadays by plantations. In a one-acre house lot there would be only a very small portion of the land so cultivated sometimes . . . Sometimes the Hawaiians planted small pieces of land at some distance from their house lots; the pieces so planted being chosen because, being in a depression, the land was richer or retained moisture longer . . . My grandfather cultivated such a piece distant from his home, containing, I should say, as much as four acres of land, but he was an exception; the average Hawaiian who planted at a distance from his home, planted ordinarily, not more than ¼ acre, and on those patches also, there was very little irrigation indeed . . . When I was young, the rainfall in Waimea district was very much heavier and more frequent than it is now. (Waimea Water Rights Case; W. C. Achi: 1-2)

Achi also testified that the main taro supply for Waimea came from Waipi'o, implying that not much taro cultivation was being done in Waimea by the 1860s. There were only a few cultivated plots of dry-land taro scattered here and there (*Ibid.*).

Pertaining to the project study area, a *mauka* ditch named "Amiikea" fed from the Kohākōhau Stream, through Palea's LCA 3828 (within the project area), and flowed down to the Waikoloa Stream. Beyond the Waikoloa Stream was yet another network of intricate ditches. The Amiikea *'auwai* reportedly also watered LCA 3762 to Auwae at Papuaa, LCA 4185 to Kanehailua at Kaluaana, LCA 976:2 to William Beckley at Waawaa and Grant 2129 to G. K. Lindsey (Nakamura 1982: 49-51).

Nainoa was born in 1842 at the Rev. Lyons' homestead in Waimea. Seventy-two years of age, he was the District Magistrate at Hau'ula and living at Lā'ie at the time testimony was taken. Nainoa states his father's name is Auwae. It is not known if this is the same Auwae who was awarded LCA 3762 at Papuaa, just southwest of the project area, but it is a very likely possibility. Nainoa lived at Papuaa and his brother taught school there. When Nainoa was old enough, he took over the school. He says, "My parents lived above with Lyons, but we children, my brother and myself, lived down below, where my brother taught school" (Waimea Water Rights Case, 1914-1915; Nainoa Testimony: 3). Nainoa talks about the general Lālāmilo area and of the Papuaa settlement a little southwest of the project area. Although not mentioned by name, he also talks about the Amiikea ditch where they got water. But, of particular interest is his mention of a burial ground.

> In Lihue there were a lot of branch *auwais*. The hollow on the makai side in Lihue was not cultivated -- it was open pasture. Nothing but prickley pear on the Kohala makai side of the wall. I recollect the burial ground along towards Waawaa. Formerly the land between the burial ground and the makai part of Lihue was pretty well cultivated . . . That land was pretty thickly populated. I had many students in the school. The school was on a hill. Just below outside of the wall was quite a big settlement on the makai side of the road going to Puako. That is where Beckley was brought up. We lived at Papuaa and they lived below the schoolhouse. Formerly the land between the school house and Kaluaana was settled. They were there at the time I was teaching school. The people mauka of the school house got their water from the streams of Waiaula and Waikoloa. The Waikoloa stream flowed down further to a dam which furnished water to our homestead at Papuaa . . . The water for the school house came from the ditch that comes to our place. The ditch used to run just below the school house and that supplied the water. The ditch going to Papuaa often went dry because the people living at Kaluaana dammed up the water mauka. The ditch running to Kaluaana dries up during dry season. The people at Waawaa got their water from the branch ditch that went towards Kaluaana. (*Ibid.*)

According to Nainoa, the burial ground was located somewhere between Lihu'e and Waawaa.

In 1917, Alfred Carter appealed the case to the Hawai'i State Supreme Court. The court maintained that the Territory owned all the waters of Waikoloa stream, that the petitioner (Carter) had rights to use the water from the stream for domestic use (according to "ancient custom"), the petitioner was entitled to surplus flow for artificial purposes only after all the domestic use requirements were satisfied and that freshet waters were "subject to reasonable use" by both the Territory and the petitioner (Hawaiian Reports Vol. 24: 70-71).

Two World Wars

As a major supplier of beef, Parker Ranch played a pivotal role in providing beef and mutton to the Armed Forces in Hawai'i during both WWI (1914) and WWII (1941). During WWII, the military (Army and Marines) basically took over Waimea town. Large areas of ranch lands were turned over to the U.S. Government for a campsite, and a firing range for training the U.S. Marines -- all for the sum of $1.00 (Brundage 1971: 109). When the war was over in 1945, Mr. Carter wrote the following:

> At the present time, there is a division, I think, consisting of something over 20,000 men, located in Waimea. They are moving out now. The licenses and leases which we gave the Armed Forces run for the duration and six months thereafter. Much, if not all, of the installations I expect will be removed within that time. The U.S.O. also has two leases upon which they have built. They have the right to remove their improvements unless we can agree to a price.
> (*Ibid.*)

The daily operations of the ranch were disrupted and Carter commented on the difficulties faced:

> . . . the period of occupation by the Armed Forces has been difficult. It could not have been otherwise than difficult. Tenting as many as 30,000 men practically in the village of Waimea resulted in numerous infringements and headaches. Very often fires were

started which we had to fight; the breaking down of gates, cutting down of fences, the breaking of pipes and the mixup of cattle, and a thousand and one other things made it difficult. We were shorthanded in our assistants and labor but it was handled well and I must say the officers cooperated in every way possible. (*Ibid.*)

A Pasture Lease map for Lālāmilo, Lihu'e, 'Ōuli, Koali'ula and Wai'aka 1 was obtained from Woody Ramos (*Figure 9*). The map indicated an easement for a "tank trail" which was used by the military during WW II (Personal Communication, Woody Ramos).

The firing range was one of the last properties to be released by the military. Mr. Carter wrote:

> The Army and Marines have released most of the property which we had turned over to them except what is known as the Firing Area. This is the land below the Kona Road and runs down to the sea, consisting of about 50,000 acres. On this land they used their artillery and many of the shells which came down did not explode and are called duds. They have about 200 men retained there in this area, detonating the duds as they find them. It is surprising how many were on the place. They are extremely dangerous because if a man going along on horseback should hit one, it would explode with fatal results so it is senseless to put our men into this area until we are well satisfied that all of the duds have been exploded. We have been promised they will keep this gang of men there as long as we wish them. It will be several months before it will be safe for us to use the land -- it is a big country to go over. (*Ibid.*: 110)

World War II reshaped the farming industry in Waimea and ironically the war was a boon to the farmers -- most of whom were Japanese. Prior to the war, there was only a relatively small market for fresh produce. Once the war started, there was an immediate demand for vegetables to supply the Armed Forces stationed in Waimea and O'ahu. Parker Ranch played a role in this effort by leasing land to the farmers. Each farmer leased twenty acres of lands combined between the Ranch and Waimea homesteaders. The farmers learned to grow new kinds of vegetables they had never grown before -- lettuce, asparagus, celery, and broccoli were especially requested by the servicemen (Nakano 1992: 101). The war helped the Waimea farmers make the shift from tenant farmers to commercial farmers.

Lālāmilo Farm Lots

After the war, the Japanese farmers found other venues to market their produce. Using their profits from the war, many of the farmers began to purchase land outright rather than lease farmlands. Besides mechanizing their farming equipment, they organized to form a cooperative (*Ibid.*: 113).

The birth of Lālāmilo farm lots stems from an amusing anecdote about how the lands were acquired. Several farmers wanted to purchase Government land around the area of Richard Smart's home at Pu'uopelu. Paniolo Yutaka Kimura foresaw that Mr. Smart's home would be a dustbin from the farmers plowing their fields so close to Mr. Smart's residence. Parker Ranch came up with a viable solution for the farmers by exchanging the Government owned land for Parker Ranch lands that would in turn be granted to the farmers. In 1963 a legislative bill was passed authorizing the sale of ranch lands at Lālāmilo to Parker Ranch in exchange for the Government lands at Pu'uopelu. The outcome actually benefited the farmers in the long run. Today, most of the privately owned farmland in Waimea belongs to Japanese farmers and they are the largest vegetable producers in the State (*Ibid.*: 113-115).

Late 1900s

Other than military use during the war, the project area has been used almost entirely for ranching purposes. A small portion of the subject parcel, near South Kohala Distribution Road was used as a dump after the war (late 1940s -1950s) and remnant pieces of disposed car parts and miscellaneous "junk" can be seen lying on the surface (Personal Communication, Woody Ramos).

At one time Lālāmilo, including the project area, was leased by Parker Ranch for pasturing their cattle. A Pasture Lease map for Lālāmilo and the surrounding area indicated a 100 ft.-wide easement for a

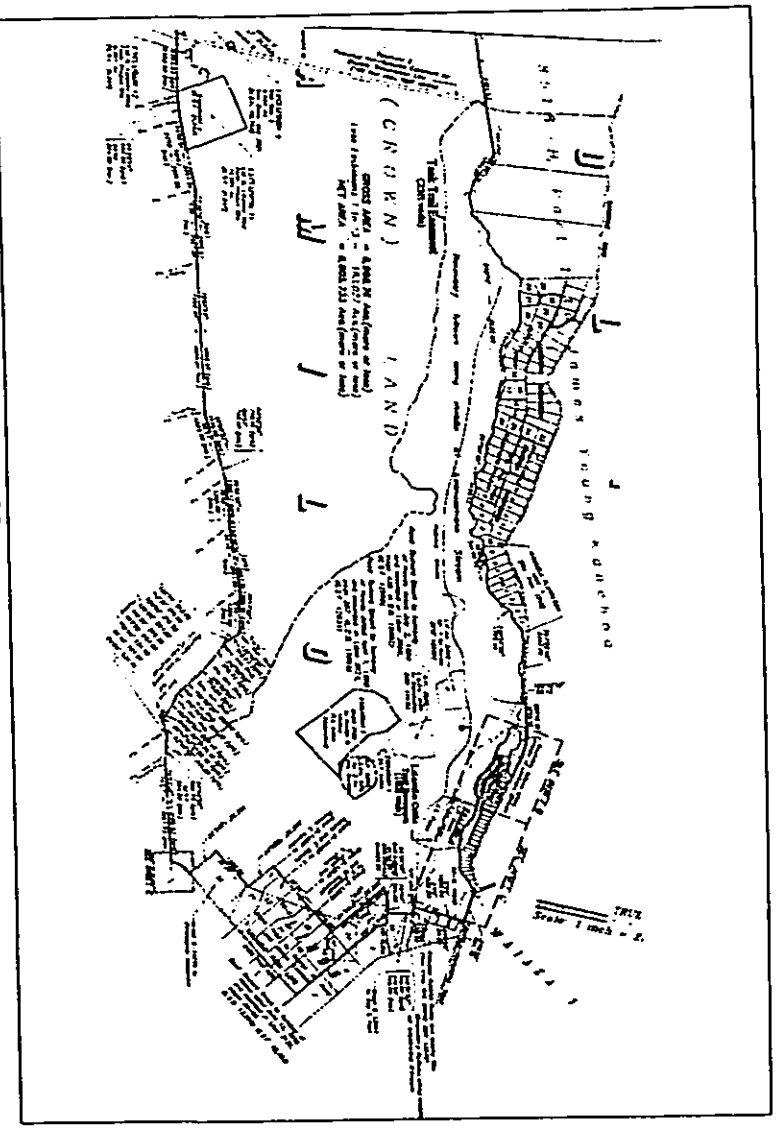


Figure 9. Portion of State of Hawaii Pasture Lease Map

"Lālāmilo Cattle Trail" which traverses through nearly the full length of the project area and LCA 3828 to Palea (see *Figure 9*). Yutaka Kimura recollected that in the "old days" the cowboys used to drive cattle through this area (Personal Communication). Having more productive pasture lands elsewhere, the Ranch opted not to renew their lease when it came up for review in the late 1950s or early 1960s. The pasture lands of Lālāmilo are marginal. They are considered "seasonal" pasture lands and are not used for pasturing year-round. They are most productive for grazing during the winter months and early spring (Personal Communication, Radcliffe Greenwell & Woody Ramos).

Parcel 77 and Parcel 12-17 are currently under lease to Jack Ramos who uses the land for cattle grazing and branding. The ranch was formerly known as the Palekoki Ranch (Petticost Ranch) after two women owners who had the lease before Ramos (Personal Communication, Jack Ramos). People today refer to it as the "Ramos Ranch". Parcel 10 is currently under a general lease to Roy Mattos and the parcel is used for pasturing horses.

Summary of Historical Documentary Research

Early historic accounts refer to Lālāmilo is an *'ili* of Waimea. Later Lālāmilo is referenced as an *ahupua'a*, which shared fishing rights with Puako. Traditional and legendary references to Waimea mention its strong gusty winds and chilly rain. Waimea was associated with royalty and chiefly lineages because of its highly valued agricultural lands. Waimea was also a renowned training ground for young chiefly warriors from ancient times. Legendary accounts refer to over a dozen battles either fought in Waimea or fought by Waimea warriors. The rich agricultural lands of the area were intensively exploited to support armies.

At least three *heiau* are mentioned for the Waimea area. The High Chiefess Hoopiliahae built and dedicated a Haleino Heiau approximately two miles from Waimea in the forest on the Lanikepu hills in the Ahupua'a of Ouli. Makuakuamana, who came with Paao from Tahiti, built a *heiau* on the land of Waiaka. Sometime between 1797 and 1811, while Kamehameha was living with the chiefs of Waimea, he restored the *heiau* of Uli in Waimea that was initially dedicated by Hakau.

Descriptions from early visitors, Mahele records, and native testimony indicate the native forest once extended much lower into the upland plains than it does today. There are many references to the Waimea region as being intensively cultivated and densely inhabited. Named crops included *wauke* and *mamaki* for making *tapa*, plantains, bananas, sugar cane, coconuts, hala trees, taro, and sweet potatoes. An extensive irrigation system was in use from at least late prehistory until the early 1900s. The cattle brought by Vancouver in 1790s thrived in the area and by the 1810s became a serious problem for farmers. Kamehameha I hired bullock catchers to hunt the cattle. Hides and salted beef became one of the commodities produced in Waimea that supplied ships at the developing port at Kawaihae.

Between the 1810s and early 1840s, the port was the central depository for the sandalwood harvested from the surrounding district, including Waimea. A missionary station was established in Waimea in 1823 by Rev. Thurston who estimated the population to be somewhere between eleven and twelve hundred. The first sugar mill at Waimea is thought to have been established at Lihu'e in Lalamilo in the late 1820s. The mill at Lihu'e was known to operate until at least the mid-1840s. Waimea farmers increased production of sweet potatoes and Irish potatoes in response to the California Gold Rush in the late 1840s. Other vegetables, along with sugar, molasses and coffee were also exported. Historically-introduced crops included watermelons, cabbages, onions, tomatoes, mulberries, figs, and beans.

During the Māhele, fourteen parcels in Lalamilo and Puako were awarded to thirteen claimants including one, LCA 3828 that is situated with the project area in the *ili* of Koaliula. House lots and cultivation are described for the inland parcels. Fourteen claims included house lots with at least 28 houses. Most of the house lots were enclosed. Evidence of agriculture in the testimony includes references to farms, patches, and fields.

By 1850, the native population was severely reduced due to introduced diseases, displacement, and changes in land tenure. The forests of Waimea were largely replaced by pasturelands owing to years of

deforestation resulting from the sandalwood trade, cattle, sheep, agricultural clearing, and other factors. During the 1840s and 1850s, much of the land was converted to government pasturage. John Parker's cattle operation began in the 1830s. The Parker Ranch began acquiring large tracts of land in the 1850s and by the early 1900s controlled over 100,000 acres of pasture land. By 1867, the population of Waimea was estimated by be only four hundred.

During WWII, the U.S. military took over much of Waimea town and large areas of ranch lands for billeting and training exercises. The military presence was a boon to the remaining Waimea farmers because there was an immediate demand for vegetables. Lettuce, asparagus, celery, and broccoli were added to the cultigen inventory. The demand led to a shift from tenant to commercial farming. After the war, the military released control of the ranch lands back to Parker Ranch. Lālāmilo, including the project area, was leased by Parker Ranch for pasturing their cattle. The project area leases were subsequently passed to others, who continue to use the area for pasture today.

PREVIOUS ARCHAEOLOGICAL RESEARCH

A search of DLNR-SHPD archaeological report database and other sources identified 31 reports covering portions of Lalamilo and adjacent areas. *Table 2* summarizes the studies and *Figure 10* shows the project locations. Not included in the table or figure are the early surveys by Thrum (1908), Stokes (Stokes and Dye 1991), Reinecke (n.d.), and an unreported survey by the Department of Hawaiian Homelands (DHHL). Thrum (1908:42) reported the former presence of a *heiau* at Uli in Waimea.

In 1906, John Stokes, then Curator of Polynesian Ethnology at Bishop Museum, did fieldwork on the island of Hawai'i, documenting *heiau* and drawing plans of the better-preserved ones. Using Thrum's list as a guide, Stokes began his fieldwork in Kailua-Kona. "Once in the field, however, Stokes discovered that local Hawaiians could identify many more *heiau* than appeared on Thrum's list" (Stokes & Dye 1991:10). In the South Kohala District, Stokes recorded only two *heiau*, Mailekini and Pu'ukoholā, at Kawaihae. He recorded none in the vicinity of Waimea. In addition, Stokes heard about four other *heiau* at Puakō, near the coast, but he was unable to gather any information about these sites from local informants (Stokes & Dye 1991).

During his 1930 survey conducted for the Bishop Museum, Reinecke examined the western coast of the island and, " walked along the coast from Kalahuipua'a [near Puako] to Kawaihae, but considered it not worth while to attempt a survey of this algarroba-covered [*kiawe*] coast unless... [he]... had a base there" (Reinecke n.d.). He makes no mention of archaeological sites within Lalamilo.

During the mid-1990s, DHHL archaeologists conducted a reconnaissance survey of several hundred acres immediately south of the project area (Ross Cordy, personal communication). The survey area extended from Waikoloa Stream to the southern boundary of Lalamilo, and from approximately 1,200 ft to 2,300 ft elevation. The survey demonstrated that agricultural features are rare below 1,900 ft elevation. The survey identified burials, small shrines, and habitation sites.

The surveys in *Table 2* cover nearly 8,000 acres identifying 776 sites with 5,399 features. Clark (1981, 1987) reports a total of 321 sites including 182 nonagricultural sites with 458 features; however, only 422 features are listed in his tables. A rough count of features depicted on the site maps yields 63 *auwai* branches, 297 field ridges, and approximately 1,379 other, presumably agricultural features that consist of terraces, swales, mounds, and modified outcrops. The feature count is exaggerated by the Bishop Museum study of the Puako petroglyph field that documented nearly 2,000 petrogyphs. If these are removed from the feature count the total number of identified features is 3,382.

To aid in reconstructing settlement patterns, features were quantified by probable age and function, and the studies are ordered by elevation. The data from the studies connected within the Mudlane-Waimea-Kawaihae road corridor (Barrera and Kelly 1974, Kirch and Clark 1981) are subdivided into four entries in *Table 2* based on elevation. Traditional Hawaiian features were categorized as habitation, agricultural, burial (including possible burials), ritual, trail, *ahu*, and rock art. Features not assignable to these categories were categorized as miscellaneous/indeterminate. Traditional sites in this category include salt

Table 2. Summary of Previous Archaeological Work

Study	Land	Elevation (feet)	Area (ac)	Historic Use	Total sites	Sites/ acre	Total feats	Feats/ acre	Hab Feats	Hab Feats/ acre	Perm Hab Feats	Temp. Hab Feats	Ag Feats	Ag Feats/ acre	Burial Feats	Ritual Feats	Trail	Arts	Rock art	Historic Feats	Misella. det. Feats
Yent and Griffen (1978), Burgett and Rosendahl (1990), Yent (1991), Jensen (1994)	Lalamilo	0-330	750	Military/ Ranching	194	0.22	425	0.57	134	0.18	30	104	82	0.08	2	1	6	18		188	10
Burgett (1990)/Dunn and Rosendahl (1992)	Lalamilo	4-30	2.3	Ranching	25	10.87	75	32.61	58	25.22		58							16		1
Bowden (1991)	Lalamilo	5-10	7.42		0																
Smart (1964)	Lalamilo	5-8	0.5		1	2.00															
Rosendahl (1989)	Lalamilo	5-10	0.5		5	10.00	7	14.00	2	4.00											
Bishop Museum (1964)	Lalamilo	5-30	800	Ranching	1	0.00	1967	2.46					4					1			
Kennedy (1980), Burgett et al. (1992)	Lalamilo	5-15	7.438	Ranching	28	3.80	47	6.33	18	2.42		7	11	1.48	1	1			1987		
Tomonari-Tuggle (1982)	Lalamilo	10-30	0.34		2	5.88	2	5.88											3	6	13
Barrera and Kelly (1974), Kirch and Clark (1981)	Kawaihae, Lalamilo, Oull	10-1110	738	Ranching	44	0.06	242	0.33	95	0.13			47	0.06	76		1	6	1	1	
Cheng (1971), Rosendahl (1972)	Waikoloa-Kamehoe	60-300	3.5		98	28.00	99	28.00	58	16.57								34		11	2
Barrera and Kelly (1974), Kirch and Clark (1981)	Lalamilo	1100-2100	1380		23	0.02	108	0.07	12	0.01			27	0.09		2	8	23		37	
Nees and Williams (1990)	Lalamilo and Waikoloa	1200-2600	821	Military/ Ranching	2	0.00	2	0.00	2	0.00											
Bowden (1964)	Lalamilo	1260-1360	60	Military/ Ranching	4	0.05	4	0.05	2	0.03										1	1
Bank (1985)	Waikoloa	1400-2600	500	Ranching	1	0.01	2	0.01													
Barrera and Kelly (1974), Kirch and Clark (1981)	Lalamilo, Waikoloa	2100-2600	810		25	0.03	93	0.11	14	0.02		14	2	0.00	1					66	6
Hammatt and Borthwick (1986)/ Hammatt et al. (1988)/ Hammatt and Shideler (1989)	Lalamilo	2175-2275	12.6	Ranching	7	0.56	34	2.74	2	0.16			21	2.80						1	
Cheng (1979), Clark (1981, 1987)	Lalamilo	2280-2480	205	Ranching	284	0.96	2143	7.28	229	0.09	74	83	1721	5.83	27					28	123
Thompson and Rosendahl (1992)	Waikoloa, Puukapu and Lalamilo	3410-3440	81	Ranching	1	0.11	8	0.98													
Barrera (1993)	Lalamilo	2440-2500	20	Ranching	1	0.02	32	0.89					33	0.89							
Kennedy, Maly and Rosendahl (1994)	Waiaka 2	2460-2500	14.9	Ranching	7	0.47	9	0.60	1	0.07			5	0.34	1					1	1
Rosendahl (1989)	Lalamilo	2200-2210	0.75	Ranching	0																
Barrera and Kelly (1974), Kirch and Clark (1981)	Waikoloa, Puukapu	2600-2650	1740		11	0.01	44	0.03	18	0.01			18	0.06			1			6	4
Emerson (1990, 1995)	Waikoloa	2640-2740	29.8	Ranching	5	0.19	7	0.29							2					5	
Total/Average			7947.7		736	3.00	5369	8.13	660	3.49	104	276	356	1.11	112	4	18	84	2007	382	163

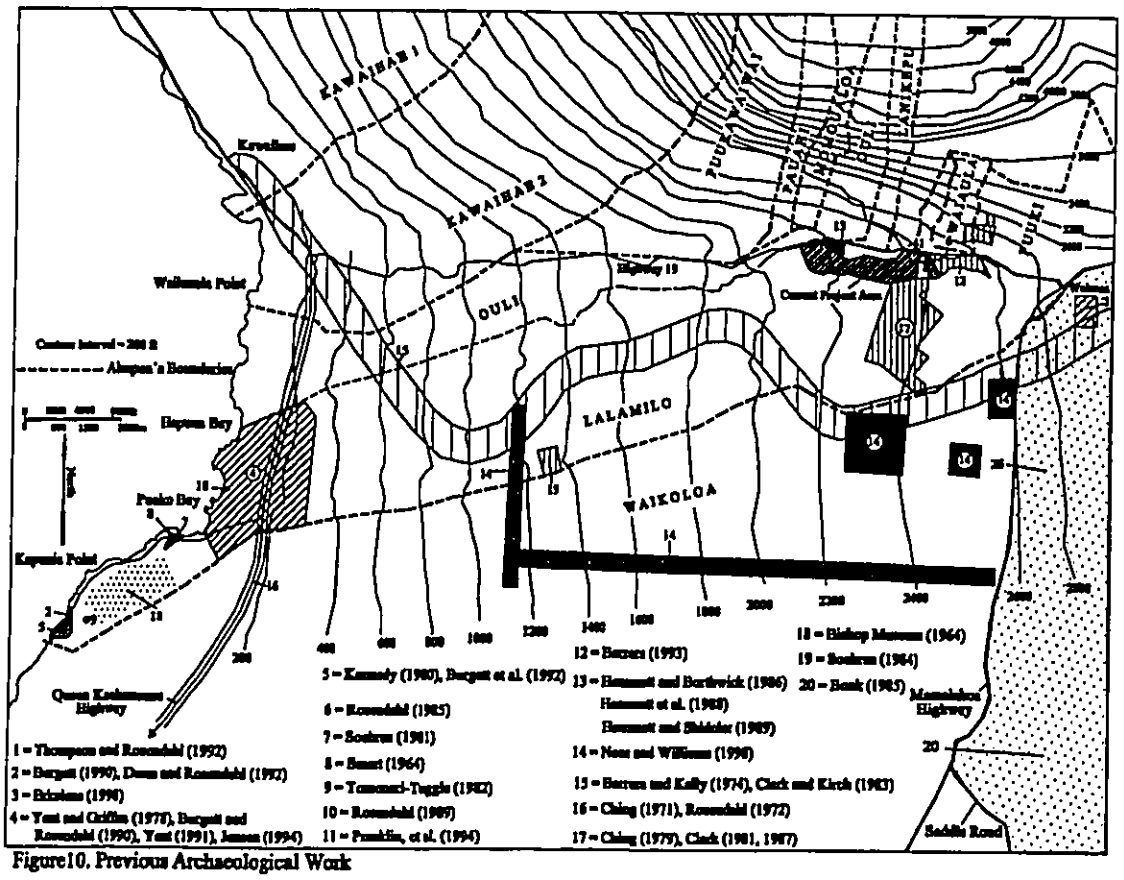


Figure10. Previous Archaeological Work

pans, *papamu*, fishponds, and pahoehoe excavations. Habitation sites are further subdivided into temporary and permanent for studies making this distinction.

Density per acre values are given for sites, features, and habitation and agricultural features. Overall, the studies have identified 640 habitation features including 104 permanent habitation features and 276 temporary habitations, 1,988 agricultural features, 112 burials, 4 ritual features, 18 trail segments, 84 *ahu*, and 2,007petroglyphs. Two hundred and sixty habitation features were not categorized by residential permanence. Historic features were not segregated by function. The majority of the historic features are ranch walls.

Density values for surveys of at least 50 acres indicate the highest densities of habitation features between 2,120 ft and 2,450 ft elevation (0.34 features per acre) and at the coast (0.18). Agricultural feature density is high between 2,280 ft and 2,480 ft elevation. Overall feature density ranges from 0.01 to 7.26 features per acre. Habitation feature density ranges from 0 to 0.34 features per acre with an average of 0.09. Agricultural feature density ranges from 0 to 5.83 features per acre with an average of 1.18. Burial and ritual sites are concentrated near the coast, but nearly 27% of the burials are reported from inland sites between 2,000 ft and 2,740 ft elevation.

Seventy-four radiocarbon dates are reported in the studies by Clark and Kirch (1983), Rosendahl (1972), Hammatt et al. (1988), Hammatt and Shideler (1989), Burgett et al. (1992), Barrera (1993), and Jensen (1994). Most of the results were calibrated using older, and less precise calibration tables. When all potential age ranges are examined five ranges span the 1200s, eleven include the 1300s, twenty-four span the 1400s, thirty span the 1500s, forty-five include the 1600s, forty-eight span the 1700s, and fifty include the 1800s to early 1900s. One early age range, AD 791 to 1341, is discounted by Kirch and Clark (1983) as anomalous. The results indicate initial use of the area in the 1200s to 1300s followed by a rapid increase between the 1400s and 1500s. The most intensive use dates to between the 1600s to early 1900s.

Four studies included portions of the project area. Three studies by Cultural Surveys Hawaii (Hammatt and Borthwick 1986, Hammatt et al. 1988, Hammatt and Shideler 1989) included a reconnaissance survey of 50 acres, and subsequent intensive survey and data recovery within a 12 acre portion of the reconnaissance survey area, for a proposed residential subdivision (see *Figure 10*). The studies documented two groups of agricultural fields, walls, habitation enclosures, and agricultural mounds. One site, a series of pipeline stanchions (Site 11,100), was relocated during the current survey.

Thompson and Rosendahl (1992) conducted an inventory survey of an approximately 9.5 acre parcel on the south side of Kawaihae Road just inland of the bridge across Waiaka Stream (see *Figure 10*). The survey identified six agricultural fields designated Site 18054. Seven backhoe trenches excavated through the field boundaries all identified a layer interpreted to be a buried agricultural soil. The current survey identified several terraces and an irrigation ditch in the area surveyed by Thompson and Rosendahl, but the features could not be readily correlated with the previously identified ones.

In 1974, the State Historic Preservation Division designated a large area extending to the southwestern edge of the project area as the Lālāmilo *Kuleana* and Ranch District (Site 2292). The area includes three LCAs (3762, 4195 and 976:2) and one grant (2129) all situated outside, south-southwest of the project area. The description of the site is as follows:

> The site consists of numerous stone walls, stone platforms, agricultural terraces, *auwai*, cattle pens, and stone wall-enclosed *kuleana* and house sites. A few structures show the use of mortar, plaster and ironware. Empty metal cartridge cases indicate military use of the area in recent years. (Historic Sites Information and Review Form:2).

The project area lies within Field Complex 2 of the Waimea Field System (Newman 1970; Clark and Kirch 1983, Clark 1981, 1987). Clark (1987) proposed a settlement pattern model for the Kawaihae-Waimea region that consists of four zones as follows:

Coastal Zone — Extends from the coast to between 200 m and 400 m inland with most sites below 30-45 m (98-148 ft) elevation. The Coastal Zone is subdivided into shoreline and inland sub-zones. Subsistence activity had a marine exploitation emphasis including fishing, collecting, and salt making. Agricultural crops included coconut, sweet potato, gourds, and other medicinal, utilitarian, and food plants. Archaeological features include "residential structures, community-oriented structures, burial monuments, agricultural features, military features [recent], and miscellaneous" (1987:247). Habitation sites include single use sites, extended and recurrent occupations, and permanently occupied sites. Habitation features include small walled shelters, caves, overhangs, terraces, platforms, and enclosures. The more intensively occupied habitation sites are clustered in neighborhoods sometimes larger wards.

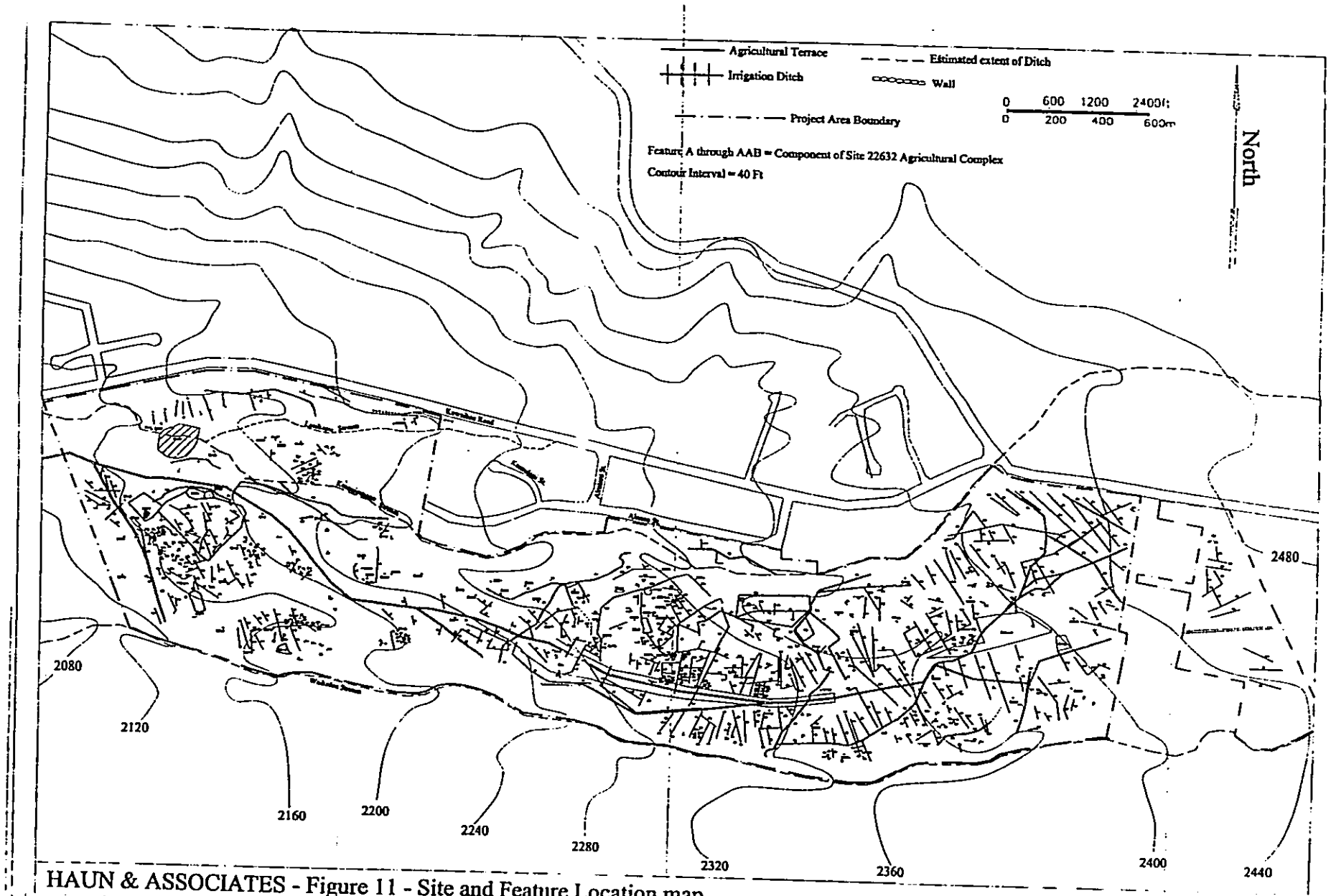
Intermediate Zone — Extends from the Coastal Zone to between 7.3 and 9.7 km inland at approximately 585 m (1,919 ft) elevation. Subsistence activity limited to small scale seasonal cultivation of alluvial flats near drainages and bird catching. Archaeological features include short-term occupation sites including midden scatters, fireplaces, small walled shelters, caves, and overhangs, which are typically situated near drainages.

Kula Zone — Extends from the Intermediate Zone to between 7.3 and 9.7 km inland. It ranges in elevation from 585 m to 830 m (1,919-2,722 ft) in elevation, with small sections extending to as much as 975 m (3,198 ft) elevation. Subsistence activity is dominated by agriculture. The zone is divided into two primary sub-zones based on the nature of cultivation. Sub-zone 1 is defined by the presence of formal fields mound complexes, small terraces, modified outcrops, and animal and garden enclosures. Sub-zone 2 is characterized by the absence of formal fields and limited to planting swales, clusters of mounds, and modified outcrops. Irrigation ditches occur in both sub-zones. Crops included sweet potatoes, dry-land taro, gourds, and *wauke*. Habitation sites include single use sites, extended and recurrent occupations, and permanently occupied sites. Habitation features include small walled shelters, caves, overhangs, terraces, platforms, and enclosures. The more intensively occupied habitation sites are clustered in neighborhoods sometimes larger wards. Burial features are also present.

Wilderness Zone — Zone extends inland from the *Kula* Zone to the mountain tops. The zone is divided into two sub-zones. Sub-zone 1 consists of areas that were exploited for a variety of resources including, wood, bark, birds, wild plants foods, fine-grained basalt for tool manufacture. Sub-zone 2 consists of the highest elevation areas that were not economically exploited and largely untouched except for some religious activity.

PROJECT EXPECTATIONS

Based on historical documentary evidence and previous archaeological work, prehistoric sites in the project area should include extensive agricultural features including irrigation ditches, formal fields, mounds, swales, modified outcrops, and small terraces. Habitation, sites, burials, and small ritual feature may also be present. Habitation sites should consist of temporary and permanent habitations (walled shelters, platforms, terraces and enclosures). Prehistoric sites would be expected to date no earlier than the 1200-1300s with most post -dating the 1600-1800s. Historic sites, except WWII military training features, primarily should be limited to ranching and farming features with scattered habitations. Ranch-related features should be represented by roads and cattle walls and pens. The military training features should be represented by small fortifications such as low C-shaped enclosures and alignments.



HAUN & ASSOCIATES - Figure 11 - Site and Feature Location map

FINDINGS

The inventory survey identified 75 sites with 818 features, and four isolated objects. The sites consist of 52 single feature sites and 23 complexes of features. The complexes are comprised of two to 700 features, with the average complex containing three features. The distribution of the sites and features is depicted in *Figure 11* (in pocket at end). *Table 3* summarizes the sites present within the project area and detailed site and feature descriptions are presented in *Appendix A*.

Subsurface testing was undertaken at 33 features at 24 sites. These excavations are summarized in *Table 4*. Controlled excavations were conducted at 12 platforms, a platform on a walled terrace, six mounds, four walled terraces, four surface hearths, three terraces, one C-shape with an adjoining platform, one U-shape, and one enclosure. Subsurface features were identified in 14 of the 33 excavations (*Table 5*). These features consist of ten burials and three subsurface hearths. The results of these excavations are incorporated into the *Appendix A* site descriptions.

The 818 features are classified into 20 formal feature types. These types are comprised of terraces (358), mounds (275), enclosures (30), field boundaries (29), stone walls (27), irrigation ditches (21), platforms (20), walled terraces (15), C-shapes (10), U-shapes (9), modified outcrops (5), surface hearths (4), L-shapes (4), cairns (3), pond fields (2), concrete piers (2), and one each of the following; cupboard, lithic scatter, a possible seat, and a trail. These formal feature types are defined as follows:

There are nine general feature functions which are defined and discussed in the following section. Agriculture is the most common feature function (702 features), followed by permanent habitation (69) and permanent habitation/burial (1), temporary habitation (20) and temporary habitation/burial (1), burial (16), marker (3), military defensive position (2), historic foundation (2), storage (1), and quarry (1). These functional categories are summarized below.

Agriculture

The majority of the features identified during the project (n=702 or 85.8%) are agricultural features. The majority of these features (n=700) have been classified as components of the Site 22632 complex. The two remaining features are internal components of a permanent habitation site (Site 22613). These two features are described in the Site 22613 site entry in *Appendix A*. The following discussion summarizes the Site 22632 agricultural elements.

The features within this complex consist of 368 agricultural terraces and field boundaries, 280 agricultural clearing features, 29 stone enclosures and walls, 21 irrigation ditches, and 2 pondfields. These features were assigned an agricultural function based on formal type, informal construction, and lack of habitation debris. The distribution of the 700 features is depicted in *Figure 11*. The feature categories are discussed below.

Agricultural Terraces, Field Boundaries, and Pondfields

Site 22632 includes 339 terraces, 29 field boundaries, and two pondfields. These features comprise at least 324 agricultural fields that extend throughout the project area. The individual feature types are summarized below.

Terraces - The agricultural terraces within the project area are constructed on sloping terrain with a soil embankment or retaining wall situated on the downslope side. These features functioned to retain level or slightly sloping soil areas for planting. Throughout much of the project area, no stones are visible in the terrace embankment surfaces; however, it is probable that the embankments were originally made of stacked stones, which were buried by the accumulation of soil through sheet wash and wind deposition. At the western end of the project area, the ground surface in some exposed areas has been deflated by erosion probably because of reduced rainfall and sparse vegetation cover. Several terrace embankments in this area

Table 3. Summary of Identified Sites

BARP Site No.	Type	Function	No. of Features	Formal Type: Terrace	Mound	Enclosure	Field Boundary	Walled Terrace	Wall	Platform	Ditch	C-shape	U-shape	Modified Outcrop	Hearth	L-shape	Cairn	Concrete Piers	Pond	Cupboard	Lithic Scatter	Possible Seat	Trail	Function: Agriculture	Permanent Habitation	Permanent Habitation/ Burial	Temporary Habitation	Temporary Habitation/ Burial	Burial	Marker	Military Defense Position	Foundation	Storage	Quarry	Field No.
11100	Concrete piers	Foundation	1															1																	1
21900	Enclosure	Permanent Habitation	1		1																				1										1
21910	Terrace	Temporary Habitation	1	1																							1								1
21920	Platform	Burial	1							1																			1						1
21943	Walled terrace	Permanent Habitation	1					1																	1										1
21947	C-shape	Temporary Habitation	1									1															1								1
21954	U-shape	Temporary Habitation	1										1														1								1
21958	Complex	Habitation/Burial	2		1																				1				1						1
21960	Complex	Permanent Habitation	2	1																					1										1
21961	Complex	Burial	9																										9						1
21962	Complex	Permanent Habitation	1																						1										1
21963	Complex	Temporary Habitation	1																								1								1
21964	Complex	Permanent Habitation	2	1																					1										1
21965	Terrace	Permanent Habitation	1	1																					1										1
21966	Complex	Permanent Habitation	2	1																					1										1
21967	Terrace	Permanent Habitation	3	3																					3										1
22612	Complex	Temporary Habitation	1																								1								1
22613	Terrace	Permanent Habitation	1	1																					1										1
22614	Walled terrace	Permanent Habitation	1					1																	1										1
22615	Terrace	Permanent Habitation	1	1																					1										1
22616	Enclosure	Permanent Habitation	1			1																			1										1
22617	Walled terrace	Permanent Habitation	1					1																	1										1
22618	Terrace	Permanent Habitation	1	1																					1										1
22619	Enclosure	Permanent Habitation	1			1																			1										1
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22719	Complex	Permanent Habitation	2																						2										1
22720	Complex	Permanent Habitation	2																						2										1
22721	Complex	Permanent Habitation	2																						2										1
22722	Complex	Permanent Habitation	2																						2										1
22723	Complex	Permanent Habitation	2																						2										1
22724	Complex	Permanent Habitation	2																						2										1
22725	Complex	Permanent Habitation	2																						2										1
22726	Complex	Permanent Habitation	2																						2										1
22727	Complex	Permanent Habitation	2																						2										1
22728	Complex	Permanent Habitation	2																						2										1
22729	Complex	Permanent Habitation	2																						2										1
22730	Complex	Permanent Habitation	2																						2										1
22731	Complex	Permanent Habitation	2																						2										1
22732	Complex	Permanent Habitation	2																						2										1
22733	Complex	Permanent Habitation	2																						2										1
22734	Complex	Permanent Habitation	2																						2										1
22735	Complex	Permanent Habitation	2																						2										1
22736	Complex	Permanent Habitation	2																						2										1
22737	Complex	Permanent Habitation	2																						2										1
22738	Complex	Permanent Habitation	2																						2										1
22739	Complex	Permanent Habitation	2																						2										1
22740	Complex	Permanent Habitation	2																						2										1
22741	Complex	Permanent Habitation	2																						2										1
22742	Complex	Permanent Habitation	2																						2										1
22743	Complex	Permanent Habitation	2																						2										1
22744	Complex	Permanent Habitation	2																						2										1
22745	Complex	Permanent Habitation	2																						2										1
22746	Complex	Permanent Habitation	2																						2										1
22747	Complex	Permanent Habitation	2																						2										1
22748	Complex	Permanent Habitation	2																						2										1
22749	Complex	Permanent Habitation	2																						2										1
22750	Complex	Permanent Habitation	2																						2										1
22751	Complex	Permanent Habitation	2																						2										1
22752	Complex	Permanent Habitation	2																						2										1
22753	Complex	Permanent Habitation	2																						2										1
22754	Complex	Permanent Habitation	2																						2										1
22755	Complex	Permanent Habitation	2																						2										1
22756	Complex	Permanent Habitation	2																						2										1
22757	Complex	Permanent Habitation	2																						2										1
22758	Complex	Permanent Habitation	2																						2										1
22759	Complex	Permanent Habitation	2																						2										1
22760	Complex	Permanent Habitation	2																						2										1
22761	Complex	Permanent Habitation	2																						2										1
22762	Complex	Permanent Habitation	2																						2										1
22763	Complex	Permanent Habitation	2																						2										1
22764	Complex	Permanent Habitation	2																						2										1
22765	Complex	Permanent Habitation	2																						2										1
22766	Complex	Permanent Habitation	2																						2										1

Table 4. Summary of Test Unit Excavations

Unit No.	Site No.	Feature	Type	Function	Unit Size	Field No.
1	22599	B	Hearth	Permanent Habitation	0.15 X 0.30	528B
2	22600	B	Walled terrace	Permanent Habitation	0.15 X 0.30	536B
3	22598	A	Enclosure	Temporary Habitation	0.5 X 1.0	539A
4	22606	-	Platform	Burial	1.0 X 1.0	545
5	22575	-	Terrace	Permanent Habitation	0.25 X 0.25	398
6	22614	-	Platform on walled terrace	Permanent Habitation/Burial	1.0 X 1.0	536B
7	22619	-	Walled terrace	Permanent Habitation	0.5 X 1.0	731
8	22632	UD	Mound	Agriculture	0.5 X 0.5	23B
9	22615	A	Walled terrace	Permanent Habitation	0.5 X 1.0	650A
10	22620	C	Terrace	Permanent Habitation	0.3 X 0.3	726H
11	22632	ZJ	Mound	Agriculture	0.5 X 0.5	3
12	22613	A	U-shape	Permanent Habitation	0.5 X 0.5	616A
13	22632	ZI	Mound	Agriculture	0.5 X 0.5	1
14	22613	B	Terrace	Permanent Habitation	0.5 X 0.5	616B
15	21955	-	Platform	Burial	1.0 X 1.0	154
16	21820	-	Platform	Burial	1.0 X 1.0	59
17	21859	B	Platform	Burial	0.75 X 0.75	196B
18	22587	B	Platform	Burial	0.5 X 1.0	411B
19	21961	E	Platform	Burial	0.7 X 1.0	256E
20	22587	C	Platform	Permanent Habitation	1.0 X 1.0	411C
21	21861	D	Platform	Burial	0.5 X 1.0	256D
22	22561	-	C-shape with adjoining platform	Temporary Habitation/Burial	1.0 X 1.0	410
23	21963	-	Platform	Temporary Habitation	1.0 X 1.0	245
24	22584	-	Hearth	Temporary Habitation	0.5 X 0.7	40B
25	22573	B	Platform	Permanent Habitation	1.0 X 1.0	352
26	22632	NA	Mound	Agriculture	0.5 X 0.7	404
27	22632	CB	Mound	Agriculture	1.0 X 1.0	646
28	22577	-	Walled terrace	Permanent Habitation	1.0 X 1.0	420
29	22631	B	Platform	Permanent Habitation	1.0 X 1.0	657B
30	22594	C	Hearth	Permanent Habitation	0.4 X 0.4	509C
31	22622	B	Hearth	Hab	0.3 X 0.3	671
32	22632	HT	Mound	Agriculture	1.0 X 1.0	773a
33	22600	A	Platform	Burial	0.5 X 1.0	538A

Table 3. Summary of Identified Sites (cont.)

BHP Site No.	Type	Function	No. of Features	Formal Type: Terrace	Bedrock	Enclosure	Floor Boundary	Hearth	Pit	Platform	U-shape	C-shape	Basin	Sedimentary Overhang	Hearth	L-shape	Cairn	Cremation Pyre	Mound	Cluster
22567	Enclosure	Permanent Habitation	1			1														
22568	Complex	Temporary Habitation	2			1														
22569	Complex	Permanent Habitation	2							1										
22600	Complex	Permanent Habitation/Burial	2																	
22601	Enclosure	Permanent Habitation	1			1														
22602	Cairn	Marker	1														1			
22603	Enclosure	Permanent Habitation	1			1														
22604	U-shape	Permanent Habitation	1								1									
22605	C-shape	Temporary Habitation	1									1								
22606	Platform	Burial	1							1										
22607	Enclosure	Temporary Habitation	1			1														
22608	L-shape	Temporary Habitation	1													1				
22609	L-shape	Temporary Habitation	1													1				
22610	Enclosure	Permanent Habitation	1			1														
22612	Cairn	Marker	1														1			
22613	Complex	Temporary Habitation	6		4	1														
22614	Walled terrace	Permanent Habitation/Agriculture	1																	
22615	Complex	Permanent Habitation	2			1														
22616	L-shape	Temporary Habitation	1									1								
22617	Enclosure	Permanent Habitation	1			1														
22618	Walled terrace	Permanent Habitation	1																	
22620	Complex	Permanent Habitation	4		2	1														
22621	Enclosure	Permanent Habitation	1			1														
22622	Complex	Permanent Habitation	3			1														
22623	C-shape	Temporary Habitation	1									1								
22624	Lithic scatter	Quarry	1																	
22625	Concrete pare	Foundation	1																	
22626	C-shape	Temporary Habitation	1									1								
22627	C-shape	Temporary Habitation	1									1								
22628	Walled terrace	Permanent Habitation	1																	
22629	Fence	Temporary Habitation	1																	
22630	Cairn	Marker	1														1			
22631	Complex	Permanent Habitation	3			1														
22632	Complex	Agriculture	700		330	275	5	29	29	15	27	26	21	10	5	5	4	4	3	2
		Totals	818		334	275	30	29	29	15	27	26	21	10	5	5	4	4	3	2

BHP Site No.	Type	Function	No. of Features	Formal Type: Terrace	Bedrock	Enclosure	Floor Boundary	Hearth	Pit	Platform	U-shape	C-shape	Basin	Sedimentary Overhang	Hearth	L-shape	Cairn	Cremation Pyre	Mound	Cluster
22567	Enclosure	Permanent Habitation	1			1														
22568	Complex	Temporary Habitation	2			1														
22569	Complex	Permanent Habitation	2							1										
22600	Complex	Permanent Habitation/Burial	2																	
22601	Enclosure	Permanent Habitation	1			1														
22602	Cairn	Marker	1														1			
22603	Enclosure	Permanent Habitation	1			1														
22604	U-shape	Permanent Habitation	1								1									
22605	C-shape	Temporary Habitation	1									1								
22606	Platform	Burial	1							1										
22607	Enclosure	Temporary Habitation	1			1														
22608	L-shape	Temporary Habitation	1													1				
22609	L-shape	Temporary Habitation	1													1				
22610	Enclosure	Permanent Habitation	1			1														
22612	Cairn	Marker	1														1			
22613	Complex	Temporary Habitation	6		4	1														
22614	Walled terrace	Permanent Habitation/Agriculture	1																	
22615	Complex	Permanent Habitation	2			1														
22616	L-shape	Temporary Habitation	1									1								
22617	Enclosure	Permanent Habitation	1			1														
22618	Walled terrace	Permanent Habitation	1																	
22620	Complex	Permanent Habitation	4		2	1														
22621	Enclosure	Permanent Habitation	1			1														
22622	Complex	Permanent Habitation	3			1														
22623	C-shape	Temporary Habitation	1									1								
22624	Lithic scatter	Quarry	1																	
22625	Concrete pare	Foundation	1																	
22626	C-shape	Temporary Habitation	1									1								
22627	C-shape	Temporary Habitation	1									1								
22628	Walled terrace	Permanent Habitation	1																	
22629	Fence	Temporary Habitation	1																	
22630	Cairn	Marker	1														1			
22631	Complex	Permanent Habitation	3			1														
22632	Complex	Agriculture	700		330	275	5	29	29	15	27	26	21	10	5	5	4	4	3	2
		Totals	818		334	275	30	29	29	15	27	26	21	10	5	5	4	4	3	2

Table 5. Summary of Subsurface Features

Site No.	Feature	Surface Feature Type	Subsurface Feature Type	Unit	Layer	Depth
21920	-	Platform	Subadult burial	16	II	0.82 below surface of platform
21955	-	Platform	Adult burial	15	II	0.8 m below surface of platform
21959	B	Platform	Adult burial	17	I	0.85 m below surface of platform
21961	D	Platform	Disturbed burial and coffin fragments	21	I	0.78-1.38 m below base of depression on surface of platform
21961	E	Platform	Wooden coffin and tooth below layer of horizontal basalt slabs	19	I	0.35-0.84 m below surface of platform
22581	-	C-shape with adjoining platform	Infant burial	22	II	0.3 m below surface of platform
22587	B	Platform	Disturbed adult burial	18	I	0.6 m below base of depression on surface of platform
22587	C	Platform	Disturbed adult burial	20	I	0.37 m below surface of platform
22584	-	Surface Hearth	Hearth	24	I	0.27-42 m below ground surface
22600	A	Platform	Disturbed adult burial within crypt	33	I	0.26 m below floor of crypt
22606	-	Platform	Human teeth	4	III	0.63 m below surface of platform
22613	B	Terrace	Hearth	14	II	0.41-0.63 m below ground surface
22614	-	Platform within walled terrace	Adult burial	6	II	0.57 m below surface of platform
22615	A	Walled terrace	Hearth	9	II	0.05-0.18 m below ground surface

consist of parallel alignments of large cobbles to small boulders. The alignments are typically one meter or more in width and have smaller stones piled between and against the sides of the alignments.

The physical characteristics of the terraces are summarized in *Table C-1*. The width of terrace embankments and walls is measured from the base of the downslope edge of the embankment or wall to the upslope edge of the wall. The terrace or planting surface is comprised of relatively level soil areas on the upslope side of the embankment or retaining wall. The planting surfaces are classified as agricultural fields when one or more of remaining three sides are bounded by other terraces, field boundaries, or definable changes in slope.

The individual terraces range in length from 3.7 to 272.1 with an average length of 41.8 m. The width of the terrace embankments ranges from 1.0 to 5.8 m, averaging 2.72 m wide. The downslope heights of the embankments vary from 0.15 to 1.4 m and average 0.56 m. The upslope sides of the embankments or retaining walls range from level with the planting surface (height= 0) to 0.6 m with an average height of 0.1 m.

Field Boundaries – The field boundaries consist of linear mounds of soil and soil that typically are perpendicular to the terrace embankments and parallel with the slope. The features serve to subdivide or bound fields. These features varied in length from 8.9 to 129.2 m (average 43.6 m long), in width from 1.3 to 4.5 (average 2.29 m wide), and in height from 0.1 to 0.81 (average 0.53 m).

Pondfields - The two pondfields (Features RX and XB) within the project area are comprised of rectangular soil embankments with an interior basin-like space that is lower than the surrounding ground surface. These features range in length from 11.2 to 35.0 m long and 9.2 to 30.1 m wide. The enclosing embankments range in width from 1.5 to 1.8 m, and in height from 0.15 to 0.45 m on the outside, and 0.3 to 0.9 m high on the inside. Feature RX is bordered on two sides by an irrigation ditch (Feature QK), and the Feature XF ditch is located upslope of Feature XB to the north.

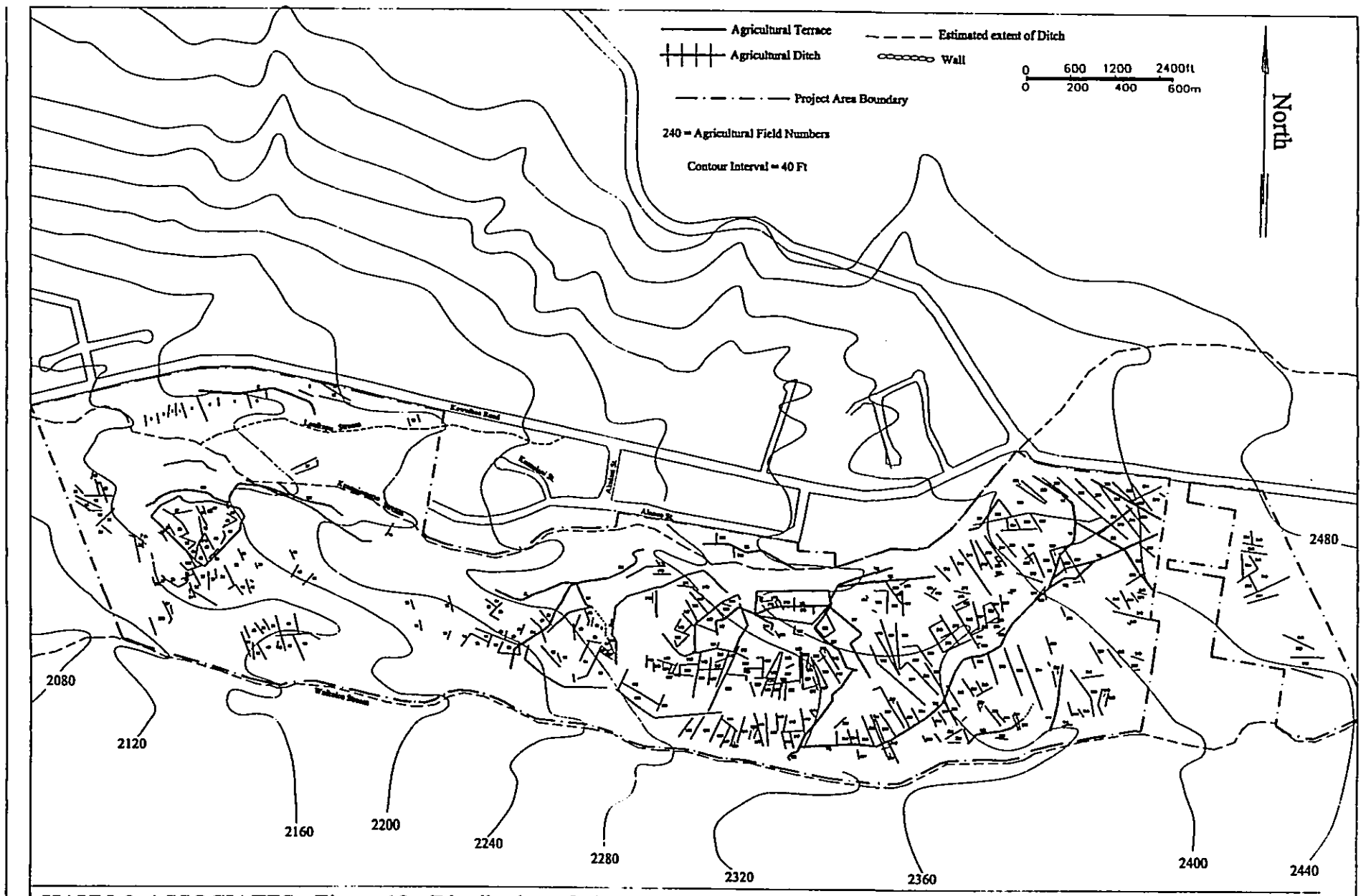
Agricultural Fields – Terraces and field boundaries define at least 324 agricultural fields. The physical characteristics and associated features of the fields are summarized in *Table C-2*, and the field locations are illustrated in *Figure 12* (in pocket at end). These fields consist of level or slightly sloping planting surfaces that range from 35.8 sq m to 6,396.2 sq m in area with an average area of 904.6 sq m. Examples of the agricultural fields are illustrated in *Figures 13* and *14*.

The total area of the fields is 28.7 hectares (70.93 ac). The fields extend over most of the eastern half of the project area on gentle slopes and on the central ridge top. There is a break in the fields in the west-central portion of the project area where the terrain is generally steeper as it slopes down from the central ridge to Keanuiomano Stream to the north and Waikolua Stream to the south. There is a small cluster of fields on an "island" formed by Waikolua Stream and an intermittent meander of the stream in the southwest corner of the project area. Another cluster of fields is situated in and surrounding a large agricultural enclosure (Feature FI) in the western portion of the project area. The final cluster of fields is situated on the north side of Lanikepu Stream in the northwest corner of the project area. It is probable that additional areas were cultivated where there are no surface remains, especially on the gentle slopes in the eastern half of the project area.

Agricultural Clearing Features

A total of 280 agricultural clearing features were identified within the Site 22632 complex (see *Figure 11*). These consist of 275 mounds and five modified outcrops. The physical characteristics of these features are summarized in *Table C-3*.

Mounds – The 275 mounds consist of piles of stones that have been cleared from adjacent planting areas. The mounds range in length from 0.55 to 0.43 m long (average 1.45 m long), in width from 0.3 to 2.88 m (average 1.08 m wide), and in height from 0.1 to 0.92 m (average 0.38 m). The majority of the mounds are oval in shape (n=208). The remaining features are irregular in shape (n=52), circular (n=11), and linear (n=4). The construction of the mounds consist of the following: 138 piled cobble features, 116 piled cobble and boulder features, eight piled cobbles mixed with soil, seven piled cobbles and boulders mixed with soil, four alignments of cobbles that appear to represent mounds that have been deflated by wind, and two



HAUN & ASSOCIATES - Figure 12 - Distribution of Site 22632 Agricultural Fields

Figure 13. Site 22632 Agricultural Fields, view to northeast

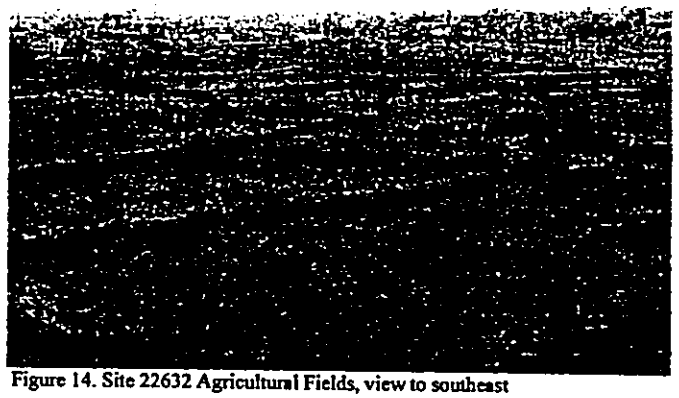


Figure 14. Site 22632 Agricultural Fields, view to southeast

mounds built of piled cobbles and boulders that are bordered by small boulders. Examples of mounds are presented in *Figures 15* and *16*.

Modified Outcrops – The five modified outcrops consist of crude piles of cobbles and or small boulders located on surface bedrock outcrops. These features were also created during the clearing of adjacent planting areas. The features vary in length from 1.1 to 2.9 m (average 1.79 m), in width from 0.45 to 1.8 m (average 1.13 m), and 0.35 to 1.3 m in height (average 0.71 m). Four of the modified outcrops are irregular in shape and one is roughly circular.

Agricultural Enclosures and Walls

Site 22632 contains 26 stone wall segments and three complete enclosures. Nine wall segments and the walls along three irrigation ditches (Features JM, QK, and ST), form three partially complete enclosures (*Figure 17*). The distribution of several other wall segments suggests that the walls were once part of two very large enclosures. The features are situated primarily in the western and central portions of the project area on the central ridgeline crest, slopes, and gentle slopes south of the ridgeline. Most of the features appear to have functioned to protect agricultural fields from cattle. These feature types are described below. Examples of the enclosures and walls within the parcel are illustrated in *Figures 18* and *19*.

The 26 wall segments are summarized in *Table 6*. The walls range in length from 3.9 to 427.3 m (averaging 77.9 m long). They vary in width at the base from 0.5 to 1.25 m (averaging 0.93 m) and at the top from 0.4 to 0.82 (averaging 0.68 m). The height of the walls ranges from 0.25 to 1.05 m, with an average height of 0.65 m. The majority of the walls (n=16) are built of stacked subangular basalt cobbles and small boulders, with core-filled interiors. The six remaining walls are built either of stacked cobbles and boulders with no core-filling (n=2), or consist of piled cobbles and boulders.

The six agricultural enclosures are summarized in *Table 7*. These features have overall lengths that range from 147.4 m to 229.4 m and widths ranging from 54.5 to 191.8 m. The base of the enclosure walls range from 0.75 to 1.25 m (average 0.95 m) thickness, and at the top from 0.35 to 0.85 m (average 0.62 m). The height of the enclosure walls vary from 0.35 to 0.95 m with an average height of 0.75 m. All of the enclosures are constructed of stacked subangular basalt cobbles and small boulders, although only five evidence core-filled interiors. The enclosures range in area from 0.13 hectares to 15.8 hectares. A portion of one partial enclosure in the west central portion of the project area (Features KJ and NJ) forms three sides of a rectangular area where two permanent habitation sites (Sites 22588 and 22589) are situated. This portion of the enclosure may have functioned to delineate a large yard around the habitation features.

Wall segments W, GT, IB, IF, and IG in the western portion of the project area are roughly aligned and potentially represent the remnants of a very large enclosure. A second very large enclosure remnant in the central portion of the project area is formed by the Feature JS wall on the south and a series of walls and smaller enclosures on the west, north, and east sides. This very large enclosure and the Feature NM enclosure closely resemble walls on an historic map that enclosure a portion of LCA 3828 (see *Figure 7*).

There are eleven relatively short isolated wall segments scattered in the southern and central portions of the project area. No cultural remains were noted in association with any of these features that would suggest that the segments are remnants of habitation features. The walls are probably remnants of former agricultural enclosures that have largely been dismantled and the stones used elsewhere for constructing walls or other features. This is especially likely for a cluster of short wall segments (Features CS, DS, DP, and DR) in the southwest corner of the project area because there is large corral and long ranch wall near these sites on the south side of Waikoloa Stream.

Irrigation Ditches

Nearly three miles (4,362.6 m) of irrigation ditches, consisting of 21 definable segments, were recorded (*Table 8, Figure 20*). The ditches range in length from 24.0 to 721.2 m, in width from 1.2 to 3.5 m (average 1.9 m wide), and in depth from 0.2 to 0.70 m (average 0.51 m deep). Undoubtedly, the ditches were originally much deeper, but have been filled in by wind and water-borne sediment. These depositional processes, and erosion in the stream drainages, probably have buried or destroyed portions of the remaining ditches, especially the intakes, and numerous small ditch branches. Portions of five ditches (Features JM,

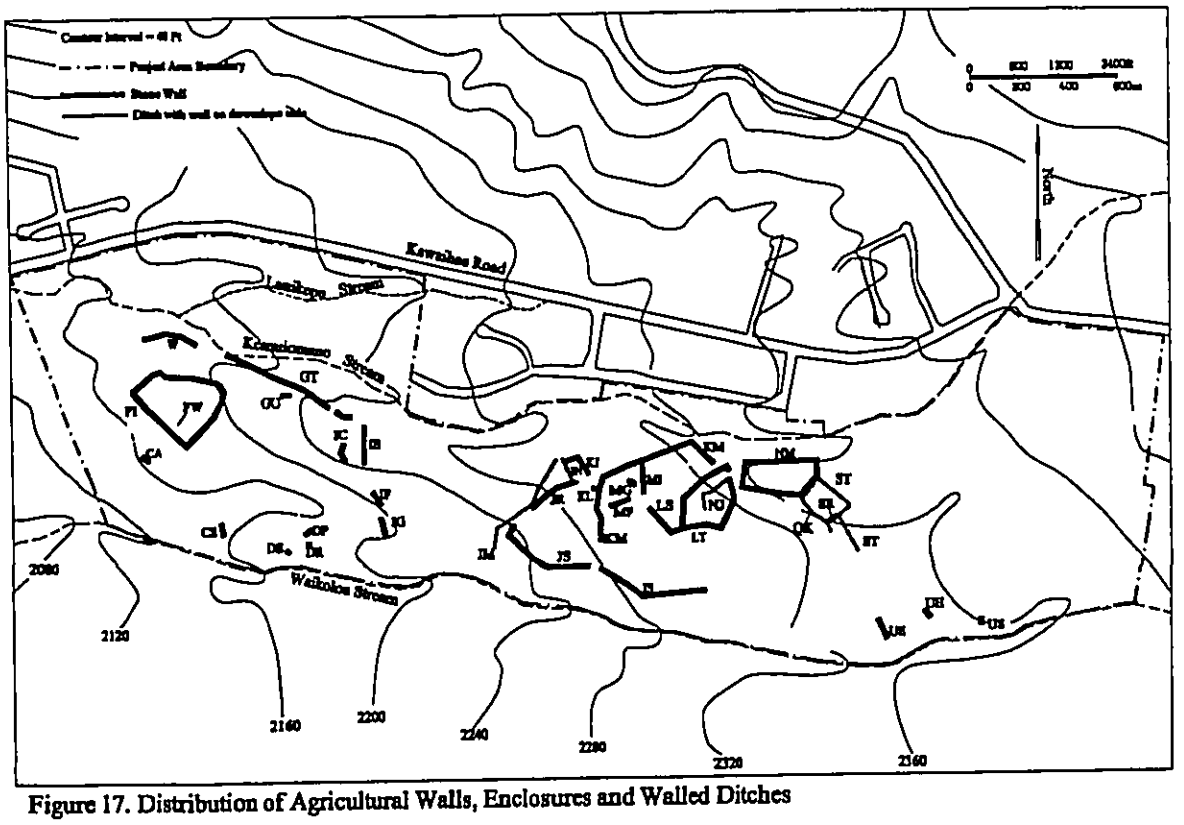


Figure 17. Distribution of Agricultural Walls, Enclosures and Walled Ditches

Figure 15. Site 22632, Feature BL, Agricultural Mound, view to southeast

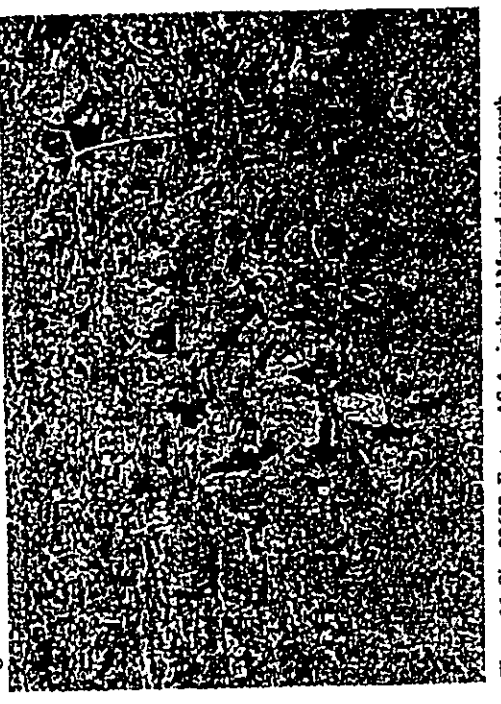


Figure 16. Site 22632, Feature AS Agricultural Mound, view to south

Figure 18. Site 22632, Feature FI, Agricultural Enclosure, view to southwest

Figure 19. Site 22632, Feature MI Agricultural Wall, view to west

Table 6. Summary of Site 22632 Agricultural Walls

Feature	Length	Base width	Top width	Height	Elevation (feet)	Construction	Orientation	Temp. Field No	Comment
W	108.00	0.5-0.65	0.4-0.5	0.35-0.5	2,175-2,195	Piled cobbles and boulders	East-west	742	
CA	8.50	0.82-0.9	0.55-0.65	0.4-0.5	2,182	Stacked cobbles and boulders	East-west	843	
CS	35.80	0.85-1.0	0.7-0.8	0.35-0.65	2,158	Piled cobbles and boulders	North-south	607	
DP	3.90	1.0-1.2	0.55-0.65	0.38-0.41	2,173	Stacked cobbles and boulders	Northeast-southwest	549	
DR	5.80	0.75-0.8	0.45-0.6	0.5-0.58	2,178	Stacked cobbles and boulders with core-filled interior	East-west	547	
DS	4.50	0.8-0.95	0.8-0.65	0.9-1.05	2,172	Stacked cobbles and boulders with core-filled interior	Northeast-southwest	820	
FW	30.00	0.52-0.7	0.41-0.6	0.35-0.45	2,184	Piled cobbles and boulders	Northeast-southwest	815	Inside Feature FI Enclosure
GT	291.70	0.65-1.1	0.45-0.7	0.65-0.8	2,195-2250	Stacked cobbles and boulders with core-filled interior	Northwest-southeast	533	May have connected to Feature W
GU	17.30	0.9-1.1	-	0.1-0.25	2,230	Aligned cobbles and boulders	East northeast - west southwest	818	Only base remaining
IB	79.20	0.8-1.0	0.5-0.7	0.85-0.9	2,250	Stacked cobbles and boulders with core-filled interior	North-south	534	May have connected to Feature IF
IC	34.90	0.75-1.0	0.45-0.68	0.7-0.95	2,243	Stacked cobbles and boulders with core-filled interior	North-south	555	
IF	32.70	0.85-1.0	0.4-0.8	0.7-0.95	2,210	Stacked cobbles and boulders with core-filled interior	Northwest-southeast	544	Move connected to Features IB and IG
IG	39.00	0.9-1.1	0.65-0.8	0.43-0.54	2,195	Stacked cobbles and boulders with core-filled interior	North northwest - south southeast	521	May have connected to Feature IF
JR	100.70	0.9-1.1	0.6-0.8	0.3-0.7	2,265-2,290	Stacked cobbles and boulders with core-filled interior	Northeast-southwest	451	May have connected to Feature JS
JS	427.30	0.75-1.05	0.55-0.8	0.25-0.82	2,237-2,297	Stacked cobbles and boulders with core-filled interior	West northwest-south southeast	496	Discontinuous wall
KJ	50.20	0.85-1.0	0.48-0.62	0.7-0.8	2,290-2,294	Stacked cobbles and boulders with core-filled interior	Northwest-southeast	447	Extends off of Feature KM
KL	19.10	0.85-1.15	0.55-0.82	0.6-0.85	2,292	Stacked cobbles and boulders with core-filled interior	northwest-southeast	824	Inside Feature KM Enclosure; Contains lined gate
KM	258.70	0.85-1.1	0.6-0.85	0.35-0.75	2,283-2,338	Stacked cobbles and boulders	Northeast-southwest	434	Inside Feature KM Enclosure
LS	68.30	0.85-1.2	0.45-0.7	0.25-0.7	2,302-2,308	Stacked cobbles and boulders with core-filled interior	Northeast-southeast	382	
MF	37.20	0.75-.9	0.35-0.78	0.4-0.7	2,296	Stacked cobbles and boulders with core-filled interior	Northeast-southwest	435	
MG	12.20	0.9-1.1	0.7-0.8	0.6-0.75	2,303	Stacked cobbles and boulders	Northwest-southeast	438	
MI	56.10	0.65-0.85	0.45-0.75	0.6-0.7	2,307	Stacked cobbles and boulders with core-filled interior	North-south	405	

Table 6. Summary of Site 22632 Agricultural Walls (cont.)

Feature	Length	Base width	Top width	Height	Elevation (feet)	Construction	Orientation	Temp. Field No.	Comment
SR	24.50	0.85-1.25	0.65-0.75	0.45-0.7	2,361	Stacked cobbles and boulders with core-filled interior	Northeast-southwest	831	
UE	49.60	0.8-0.95	0.5-0.7	0.35-0.65	2,328	Stacked cobbles and boulders with core-filled interior	Northeast-southwest	233	
UH	20.00	0.85-1.0	0.6-0.75	0.25-0.60	2,350	Stacked cobbles and boulders with core-filled interior	Northwest-southeast	178	
US	12.40	0.75-1.0	0.45-0.6	0.3-0.6	2,360	Stacked cobbles and boulders with core-filled interior	Northwest-southeast	133	

Table 7. Summary of Site 22632 Agricultural Enclosures

Feature	Length	Width	Area (sq m)	Wall Base width	Wall Top width	Height	Elevation (feet)	Construction	Temp. Field No.	Comments
FI	156.90	73.8 - 151.0	15864.80	0.75-0.95	0.6-0.73	0.7-0.93	2,170-2,205	Stacked cobbles and boulders with core-filled interior	671	Contains 16 ag fields
LT	147.40	52.8-92.6	9058.20	0.75-0.95	0.35-0.82	0.45-0.85	2,304-2,341	Stacked cobbles and boulders with core-filled interior	339/342	Contains 4 ag fields and 1 ditch
NM	155.70	54.5-68.9	8872.70	0.85-1.2	0.65-0.85	0.6-0.95	2,345-23,65	Stacked cobbles and boulders with core-filled interior	265	Contains 5 ag fields and 1 ditch
JS/JM/JR/JN/KJ/KM	229.40	84.5-181.8	25198.30	0.75-1.1	0.48-0.85	0.25-0.82	2,229-2,295	Stacked cobbles and boulders with core-filled interior	Various	Contains 13 ag fields and 2 permanent habitation sites with 3 features-bordered by
SR/ST/QK	77.70	60.5-68.0	1329.40	0.85-1.25	0.65-0.75	0.45-0.7	2,360-2,365	Stacked cobbles and boulders with core-filled interior	Various	Contains 1 ag field and 1 burial complex (9 features)-bordered by ditches on 4 sides
KM/MV LS/LT	154.50	81.0-150.0	15582.30	0.85-1.2	0.45-0.85	0.25-0.75	2,300-2,325	Stacked cobbles and boulders with core-filled interior	Various	Contains 7 ag fields, 14 ag mounds, 3 permanent habitation sites with 10 features (including 2 burials), and 3 temporary habitation sites with 3 features (including 1 burial)

Table 8. Summary of Site 22632 Irrigation Ditches

Feature	Length	Width	Depth	General Orientation	Elevation (feet)	Temp. Field No.	Comment
GS	277	1.4	0.35-0.8	West northwest-East southeast	2,200-2,238	743	Extends off Keanulomano Stream and empties into Feature FI Agricultural Enclosure
JL	189.7	1.30	0.2-0.4	East-west	2,282-2,292	486	From intersection with Feature M ditch to west
JM	369.7	1.60	0.35-0.7	Northeast-southwest	2,230-2,315	443	From Keanulomano Stream to southwest
JN	57.9	1.40	0.35-0.8	Northwest-southeast	2,290-2,292	822	From intersection with Feature M ditch to southeast - Possibly continued to southeast 67 m into ag field
K	263.5	1.5	0.4-0.7	East-west	2,200-2,230	765	Associated with Lanikapu Stream
NJ	99.8	1.20	0.35-0.45	Northeast-southwest	2,312-2,345	335	From intersection with Feature NL ditch to southwest; Extends into Feature LT Enclosure
NL	314.1	1.5	0.3-1.05	West southwest-east northeast	2,340-2,371	268	From Keanulomano Stream to west-southwest; Extends through Feature NM Enclosure
QK	375.8	1.70	0.4-0.5	North northeast-west southwest	2,318-2,358	251	From intersection with Feature NL ditch to south-southwest; Terminating at Waikoloa Stream
QL	205.40	1.60	0.2-0.45	East-west	2,358-2362	200	Terminates at Feature NL ditch
ST	168.5	1.30	0.2-0.8	Northwest-southeast	2,342-2,363	219	Extends to southeast from Feature QK ditch
TQ	721.2	1.40	0.3-0.55	Northeast-southwest	2,318-2,420	42/110/232	Originates at Feature TR ditch and extends southwest, emptying into Feature QK ditch above Waikoloa Stream
TR	236.2	2.50	0.3-0.8	Northeast-southwest	2,405-2,445	19	Originates at eastern project area boundary and extends to southwest, emptying into Feature TS ditch
TS	254.3	1.80	0.2-0.5	North-south	2,402-2,408	37	Originates at northern project area boundary and extends to south, emptying into Feature TQ ditch
UR	158	1.60	0.25-0.8	Northeast-southwest	2,358-2,375	173	Originates in level area with ag terraces and extends to southwest to Waikoloa Stream
VV	140.4	1.70	0.4-0.52	North northeast-west southwest	2,360-2382	50	Originates in level area with ag terraces and extends to south to Waikoloa Stream
VX	55.8	1.60	0.4-0.6	East-west	2,360-2383	57	Parallels Waikoloa Stream
XF	24.00	2.50	0.3-0.8	Northeast-southwest	2,396-2,402	88	Originates in level area with ag terraces and extends to southwest to Keanulomano Stream
XR	167.2	3.50	0.4-0.85	Northwest-southeast	2,429-2,445	26	Originates at northern project area boundary and extends to southeast out of the project area, through area of ag terraces
XY	82.2	2.50	0.25-0.45	Northeast-southwest	2,428-2,438	25	Originates in area of ag terraces and extends to southwest, emptying into Feature XZ ditch
XZ	213.9	3.20	0.4-0.7	Northwest-southeast	2,421-2,440	18	Originates at eastern project area boundary and extends to northwest through area of ag terraces, southwest, emptying into Feature TS ditch
ZZ	195.70	1.70	0.45-0.65	East-west	2,325-2,360	835	Associated with Keanulomano Stream

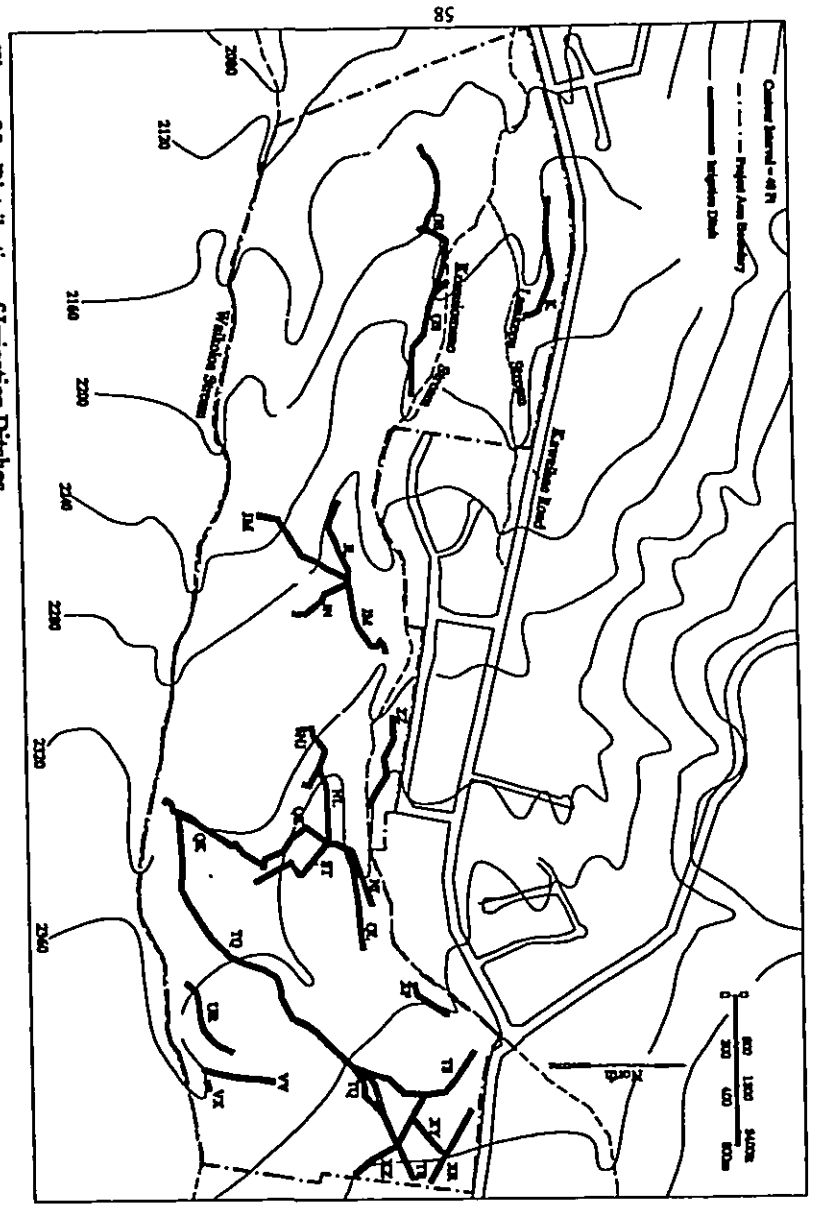


Figure 20. Distribution of Irrigation Ditches

JN, NJ, QK and ST) have stacked and/or piled stone walls on the downslope sides where the ditches traverse steeper slopes. The 15 remaining trenches are comprised of shallow linear depressions with no visible stone retaining walls. Examples of the agricultural ditches within the project area are illustrated in *Figures 21* and 22.

At least five separate irrigation systems are represented; four were fed by Keanuiomano Stream and one by Lanikepu Stream. The four systems fed by Keanuiomano Stream are situated in the western, west-central, east-central, and eastern portions of the project area. The simplest system consists of a single ditch Feature K, which was fed by Lanikepu Stream in the northwestern portion of the project area. This ditch fed a series of at least nine terraces.

Three systems channeled water out of the Keanuiomano Stream drainage and over a prominent ridgeline that extends through the central and western portions of the project area in an east-west direction. Feature GS in the western portion of the project area channeled water from Keanuiomano Stream to the fields within the extensive Feature FI agricultural enclosure and to a series of permanent habitation sites (22620-22622). Two short branches extend off the main ditch in this system. Portions of this system including the segment that crossed the prominent ridgeline have been destroyed by bulldozing in the vicinity.

The irrigation system formed by Features JL, JM, and JN in the west-central portion of the project area consists of a main channel that originates in the Keanuiomano Stream drainage. Two branches extend off the main channel immediately after the channel reaches the crest of the central ridgeline. One ditch (Feature JL) extends to the west along the side of the ridge past one temporary habitation site (22593) and near three permanent habitation sites (22594-22596). This ditch probably fed at least three fields (Field nos. 83-85). The other branch, Feature JN, extends downslope to the southeast past two permanent habitation sites (22588 and 22589) to a series of at least eleven fields (89-94, 97-101). There is a stone wall on the downslope side of the ditch, where it traverses a moderately steep slope. The main ditch (Feature JM) continues in a southwesterly direction downslope past two permanent habitation sites (22590 and 22592) and then on towards Waikoloa Stream. This portion of the main ditch passes through at least three fields (81, 87, 88).

One of the more complex systems is represented by at least six ditch segments (Features NL, NJ, QK, QL, and ST) in the east-central portion of the project area. The system extends into LCA 3828 and is likely part of the Amiikea Ditch system described in the Waimea Water Rights Case (Nakamura 1982; Carter vs. Territory of Hawai'i). Ditch segments NL and QL carried water into the system. Feature NL channeled water from Keanuiomano Stream. Feature QL apparently channeled excess water into Feature NL from another irrigation system to the east. Seven fields (184-190) are situated downslope from the QL ditch and may have been irrigated by it.

Two branches extend off the NL channel immediately south of the crest of the central ridgeline. One ditch (Feature ST) extends to the southeast along the side of the ridge and has a stone wall on the downslope side. There are no obvious fields along its course. The ditch extends towards the lower reaches of the next irrigation system to the east and may have served to transport excess water into that system.

The other branch, Feature QK, extends down a moderately steep slope to the south-southeast, traverses the gentle slope south of the ridge line, and joins the western end on the next irrigation system to the east just before it drains into Waikoloa Stream. The ditch has a wall on the downslope side where it traverses the steeper slopes. The ditch passes next to one permanent habitation site (21692). The ditch probably fed a pondfield (Field No. 183), and potentially, at least sixteen other fields (Field Nos. 133-143 and 144-148), which are situated immediately downslope from the ditch.

After the junction with branch ditches (Features ST and QL), the main ditch (Feature NL) extends along the south side of the central ridgeline to the west through a large agricultural enclosure (Feature NM) where at least five fields (Field Nos. 175-179) are situated. At its western terminus, the ditch branches into the Feature NJ ditch. The eastern portion of the ditch flowed to the southeast into two fields (Field Nos. 180 and 181), and potentially another dozen or more fields situated downslope to the south. The western portion extends downslope to the southwest through four fields (Field Nos. 161-164). There are more than twenty other fields downslope to the southwest that may have received water from the Feature NJ ditch.

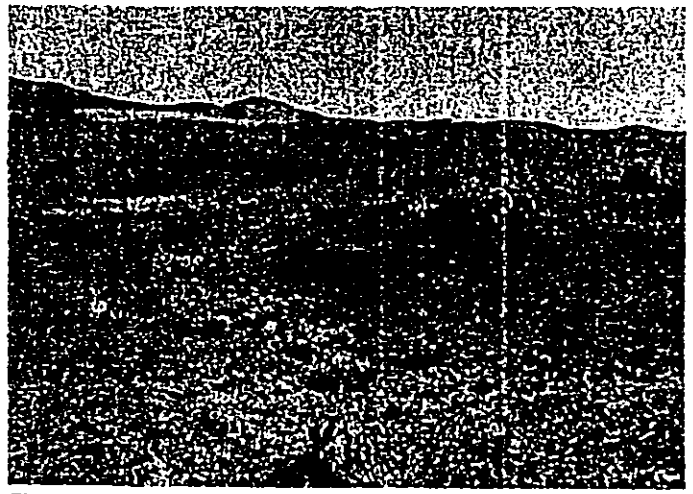


Figure 21. Site 22632, Feature QK, Irrigation Ditch, view to north

Figure 22. Site 22632, Feature GS Irrigation Ditch, view to south

The easternmost irrigation system is the most complex and its interpretation is complicated by modern development at its northeastern end where it has been truncated by the construction of roads and other facilities. The system consists of five ditch segments: Features TQ, TR, TS, XR, and XZ. Three other segments (Features UR, VV, and VX), situated in the southeastern portion of the project area, probably were formerly part of the system, but earthmoving activity in the intervening area has isolated the ditches, which drain toward Waikolou Stream.

The eastern irrigation system probably had at least two inputs from Keanuiomano Stream; Features TS and XR. The Feature XR ditch probably fed two branch ditches (Features XY and TR), which both fed the Feature XZ ditch. The Feature TS intake ditch and Feature TR branch ditch fed a major ditch, Feature TQ that extends over 700 m to the southwest where it feeds into the Feature QK ditch, which drains into Waikolou Stream. There are over 120 fields in the portion of the project area spanned by the ditches in the easternmost system (see *Figure 12*). There are three permanent and two temporary habitation sites in the area, but none are adjacent to any of the ditches.

There are two isolated ditch segments, Features XF and ZZ. The Feature XF ditch parallels Keanuiomano Stream in the north-central portion if the project area. The segment, which extends through Field No. 303, may have served to drain water in the eastern irrigation system back into Keanuiomano Stream. The isolated segment is situated on the north side of Keanuiomano Stream. This ditch probably channeled water in to 2 fields (Field Nos. 323 and 324).

Permanent Habitation

Permanent habitation features are defined as the primary dwelling structures at a permanent habitation site. Permanent habitation features were defined based on a criteria developed by Cordy (1981:66-82). In his model, Cordy presents the following attributes for permanent habitation structures: (a) external area greater than 16.0 to 19.0 sq m; (b) substantial construction (i.e. faced walls, paving); (c) presence of special purpose structures (small structures for work and storage); and (d) location (permanent housing clustered primarily along the shoreline or at the mouth of and on the sides of valleys).

Other attributes used in this study as evidence of substantial construction include architectural features such as internal hearths, constructed doorways and steps, and internal subdivision into rooms. Many structures in the project area appear to have had most of the wall stones removed leaving only the basal course of the interior and/or exterior wall faces as an alignment of boulders set on edge. Such alignments were interpreted as evidence of substantial construction because of the substantial effort that would have been required to select and transport suitable stones and embed the stone in the soil.

Special purpose structures, which are smaller in area than Cordy's permanent habitation size criteria, consist of structures present at permanent habitation sites, but which do not comprise the basic dwelling structure. Their specific functions cannot usually be determined at the inventory level of investigation. These structures may represent sleeping structures, cookhouses or storage areas. Special purpose structures are typically smaller and less formally constructed than permanent habitation features.

For the purposes of this study, other features, which would not have supported roof structures, are classified as permanent habitation ancillary features. These features consist of surface hearths, small platforms and terraces and pavements, and often functioned as site furniture such as tables, benches or drying racks. Large enclosures surrounding permanent habitations sites are also termed ancillary features, functioning to define the limits of enclosed yards.

Permanent habitation features comprise 8.6 % (70 features) of the total features identified within the project area. *Table 9* lists the permanent habitation features and summarizes the attributes utilized in determining their interpretation (after Cordy 1981). Forty of the features represent the foundation for a roofed structure, and the remaining 30 features consisting of ancillary features. The ancillary features are comprised of 18 structures that defined the perimeters of a yard, four special purpose structures, three features interpreted as site furniture, three cooking features, one activity area, and one path leading into a permanent habitation site.

Table 9. Summary of Permanent Habitation Sites

Site	Feature	Formal Type	Shape	Substantial Construction	Area (sq m)	Comments
21900	-	Enclosure	Rectangular	None	84.70	Ancillary feature - yard
21956	-	Walled terrace	Rectangular	Boulders set on edge	618.90	Ancillary feature - yard
21959	A	Enclosure	Rectangular	Boulders set on edge	978.30	Ancillary feature - yard, Internal burial feature
21960	A	Enclosure	Rectangular	Internal subdivisions	62.60	Foundation for roofed structure
21960	B	Enclosure	Rectangular	None	24.20	Foundation for roofed structure
21962	A	Enclosure	Rectangular	None	253.30	Ancillary feature - yard
21962	B	Terrace	Rectangular	None	14.60	Foundation for roofed structure
21964	A	Enclosure	Rectangular	None	61.70	Foundation for roofed structure
21964	B	Enclosure	Rectangular	Faced walls	36.25	Foundation for roofed structure
21965	-	Terrace	Rectangular	Boulders set on edge	106.90	Ancillary feature - yard
22573	A	Enclosure	Rectangular	Faced walls	229.00	Ancillary feature - yard
22573	B	Platform	Rectangular	Faced walls	7.08	Ancillary feature - site furniture
22573	C	Platform	Irregular	None	6.90	Ancillary feature - site furniture
22575	-	Terrace	L-shaped	Internal hearth/Possible entrance stone	28.35	Foundation for roofed structure
22576	-	Walled terrace	Square	Boulders set on edge	23.50	Foundation for roofed structure
22577	-	Walled terrace	Square with notched corner	Faced walls	71.10	Foundation for roofed structure
22578	-	Enclosure	Rectangular	Faced walls	39.10	Foundation for roofed structure
22579	A	Terrace	Rectangular	Faced walls, pavement	38.00	Foundation for roofed structure
22579	B	Terrace	Oval	Pavement	21.00	Foundation for roofed structure
22580	A	U-shape	U-shaped	Faced walls, pavement	10.80	Ancillary feature - special purpose structure
22580	B	U-shape	U-shaped	Faced walls	17.50	Foundation for roofed structure
22582	-	L-shape	L-shaped	Faced walls	32.20	Foundation for roofed structure
22585	A	Walled terrace	Irregular	Faced walls, Internal feature	61.70	Foundation for roofed structure
22585	B	Terrace	Rectangular	Pavement	57.20	Foundation for roofed structure
22585	D	Enclosure	Rectangular	None	12.30	Ancillary feature - special purpose structure
22587	A	Enclosure	Rectangular	Faced walls	529.50	Ancillary feature - yard
22587	D	C-shape	C-shaped	Faced walls	18.80	Foundation for roofed structure
22587	E	C-shape	C-shaped	None	3.80	Ancillary feature - special purpose structure
22588	A	Enclosure	Rectangular	Faced walls, pavement	16.00	Ancillary feature - special purpose structure
22588	B	Wall	Linear	None	13.90	Ancillary feature - yard
22589	-	Terrace	Rectangular	Internal feature	41.66	Foundation for roofed structure
22590	-	Walled terrace	Rectangular	Faced walls	72.00	Foundation for roofed structure
22592	A	Enclosure	Rectangular	Boulders set on edge	577.90	Ancillary feature - yard
22592	B	Terrace	Rectangular	None	39.60	Foundation for roofed structure
22592	C	Trail	Linear	None	37.70	Ancillary feature - transportation route
22592	D	Terrace	Oval	None	39.50	Foundation for roofed structure
22594	A	L-shape	L-shaped	Entryway	29.90	Foundation for roofed structure
22594	B	Enclosure	Oval	None	32.30	Foundation for roofed structure
22594	C	Hearth	Square	None	0.42	Ancillary feature - cooking feature
22595	-	Walled terrace	Square	Faced walls, Internal feature	56.20	Foundation for roofed structure
22596	-	Walled terrace	Rectangular	Faced walls	77.70	Foundation for roofed structure
22597	-	Enclosure	Oval	None	87.90	Ancillary feature - yard
22599	A	Enclosure	Rectangular	Faced walls, Internal feature	133.50	Ancillary feature - yard
22599	B	Hearth	Rectangular	None	0.27	Ancillary feature - cooking feature
22600	B	Walled terrace	Rectangular	Faced walls, Internal feature	35.10	Foundation for roofed structure - Associated burial (Feature A)
22601	-	Enclosure	Square	Faced walls	18.90	Foundation for roofed structure
22603	-	Enclosure	Rectangular	Faced walls	124.10	Ancillary feature - yard
22604	-	U-shape	U-shaped	Pavement	32.40	Foundation for roofed structure
22610	-	Enclosure	Rectangular	Faced walls	23.50	Foundation for roofed structure
22611	-	Terrace	Rectangular	None	19.20	Foundation for roofed structure
22613	A	U-shape	U-shaped	Faced walls	42.00	Foundation for roofed structure
22613	B	Terrace	Rectangular	None	27.70	Foundation for roofed structure
22613	C	Terrace	Rectangular	None	40.10	Ancillary feature - activity area

Table 9. Summary of Permanent Habitation Sites (cont.)

Site	Feature	Formal Type	Shape	Substantial Construction	Area (sq m)	Comments
22613	F	Enclosure	Triangular	Faced walls	424.40	Ancillary feature - yard
22614	-	Walled terrace	Rectangular	Faced walls, internal feature	79.20	Foundation for roofed structure with burial present
22615	A	Walled terrace	Rectangular	Faced walls, pavement, hearth	33.80	Foundation for roofed structure
22615	B	Walled terrace	Rectangular	Faced walls	21.20	Foundation for roofed structure
22617	-	Enclosure	Rectangular	None	1091.30	Ancillary feature - yard
22618	-	Walled terrace	Rectangular	Faced walls	57.90	Foundation for roofed structure
22619	-	Walled terrace	Rectangular	Faced walls	79.60	Foundation for roofed structure
22620	A	Terrace	Rectangular	Pavement, internal feature	28.20	Foundation for roofed structure
22620	B	Possible Seat	Irregular	None	1.95	Ancillary feature - site furniture
22620	C	Terrace	Rectangular	Pavements, internal features	48.50	Foundation for roofed structure
22620	D	Enclosure	Rectangular	None	2731.20	Ancillary feature - yard
22621	-	Enclosure	Rectangular	None	723.90	Ancillary feature - yard
22622	A	Enclosure	Rectangular	Feature B hearth	271.90	Ancillary feature - yard
22622	B	Hearth	Rectangular	None	0.25	Ancillary feature - cooking feature
22626	-	Walled terrace	Rectangular	Faced walls	23.50	Foundation for roofed structure
22631	A	Enclosure	Rectangular	Faced walls	431.00	Ancillary feature - yard
22631	B	Platform	Rectangular	Pavement	17.90	Foundation for roofed structure

Permanent habitation features are present at 43 sites (*Figure 23*). Twenty-four sites consist of a single permanent habitation feature, 12 sites contain two features, four sites consist of three features, and three sites consist of four permanent habitation features. The permanent habitation sites are distributed throughout the project area, although there are several clusters of site areas. The first cluster is situated along the top, sides and base of an east-west trending ridge south of Keanuiomano Stream. A second cluster is located at the western end of the parcel in an area that slopes slightly to the moderately to the west. A final cluster is located on a low ridge north of Waikolea Stream and south of an unnamed, seasonal drainage in the southwestern portion of the project area.

The main permanent habitation structures (excluding special purpose structures) range in area from 14.8 to 79.6 sq m. Excluding the smallest feature (Site 21962, Feature B – 14.8 sq m), all the of the features are greater than 17.0 sq m in area, with an average area of 40.3 sq m. The majority of the features (n=26, 65 %) are smaller than 40.0 sq m in area, with the remaining 14 features ranging in size from 41.8 to 79.6 sq m. These features consist of 13 walled terraces, 12 terraces, eight enclosures, three U-shapes, two L-shapes, one platform, and one C-shape.

Four burials were identified at three of the permanent habitation sites. These consist of Features B and C at Site 22587, Feature A at Site 22600 and Site 22614. All three appear to be post-occupation features because the burial platforms are constructed inside the larger habitation features and occupy much of the interior space.

Temporary Habitation

As defined by Cordy (1981), temporary habitations are (a) less than 16 sq m in external area, (b) insubstantial constructions, (c) contain numerous features of internal stratification (multiple firepits), and (d) have few or no associated structures. These habitations are of short-term or recurrent duration. Twenty-one features at twenty sites are classified as temporary habitations using Cordy's (1981) criteria.

The temporary habitations within the project area consist of seven C-shapes, four U-shapes, three terraces, three L-shapes, two enclosures, one platform and one surface hearth. *Table 10* lists all features interpreted to have functioned as temporary habitations and *Figure 24* shows their distribution. Nearly all of the 21 temporary habitation features consist of single feature sites (n=19), with the two remaining features representing components of a small complex.

The temporary habitations are present throughout the project area, although the majority appear to be situated primarily on the top or sides of ridges. Agricultural features of the Site 22632 complex and permanent habitations are generally found in close proximity to the temporary habitation features.

Most of the temporary habitations have small areas of less than 16.0 sq m, with only one site evidencing an area greater than 16.0 sq m. The features range in size from 2.72 to 16.9 sq m, with an average area of 9.53 sq m. All of these habitations evidence unsubstantial construction, consisting either of unfaced walls or perimeters defined solely by aligned stones. One site (Site 22581) contained a human burial incorporated into the structure.

Burial

Table 11 lists the sites and features that have been assigned a burial function, and *Figure 25* illustrates the distribution of the burial structures. Burial features were identified in 18 locations within the project area. These consist of 11 confirmed burials at nine sites. The seven remaining features were assigned burial functions based on formal types and location within an historic graveyard (Site 21961, Features A-C, and F-I).

Sixteen of the burial features are comprised of free-standing platforms, with the two remaining features consisting of platforms that have been built on the side of either a C-shape (Site 22581) or a walled terrace (Site 22614). The platforms range in area from 3.02 to 19.6 sq m, with an average area of 9.5 sq m. The height of the features ranges from 0.18 to 0.85 m, averaging 0.46 m high. Thirteen of the burials consisted of platforms bordered by small boulders. Four of the platforms were constructed of stacked and piled cobbles and small boulders, and one has faced sides.

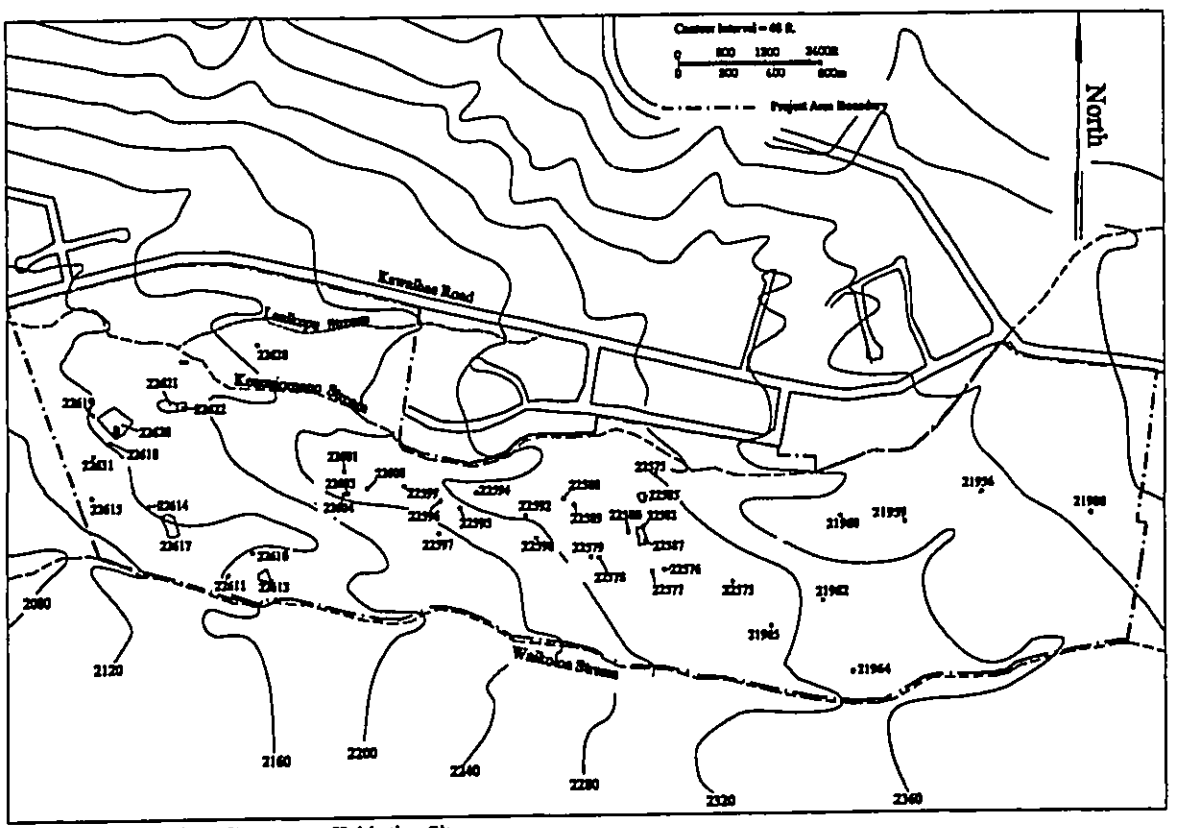


Figure 23. Distribution of Permanent Habitation Sites

Table 10. Summary of Temporary Habitation Sites

Site	Feature	Formal Type	Shape	Insubstantial Construction	Area (sq m)	Associated Features and Comments
21910	-	Terrace	Rectangular	Unfaced walls	9.05	Numerous agricultural features in area
21957	-	C-shape	C-shaped	Unfaced walls	4.86	Numerous agricultural features in area
21958	-	U-shape	U-shaped	Unfaced walls	15.00	Numerous agricultural features in area
21963	-	Platform	Rectangular	Unfaced walls	9.43	Numerous agricultural features in area
22574	-	U-shape	U-shaped	Unfaced walls	8.20	Built on side of Ag wall (Site 22632, Feature KM)
22581	-	C-shape	C-shaped	Unfaced walls	16.90	Adjoining platform with burial present
22583	-	U-shape	U-shaped	Unfaced walls	14.30	Numerous agricultural features in area
22584	-	Hearth	Oval	Aligned stones	2.72	Numerous agricultural features in area
22593	-	Terrace	Rectangular	Unfaced walls	9.50	Agricultural ditch located to the south
22598	A	Enclosure	Square	Unfaced walls	7.80	Permanent habitation/burial sites in area
22598	B	U-shape	U-shaped	Aligned stones	6.55	Permanent habitation/burial sites in area
22605	-	C-shape	C-shaped	Aligned stones	9.60	Permanent habitation sites in area
22607	-	Enclosure	Triangular	Unfaced walls	11.40	Built on side of Ag wall (Site 22632, Feature GT)
22608	-	L-shape	L-shaped	Aligned stones	11.70	Numerous agricultural features in area
22609	-	L-shape	L-shaped	Unfaced walls	9.85	Numerous agricultural features in area
22612	-	C-shape	C-shaped	Unfaced walls	7.40	Numerous agricultural features to north
22616	-	L-shape	L-shaped	Unfaced walls	5.85	Numerous agricultural features in area
22623	-	C-shape	C-shaped	Unfaced walls	12.00	Numerous agricultural features in area
22626	-	C-shape	C-shaped	Unfaced walls	11.80	Narrow ridge top
22627	-	C-shape	C-shaped	Unfaced walls	7.83	Narrow ridge top
22629	-	Terrace	Rectangular	Unfaced walls	7.80	Narrow ridge top

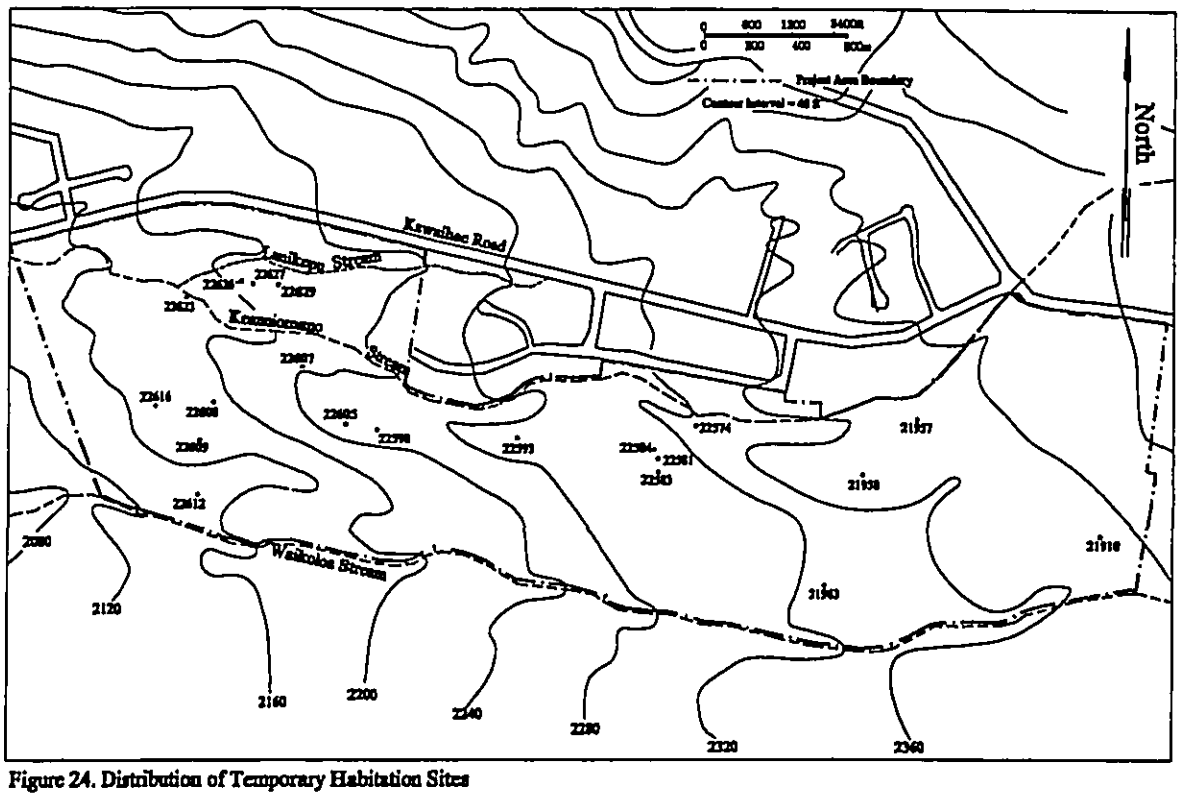


Figure 24. Distribution of Temporary Habitation Sites

Table 11. Summary of Burial Features

Site	Feature	Formal Type	Construction	Other Confirmed Burials at Site	Area (sq m)	Height (m)	Shape	Comments
21920	-	Platform	Bordered by boulders	None	12.20	0.75	Oval	Subadult burial
21955		Platform	Bordered by boulders, upright cobble on surface	None	10.53	0.41	Oval	Adult burial
21959	B	Platform	Stacked and piled cobbles and boulders	None	6.05	0.51	Oval	Adult burial
21961	A	Platform	Bordered by boulders	Features D and E	7.80	0.38	Rectangular	Disinterred historic burial - Depression in center
21961	B	Platform	Bordered by boulders with domed surface	Features D and E	4.73	0.25	Rectangular	Disinterred historic burial
21961	C	Platform	Bordered by boulders	Features D and E	7.64	0.18	Rectangular	Disinterred historic burial - Depression in center
21961	D	Platform	Bordered by boulders	Feature E	11.49	0.18	Rectangular	Disinterred historic burial - remnants of coffin and human remains noted
21961	E	Platform	Bordered by boulders	Feature D	5.29	0.3	Rectangular	Disinterred historic burial - Coffin and human remains noted
21961	F	Platform	Bordered by boulders with domed surface	Features D and E	3.02	0.35	Rectangular	Disinterred historic burial
21961	G	Platform	Bordered by boulders	Features D and E	8.43	0.43	Rectangular	Disinterred historic burial
21961	H	Platform	Bordered by boulders	Features D and E	5.23	0.38	Rectangular	Disinterred historic burial
21961	I	Platform	Bordered by boulders	Features D and E	3.55	0.28	Rectangular	Disinterred historic burial
22581	-	C-shape with platform	Stacked and piled cobbles and boulders	None	17.00	0.48	C-shaped	Infant burial - Also temporary habitation
22587	B	Platform	Bordered by boulders	Feature C	12.70	0.52	Rectangular	Disturbed adult burial
22587	C	Platform	Faced walls	Feature B	13.80	0.65	Rectangular	Disinterred burial
22600	A	Platform	Stacked and faced sides	None	19.60	0.8	Rectangular	Disturbed adult burial within crypt
22606	-	Platform	Bordered by boulders, upright cobble on surface	None	9.00	0.5	Square	Disturbed burial (teeth)
22614	-	Platform on walled terrace	Stacked and faced sides	None	9.13	0.6	Rectangular	Adult burial - Also permanent habitation

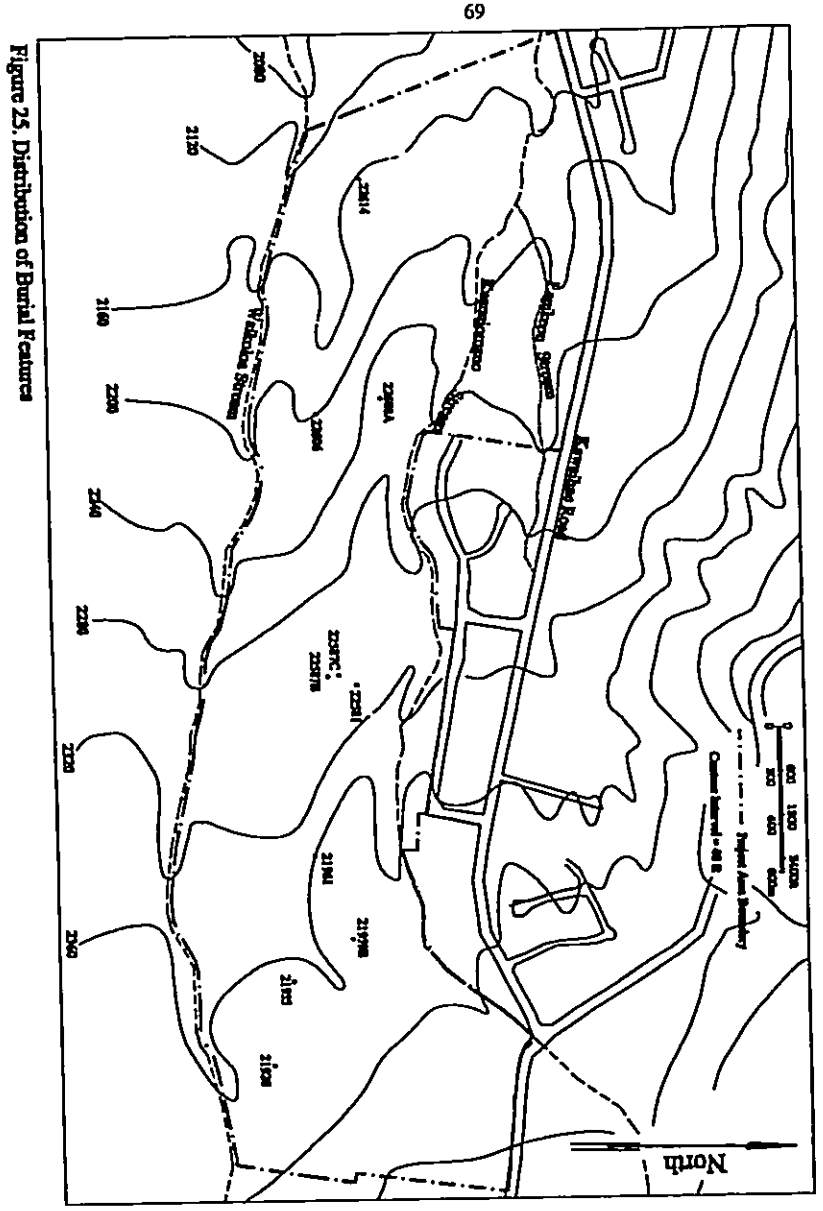


Figure 25. Distribution of Burial Features

The condition of the remains within the burial platforms varied considerably. Five of the burials are intact and consist of three adult burials (Sites 21955, 21959, Feature B, and 22614), one sub-adult burial (Site 21920), and one infant burial (Site 22581). The six remaining confirmed burials appear to have been disinterred, based on the fragmented nature of the remains and disturbance to the surface structure. The seven probable burial platforms at Site 21961 were also disturbed and the most of the skeletal remains within these platforms have probably been removed.

The remnants of wooden coffins were identified at the two tested features of Site 21961, indicating an historic age. The burial at Feature A of Site 22600 was interred in a well-constructed crypt with a corbelled ceiling. All of the other burials were situated in soil deposits below stone architectural layers.

Miscellaneous

Miscellaneous feature functions are comprised of marker, military defensive position, historic foundation, storage, and quarry. Three cairns were interpreted as markers because they appear to have functioned as property boundary monuments or reference points. Two features interpreted as military defensive positions were assigned this function based on their recent looking appearance and on the presence of military C-ration tins. A constructed cupboard in a wall (Site 22585, Feature C) was assigned a storage function, and an extensive surface scatter of flaked basalt (Site 22624) located on and around a knoll was interpreted as a quarry based on the presence of several basalt outcrops of the same material. Two sites were assigned historic foundation functions based on the use of concrete.

Isolated Objects

Four isolated objects (IO) were noted during the project. These objects consist of artifacts that were collected from the ground surface during the survey. They are comprised of three basalt adze fragments (IOs 1, 2 and 3), and two glass bottles (IO-4). The locations of the IOs are illustrated in *Figure 11*.

IO-1 is a broken fragment of a basalt adze recovered from the surface of a dirt road at the 2,290 ft elevation. This adze fragment is 4.23 cm long, 4.03 cm wide, 1.34 cm in thickness, and weighs 48.01 grams. IO-1 is illustrated in *Figure B-1, Image B.*

IO-2 is a fragment of a basalt adze with a polished surface, found along the main dirt road at the 2,262 ft elevation. It is 3.53 cm long, 2.3 cm wide and 1 cm in thickness, and weights 32.1 grams. IO-2 is illustrated in *Figure B-1, Image C.*

IO-3 is a portion of a basalt adze recovered from the southern side of the main dirt road, at the 2,210 ft elevation. The bevel edge of the adze is present but the base has been broken off. It measures 9.23 cm long, 3.84 cm wide, 3.3 cm in thickness, and weighs 282 grams. *IO-3* is depicted in *Figure B-1, Image E.*

IO-4 consists of two complete glass bottles recovered from the soil bank on the northern side of Keanuiomano Stream, at the 2,125 ft elevation. These bottles are illustrated in *Figure B-4, Images A* and *B.* The first bottle is brown in color and is 18.03 cm tall, 9.38 cm wide and 4.16 cm thick. It weighs 381.9 grams. The bottle is machine made with an Owen's ring base and screw cap lip and probably dates to the early 1900s. Embossed on the side of the bottle are "Federal Law Prohibits Sale or Reuse of This Bottle" and Exporters, White Horse Distillers LTD, Glasgow Scotland".

The second IO-4 bottle is made of aqua colored glass and is 11.64 cm tall, 4.01 cm wide and 1.84 cm in thickness. It weighs 68.24 grams. The bottle is machine made with an Owen's ring base and probably dates to the late 1800s to early 1900s. "BURNETT'S, STANDARD FLAVORING EXTRACTS" is embossed on the side of the bottle.

CONCLUSION

Discussion

The identified sites and features conform to the site/feature types expected in Clark's (1987) Kula Zone of the Waimea-Kawaihae region based on previous archaeological work and historic documentary research. The project area lies within Field Complex 2 of the Waimea Field System (Newman 1970; Clark and Kirch 1983, Clark 1981, 1987). Probable late prehistoric to historic agricultural features, consisting of modified outcrops, mounds, terraces, field boundaries and irrigation ditches, are distributed across much of the project area. Traditional crops included plantains, bananas, sugar cane, dryland taro, sweet potatoes and *wauke* and *mamaki* for making *tapa* based on early historic accounts and LCA testimony.

The terraces and field boundaries define over 300 discrete fields covering 28.7 hectares (70.93 ac). Other areas were also cultivated as evidenced by clusters of mounds of stones cleared from cultivation plots. It is probable that additional areas were cultivated where there are no surface remains, especially on the gentle slopes. Two probable pondfields were documented indicating that cultivation of wet taro was also practiced on at least a limited scale. Another characteristic of the field system is the extensive network of walls, most of which form large enclosures that apparently where built to keep cattle out of the fields. Free-ranging cattle became an increasing problem as early as the late 1790s and probably lead to the erection of the enclosures. Historically-introduced crops included watermelons, cabbages, onions, corn, tomatoes, mulberries, figs, and beans.

The irrigation system includes nearly three miles (4,362.6 m) of irrigation ditches. The system is comprised of at least five discrete subsystems, four of which channeled water from Keanu'i'omanō Stream through a dendritic series of branches that drain into Waikoloa Stream to the south. Clark (1983) characterized the irrigation system in an adjacent area (Field System 3) as a supplemental one that provided water to crops during dry periods and not on a continuous basis. This interpretation was based on testimony in the Carter vs. Territory of Hawai'i water rights case that suggests ditch water was primarily for domestic use. Crops only were irrigated when excess water was available or when rainfall was insufficient.

Only two of the five irrigation subsystems documented during the survey channeled water close to habitation sites and all of the subsystems flow through fields. This pattern suggests that providing water for domestic purposes was not the primary function of the ditch systems, but would not preclude a supplemental, as opposed to continuous, irrigation regime. It is possible that the importance of water for domestic use increased in the late 1800s to early 1900s because of increased aridity resulting from deforestation caused by timber harvesting, agricultural clearing, and pasture improvement. The recollections of most of the individuals who testified in the water rights case were limited to the late 1800s and early 1900s.

The extensive nature of the irrigation system suggests that its construction was a large scale communal effort that could only have been organized by chiefly authority. The system was probably intended to increase agricultural production initially to support military campaigns as suggested by Barrere (*in* Clark & Kirch 1983) and later foreign trade. Several of the agricultural enclosures are quite large and also potentially required a large-scale communal effort to build.

Other traditional Hawaiian sites consist of numerous permanent and temporary habitations. The permanent habitation features primarily consist of walled terraces and enclosures. Many permanent habitation sites have enclosed yards, a typical early historic form that served to keep free-ranging cattle out. The permanent habitation sites are distributed throughout the project area, although there are several apparent clusters. The first cluster is situated along the crest and southern slopes of the prominent east-west trending ridge south of Keanu'i'omanō Stream. A second cluster is located at the western end of the parcel surrounding a very large agricultural enclosure (Site 22632, Feature FI). A third small cluster is located on a low ridge between Waikoloa Stream and a seasonal meander of the drainage in the southwestern portion of the project area.

Within the first cluster, there are two concentrations of habitation sites that are situated within close proximity to each other. One concentration consists of four permanent habitation sites (Sites 22600,

22601, 22603, and 22604) and two temporary habitation sites (22598 and 22605). A burial is present at Site 22600. The other concentration consists of four permanent habitation sites (Sites 22580, 22582, 22585, and 22587) and three temporary habitation sites (22581, 22583, and 22584). Burials are present at Sites 22581 and 22587. These concentrations occupy areas of approximately 4-5 acres and some of the sites are situated less than 25 m apart. The concentrations potentially represent permanent *kauhale* residential complexes and/or small villages comparable to Clark's (1987) neighborhoods.

Eighteen burials were identified at nine sites including an historic cemetery (Site 21961). Five burials were identified at three of the permanent habitation sites and one temporary habitation. Most appear to be post-occupation features because the burial platforms are constructed inside the larger habitation features and occupy much of the interior space. More than half of the burial features show evidence of previous excavation. Most of the excavations were the result of disinterment because only a few fragmentary skeletal elements were encountered during the test excavations in a sample of these disturbed features.

The central portion of the project area between irrigation ditch Features JM and QK contains fourteen permanent and four temporary habitation features, three burials, numerous agricultural features, and a series of large enclosures and remnants of a very large enclosure. This very large enclosure and the Feature NM enclosure correspond to walls on an historic map and were part of LCA 3828, a 48-acre parcel awarded to J.A. Palea in the Ili of Koaliula (see *Figure 7*). According to the claim testimony, the land had one house for Palea and was surrounded by lands of the *konohiki*, William Beckley. Palea's wife, Papai, had lived there since the time of Keaumoku, before the arrival of the missionaries. The award boundary description describes ditches on the east and west sides of the parcel. The western ditch is referred to as Amiikea, a ditch name that also appears in the early 1900s water rights case testimony as a ditch that provided water to LCA 3828.

Palea subsequently sold a small portion of his land to Emalia in 1880. The land was described as a house lot and cultivated plot enclosed by a stone wall and an adjacent area of one acre outside of the enclosure. In 1881, Palea sold half of his remaining land to J.W. Pa with the provision that Pa provide him with food, clothing, lodging, and a decent burial upon his death. There are several enclosures and partial enclosures within the area of LCA 3828. One enclosure (Site 22587, Feature A) was interpreted to be a permanent habitation feature that enclosed a yard. Fragments of rusted metal and volcanic glass were found in excavations at the site indicating late prehistoric to historic period use. There are two burial platforms built against the interior faces of the enclosure and one of these may be Palea's grave. The skeletal remains, except for several long bone fragments, from one of platforms (Feature C) were removed in the past. The other grave (Feature B) was previously disturbed but still contains a cranium and other skeletal elements.

A portion of a larger agricultural enclosure nearby, which is enclosed on three sides by portions of wall Feature KJ and the Feature JN ditch, contains two permanent habitations, Sites 22588 and 22599. Glass and ceramic fragments were noted on the surface of the latter site indicating historic period utilization. It is possible that this is the house lot Palea sold to Emalia in 1880. Historic materials were also found at two other permanent habitation sites (22575 and 22585) in the vicinity, but neither is situated within a typical house lot enclosure.

An unexpected traditional site type documented during the survey is an extensive surface scatter of fine grained basalt flakes and debitage (Site 22624). The site is situated on and around a rocky knoll on the south side of Keanu'i'omanō Stream in the northwestern portion of the project area, and on the opposite bank of the stream where there is vertical exposed basalt face that was apparently a source for the stone. The site encompasses an area of over 5,000 sq m and was a basalt quarry and preliminary reduction site.

Radiocarbon age determinations were made on charcoal samples from four permanent habitation sites (see *Appendix D*). A sample from a slab-lined hearth at Site 22599 yielded multiple calibrated age ranges of AD 1530-1560, 1630-1680, 1740-1800, and 1930-1950. The absence of historic artifacts at the site indicates that the site was probably occupied sometime between the mid-1500s and 1800s. A sample from another walled terrace (Site 22614) yielded multiple age ranges of 1680-1730, 1810-1930, and 1950 to beyond 1960. The earliest age range is the most likely one based the association of ground stone and volcanic glass flakes with the sample.

A sample from a walled terrace at Site 22600 yielded an age range of 1650 to beyond 1960. The absence of historic artifacts at the site indicates that the site was probably occupied between the mid-1600s and late 1700s. The fourth sample came from a slab-lined hearth at Site 22622 and produced age ranges of 1510-1600, 1620-1700, 1720-1820, 1840-1880, and 1920-1950. Associated artifactual material included volcanic glass and basalt flakes. The artifacts indicating that the latter two age ranges are unlikely and that the site was occupied sometime between the 1500s and early 1800s. Overall the radiocarbon dating results indicate that two permanent habitations in the project area were occupied between the1500s and early 1800s. Occupation of the other two sites occurred between the mid- to late 1600s and 1800s.

Traditional Hawaiian artifacts including volcanic glass flakes, basalt flakes, adzes, and ground stone fragments were collected from or observed on the surface of seventeen permanent and four temporary habitation sites. Historic artifacts dating to the 1800s, including clay pipe fragments, shell beads and buttons, square nails, glazed ceramics, and blown bottle glass, were collected from two temporary and five permanent habitation sites. Both historic and traditional artifacts were present at four of these permanent habitations and one temporary habitation site indicating that the occupation of these sites probably spanned the late 1700s to early 1800s.

The combined evidence from radiocarbon dating, artifact assemblages, and historic documentary research documents traditional Hawaiian utilization of the project area beginning as early as the 1500s. This use continued until at least the mid-1800s. Two embossed machine-made bottles with Owens rings (IO-4) and a nearby foundation for some type of machinery beside Keanu'i'omanō Stream probably date to the late 1800s to early 1900s. Military ordnance fragments and impact craters scattered across the project area evidence the project areas use for military training in the 1940s. Ranching-related infrastructure including wire fences, corals, and water troughs are scattered across the project area and document the long-standing and current use of the area for grazing.

Significance Assessments

Pursuant to DLNR (1998) Chapter 275-6 (d), the initial significance assessments provided herein are not final until concurrence from the DLNR has been obtained. Sites identified and relocated during the survey are assessed for significance based on the criteria outlined in the Rules Governing Procedures for Historic Preservation Review (DLNR 1998: Chap 275). According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:

> Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;
>
> Criterion "b". Be associated with the lives of persons important in our past;
>
> Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
>
> Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; and
>
> Criterion "e". Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts--these associations being important to the group's history and cultural identity.

Based on the above criteria, all seventy-five sites are assessed as significant under Criterion "d" (*Table 12*). The sites have yielded information important for understanding late prehistoric to historic land use in the project area. Nine sites (Sites 22581, 21920, 21955, 21959, 21961, 22587, 22600, 22606, and 22614) are also assessed as culturally significant because probable Hawaiian burials are present. Four of these culturally significant sites (Sites 21961, 22587, 22600, and 22614) and six other sites (Sites 22573, 22585, 22618, 22620, 22624, and 22632) are additionally assessed as significant under Criterion "c" as a well-preserved example site types including the agricultural field complex, an historic cemetery, a basalt quarry, and several permanent habitation sites. The agricultural field complex (Site 22632) is also assessed as significant under Criterion "a" because it is associated with the broad pattern of traditional and early historic agricultural intensification in Hawaii.

Recommended Treatments

The mapping, written descriptions, photography, and test excavations at six sites adequately documents them and no further work or preservation is recommended (see *Table 12*). The remaining sites retain the potential to yield information important for understanding prehistoric and historic land use. Ten sites, including four with burials, are recommended for preservation because of their cultural significances (4 sites), or because the sites are well-preserved examples of site types (6 sites).

The remaining sites, except the sites with burials and representative portions of the Site 22632 agricultural complex, could be mitigated through data recovery; however, the landowner intends to preserve two clusters of sites within two preservation areas (*Figure 26*). In addition to including two permanent habitation sites recommended for preservation as site type examples (Sites 22618 and 22620), the Western Preservation Area includes two other permanent habitation sites (22621 and 22622), a temporary habitation (Site 22616), and twenty-seven features of Site 22632. The latter features include a large agricultural enclosure, a portion of an irrigation ditch, a wall segment, mounds, and numerous terraces. The Central Preservation Area includes two sites with burials (Sites 22581 and 22587) and a permanent habitation complex recommended for preservation as site type example (Site 22585). Other sites within this preservation area consist of three temporary habitations (Sites 22574, 22583, and 22584), five permanent habitations (Sites 22576-78, 22580, and 22582), and 53 features of Site 22632 including walls, field boundaries, and enclosure, and numerous mounds and terraces. Two sites recommended for preservation that are outside of the preservation areas consist of a quarry (Site 22624) and a permanent habitation complex (Site 22573).

The remaining sites outside of the preservation areas and remaining features of Site 22623 are recommended for data recovery. The plans for preservation of sites and data recovery would be detailed in a Mitigation Plan prepared for DLNR-SHPD review and approval. The specific plans for preservation and maintenance of the nine sites with burials would be detailed in a Burial Treatment Plan prepared for DLNR-SHPD and the Hawaii Island Burial Council (HIBC) review and approval.

Table 12. Site Significance and Recommended Treatment

SIHP Site No.	Type	Function	Significance Criteria	Recommended Treatment
11100	Concrete piers	Foundation	d	NFW
21900	Enclosure	Permanent Habitation	d	DR
21910	Terrace	Temporary Habitation	d	DR
21920	Platform	Burial	d, e	PR
21955	Platform	Burial	d, e	PR
21956	Walled terrace	Permanent Habitation	d	DR
21957	C-shape	Temporary Habitation	d	DR
21958	U-shape	Temporary Habitation	d	DR
21959	Complex	Permanent Habitation/Burial	d, e	PR
21960	Complex	Permanent Habitation	d	DR
21961	Complex	Burial	d, e	PR
21962	Complex	Permanent Habitation	d	DR
21963	Platform	Temporary Habitation	d	DR
21964	Complex	Permanent Habitation	d	DR
21965	Walled terrace	Permanent Habitation	d	DR
22573	Complex	Permanent Habitation	c, d	PR
22574	U-shape	Temporary Habitation	d	PR
22575	Walled terrace	Permanent Habitation	d	DR
22576	Walled terrace	Permanent Habitation	d	PR
22577	Walled terrace	Permanent Habitation	d	PR
22578	Enclosure	Permanent Habitation	d	PR
22579	Complex	Permanent Habitation	d	DR
22580	Complex	Permanent Habitation	d	PR
22581	C-shape	Temporary Habitation/Burial	d, e	PR
22582	Enclosure	Permanent Habitation	d	PR
22583	U-shape	Temporary Habitaiton	d	PR
22584	Hearth	Temporary Habitaiton	d	PR
22585	Complex	Permanent Habitation/ Storage	c, d	PR
22586	Complex	Military	d	NFW
22587	Complex	Permenant Habitation/Burial	d, e	PR
22588	Complex	Permanent Habitation	d	DR
22589	Walled terrace	Permanent Habitation	d	DR
22590	Walled terrace	Permanent Habitation	d	DR
22591	Cairn	Marker	d	NFW
22592	Complex	Permanent Habitation	d	DR
22593	Terrace	Temporary Habitation	d	DR
22594	Complex	Permanent Habitation	d	DR
22595	Walled terrace	Permanent Habitation	d	DR
22596	Walled terrace	Permanent Habitation	d	DR
22597	Enclosure	Permanent Habitation	d	DR
22598	Complex	Temporary Habitation	d	DR
22599	Complex	Permanent Habitation	d	DR
22600	Complex	Permanent Habitation/Burial	d, e	PR
22601	Enclosure	Permanent Habitation	d	DR

Recommended Treament - NFW = No Further Work, DR = Data Recovery, PR = Preservation

Table 12. Site Significance and Recommended Treatment (cont.)

SIHP Site No.	Type	Function	Significance Criteria	Recommended Treatment
22602	Cairn	Marker	d	NFW
22603	Enclosure	Permanent Habitation	d	DR
22604	U-shape	Permanent Habitation	d	DR
22605	C-shape	Temporary Habitation	d	DR
22606	Platform	Burial	d, e	PR
22607	Enclosure	Temporary Habitation	d	DR
22608	L-shape	Temporary Habitation	d	DR
22609	L-shape	Temporary Habitation	d	DR
22610	Walled terrace	Permanent Habitaiton	d	DR
22611	Walled terrace	Permanent Habitaiton	d	DR
22612	C-shape	Temporary Habitation	d	DR
22613	Complex	Permanent Habitaiton	d	DR
22614	Walled terrace	Permanent Habitation/Burial	d, e	PR
22615	Complex	Permanent Habitaiton	d	DR
22616	L-shape	Temporary Habitation	d	PR
22617	Enclosure	Permanent Habitation	d	DR
22618	Walled terrace	Permanent Habitation	c, d	PR
22619	Walled terrace	Permanent Habitation	d	DR
22620	Complex	Permanent Habitation	c, d	PR
22621	Enclosure	Permanent Habitation	d	PR
22622	Complex	Permanent Habitation	d	PR
22623	C-shape	Temporary Habitation	d	DR
22624	Lithic scatter	Quarry	c, d	PR
22625	Concrete piers	Foundation	d	NFW
22626	C-shape	Temporary Habitation	d	DR
22627	C-shape	Temporary Habitation	d	DR
22628	Walled terrace	Permanent Habitation	d	DR
22629	Terrace	Temporary Habitation	d	DR
22630	Cairn	Marker	d	NFW
22631	Complex	Permanent Habitation	d	DR
22632	Complex	Agriculture	a, c, d	DR/PR

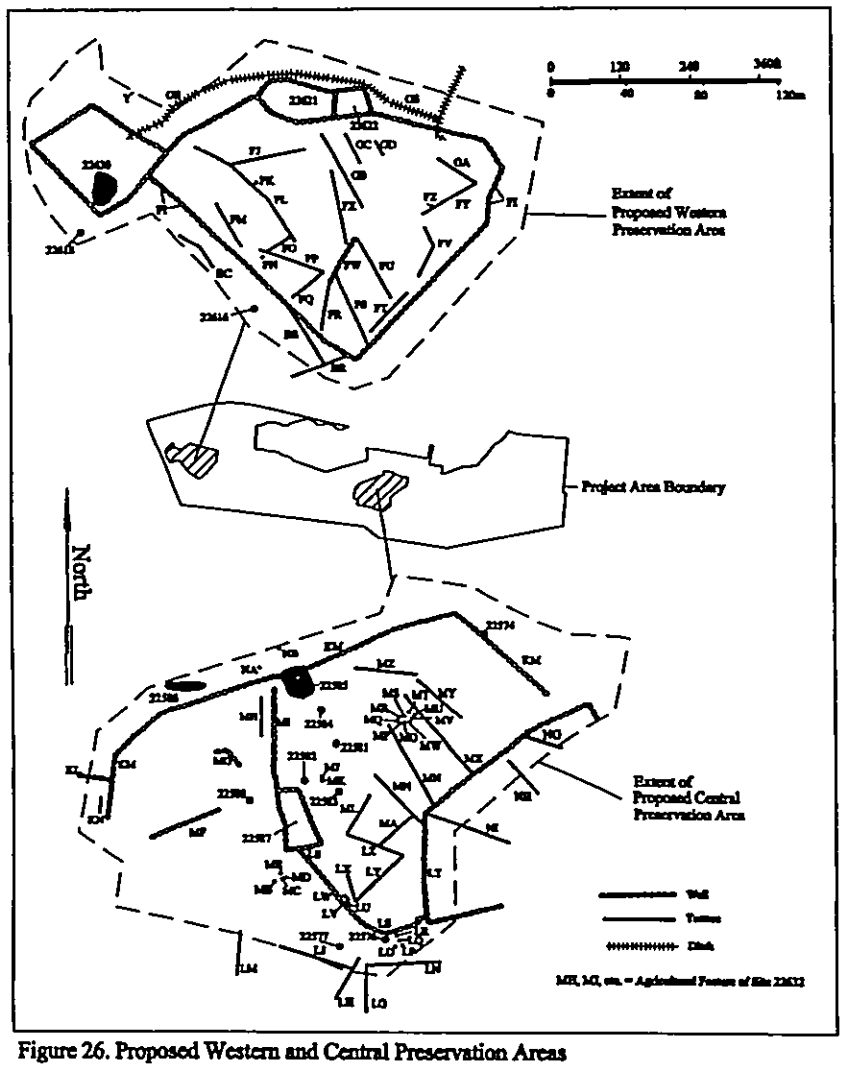


Figure 26. Proposed Western and Central Preservation Areas

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APPENDIX A – SITE AND FEATURE DESCRIPTIONS

State No.: 11100
Site Type: Concrete and Stone Piers
Topography: Level area
Elevation: 2,240 feet
Probable Age: Historic
Functional Interpretation: Foundation
Overall Dimensions: 173.0 by 0.60 m
Condition: Fair
Integrity: Altered
Description: Site 11100 is a linear configuration of concrete and stone piers located in a level area north of Lanikepu Stream and south of Kawaihae Road. The site was initially documented by Hammatt and Borthwick (1986) during a reconnaissance survey of this portion of the project area. There are 12 piers present at the site though many of the intervening piers appear to be missing. The distribution of the piers is presented in *Figure 11*. There is a cluster of nine piers at the western end of the site, with an additional three similar piers located 95.0 m to the east. The individual piers are constructed of subangular basalt cobbles and small boulders that have been mortared together. They range in size at the base from 0.6 to 0.8 sq m and 0.45 to 0.55 sq m at the top. The height of the piers varies from 0.16 to 1.3 m. The majority of the piers have a groove in the center that is oriented parallel to the long axis of the configuration. This groove averages 0.08 m wide and 0.04 m deep and probably supported a pipeline. No pipe was present. Site 11100 is interpreted as a series of foundations for a pipeline based on distribution of the piers and the presence of the groove.

State No.: 21900
Site Type: Enclosure
Topography: Base of knoll
Elevation: 2,410 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 10.3 by 9.2 m
Condition: Poor
Integrity: Altered
Description: Site 21900 consists of the remnants of a rectangular-shaped enclosure located at the base of a knoll on the eastern side. All that remains of the structure is the base of the enclosure walls, defined by linear alignments of small subangular boulders and large cobbles which suggest many of the wall stones were removed (*Figure A-1*). The position of the alignments indicate that walls originally measured 1.0 to 1.05 m wide, and were likely core-filled. The enclosure is 10.3 m long (north-south) by 9.2 m wide, with the wall stones varying in height from 0.05 to 0.51 m above ground surface. The interior of the enclosure consists of level soil covered in sparse grasses. No cultural remains were noted. Site 21900 is interpreted as a permanent habitation ancillary feature that served to define the boundaries of a yard based on its formal type and large area (94.7 sq m). A pole and thatch structure probably once existed within the enclosure.

State No.: 21910
Site Type: Terrace
Topography: Side of ridge
Elevation: 2,390 feet
Probable Age: Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.4 by 2.66 m
Condition: Fair
Integrity: Unaltered
Description: Site 21910 is a roughly rectangular-shaped terrace located on the western side of a ridge. The terrace is built within a low swale with retaining walls constructed on the west and northern sides (*Figure A-2*). The main portion of the terrace is 2.85 m long (east northeast by west southwest) by 2.66 m wide. The retaining wall along the north side consists of a single course of large subangular cobbles that ranges in height from 0.16 to 0.28 m above ground surface. The western retaining wall is comprised of two courses

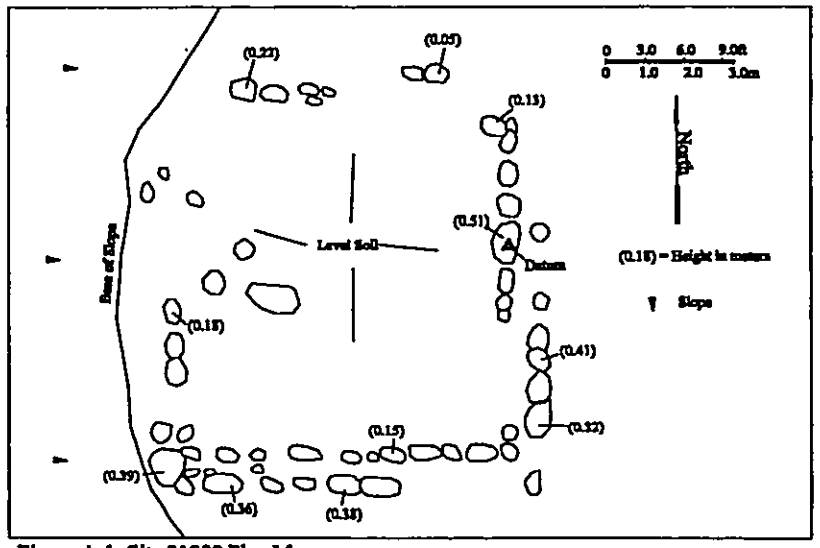


Figure A-1. Site 21900 Plan Map

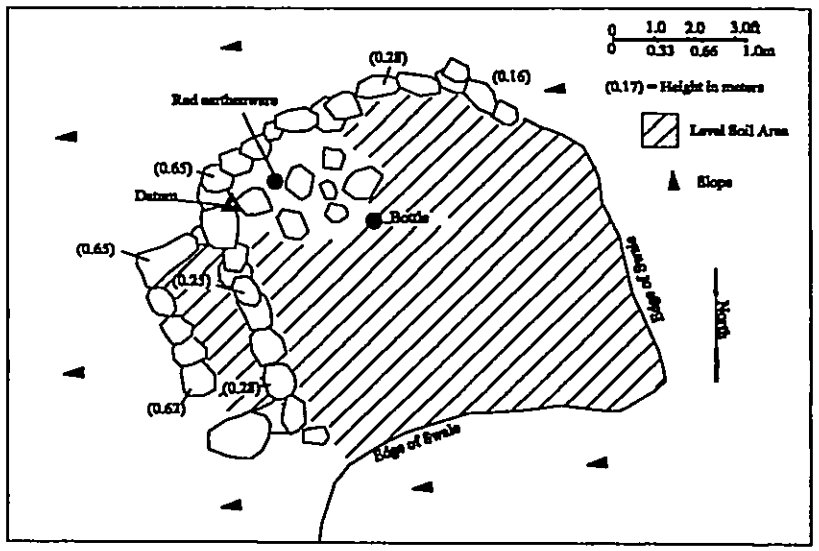


Figure A-2. Site 21910 Plan Map

of large cobbles and small boulders, varying in height from 0.28 to 0.65 m.

The surface of the terrace consists of level soil with scattered stones located at the northwestern corner. Clear bottle glass fragments and pieces of rusted metal are scattered over the surface of the structure. A portion of a clear glass bottle was noted in the approximate center of the terrace, and fragments of red earthenware ceramics were present in the northwest corner. The bottle base is 5.3 cm in diameter, and has "Property of Hamakua Soda Works – Paauilo, Hawaii" inscribed on the side, and "U.M" on the base (*Figure B-4, Image C*). The earthenware fragments are 5 mm in thickness and have a raised pattern on one side (*B-5, Image A*).

A lower tier abuts the main terrace along the western side measuring 1.7 m long (north-northwest by south-southeast) and 0.6 m wide. This tier is 0.25 m lower than the main portion of the terrace, and may have functioned as a step. It is bordered on the west, north and south sides by one course of small boulders and large cobbles that range in height from 0.62 to 0.65 m. The ground surface slopes moderately to the west on the western side of the lower tier.

Site 21910 is interpreted as an historic temporary habitation structure. This is based on its formal type, its lack of substantial construction, and its area (9.05 sq m).

State No.: 21920
Site Type: Platform
Topography: Level area
Elevation: 2,390 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Burial
Overall Dimensions: 3.88 by 3.15
Condition: Fair
Integrity: Unaltered
Description: Site 21920 is an oval-shaped platform located in a level soil area south of a dirt road. The platform is 3.88 m long (northeast by southwest) by 3.15 m wide, and is bordered by small subangular basalt boulders and large cobbles (*Figure A-3*). The sides of the platform range in height from 0.18 to 0.52 m above ground surface. The surface of the structure is slightly domed and is comprised of tightly packed subangular cobbles. The center of the platform is 0.75 m in height above ground surface. No cultural remains were observed on or around the site.

A 1.0 by 1.0 m test unit (TU-16) was excavated in the center of the platform. The excavation revealed a stone architectural layer (Layer I) over a soil deposit (Layer II) (see *Figure A-3*). Layer I consisted of 0.1 to 0.13 m of tightly packed subangular basalt cobbles. No cultural remains were present and no evidence was found to suggest that the architectural layer had been built during more than a single construction episode. The base of Layer I intruded into the Layer II deposit.

Layer II consisted of a dark yellowish brown (10YR 3/6) silt with 50% cobble inclusions. Layer II was excavated to a depth of 0.82 m below the surface of the platform, where a sub-adult human cranium was encountered. The excavation was terminated upon identification of the human remains. Additional cultural remains recovered from Layer II consisted of 15 fragments of *cowrie* (*Cypraeidae*) shell (18.44 grams), ten fragments of unidentified marine shell (7.24 grams), six pieces of waterworn coral (18.68 grams), two pieces of burned coral (0.64 grams), two fragments of bird bone (1.24 grams), 140.5 grams of charcoal and three volcanic glass flakes (1.58 grams).

State No.: 21955
Site Type: Platform
Topography: Level area
Elevation: 2,375 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Burial
Overall Dimensions: 3.96 by 2.66

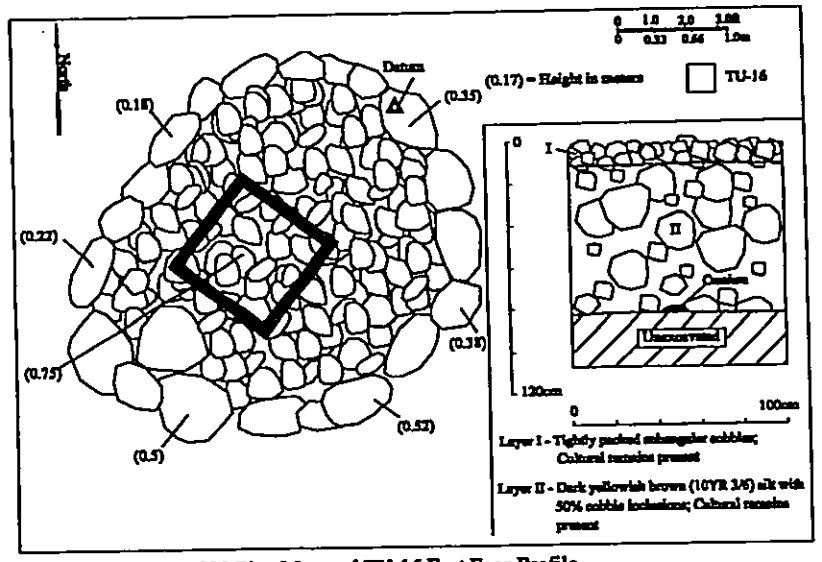


Figure A-3. Site 21920 Plan Map and TU-16 East Face Profile

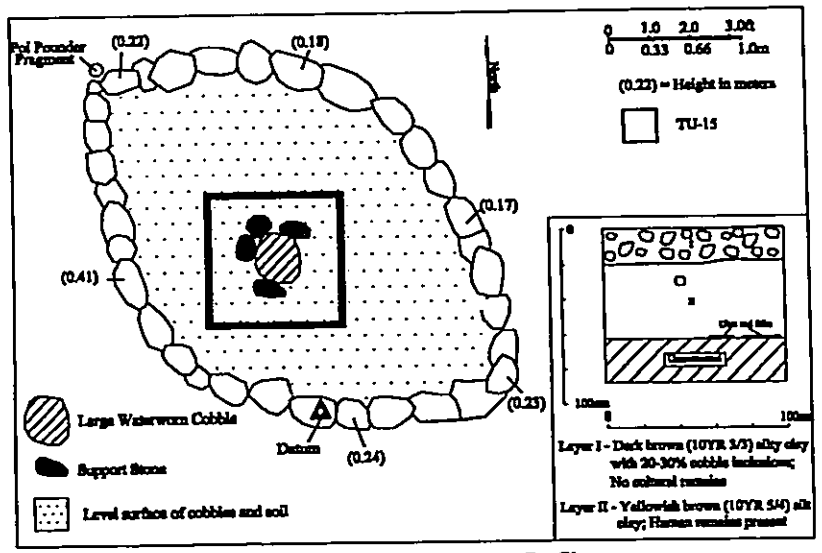


Figure A-4. Site 21955 Plan Map and TU-15 North Face Profile

Condition: Fair
Integrity: Unaltered
Description: Site 21955 is an oval-shaped platform located in a level soil area adjacent to a dirt road to the south. The platform is 3.96 m long (northwest by southeast) by 2.66 m wide, and is bordered by small subangular basalt boulders and large cobbles (*Figure A-4*). The sides of the platform range in height from 0.17 to 0.41 m above ground surface. The surface of the structure is comprised of level soil and cobbles (*Figure A-5*). The basal portion of a basalt *poi* pounder was collected from the ground surface adjacent to the site at the northwestern end. The *poi* pounder is 8.78 cm long, 7.82 cm in diameter at the base and 5.0 cm in diameter at the top (*Figure B-2, Image A*). A large waterworn basalt cobble is present in the approximate center of the platform. It is 0.38 m long by 0.34 m wide, and is supported in an upright position by four subangular cobbles.

A 1.0 by 1.0 m test unit (TU-15) was excavated into the platform, over the upright cobble. The excavation revealed two soil deposits (see *Figure A-4*). Layer I consisted of 0.08 to 0.1 m of a dark brown (10YR 3/3) silty clay with 20-30 % subangular basalt cobble inclusions. No cultural remains were present. Layer II was comprised of a yellowish brown (10YR 5/4) silty clay. Layer II was excavated to a depth of 0.6 m, where an articulated adult human burial was encountered. The identified remains consisted of ribs and an ulna. No additional cultural remains were recovered from the deposit. The excavation of TU-15 was terminated upon identification of the human remains.

State No.: 21956
Site Type: Walled terrace
Topography: Side of ridge
Elevation: 2,390 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 27.8 by 22.3
Condition: Fair
Integrity: Altered
Description: Site 21956 is a walled terrace remnant located on the southern side of an east-west trending ridge near the base. The site consists of a rectangular-shaped enclosure that is 18.6 m long (northeast by southwest) and 13.6 m wide. The east, west and south sides of the enclosure are single course alignments of stones set in the ground that probably represent the basal course of free standing walls. The northern side consists of a low retaining wall with a level terrace on the upslope side (*Figure A-6* and *A-7*). The walls appear to have had stones removed and today consist of alignments of small to large boulders and large cobbles that vary in height from 0.18 to 0.87 m. A portion of the southern wall is relatively intact, and appears to have originally measured 1.45 m in thickness with a core-filled interior of small cobbles. The interior of the enclosure is level soil with scattered surface stones. Several sun-bleached marine shell fragments were observed within the interior.

The retaining wall along the north side of the enclosure consists of one to two courses of small subangular basalt boulders and large cobbles ranging in height on the downslope side from 0.24 to 0.51 m and on the upslope side from 0.1 to 0.13 m. The surface of the terrace is level soil and is 19.3 m long (northeast by southwest) and 4.9 m wide. The northern side of the terrace abuts the natural slope. No cultural remains were noted in this area.

An L-shaped alignment of small to medium-sized boulders is located to the west of the enclosure forming a secondary enclosure. This alignment originates 2.75 m southwest of the southwestern corner of the enclosure and extends 3.0 m to the southwest. It then turns upslope to the northwest for 22.3 m. No cultural remains were observed. Site 21956 is interpreted as a permanent habitation ancillary feature that served to define the boundaries of a yard, based on its formal type and large area (619.9 sq m). A pole and thatch structure probably once existed within the enclosure.

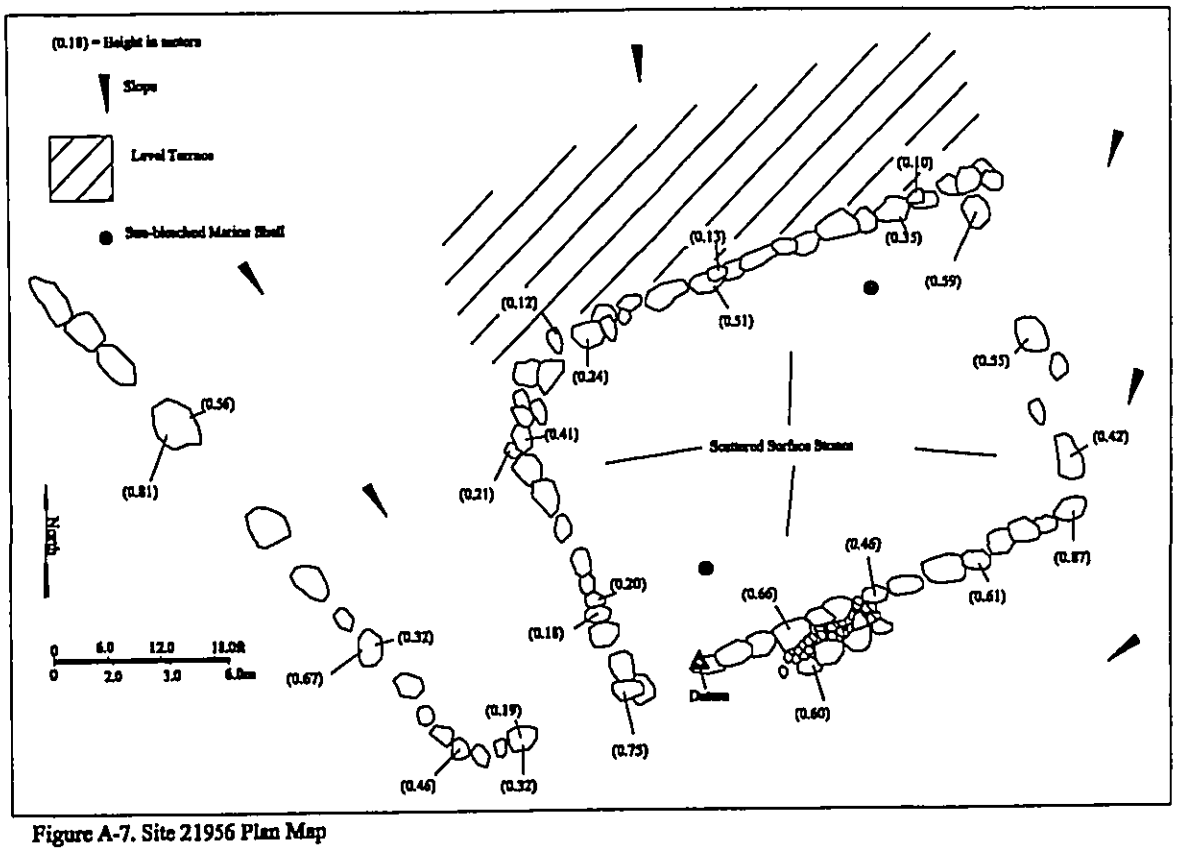


Figure A-7. Site 21956 Plan Map

A-7

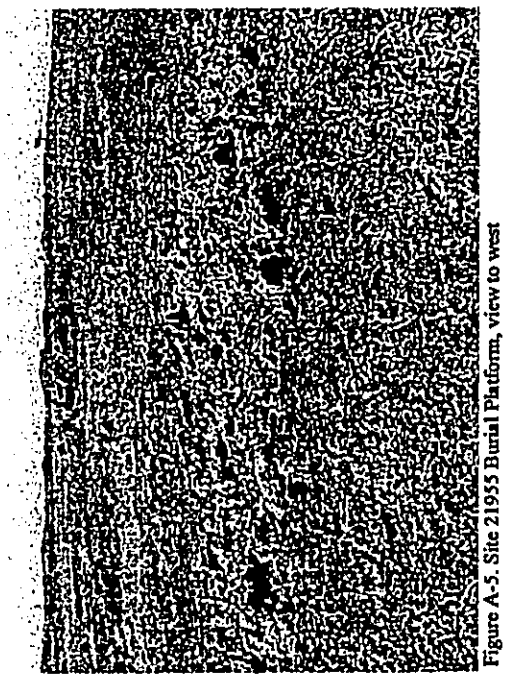


Figure A-5. Site 21955 Burial Platform, view to west

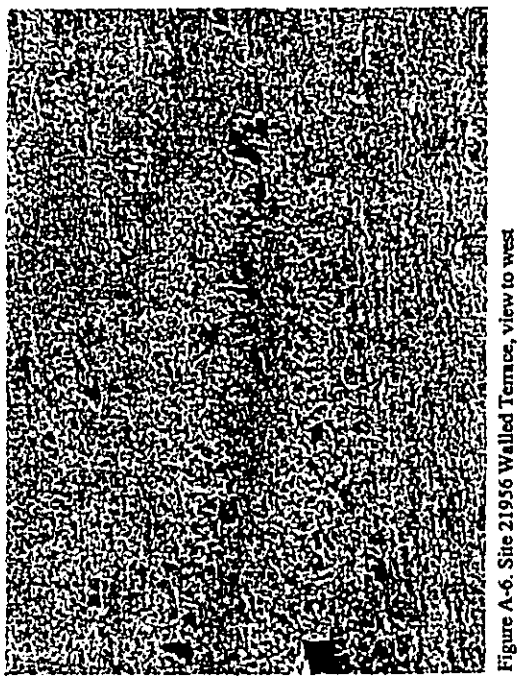


Figure A-6. Site 21956 Walled Terrace, view to west

State No.: 21957
Site Type: C-shape
Topography: Level area above stream
Elevation: 2,380 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.28 by 1.4 m
Condition: Poor
Integrity: Altered
Description: Site 21957 consists of a C-shaped wall located on a level bench above Keanuiomano Stream to the south. The C-shape is open to the southwest and is comprised of two to four courses wide and one course tall of subangular basalt cobbles. The site encompasses an area 2.38 m long (northwest by southeast) by 1.4 m wide with the wall ranging in width from 0.62 to 0.68 m and 0.07 to 0.19 m in height (*Figure A-8*). The area surrounding the site consists of level soil with no cultural remains observed. Site 21957 is interpreted as a temporary habitation based on its formal type, informal construction and its area (4.86 sq m).

State No.: 21958
Site Type: U-shape
Topography: Side of ridge near top
Elevation: 2,365 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.95 by 3.8 m
Condition: Fair
Integrity: Altered
Description: Site 21958 is a crudely constructed U-shaped enclosure located on the south side of a ridge just below the top. The structure is 3.95 m long (north-northwest by south-southeast) and 3.8 m wide with a 2.15 m wide opening at the northwestern end (*Figure A-9*). The walls of the U-shape are built of stacked and piled subangular basalt cobbles ranging in width from 0.49 to 0.58 m and in height from 0.29 to 0.6 m. A plastic pot is located within the enclosure at the southwest end and there are several wooden survey stakes at the northern end. No indigenous cultural remains were observed.

A pile of large basalt boulders is located above the U-shape to the north. Soil mixed in with the boulders suggests that this pile was created by bulldozer activity. A linear wall built of piled cobbles has been constructed within an open area between the boulders measuring 1.9 m long (north-south), 0.6 m wide and 0.52 to 0.55 m in height. Milled lumber and a piece of plywood are located adjacent to the wall to the east.

The stones that comprise the U-shape are weathered and covered in lichen and appear to be intact. This portion of the site is interpreted as a temporary habitation based on its formal type, informal construction, and size (15 sq m). The structure faces into the prevailing tradewinds which is atypical of temporary habitation structure, however its location is sheltered by the ridge crest. The wall within the boulder pile and the presence of modern debris indicates that the site has been recently modified, potentially by neighborhood children, or by hunters who may have used the structure as a hunting blind.

State No.: 21959
Site Type: Complex (2)
Topography: Top of level ridge
Elevation: 2,370 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Burial
Overall Dimensions: 32.5 by 30.1 m
Condition: Poor/Fair
Integrity: Altered
Description: Site 21959 is a complex of two features situated on top of a level ridge. The features consists of a large enclosure (Feature A) and a low burial platform (Feature B). The features are illustrated in *Figure A-10* and described below.

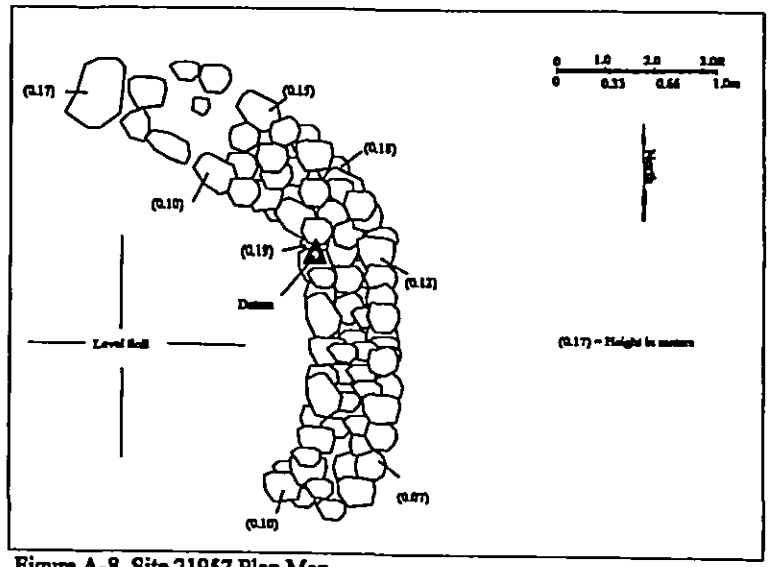


Figure A-8. Site 21957 Plan Map

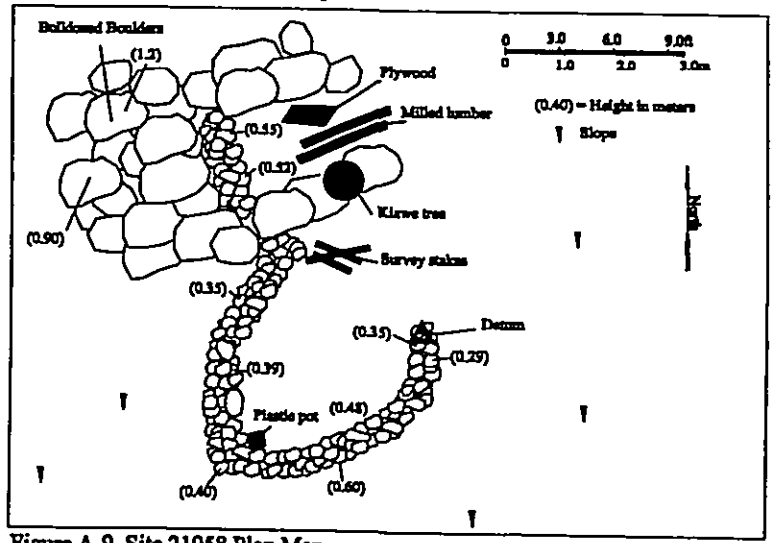


Figure A-9. Site 21958 Plan Map

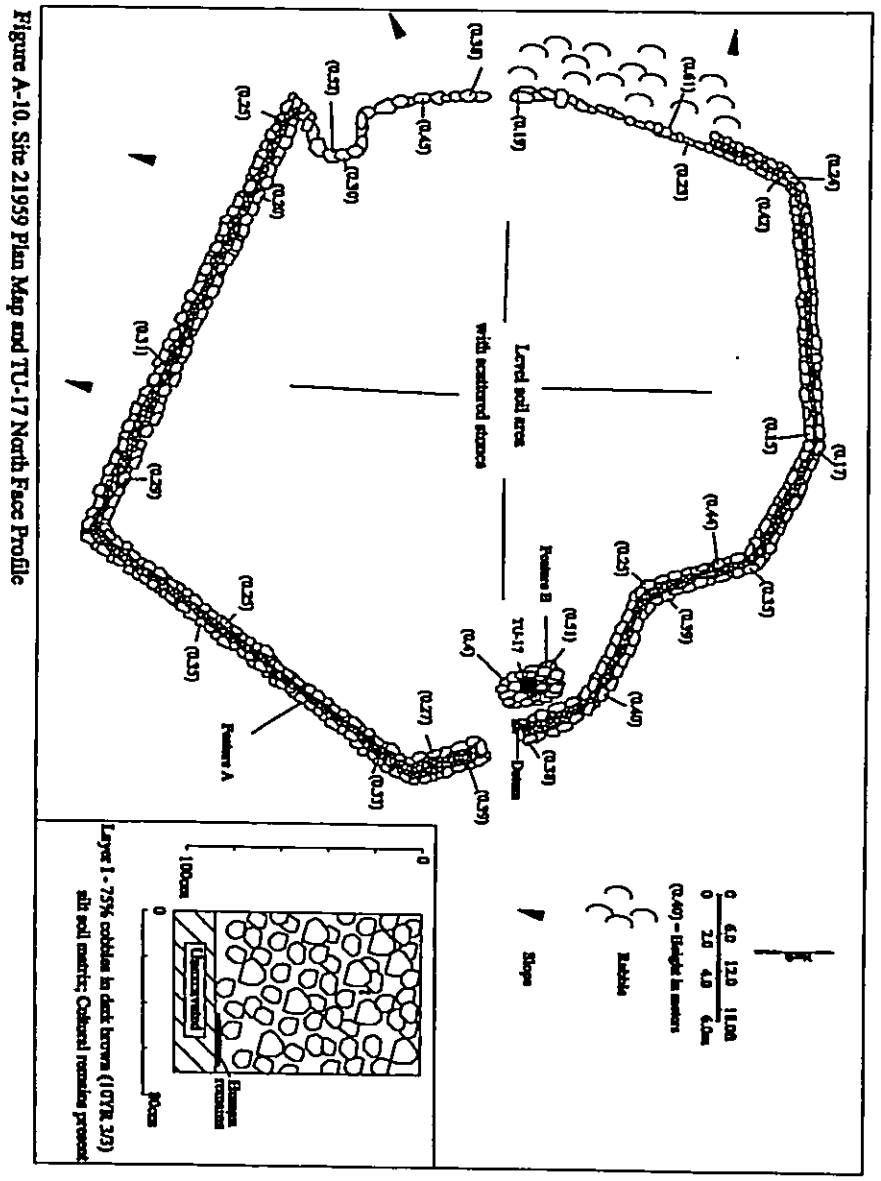


Figure A-10. Site 21959 Plan Map and TU-17 North Face Profile

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 32.5 by 30.1 m
Condition: Poor
Integrity: Altered
Description: Feature A is a large roughly rectangular enclosure situated at the western end of a level ridge top. The enclosure is 32.5 m long (northwest by southeast) and 25.3 to 30.1 m wide. The majority of the wall stones have been removed with only the base of the walls remaining. The enclosure walls on the south, east and north sides consist of parallel alignments of subangular basalt boulders and large cobbles with a core-filled interior of small cobbles. These walls range in width from 0.7 to 1.1 m and in height from 0.15 to 0.44 m. The western wall consists of an alignment of small to medium sized boulders many of which are set on edge. This portion of the enclosure varies in height from 0.19 to 0.3 m on the eastern side and 0.38 to 0.61 m on the western side. There is a C-shaped enclosure incorporated into the western wall at the southern end. The C-shape measures 3.7 m long (east-west), 2.75 m wide and 0.3 to 0.52 m in height.

There are two entrances into the enclosure, one at the eastern end and one at the western end. The eastern entrance is 1.35 m wide and the western entrance is 0.7 m wide. A low oval-shaped platform (Feature B) is located within the enclosure adjacent to the eastern entrance. The interior of the enclosure is comprised of a level soil deposit. No cultural remains were noted within the enclosure. Feature A is interpreted as a permanent habitation ancillary feature that served to define the boundaries of a yard based on its formal type and large area (978.3 sq m). A pole and thatch structure probably once existed within the enclosure.

Feature B: Platform
Function: Burial
Dimensions: 3.1 by 1.95
Condition: Fair
Integrity: Unaltered
Description: Feature B is an oval-shaped platform located within the Feature A enclosure at the eastern end. The platform is 3.1 m in length (north-northwest by south-southeast) by 1.95 m wide. It is constructed of stacked and piled subangular basalt cobbles and small boulders with a level surface that ranges in height from 0.4 to 0.51 m. No cultural remains were noted on the surface of the structure.

A 0.75 by 0.75 m test unit (TU-17) was excavated into the center of the platform revealing a layer of 75 % subangular basalt cobbles within a dark brown (10YR 3/3) soil matrix (Layer I; see *Figure A-10*). Cultural remains from this deposit consisted of a possible basalt groundstone fragment (361.95 grams). Articulated human remains consisting of an adult femur and an inominate were noted at 0.85 m below the surface of the platform. The excavation was terminated upon identification of the human remains.

State No.: 21960
Site Type: Complex (2)
Topography: Top of level ridge
Elevation: 2,365 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 19.6 by 10.1 m
Condition: Poor
Integrity: Altered
Description: Site 21960 is a complex of two features situated on top of a level ridge. The features consist of two enclosures (Features A and B) which are presented in *Figure A-11* and described below.

Feature A: Enclosure
Function: Permanent Habitation
Dimensions: 10.1 by 6.2 m
Condition: Poor
Integrity: Altered

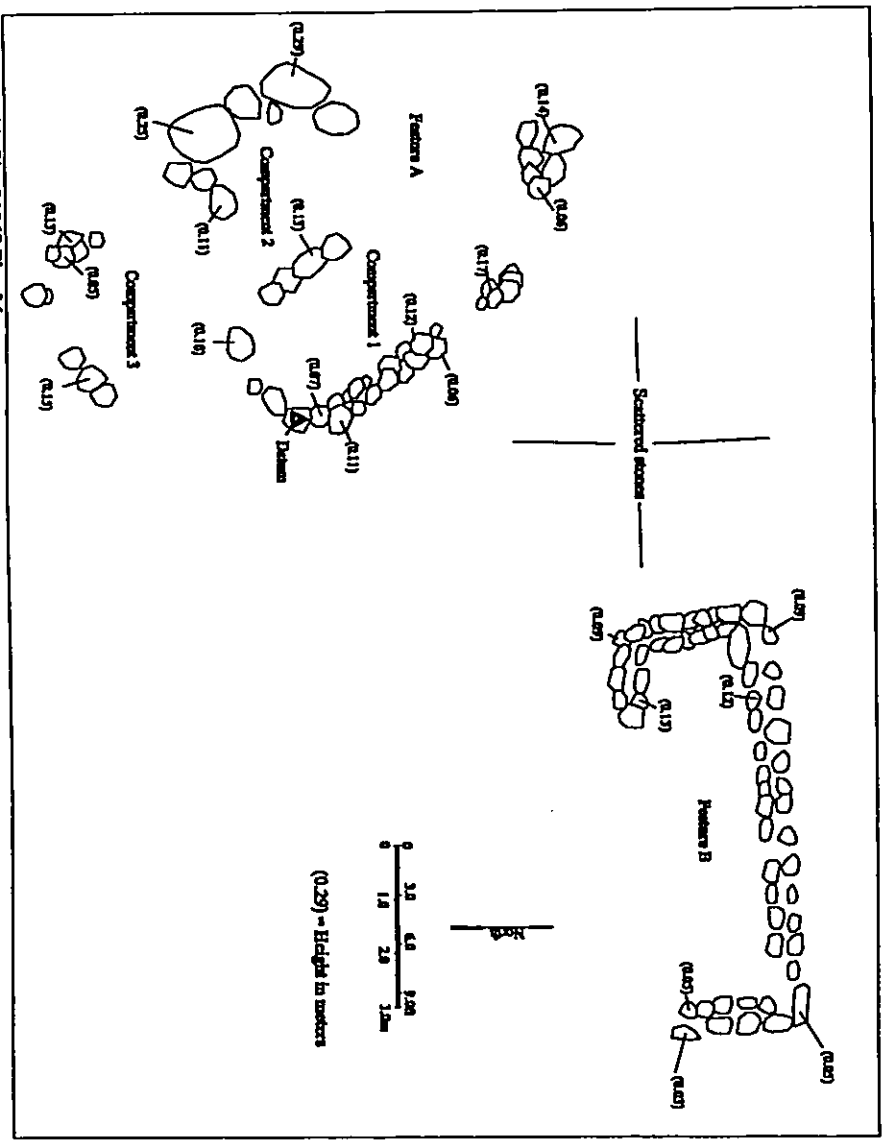


Figure A-11. Site 21960 Plan Map

Description: Feature A consists of the disturbed remnants of a rectangular enclosure located at the southwestern end of the site. The enclosure is 10.1 m long (northwest by southeast) by 6.2 m wide. Many of the wall stones have been removed from the feature. All that remains of the structure is the base of the walls which consist of one to two courses of small subangular basalt boulders and cobbles. The walls range in height from 0.05 to 0.29 m and in width from 0.35 to 0.88 m. The enclosure appears to have originally been divided into three compartments. The first compartment is located along the eastern side of the structure measuring 7.2 m long (northwest by southeast) by 2.8 m wide. The second compartment abuts the first to the west, and is defined by alignments of small boulders. This compartment appears to have measured 3.4 m long (northeast by southwest) by 2.8 m wide. The third compartment is defined by an L-shaped alignment of cobbles situated to the south of the first two compartments. The original dimensions of the compartment cannot be determined because it has been disturbed by cattle grazing.

Feature A is situated in a level soil area that is covered in scattered surface stones. No cultural remains were observed. The enclosure is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (internal subdivisions) and its area (62.6 sq m).

Feature B: Enclosure
Function: Permanent Habitation
Dimensions: 7.85 by 3.08 m
Condition: Poor
Integrity: Altered
Description: Feature B is a disturbed rectangular enclosure located 5.95 m to the northeast of Feature A. The enclosure is 7.85 m long (east-west) by 3.08 m wide. The wall remnants consist of two course wide alignments of small subangular basalt boulders and large cobbles that vary in height from 0.03 to 0.13 m. The walls range in width from 0.57 to 0.73 m. The enclosure is open along the southern side and the interior consists of a level soil deposit with no cultural remains noted. Feature B is interpreted as a permanent habitation based on its formal type and area (62.6 sq m). No substantial construction was observed, but this may be the result of disturbance to the site by cattle grazing and/or the removal of wall stones.

State No.: 21961
Site Type: Complex (9)
Topography: Level terrace on side of ridge
Elevation: 2,360 ft
Probable Age: Historic
Functional Interpretation: Burial
Overall Dimensions: 22.2 by 12.9 m
Condition: Fair/Poor
Integrity: Altered
Description: Site 21961 is a complex of eight low platforms located on a level terrace on the side of a ridge which slopes to the south and west. Each of the eight platforms are at least partially bordered by small boulders and large cobbles and each evidence varying degrees of disturbance. Five of the platforms (Features A, C, D, G and H) have excavated depressions within the center and three appear to have had stones removed from around the perimeter (Features B, E and F). Feature I has a surface comprised of loosely piled stones. The results of subsurface testing at two of the features (Features D and E discussed below) revealed the remnants of wooden coffins and human remains indicating that the site represents the disturbed remnants of an historic cemetery from which the majority of the remains have been disinterred. *Figure A-12* illustrates the Site 21961 features which are described below.

Feature A: Platform
Function: Burial
Dimensions: 3.2 by 2.44 m
Condition: Fair
Integrity: Altered
Description: Feature A is a rectangular platform that is 3.2 m long (north-northwest by south-southeast) 2.44 m wide and 0.14 to 0.38 m in height. The structure is bordered by small subangular basalt boulders

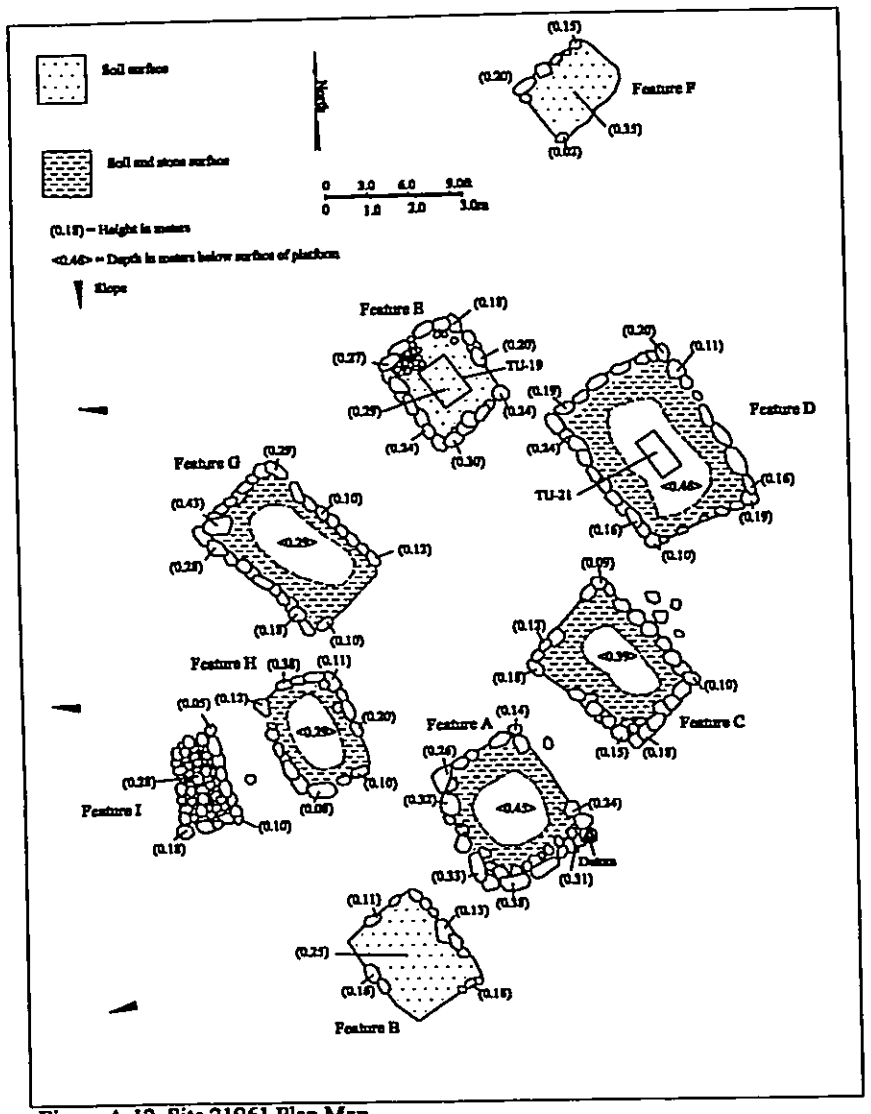


Figure A-12. Site 21961 Plan Map

and large cobbles with the interior comprised of soil and cobbles. There is a circular depression located in the center of the platform that is 1.44 m in diameter, 0.45 m in depth below the surface of the platform, and 0.29 m deep below the surrounding ground surface. No cultural remains were noted at the feature. Feature A is interpreted as an historic burial based on its formal type and area (7.8 sq m) and its proximity to other burial features at the site. The presence of the depression in the center of the platform indicates that the burial probably was removed.

Feature B: Platform
Function: Burial
Dimensions: 2.38 by 1.99 m
Condition: Poor
Integrity: Altered
Description: Feature B is a low rectangular platform located 1.35 m southwest of Feature A. Portions of the platform are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.11 to 0.18 m. The interior of the structure is slightly domed-shaped comprised of a brown soil that is 0.25 m in height above the surrounding ground surface. No cultural remains were observed. Feature B is interpreted as an historic burial based on its formal type, its area (4.73 sq m) and association with other burial features at the site. Many of the stones bordering Feature B appear to have been removed, although there is no depression suggesting that the burial has been removed.

Feature C: Platform
Function: Burial
Dimensions: 3.16 by 2.42 m
Condition: Fair
Integrity: Altered
Description: Feature C is a rectangular platform located 1.3 m northeast of Feature A. The sides of the structure are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.09 to 0.18 m. The interior of the structure is comprised of soil and cobbles with no cultural remains present. There is an oval-shaped depression situated in the center of the platform that is 1.77 m long (northwest by southeast), 0.83 m wide, 0.39 m below the surface of the platform, and 0.21 m below the surrounding ground surface. Feature C is interpreted as a burial platform based on its formal type and size (7.64 sq m) and its proximity to other burial features at the site. The presence of the depression in the center of the platform indicate that the burial has probably been removed.

Feature D: Platform
Function: Burial
Dimensions: 3.77 by 3.05 m
Condition: Fair
Integrity: Altered
Description: Feature D is a rectangular platform situated 1.22 m northeast of Feature C. The sides of the structure are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.11 to 0.24 m. The platform is 3.77 m long (north-northwest by south-southeast) and 3.05 m wide. The interior of the structure is comprised of soil and cobbles. An oval-shaped depression is located in the center of the platform that is 2.71 m long (north-northwest by south-southeast), 1.44 m wide, 0.46 m below the surface of the platform, and 0.34 m below the surrounding ground surface. No cultural remains were noted at the feature.

A 1.0 by 0.5 m test unit (TU-21) was excavated into the center of the feature within the depression. The excavation revealed a soil deposit comprised of a dark yellowish brown (10YR 3/4) silt with 50 % subangular basalt cobble inclusions (Layer I; *Figure A-13*). Fragments of milled lumber potentially representing the remnants of a wooden coffin were identified at 0.78 to 1.02 m below the base of the depression. Fragmented human remains were identified within the Layer I deposit at a depth 1.3 m. No other cultural remains were recovered. The excavation continued to 1.4 m below the base of the depression to where bedrock was encountered. The results of this excavation indicate that Feature D once contained an historic burial which has been disinterred; however the presence of the fragmented human remains indicates that the

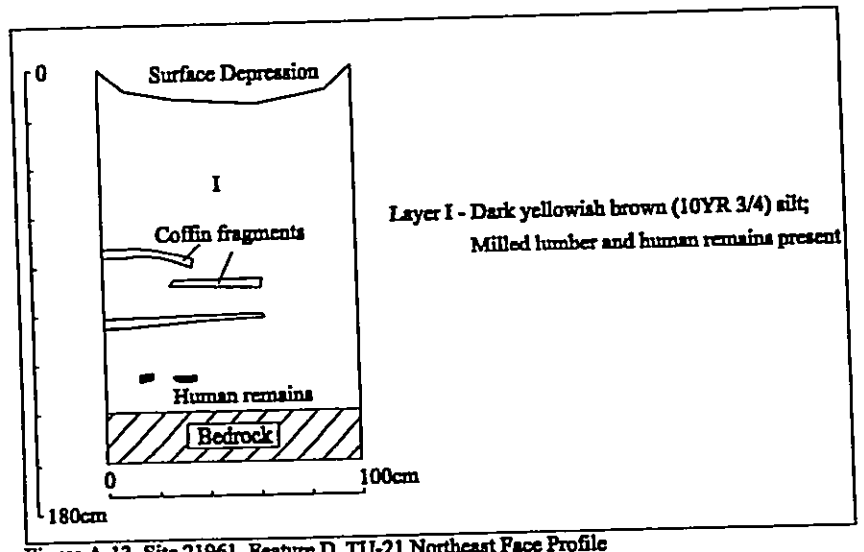


Figure A-13. Site 21961, Feature D, TU-21 Northeast Face Profile

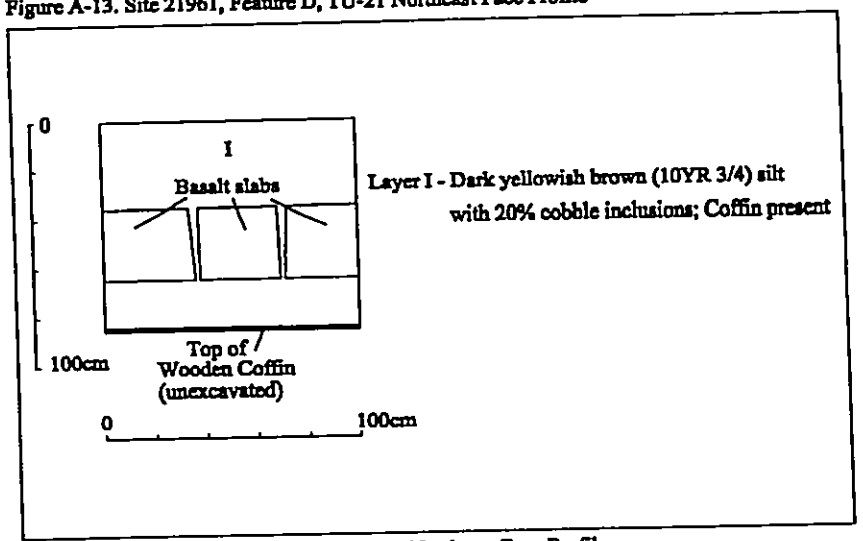


Figure A-14. Site 21961, Feature E, TU-19, Northeast Face Profile

burial was not completely removed. The similarity of this feature to the other Site 21961 features indicates the remains of disinterred human burials are probably present within the other platforms.

Feature E: Platform
Function: Burial
Dimensions: 2.45 by 2.16 m
Condition: Fair
Integrity: Altered
Description: Feature E is a rectangular platform located 0.9 m northwest of Feature D. The platform is 2.45 m long (north-northwest by south-southeast) by 2.16 m wide and is partially bordered by small subangular basalt boulders and large cobbles that vary in height from 0.18 to 0.3 m. The surface of the platform is slightly domed and is 0.29 m in height above the surrounding ground surface. There is a loose pile of cobbles located on the surface of the platform in the northwestern corner. No surface cultural remains were observed.

A 1.0 by 0.7 m test unit (TU-19) was excavated into the surface of the platform revealing a deposit of dark yellowish brown (10YR 3/4) silt with 20 % cobble inclusions (*Figure A-14*). A series of four basalt slabs were encountered at 0.35 m below the surface of the platform positioned horizontally across the structure. The slabs ranged in size from 0.22 to 0.48 m wide and 0.3 m in thickness and each extended out of the excavation to the east and west. The southern-most slab was removed and the excavation continued. An intact wooden coffin built of nailed wooden planks was encountered at 0.84 m below the surface. A rectangular piece of glass had been inserted into the top of the coffin apparently positioned over the face of the interred individual. The glass was removed, and observations into the interior of the coffin revealed a single tooth indicating that the burial had been removed. As the top of the coffin appeared intact it is assumed that the remains were disinterred through the northern end of the coffin, potentially indicated by the loose pile of stones noted on the surface of the structure. Two *cowrie* (*Cypraeidae*) shells (0.53 grams) and 0.44 grams of charcoal were also recovered from the deposit. The excavation was terminated once the tooth was identified. Feature E is interpreted as a disturbed historic burial platform based on the results of this excavation.

Feature F: Platform
Function: Burial
Dimensions: 1.95 by 1.55 m
Condition: Poor
Integrity: Altered
Description: Feature F is a rectangular platform located 4.7 m north-northeast of Feature E. Portions of the platform are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.15 to 0.22 m. The interior of the structure is slightly domed-shaped comprised of a brown soil that is 0.35 m in height above the surrounding ground surface. No cultural remains were observed. Feature F is interpreted as an historic burial based on its formal type, size (3.02 sq m) and association with other burial features at the site. Many of the stones bordering Feature F appear to have been removed though there is no depression suggesting that the burial has been removed.

Feature G: Platform
Function: Burial
Dimensions: 3.61 by 2.33 m
Condition: Fair
Integrity: Altered
Description: Feature G is a rectangular platform located 2.6 m southwest of Feature E. The sides of the structure are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.1 to 0.43 m. The interior of the structure is comprised of soil and cobbles with no cultural remains present. There is an oval-shaped depression situated in the center of the platform that is 2.3 m long (northwest by southeast), 1.16 m wide, 0.29 m below the surface of the platform and 0.15 m below the surrounding ground surface. Feature G is interpreted as a burial platform based on its formal type and size (8.41 sq m), and its proximity to other burial features at the site. The presence of the depression in the center of the platform indicates that the burial has probably been removed.

Feature H: Platform
Function: Burial
Dimensions: 2.77 by 1.89 m
Condition: Fair
Integrity: Altered
Description: Feature H is a rectangular platform located 0.75 m south of Feature G. The sides of the structure are bordered by small subangular basalt boulders and large cobbles that vary in height from 0.08 to 0.38 m. The interior of the structure is comprised of soil and cobbles. There is an oval-shaped depression situated in the center of the platform that is 1.66 m long (north-northwest by south-southeast), 0.89 m wide, 0.29 m below the surface of the platform, and 0.31 m below the surrounding ground surface. No cultural remains were noted at the feature. Feature H is interpreted as a burial platform based on its formal type and size (5.23 sq m), and its proximity to other burial features at the site. The presence of the depression in the center of the platform indicates that the burial has probably been removed.

Feature I: Platform
Function: Burial
Dimensions: 2.45 by 1.45 m
Condition: Poor
Integrity: Altered
Description: Feature I is a low rectangular platform located 1.15 m west of Feature H. The platform is bordered on the east and south sides by small subangular basalt boulders and large cobbles that range in height from 0.05 to 0.18. The surface of the platform is slightly domed-shaped and is comprised of loosely piled cobbles that is 0.28 m in height above the surrounding ground surface. No cultural remains were noted. Feature I is interpreted as a burial platform based on its formal type, its size (3.55 sq m), and its proximity to other burial features at the site. The loosely piled stones that comprise the surface of the platform indicate that it was probably dismantled and reconstructed after the removal of the human remains.

State No.: 21962
Site Type: Complex (2)
Topography: Level terrace area on side of slope
Elevation: 2,340 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 17.0 by 14.9 m
Condition: Poor/Fair
Integrity: Altered
Description: Site 21962 is a complex of two features located on a natural terrace on the side of a slight slope that angles to the west and northwest. A dirt road is located to the south of the site. The features consist of a large enclosure (Feature A) and an internal terrace (Feature B). The site has been impacted along the southern side by bulldozer activity. The site is depicted in *Figure A-15*, and is described below.

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 17.0 by 14.9 m
Condition: Poor
Integrity: Altered
Description: Feature A is a large roughly rectangular enclosure that is 17.0 m in length (east-west) by 14.9 m in width. The southern side of the structure has been truncated by a bulldozer berm that is situated on the northern side of a dirt road that extends through this portion of the project area in a roughly east-west direction. The remaining walls of the enclosure evidence varying degrees of disturbance. The walls appear to have had stones removed. The northern wall is the most intact with a basal course comprised of small subangular basalt boulders and large cobbles and a narrow core-filled interior. This wall varies in height from 0.25 to 0.64 m. The east and west walls are more disturbed consisting primarily of alignments of small boulders and cobbles that range from 0.08 to 0.25 m above the surrounding ground surface. The interior of the enclosure consists of level soil with scattered surface stones. Several sun-bleached marine shells were observed within the interior. A modern cow path bisects the enclosure in a northwest by southeast

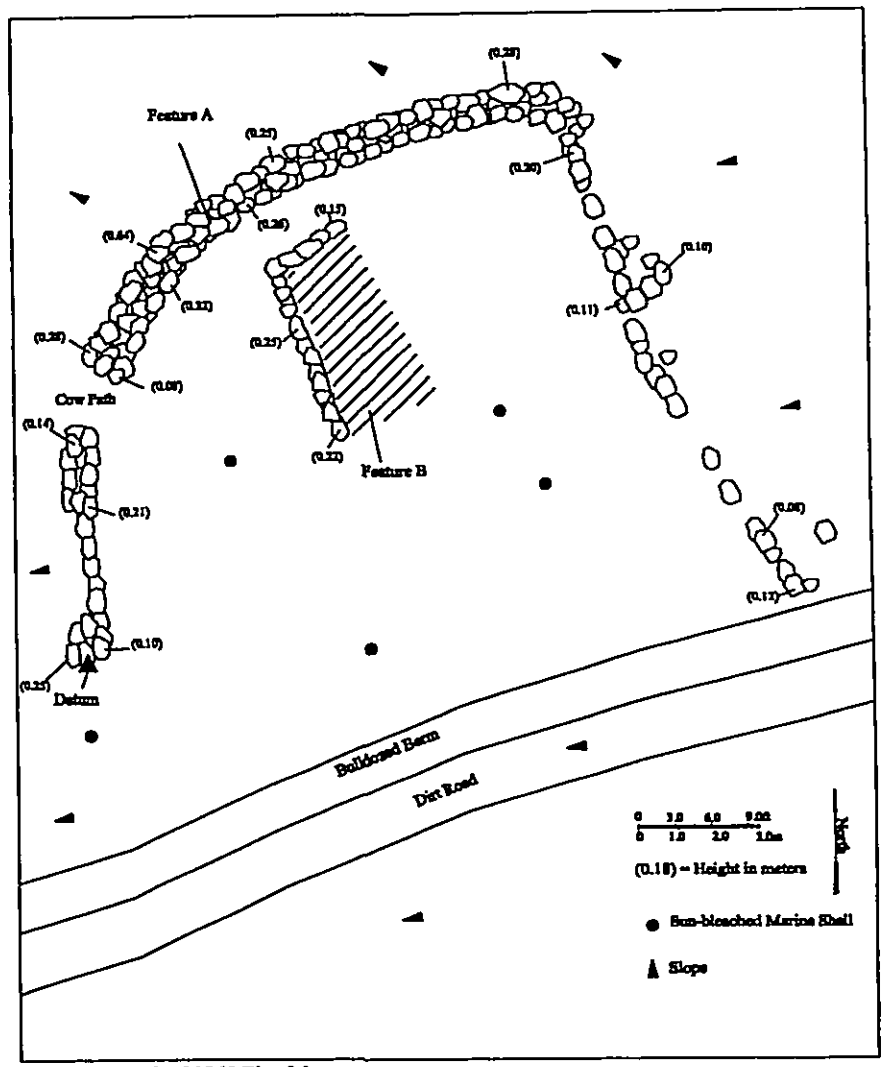


Figure A-15. Site 21962 Plan Map

direction. The Feature B terrace (discussed below) is situated within the Feature A enclosure. Feature A is interpreted as a permanent habitation ancillary feature that probably served to define the boundaries of a yard. This is based on its formal type and large area (253.3 sq m).

Feature B: Terrace
Function: Permanent Habitation
Dimensions: 5.08 by 2.92 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a rectangular terrace located within the Feature A enclosure in the northern portion. The terrace is 5.08 m in length (north-northwest by south-southeast) and 2.92 m wide. There is a low retaining wall along the north and west sides of the terrace comprised of one to two courses of stacked subangular cobbles and small boulders. These walls range in height from 0.15 to 0.25 m and in width from 0.4 to 0.5 m wide. The surface of the terrace consists of level soil with no cultural remains observed. Although smaller in area than typical permanent habitations (14.8 sq m) its formal type and location within the Feature A enclosure suggest that this terrace may have served as the foundation for a roofed habitation structure.

State No.: 21963
Site Type: Platform
Topography: Side of ridge
Elevation: 2,330 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.22 by 2.93 m
Condition: Fair
Integrity: Unaltered
Description: Site 21963 is a rectangular platform located on a natural level terrace on the side of a slope that angles to the north and northwest. The platform is 3.22 m long (west-northwest by east-southeast) and 2.93 m wide (*Figure A-16*). The sides of the platform are bordered by one to two courses of small subangular basalt boulders and large cobbles that range in height from 0.11 to 0.34 m. The surface of the structure is slightly domed-shaped and is comprised of a brown soil. The center of the platform is 0.38 m in height above the surrounding ground surface. No cultural remains were observed on or around the structure.

A 1.0 by 1.0 m test unit (TU-23) was excavated into the surface of the platform revealing two deposits (see *Figure A-16*). Layer I consisted of 0.42 to 0.48 m of a dark brown (10YR 3/3) silty clay with 25 % cobble inclusions. Cultural remains from this layer consisted of one *cowrie* (*Cypraeidae*) shell (1.12 grams), and five fragments of fish bone (0.88 grams). Layer II was comprised of a dark yellowish brown (10YR 4/4) silty clay with no cultural remains present. The excavation was terminated 0.6 m into the Layer II deposit, 1.1 m below the surface of the platform.

Site 21963 is interpreted as temporary habitation structure. This is based on its formal type, its lack of substantial construction, and its area (9.43 sq m).

State No.: 21964
Site Type: Complex (2)
Topography: Level area above stream
Elevation: 2,330 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 16.7 by 8.3 m
Condition: Fair
Integrity: Altered
Description: Site 21964 is a complex of two features located in a relatively level area north of Waikoloa Stream. The site is comprised of two enclosures (Features A and B) depicted in *Figure A-17* and discussed below.

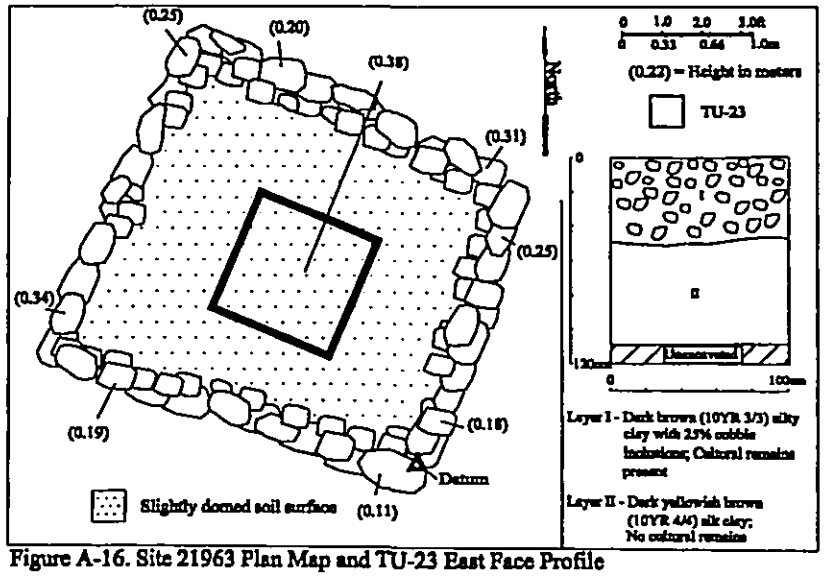


Figure A-16. Site 21963 Plan Map and TU-23 East Face Profile

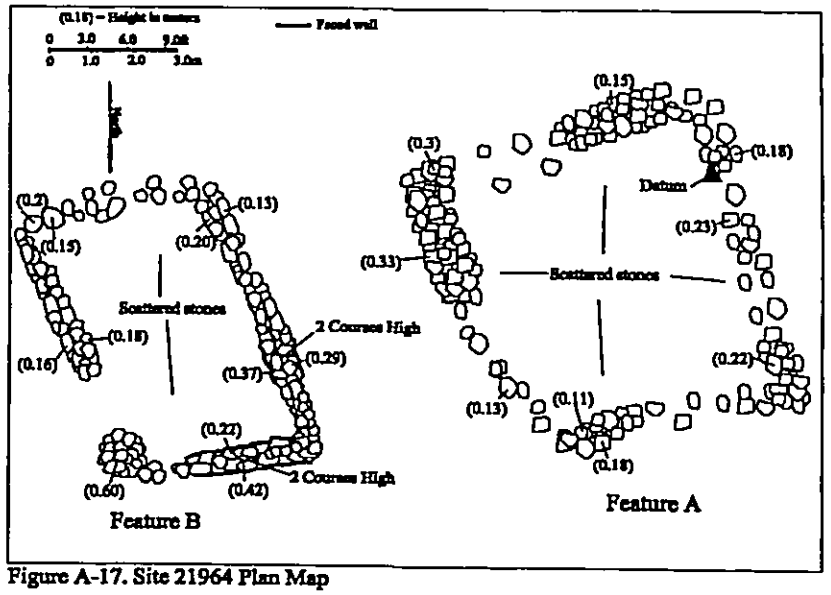


Figure A-17. Site 21964 Plan Map

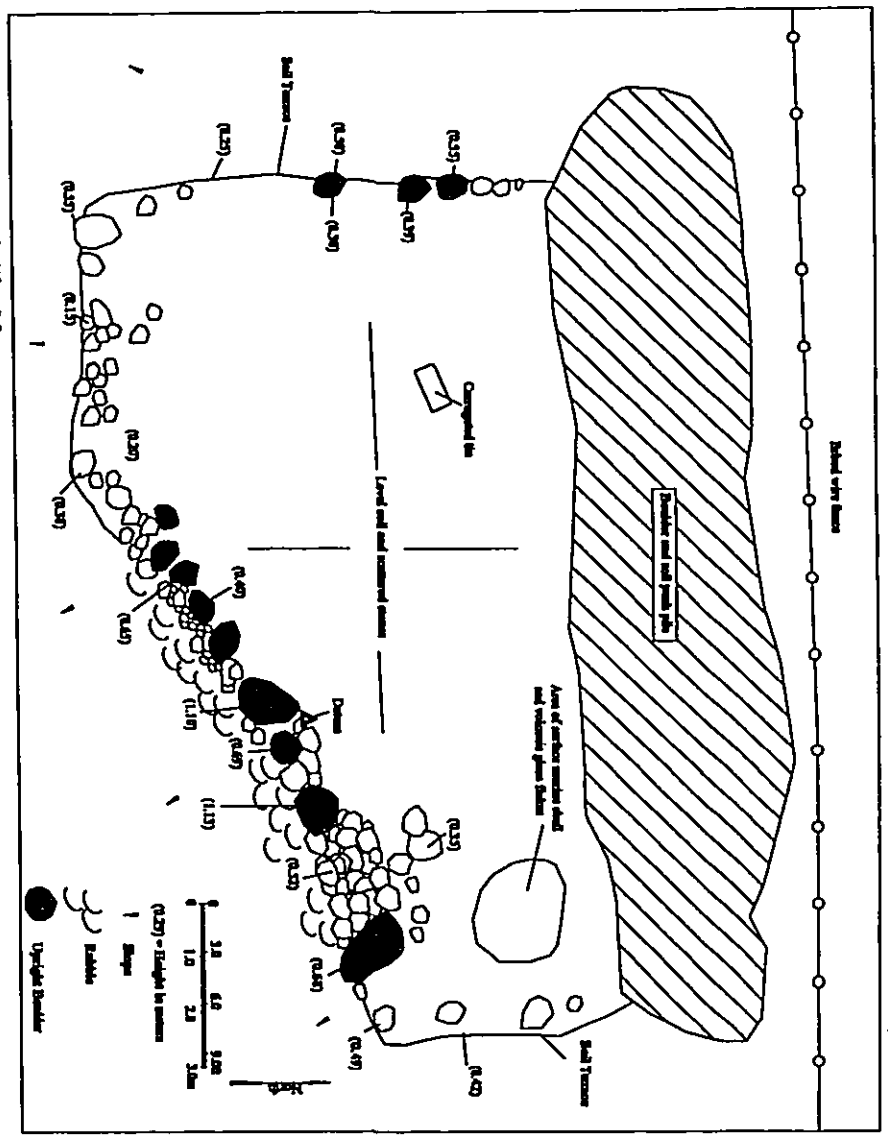
Feature A: Enclosure
Function: Permanent Habitation
Dimensions: 8.29 by 7.44 m
Condition: Fair
Integrity: Altered
Description: Feature A is a rectangular enclosure located at the eastern end of the site. It is 8.29 m long (north-northwest by south-southeast) and 7.44 m wide. Many of the wall stones appear to have been removed from the site. The majority of the structure is comprised of one to three courses wide and one course tall of small subangular basalt boulders and small cobbles that range in height from 0.11 to 0.23 m. A portion of the western wall at the northern end evidences stones stacked two to three courses in height (0.3 to 0.33 m). The walls range in width from 0.7 to 1.05 m. The interior of the enclosure is comprised of level soil with scattered surface stones. No cultural remains were noted. Feature A is interpreted as a permanent habitation that possibly formed the foundation for a roofed structure based on its formal type, size (61.7 sq m) and association with Feature B. No substantial construction was observed but this may be the result of disturbance to the site by cattle grazing and/or the removal of wall stones.

Feature B: Enclosure
Function: Permanent Habitation
Dimensions: 7.25 by 5.0 m
Condition: Fair
Integrity: Altered
Description: Feature B is a rectangular enclosure located 3.8 m west of Feature A. The feature is 7.25 m long (north-northwest by south-southeast) and 5.0 m wide. Many of the wall stones appear to have been removed. The majority of the walls are comprised of one course high and two to four courses wide of small boulders and large cobbles that vary in width from 0.48 to 0.9 m and in height from 0.13 to 0.6 m. Portions of the western and southern walls evidence faced sides that range in height from 0.22 to 0.42 m. There is a possible entrance into the enclosure in the western wall at the southern end that is 1.25 m in width. The interior of Feature B consists of level soil with scattered surface stones. No cultural remains were noted. The enclosure is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (faced walls), and its area (36.25 sq m).

State No.: 21965
Site Type: Terrace
Topography: Level area
Elevation: 2,315 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 16.2 by 8.5 m
Condition: Fair
Integrity: Altered
Description: Site 21965 is a terrace located in a relatively level area on the southern side of a barbed wire fence c. 20 m south of a dirt road. The ground surface slopes slightly to the south. The terrace is 16.2 m in length (east-west) and from 4.7 to 8.5 m in width (*Figure A-18*). The northern side of the site has been disturbed by a large linear bulldozer push pile comprised of boulders and soil. This pile is 18.0 m in length (east-west) and 2.7 by 3.6 m wide and was likely created during the construction of the dirt road to the north.

There are disturbed stone retaining walls bordering the terrace on the south, east and west sides. Many of the stones from these walls appear to have been removed. The east and west walls consist of soil terraces that vary in height from 0.25 to 0.42 m. Several small subangular basalt boulders and large cobbles are incorporated into the soil terraces on these sides. Three of the boulders on the western side have been set on edge and range in height on the exterior of the terrace from 0.5 to 0.55 m and on the interior from 0.3 to 0.39 m.

Figure A-18. Site 21965 Plan Map



The southern wall of the structure is the most intact consisting of boulders set on edge with boulders and cobbles stacked and piled between them. The boulders vary in height from 0.65 to 1.1 m on the exterior side and 0.4 to 0.6 m on the interior side. The remaining portions of the southern retaining wall range in height from 0.15 to 0.52 m. Portions of the southern wall have collapsed outwards.

The surface of the terrace is level and is covered with scattered stones. There is a piece of corrugated tin roofing material located on the surface of the terrace in the northwestern portion and a concentration of sun-bleached marine shell and volcanic glass flakes in the northeastern corner. No other cultural remains were observed. Site 21965 is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (boulders set on edge) and its area (106.9 sq m).

State No.: 22573
Site Type: Complex (3)
Topography: Level area
Elevation: 2,310 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 18.7 by 12.25 m
Condition: Fair
Integrity: Altered
Description: Site 22573 is a complex of three features located in a relatively level area c. 20 m north of a dirt road. The site is comprised of a walled terrace (Feature A) and two internal platforms (Features B and C) depicted in *Figure A-19* and discussed below.

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 18.7 by 12.25 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a rectangular-shaped enclosure that is 18.7 m long (north-northwest by south-southeast) and 12.25 m wide. The ground surface slopes slightly to the west on the western side of the structure. The south, east and west walls of the feature are comprised of low stacked and piled subangular basalt cobbles and small boulders, ranging in width from 1.1 to 1.6 m, and in height from 0.18 to 0.7 m. There are faced wall sections located on the east and west sides of the structure. The northern wall is comprised of a mounded soil berm that averages 1.9 m wide and from 0.61 to 0.7 m in height. The surface of the enclosure is level soil with scattered surface stones. Several waterworn basalt cobbles were present at the feature with four located on top of the southern wall and one situated in the center of the structure. Sun-bleached marine shell was noted on the surface of the terrace. Two low platforms (Features B and C) are present within Feature A. Feature A is interpreted as a permanent habitation ancillary feature that probably served to define the boundaries of a yard. This is based on its formal type, substantial construction (faced walls) and large area (229 sq m).

Feature B: Platform
Function: Permanent Habitation, Ancillary Feature
Dimensions: 3.22 by 2.2 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a low, rectangular platform situated within the Feature A enclosure. The platform is 3.22 m long (north-northwest by south-southeast), and 2.2 m wide, built of stacked subangular basalt cobbles and small boulders. The feature is collapsed outward in the southwestern corner. A portion of the eastern side of the platform is faced. The surface of the feature is level, but unpaved, ranging in height from 0.3 to 0.36 m. No cultural remains were noted on the surface.

A 1.0 by 1.0 m test unit (TU-25) was excavated into the surface of the platform. This excavation revealed a stone architectural layer (Layer I), above a soil deposit (Layer II; see *Figure A-19*). Layer I consisted of

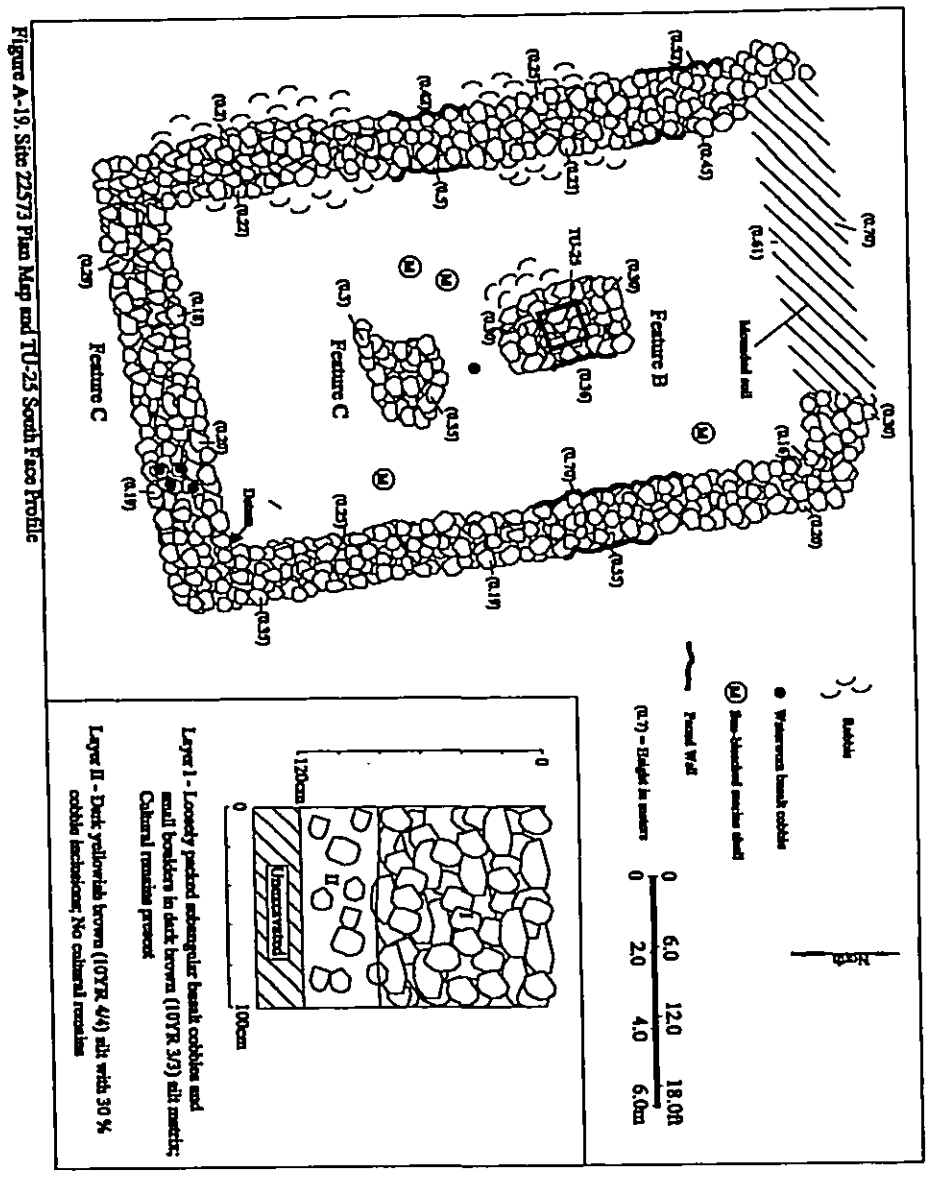


Figure A-19. Site 22573 Plan Map and TU-25 South Face Profile

0.78 to 0.82 m of loosely packed cobbles and small boulders. The base of Layer I intrudes slightly into the Layer II deposit. No evidence was found to suggest that the structure has been built during more than a single construction episode. Cultural remains from Layer I consisted of two small volcanic glass flakes (1.2 grams), and marine shell (*cowrie; Cypraeidae*, n=4, 8.3 grams, *opihi; Patellidae*, n=4, 3.2 grams).

Layer II was comprised of a dark yellowish brown (10YR 4/4) silt with 30% subangular basalt cobble inclusions. No cultural remains were present. TU-25 was excavated 0.4 m in to this deposit before it was terminated.

Feature B is smaller than typical permanent habitations (7.08 sq m), and its formal type and location within the Feature A enclosure suggest that it may have functioned as site furniture.

Feature C: Platform
Function: Permanent Habitation, Ancillary Feature
Dimensions: 3.35 by 2.06 m
Condition: Fair
Integrity: Altered
Description: Feature C is a low irregularly-shaped platform situated within the Feature A enclosure 1.55 m south of Feature B. The structure is 3.35 m long (east-west), 2.06 m wide, and 0.3 to 0.35 m in height. It is constructed of stacked and piled cobbles and small boulders with a relatively level, unpaved surface. No cultural remains were present on the platform, though a piece of sun-bleached marine shell was observed on the ground surface to the north. Feature C is also interpreted as site furniture associated with the permanent habitation of the site based on its formal type and location within the Feature A enclosure.

State No.: 22574
Site Type: U-shape
Topography: Level area above stream
Elevation: 2,330 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.36 by 2.44 m
Condition: Fair
Integrity: Altered
Description: Site 22574 is a small U-shaped enclosure located in a level area above Keanuiomano Stream to the south. The structure is situated on the northeastern side of a large agricultural enclosure (Site 22632, Feature KM). Many of the stones from the structure appear to be missing and may have been removed during the construction of this wall. The enclosure is built of one to two courses wide and one course high of small subangular basalt boulders and large cobbles (*Figure A-20*). It is 3.36 m in length (northwest by southeast) and 2.44 m wide. The walls range in width from 0.35 to 0.0.7 m wide and 0.1 to 0.33 m in height. The interior of the U-shape is comprised of level soil with scattered surface stones. No cultural remains were observed. Site 22574 is interpreted as a temporary habitation based on its formal type, lack of substantial construction and its area (8.2 sq m).

State No.: 22575
Site Type: Terrace
Topography: Level area above stream
Elevation: 2,320 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 10.0 by 6.7
Condition: Fair
Integrity: Unaltered
Description: Site 22575 is a terrace located on a level bench south of Keanuiomano Stream. The structure consists of a roughly rectangular-shaped terrace and a low wall that extends to the northwest from the terrace. The terrace is 6.3 m long (northwest by southeast) and 4.5 m wide (*Figure A-21*). The walls on the west, south and east sides of the terrace consists of one to three courses wide and one to two courses tall of

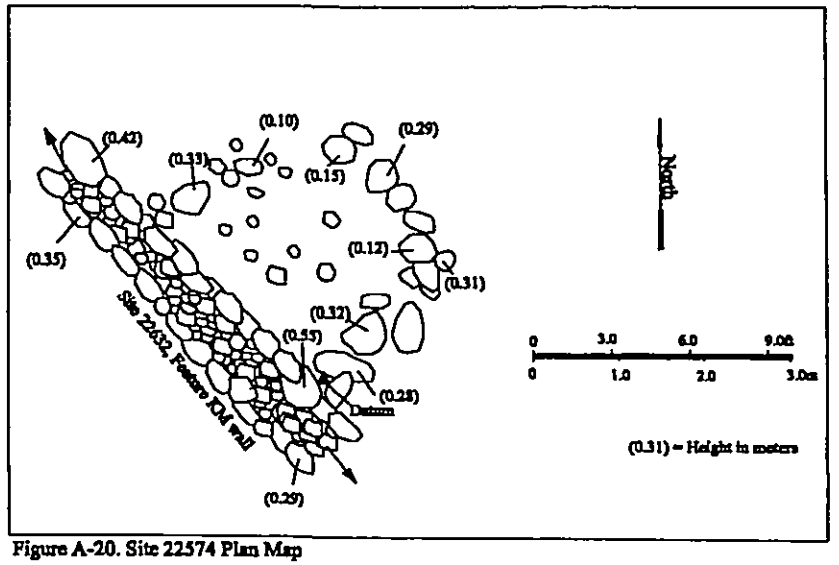


Figure A-20. Site 22574 Plan Map

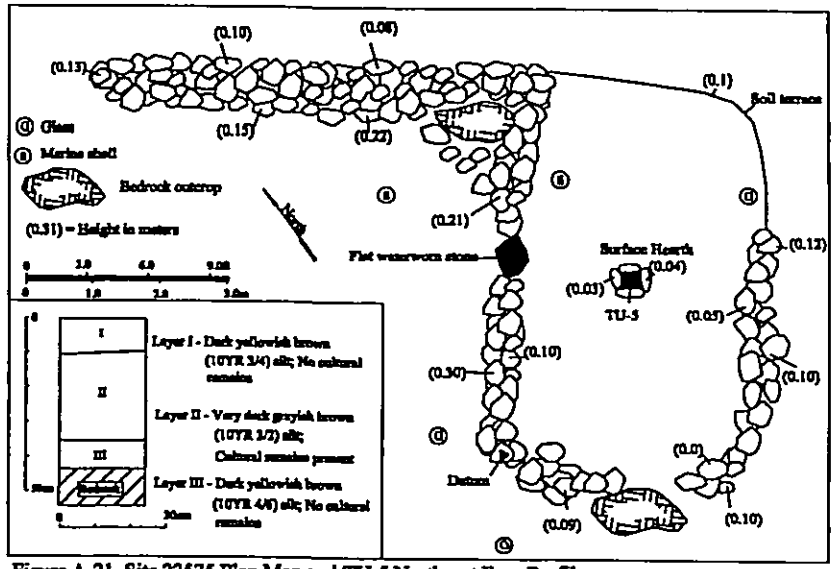


Figure A-21. Site 22575 Plan Map and TU-5 Northeast Face Profile

small subangular basalt boulders and large cobbles. These walls range in width from 0.45 to 0.65 m and in height from 0.09 to 0.3 m on the exterior and 0.0 to 0.1 m in height on the interior. A bedrock outcrop is located at the southern end of the terrace. There is a flat waterworn basalt stone located in the center of the western wall of the structure. This stone measures 0.6 m long, 0.42 m wide and 0.1 m in height and may have functioned as a threshold step into the interior. The northeastern end of the terrace is comprised of raised soil that averages 0.1 m in height.

The interior of the terrace consists of a level soil deposit. There is a small, rectangular-shaped surface hearth located in the center, comprised of four large cobbles that have been placed on their sides. These cobbles range in height from 0.03 to 0.04 m above the surrounding ground surface. The hearth is 0.53 m long (northwest by southeast) and 0.48 m wide. No cultural remains were noted inside the hearth, though sun-bleached marine shell and fragments of clear glass were observed on the surface of the terrace, and on the ground surface to the northwest of the structure. A small flat piece of polished basalt was recovered from the surface of the terrace. It is 2.93 cm long, 2.19 cm wide and 0.66 cm in thickness and may represent a fragment of a basalt mirror.

A 0.25 by 0.25 m test unit (TU-5) was excavated within the interior of the hearth. This excavation revealed three soil layers overlying bedrock (see *Figure A-21*). Layer I consisted of 0.1 to 0.12 m of a dark yellowish brown (10YR 3/4) silt, with no cultural remains present. The absence of cultural remains and silty nature of the soil suggests that Layer I may be a windblown deposit that accumulated after the abandonment of the site. Layer II was comprised of 0.26 to 0.28 m of a very dark grayish brown (10YR 3/2) silt. Cultural remains from Layer II consisted of 25 *kukui* nut shells (2.91 grams), one fish vertebrae (2.2 grams), one unidentified marine shell fragment (0.17 grams), 2.25 grams of charcoal, a fragment of green bottle glass (0.36 grams) and seven square headed nail fragments (4.68 grams). Layer III consisted of 0.08 m of a dark yellowish brown (10YR 4/6) silt, with no cultural remains present.

The wall that extends to the northwest from the terrace is 6.75 m long, 0.45 to 0.91 m wide and 0.08 to 0.22 m in height. It is constructed of one to three courses of stacked and piled cobbles and small boulders.

The Site 22575 walled terrace is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (internal hearth, possible entry stone) and its area (28.35 sq m).

State No.: 22576
Site Type: Walled Terrace
Topography: Level area south of ridge
Elevation: 2,300 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 4.9 by 4.8 m
Condition: Fair
Integrity: Altered
Description: Site 22576 consists of a roughly square walled terrace located in a level area south of a large agricultural enclosure (Site 22632, Feature LS). The northern end of the terrace nearly abuts the south side of the enclosure wall (*Figure A-22*). The walled terrace is 4.9 m long (east-west) by 4.8 m wide. The south and east sides of the terrace consist predominately of basalt boulders set on edge with small boulders and large cobbles piled on the interior sides. Many of the wall stones appear to have been removed potentially during the construction of the agricultural enclosure. The upright boulders range in height from 0.41 to 0.51 m. The piled stones associated with these walls range in height from 0.22 to 0.28 m above the surface of the terrace. The south and west walls range in width from 0.49 to 1.1 m. Both of these walls have collapsed outward.

The eastern wall of the structure is built of piled cobbles and small boulders. It originates 0.3 m south of the agricultural enclosure, and extends 3.6 m to the south. This wall is 1.35 to 1.48 m wide and 0.2 to 0.45 m in height. An oval-shape mound which may represent a southern extension of this wall is located 1.25 m to

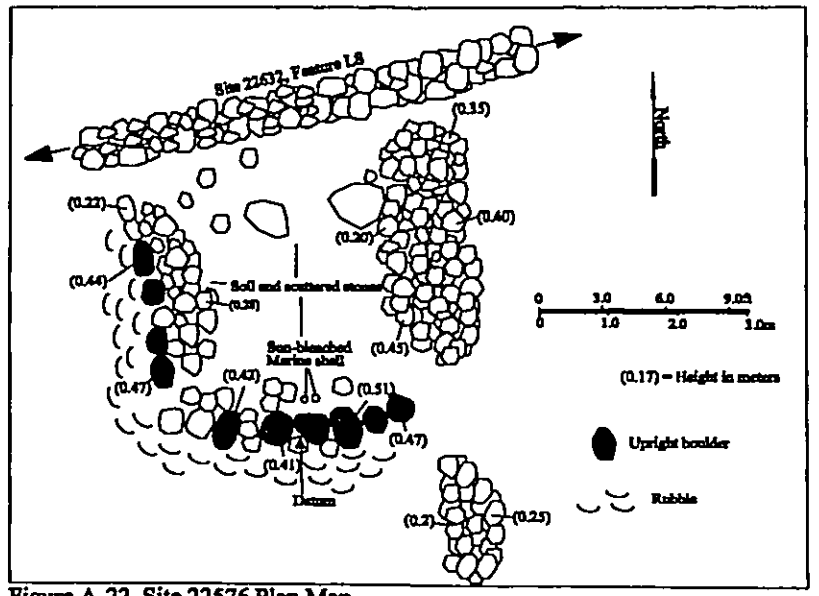


Figure A-22. Site 22576 Plan Map

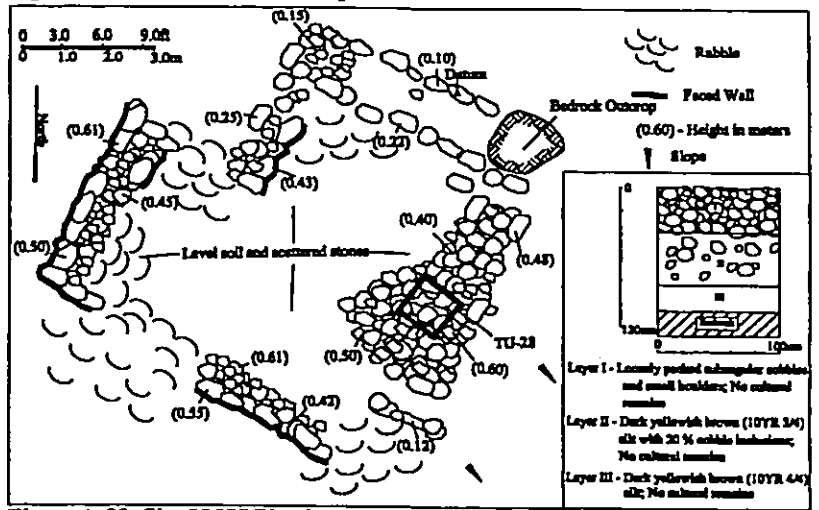


Figure A-23. Site 22577 Plan Map and TU-28 Northeast Face Profile

the south. This mound is 1.95 m long (north-south), 0.9 m wide and 0.2 to 0.25 m in height, constructed of piled cobbles and small boulders.

The interior of the terrace consists of a level soil covered in scattered cobbles. Several sun-bleached marine shells were noted at the southern end. Site 22576 is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (boulders set on edge) and its area (23.5 sq m).

State No.: 22577
Site Type: Walled Terrace
Topography: Level area south of ridge
Elevation: 2,295 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 9.4 by 9.1 m
Condition: Fair
Integrity: Altered
Description: Site 22577 is a roughly square-shaped walled terrace, with a notched corner, located south of a large agricultural enclosure (Site 22632, Feature LS). The ground surface in this area slopes slightly to the southeast. The site evidences overall dimensions of 9.4 m long (northwest by southeast) and 9.1 m wide with the notch measuring 4.0 m long (northeast by southwest) and 3.6 m wide (*Figure A-23*). Many of the walls stones appear to have been removed from the site. The perimeter of the walls are comprised of aligned small to medium-sized subangular basalt boulders, with cobbles and small boulders on the inside. The walls range in width from 0.9 to 2.6 m though most average 1.0 m in width. The southeastern side of the structure is terraced measuring 0.48 to 0.6 m in height on the exterior and 0.4 to 0.5 m high on the interior. The remaining walls range in height from 0.15 to 0.61 m. Portions of the northwest and southwest walls are partially faced, though parts of these walls have collapsed to the inside and outside. The interior of the terrace is comprised of level soil with scattered surface stones. No cultural remains were observed.

The southeastern wall of the structure is platform-like, with a relatively level, but unpaved surface. A 1.0 by 1.0 m test unit was excavated in the center of this wall (TU-28). This excavation revealed a stone layer (Layer I) over two soil deposits. Layer I consisted of 0.38 to 0.41 m of loosely packed subangular cobbles and small boulders with no cultural remains recovered. No evidence was found to suggest that Layer I had been built during more than a single construction episode. The base of Layer I intrudes slightly into the Layer II soil deposit.

Layer II was comprised of 0.43 to 0.46 m of a dark yellowish brown (10YR 3/4) silt with 20 % cobble and pebble inclusions. No cultural remains were present. Layer III consisted of 0.2 m of a dark yellowish brown (10YR 4/4) silt with no cultural remains. The excavation of TU-28 was terminated on bedrock.

Site 22577 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and size (71.1 sq m).

State No.: 22578
Site Type: Enclosure
Topography: Top of low ridge
Elevation: 2,285 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 13.2 by 11.3 m
Condition: Fair
Integrity: Unaltered
Description: Site 22578 is a rectangular enclosure located on the top of a low ridge. The structure is 6.8 m long (north-south) by 5.75 m wide (*Figure A-24*), and has been impacted by cattle grazing activity. The north and western sides of the enclosure are relatively intact constructed of stacked subangular basalt cobbles and small boulders. These walls vary in width from 0.72 to 0.89 m, and in height from 0.38 to 0.5 m.

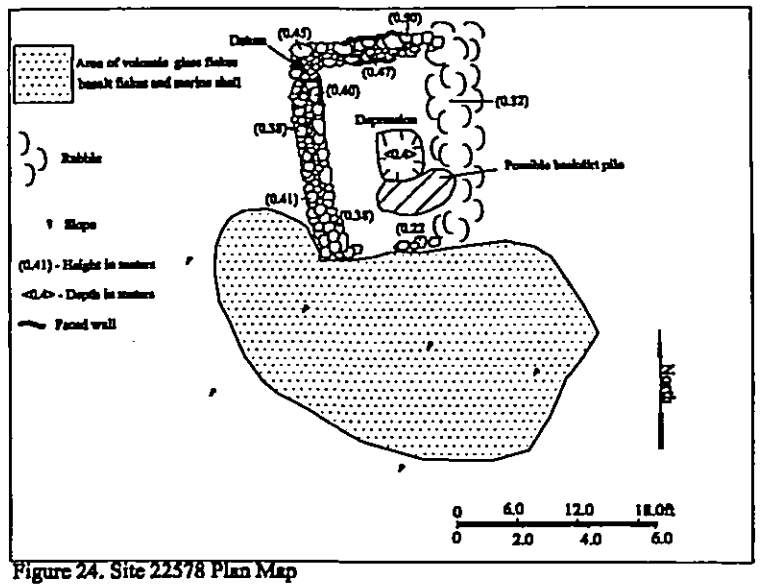


Figure 24. Site 22578 Plan Map

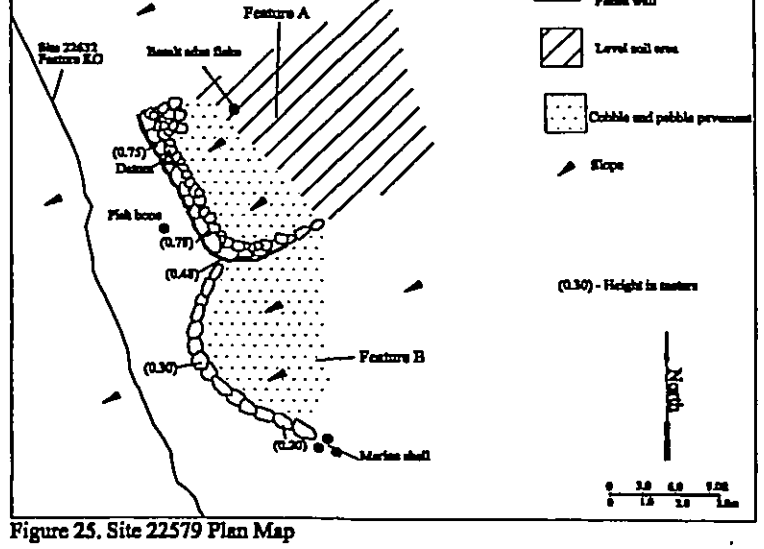


Figure 25. Site 22579 Plan Map

Portions of these walls are faced. The eastern and south walls are collapsed, comprised of piles of rubble that range in width from 1.2 to 1.6 m, and in height from 0.22 to 0.32 m.

The interior of the enclosure is comprised of level soil with no cultural remains present. There is an oval-shaped depression located in the approximate center of the interior that is 1.35 m long (north-south), 1.25 m wide and 0.4 m in depth. Basalt cobbles are loosely piled within the depression. A pile of brown soil is located adjacent to the depression to the south. This pile is 2.4 m long (east-west), and 1.1 m wide. This depression and pile of soil may represent the results of site looting.

There is a surface scatter of volcanic glass and basalt flakes and sun-bleached marine shell located to the south of the structure. These materials are scattered over an area 11.3 m long (west-northwest by east-southeast) and 6.0 m wide. Site 22578 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and its size (39.1 sq m).

State No.: 22579
Site Type: Complex (2)
Topography: Side of ridge
Elevation: 2,283 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 10.4 by 7.6 m
Condition: Fair
Integrity: Unaltered
Description: Site 22579 is a complex of two terraces (Features A and B) located on the side of a ridge that angles down to the southwest. An agricultural terrace (Site 22632, Feature KO) is located 2.7 m downslope from the site. The features are depicted in *Figure A-25* and are described below.

Feature A: Terrace
Function: Permanent Habitation
Dimensions: 7.6 by 5.0 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a well-built terrace located at the northern end of the site. It consists of stone retaining walls on the southwest and south sides with a level area that extends to the northeast. The retaining walls are constructed of stacked subangular basalt cobbles and small boulders. These walls are faced and vary in width from 0.4 to 1.22 m and in height from 0.75 to 0.78 m. A small piece of weathered fishbone was observed on the ground surface below the southwestern retaining wall, and a probable adze flake (basalt flake or chip with a flat polished surface) was noted on the surface of the terrace.

There is a pavement of basalt cobbles and pebbles that extends to the northeast from the retaining wall a distance of 2.0 m. The surface of the pavement slopes slightly to southwest. A level soil area measuring 5.5 m long (northeast by southwest) and 5.0 m wide is located on the northeastern side of the pavement. Feature A is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls, pavement) and its area (38.0 sq m).

Feature B: Terrace
Function: Permanent Habitation
Dimensions: 5.7 by 3.7 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a roughly oval-shaped terrace that abuts Feature A to the south. A retaining wall comprised of an alignment of small subangular basalt boulders extends along the western side of the feature. This curved wall ranges in height from 0.2 to 0.48 m. The surface of the terrace consists of a pavement of basalt cobbles and pebbles that slopes slightly to the southwest. This pavement is 4.5 m long (north-south) and 3.7 m wide. Several sun-bleached marine shells were observed at the southern end of the terrace. Feature B is also assigned a permanent habitation function based on its formal type, substantial construction (pavement) and area (21.0 sq m).

State No.: 22580
Site Type: Complex (2)
Topography: Top of level ridge
Elevation: 2,300 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 14.6 by 6.0 m
Condition: Fair
Integrity: Unaltered
Description: Site 22580 is a complex of two features situated on top of a level ridge. The features consists of two U-shaped enclosures (Features A and B). The features are depicted in *Figure A-26* and are described below.

Feature A: U-shape
Function: Permanent Habitation, Special Purpose Structure
Dimensions: 3.6 by 3.0 m
Condition: Fair
Integrity: Altered
Description: Feature A is a U-shaped enclosure that is open at the southeastern end. The structure is 3.6 m long (northwest by southeast) and 3.0 m wide. The southwest and northwestern walls of the U-shape are comprised of one to two courses wide and high of subangular basalt cobbles and small boulders. The walls range in width from 0.35 to 0.73 m and in height from 0.28 to 0.32 m. The northeastern wall is built of stacked and faced cobbles and small boulders and varies in width from 0.65 to 0.72 m and in height from 0.56 to 0.6 m. The interior of the feature is roughly paved with small subangular cobbles. No cultural remains were noted. Though smaller in area than typical permanent habitations (10.8 sq m), its formal type, and substantial construction (faced walls, pavement) suggest that this feature may have served as the as the foundation for a permanent habitation special purpose structure.

Feature B: U-shape
Function: Permanent Habitation
Dimensions: 5.3 by 3.3 m
Condition: Fair
Integrity: Altered
Description: Feature B is a U-shaped enclosure located 6.2 m northeast of Feature A on the same level ridge. The U-shape is open to the southwest and is 5.3 m long (northwest by southeast) and 3.3 m wide. The northwest and southeast walls are comprised of one to two courses wide and tall of subangular basalt cobbles and small boulders ranging in width from 0.6 to 0.94 m and in height from 0.2 to 0.44 m. The northeastern wall is built of stacked cobbles and small boulders varying in width from 0.89 to 1.15 m and in height from 0.48 to 0.98 m. This wall has collapsed outward though intact, faced sections are still present. The interior of the U-shape is comprised of level soil with scattered surface stones. No cultural remains were noted. Feature B is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (faced walls) and its area (17.5 m).

State No.: 22581
Site Type: C-shape
Topography: Top of level ridge
Elevation: 2,310 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation/Burial
Overall Dimensions: 5.3 by 3.2 m
Condition: Fair
Integrity: Unaltered
Description: Site 22581 consists of a C-shaped enclosure located along the eastern edge of a level ridge top against a bedrock outcrop. The C-shape is open to the west and has an oval-shaped, level platform built

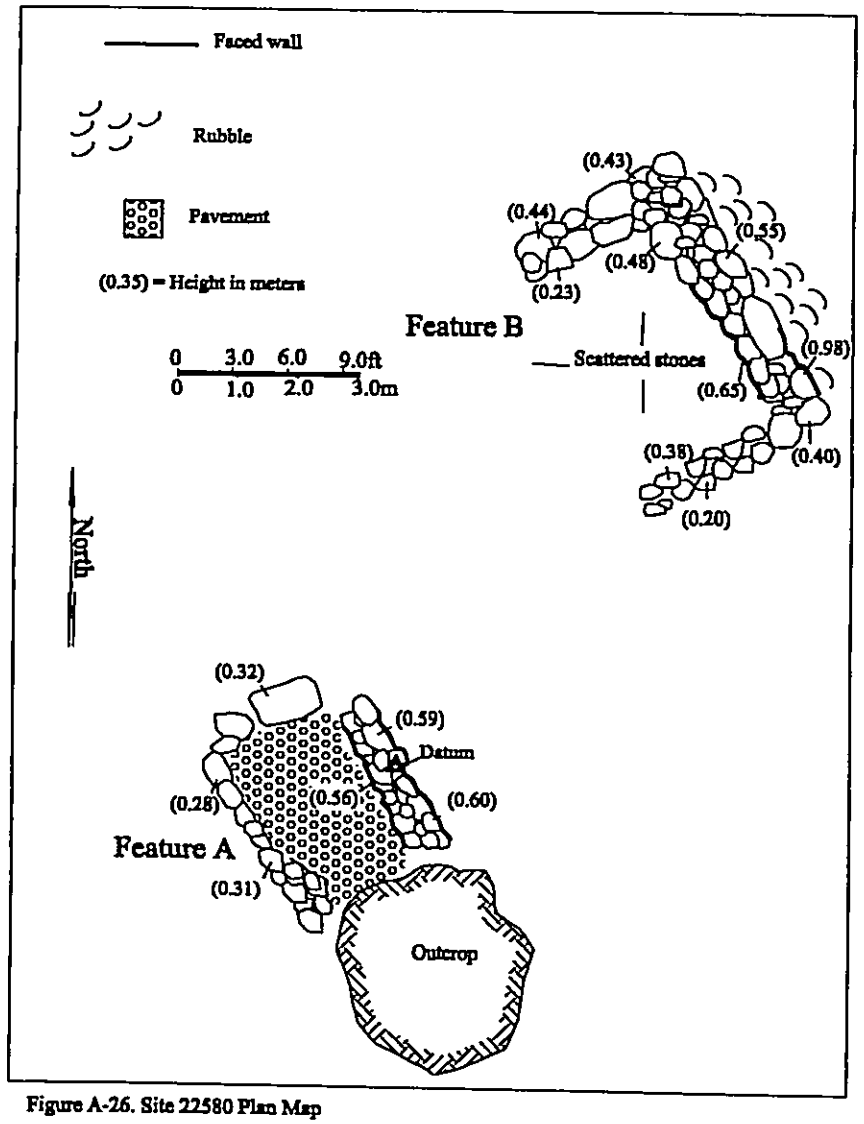


Figure A-26. Site 22580 Plan Map

against the southern side (*Figure A-27*). The C-shape is 2.75 m long (north-south) by 2.6 m and is constructed of one to three courses wide and tall of small subangular basalt boulders and large cobbles. The height of the C-shape varies from 0.38 to 0.61 m. The interior is comprised of level soil with scattered stones. No cultural remains were observed.

The platform at the south end of the C-shape is 3.3 m long (east-west) by 2.4 m wide. The north side of the platform forms the southern side of the C-shape. This portion of the site is built of stacked and piled cobbles and boulders ranging in height from 0.39 to 0.48 m. The surface of the platform is level but unpaved.

A 1.0 by 1.0 m test unit (TU-22) was excavated in the center of the platform. This excavation revealed a stone architectural layer (Layer I) over a soil deposit (Layer II; see *Figure A-27*). Layer I consisted of 0.19 to 0.21 m of tightly packed subangular basalt cobbles. Cultural remains recovered from Layer I consisted of two unidentified marine shell fragments (1.25 grams), two pieces of burned coral (33.3 grams), and eight volcanic glass flakes (6.85 grams). The base of Layer I intrudes slightly into the Layer II soil deposit. No evidence was found to indicate that the architectural layer had been built during more than a single construction episode.

Layer II was comprised of a brown (10YR 4/3) silt. An infant cranium was identified within this deposit in the southwestern corner of the unit at 0.3 m below the surface of the platform, or 0.09 m into the Layer II deposit. The excavation was terminated upon identification of the human remains. Habitation debris was also recovered from Layer II, consisting of five fragments of unidentified marine shell (2.04 grams).

Site 22581 is interpreted as a temporary habitation structure with an associated or subsequent burial function based on the presence of the human remains. The structure is assigned a temporary habitation function based on its formal type, informal construction, and area (16.9 sq m).

State No.: 22582
Site Type: L-shape
Topography: Top of level ridge
Elevation: 2,305 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 10.4 by 3.1 m
Condition: Poor
Integrity: Altered
Description: Site 22582 consists of the disturbed remnant of an L-shape located along the southern edge of a level ridge crest. All that remains is an L-shaped wall that is 10.5 m in length (east northeast by west southwest) and 3.1 m wide (*Figure A-28*). A circular bomb crater (2.35 m in diameter and 0.35 m in depth) is located in the center of the longer wall, significantly disturbing the structure. Many of the wall stones appear to have been removed from the site and it is possible that the structure was originally much larger and may have been rectangular in shape. The remaining walls range in width from 1.13 to 1.46 m, and in height from 0.27 to 0.6 m. The walls are constructed with a basal course of small subangular boulders with a slightly core-filled interior of cobbles. No cultural remains were noted at the site. Site 22582 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and its area (32.2 sq m).

State No.: 22583
Site Type: U-shape
Topography: Base of slope
Elevation: 2,308 ft
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 4.25 by 3.36 m
Condition: Fair
Integrity: Altered

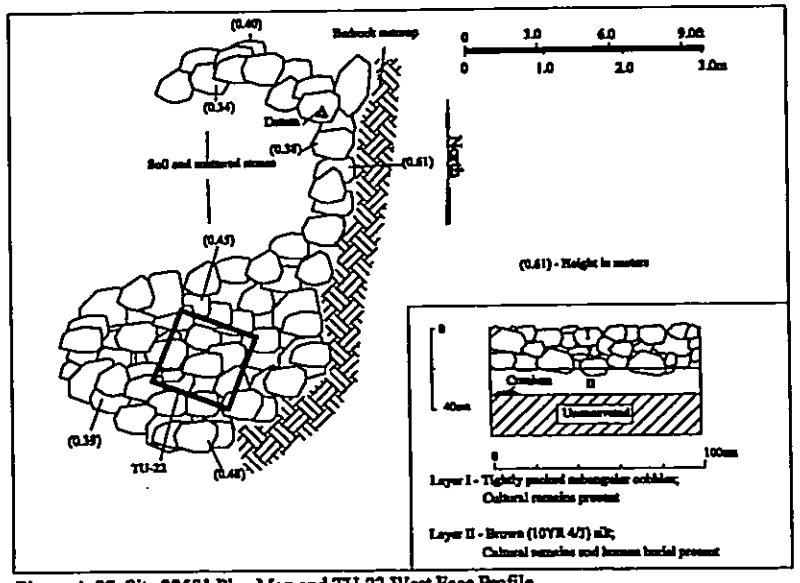


Figure A-27. Site 22581 Plan Map and TU-22 West Face Profile

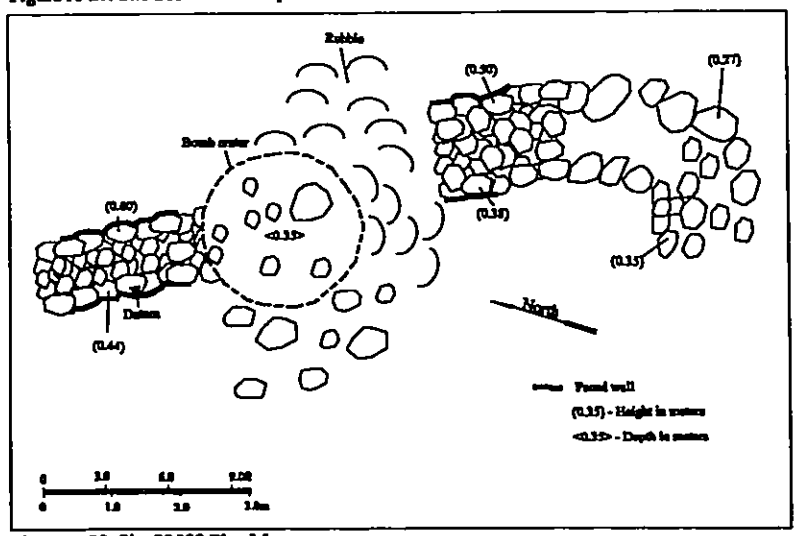


Figure A-28. Site 22582 Plan Map

Description: Site 22583 is a U-shaped enclosure located at the base of a slope on the southern side of a ridge. The U-shape is open to the south and is 4.25 m long (northwest by southeast) and 3.36 m wide (*Figure A-29*). Many of the wall stones appear to have been removed from the site. The walls consist of two to four courses wide and one to three courses high of subangular basalt cobbles and small boulders. These walls range in width from 0.6 to 1.2 m and in height from 0.09 to 0.46 m. There is an upright basalt slab located along the western side of the feature that is 0.88 m long by 0.34 m wide. The interior of the U-shape is comprised of level soil with no cultural remains present. Site 22583 is interpreted as temporary habitation based on its formal type, informal construction, and area (14.3 sq m).

State No.: 22584
Site Type: Hearth
Topography: Top of level ridge
Elevation: 2,310 ft
Probable Age: Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 2.25 by 1.21 m
Condition: Fair
Integrity: Unaltered
Description: Site 22584 is a small surface hearth located on the top of a level ridge. The hearth consists of an oval-shaped alignment that is 2.25 m in length (east-west) and 1.21 m wide, constructed of aligned partially buried cobbles that range in height from 0.08 to 0.13 m above ground surface (*Figure A-30*). The interior of the hearth is comprised of level soil. No cultural remains were observed within the hearth, though a concentration of brown stoneware ceramic fragments was noted 1.1 m to the east.

A 0.5 by 0.7 m test unit (TU-24) was excavated in the center of the hearth. This excavation revealed a deposit of a dark yellowish brown (10YR 3/4) silt (Layer I) overlying bedrock (see *Figure A-30*). No cultural remains were recovered from the Layer I deposit, though a basin-shaped pit (Feature 1) was encountered in the eastern portion of the unit at 0.27 m below surface. The pit measured 0.15 m in thickness, 0.44 m long (north-south), and 0.25 m+ wide extending out of the unit to the east. The soil matrix within the pit consisted of a very dark brown ashy silt. Cultural remains from the pit consisted of 63.18 grams of charcoal.

Site 22584 is interpreted as a temporary habitation. The presence of the stoneware fragments found adjacent to the hearth suggests that this structure may be historic in origin.

State No.: 22585
Site Type: Complex (4)
Topography: Level ridge top
Elevation: 2,312 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Storage
Overall Dimensions: 24.0 by 14.6 m
Condition: Fair
Integrity: Unaltered
Description: Site 22585 is a complex of four features located on a level ridge top. The features consist of a walled terrace (Feature A), a terrace (Feature B), a cupboard (Feature C) and a small enclosure (Feature D). The site is bisected by the northern wall of an agricultural enclosure (Site 22632, Feature KM). *Figure A-31* illustrates the distribution of the Site 22585 features, which are described below.

Feature A: Walled Terrace
Function: Permanent Habitation
Dimensions: 11.22 by 7.23 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a walled terrace located south of the Site 22632, Feature KM agricultural enclosure. It is irregularly-shaped with overall dimensions of 11.22 m long (east northeast by west southwest) and 3.8 to 7.2 m wide. The walls of the structure are comprised of stacked and piled subangular basalt cob-

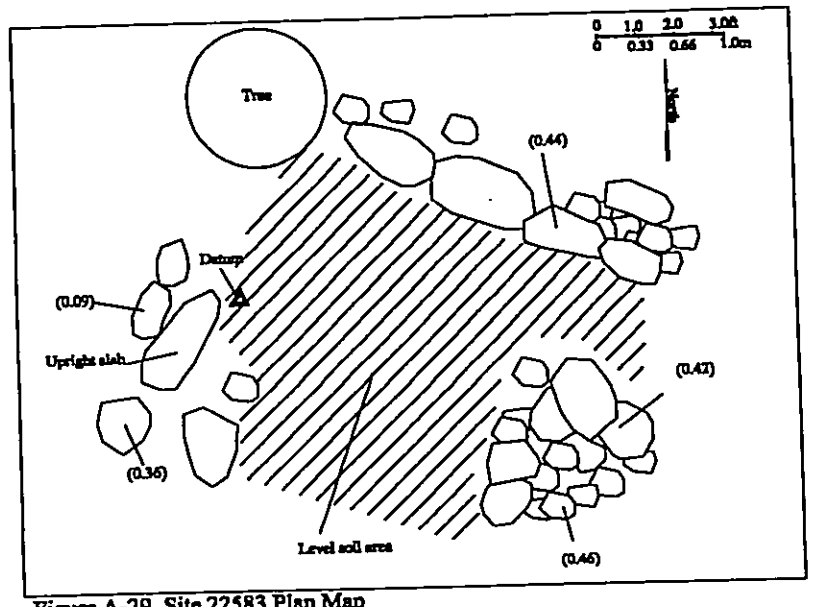


Figure A-29. Site 22583 Plan Map

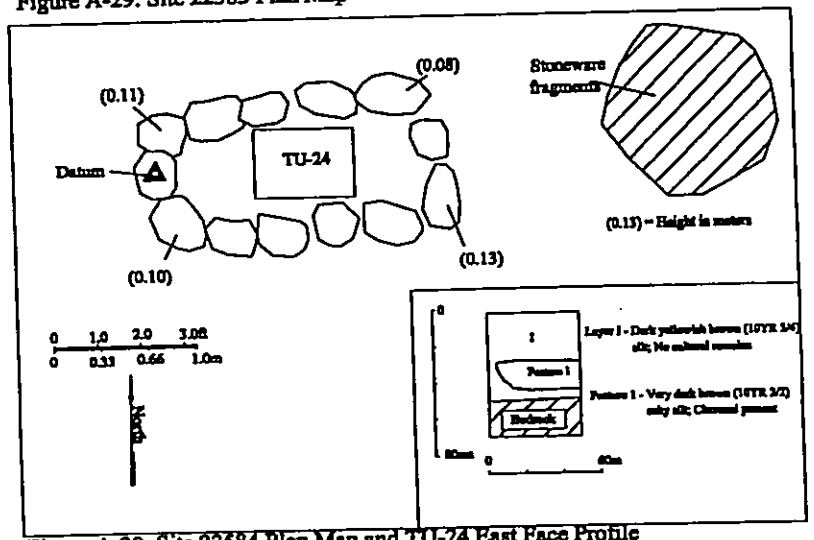


Figure A-30. Site 22584 Plan Map and TU-24 East Face Profile

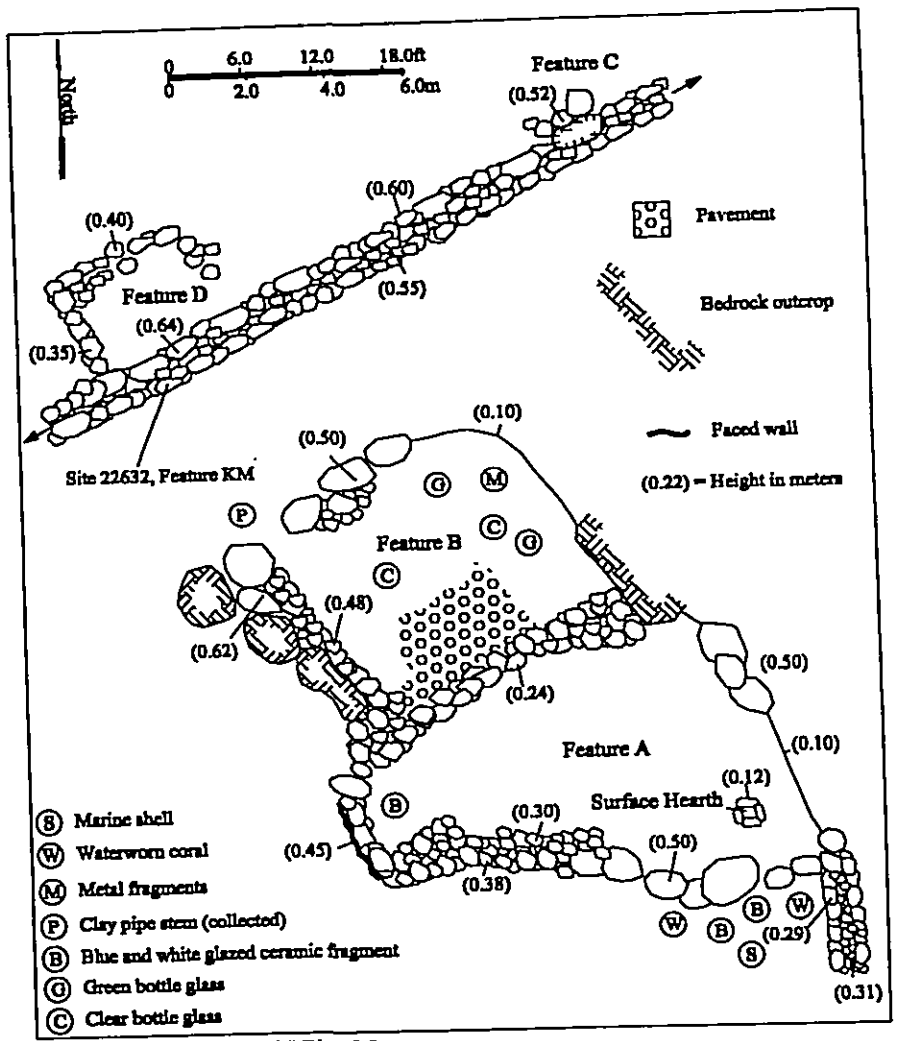


Figure A-31. Site 22585 Plan Map

bles and small boulders. The north, south, and west walls vary in width from 0.63 to 1.5 m, and in height from 0.24 to 0.5 m. The exterior side of the western wall is faced. The eastern end of the southern wall consists of an alignment of small boulders. The eastern side of the structure consists of a low soil terrace (0.10 m high) with an alignment of three small boulders (0.5 m high) located in the center.

A terrace wall originates at the southeastern corner of the feature and extends 3.7 m to the south. This wall is 0.88 to 0.9 m wide and 0.29 to 0.31 m in height and is built of stacked cobbles with a slightly core-filled interior. The interior of Feature A consists of level soil. A fragment of blue and white glazed ceramics was noted in the northwestern corner of the structure and marine shell, waterworn coral and glazed ceramics were observed outside the structure to the south, west of the extension wall. A surface hearth measuring 0.55 by 0.6 m, and 0.12 m in height is located inside the feature at the southeastern corner (*Figure A-32*). The hearth is bordered by four large basalt cobbles set on edge. Feature A is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls, internal hearth) and its area (61.7 sq m).

Feature B: Terrace
Function: Permanent Habitation
Dimensions: 8.29 by 6.9 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a terrace adjacent to Feature A to the north. It is 8.29 m long (northeast by southwest) and 6.9 m wide. The west and southeast portions of the structure are bordered by bedrock outcrops. The southern and western sides of the feature are constructed of stacked and piled subangular basalt cobbles and small boulders. These walls range in width from 0.51 to 1.5 m and in height from 0.24 to 0.48 m. The northern wall is comprised of an alignment of boulders with small boulders and cobbles piled along the southern side. This portion of the terrace varies in height from 0.4 to 0.5 m. The eastern side of the feature consists of a low (0.1 m high) soil retaining wall.

The interior surface of the feature consists of level soil. Fragments of clear and green bottle glass and metal fragments were noted inside the structure, and a clay pipe stem was collected from the ground surface to the north of the feature (1.92 cm long, 0.19 cm diameter with a 1.9mm hole through center, 0.97 grams; *Figure B-3, Image C*). There is a level pavement of flat waterworn cobbles located along the southern side of the feature. This pavement is rectangular in shape and is 3.19 m long (northeast by southwest), 2.0 m wide, and 0.02 to 0.05 m in height above the surrounding ground surface. Feature B is also interpreted as a permanent based on its formal type, substantial construction (pavement) and its area (57.2 sq m).

Feature C: Cupboard
Function: Storage
Dimensions: 0.4 by 0.38 m
Condition: Fair
Integrity: Unaltered
Description: Feature C is a small cupboard built into the northern wall of the Site 22632, Feature KM agricultural enclosure wall, 8.0 m northeast of Feature B. The cupboard opens to the north with the interior space measuring 0.4 m long (northeast by southwest), 0.38 m deep and 0.24 m in height (*Figure A-33*). The floor of the cupboard is comprised of soil with no cultural remains. Feature C is interpreted as a storage feature associated with the permanent habitation of Site 22585 based on its formal type and proximity to other features of the site.

Feature D: Enclosure
Function: Permanent Habitation, Special Purpose Structure
Dimensions: 4.4 by 2.8 m
Condition: Fair
Integrity: Unaltered
Description: Feature D is a rectangular enclosure located on the northern side of the Site 22632, Feature KM agricultural enclosure, 5.75 m north of Feature B. It is 4.4 m long (northeast by southwest) and 2.8 m wide. The walls are built of stacked and piled subangular basalt cobbles and small boulders ranging in

Figure A-32. Site 22585, Feature A Surface Hearth, view to west

Figure A-33. Site 22585, Feature C Cupboard, view to southeast

width from 0.51 to 0.6 m and in height from 0.35 to 0.4 m. The interior of the enclosure is comprised of level soil with no cultural remains present. Feature D is interpreted as a special purpose structure associated with the permanent habitation of the site based on its formal type, proximity to the other Site 22585 features and small area (12.3 sq m).

State No.: 22586
Site Type: Complex (2)
Topography: Level ridge top
Elevation: 2,302 feet
Probable Age: Historic
Functional Interpretation: Military
Overall Dimensions: 20.5 by 2.95 m
Condition: Good
Integrity: Unaltered
Description: Site 22586 is a complex of two small enclosures located on a level ridge top. The features are illustrated in *Figure A-34* and are described below.

Feature A: C-shape
Function: Military Defensive Position
Dimensions: 2.11 by 1.47 m
Condition: Good
Integrity: Unaltered
Description: Feature A is a C-shaped enclosure located at the western end of the site. The C-shape is open to the southeast and is 2.11 m long (northeast by southwest) and 1.47 m wide. The walls are constructed of one course wide and one to two courses high of stacked subangular basalt cobbles that range in height from 0.25 to 0.31 m. The condition of the walls suggest that the structure is of relatively recent origin. The interior of the enclosure consists of level soil with no cultural remains present. Feature A is interpreted as a World War II era American military defensive position based on its formal type and its appearance.

Feature B: U-shape
Function: Military Defensive Position
Dimensions: 2.15 by 2.0 m
Condition: Good
Integrity: Unaltered
Description: Feature B is a U-shaped enclosure located 15.6 m east of Feature A on the same level ridge. It is built against the western side of a low bedrock outcrop with walls constructed along the north and south sides. The feature is 2.15 m long (east-west) by 2.0 m wide with the walls comprised of two to three courses wide and one to three courses high of stacked subangular cobbles and small boulders. The walls range in width from 0.4 to 0.46 m and in height from 0.25 to 0.32 m and appear to be of relatively recent origin. Two rusted metal military C-rations tins were observed within the U-shape at the eastern end. No other cultural remains were noted. Feature B is also interpreted as a World War II era American military defensive position based on its formal type and on the presence of C-rations.

State No.: 22587
Site Type: Complex (5)
Topography: Side of slope
Elevation: 2,300 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Burial
Overall Dimensions: 33.3 by 23.3 m
Condition: Fair
Integrity: Altered
Description: Site 22587 is a complex of five features located on the southern side of a ridge within a large agricultural enclosure (Site 22632, Feature KM). The features consist of a large enclosure (Feature A), two platforms (Features B and C) and two C-shapes (Features D and E). The Site 22587 features are depicted in *Figure A-35* and are described below.

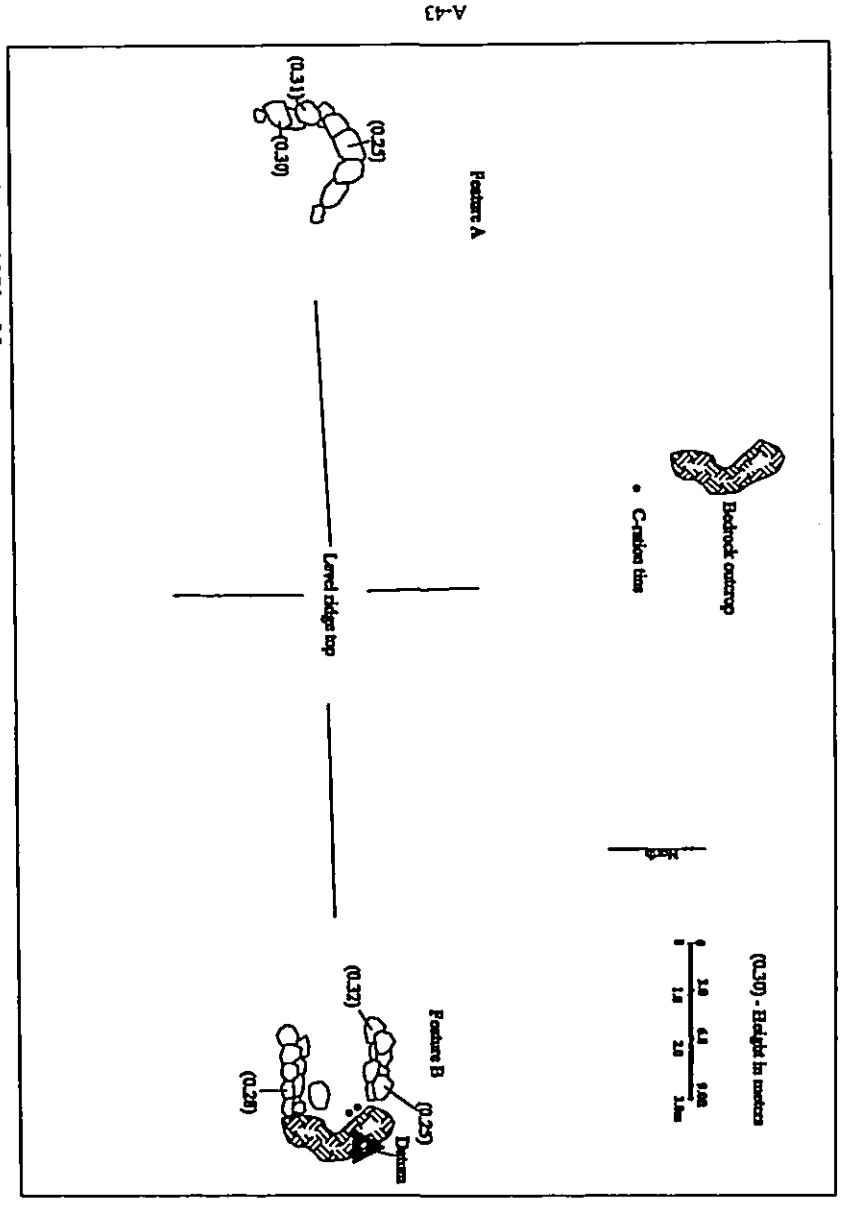


Figure A-34. Site 22586 Plan Map

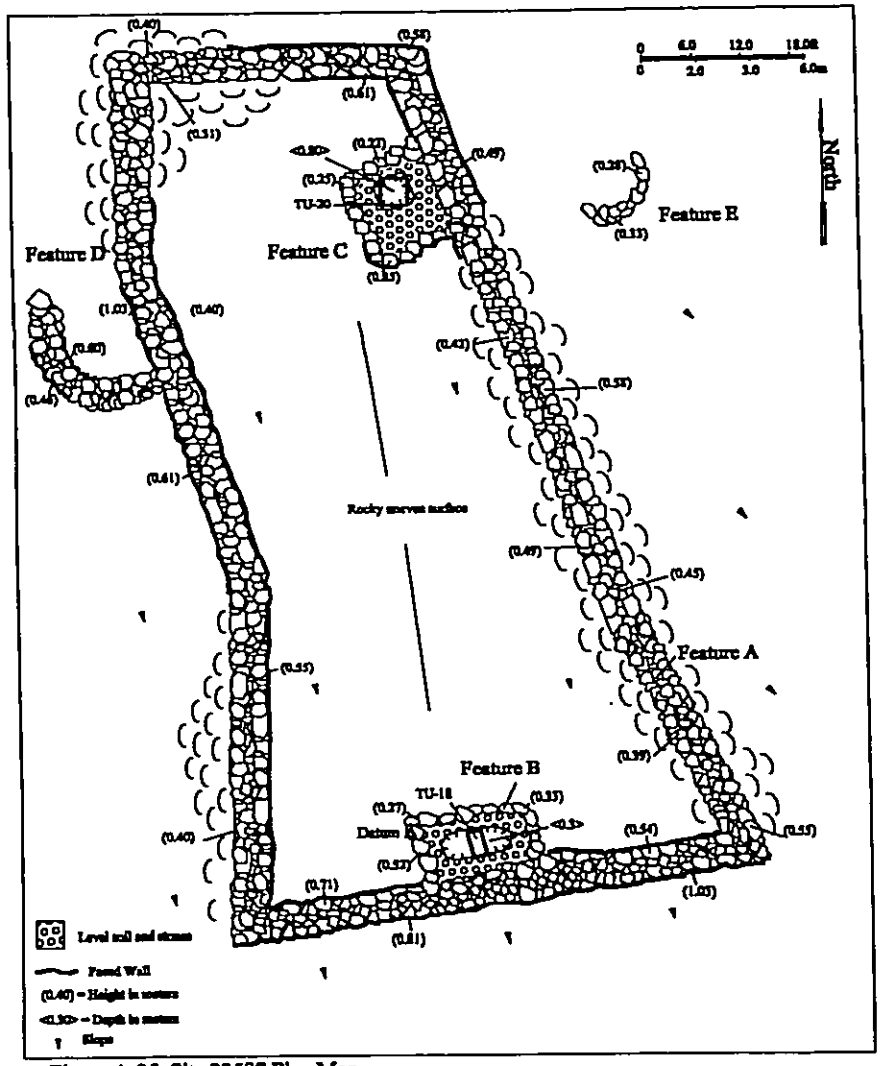


Figure A-35. Site 22587 Plan Map

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 33.3 by 19.8 m
Condition: Fair
Integrity: Altered
Description: Feature A is a large rectangular-shaped enclosure that is built on the side of a ridge that angle down moderately to the south. Features B-E are situated within or adjacent to the Feature A enclosure. The enclosure is 33.3 m long (north-south) and ranges in width from 12.0 m at the northern end to 19.8 m wide at the southern end. The walls are built of stacked subangular basalt cobbles and small boulders. They range in width from 1.0 to 1.3 m and in height from 0.31 to 1.03 m. Portions of the interior and exterior walls are faced.

The central half of the interior of the enclosure consists of a rocky slope with no cultural remains noted. Feature A is interpreted as a permanent habitation ancillary feature that functioned to delineate the boundaries of a yard. This is based on its formal type, substantial construction (faced walls) and large area (529.5 sq m). One or more pole and thatch structures were probably present within the yard. The interior surfaces next to Features B and C are level and large enough to have accommodated structures.

Feature B: Platform
Function: Burial
Dimensions: 4.8 by 2.65 m
Condition: Fair
Integrity: Altered
Description: Feature B is a rectangular platform situated within the interior of the Feature A enclosure along the center of the southern wall. The platform is 4.8 m long (east-west) by 2.65 m wide. The perimeter of the platform is comprised of alignments of small to medium-sized subangular basalt boulders that range in height from 0.27 to 0.52 m. The surface of the feature is comprised of level soil and cobbles. Several sun-bleached marine shells were noted on the surface of the feature.

There is an oval-shaped depression located on top of the platform that is 2.6 m long (east-west), 1.0 m wide and 0.3 m deep below the surface of the feature. A 1.0 by 0.5 m test unit (TU-18) was excavated into this depression revealing a deposit of brown (10YR 4/3) silt with 50% subangular basalt cobble and pebble inclusions (*Figure A-36*). Cultural remains collected from this deposit consisted of one *cowrie* (*Cypraeidae*) shell (0.72 grams), 8.24 grams of charcoal, a fragment of volcanic glass angular waste (1.07 grams) and a piece of rusted metal (2.55 cm long, 1.11 cm wide, 0.8 cm thick, 1.68 grams). Fragments of an adult human cranium and unidentified human bone fragments were identified at 0.6 m below the base of the surface depression or 0.9 m below the top of the platform. The excavation was terminated on identification of the human remains. Feature B is interpreted as a burial platform based on the presence of the remains. The depression on the surface of the feature and the disturbed nature of the human remains indicate that the structure has been disturbed, potentially by looters.

Feature C: Platform
Function: Burial
Dimensions: 3.95 by 3.5 m
Condition: Fair
Integrity: Altered
Description: Feature C is a rectangular platform situated within the interior of the Feature A enclosure along the eastern wall at the northern end. The structure is 3.95 m long (north-northwest by south-southeast) and 3.5 m wide. The sides of the platform consist of two to three courses of small subangular basalt boulders and large cobbles ranging in height from 0.22 to 0.85 m. The southern side of the platform is faced. The surface consists of level soil and cobbles. No cultural remains were noted on the surface.

There is a roughly circular-shaped depression located on top of the platform that is 1.25 m in diameter by 0.8 m deep below the surface of the structure. A 1.0 by 1.0 m test unit (TU-20) was excavated into the depression revealing two soil deposits over bedrock (*Figure A-37*). Layer I consisted of 0.27 to 0.37 m of a

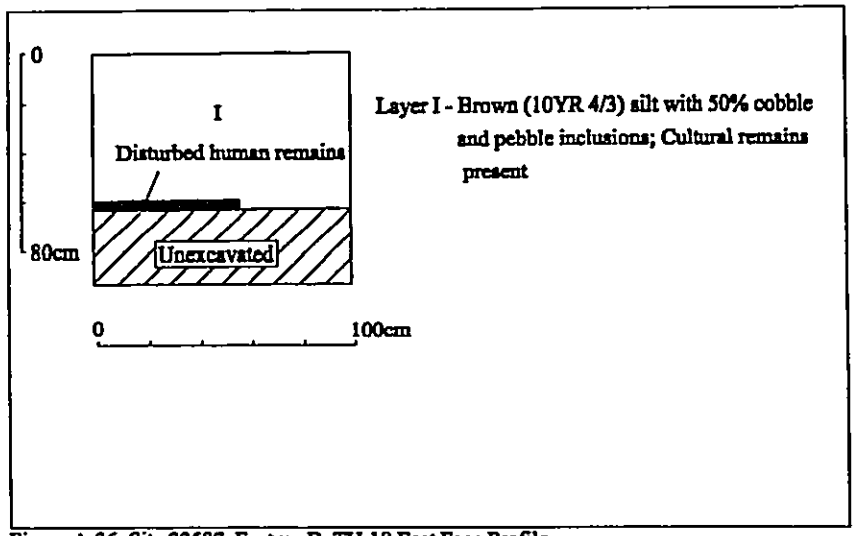


Figure A-36. Site 22587, Feature B, TU-18 East Face Profile

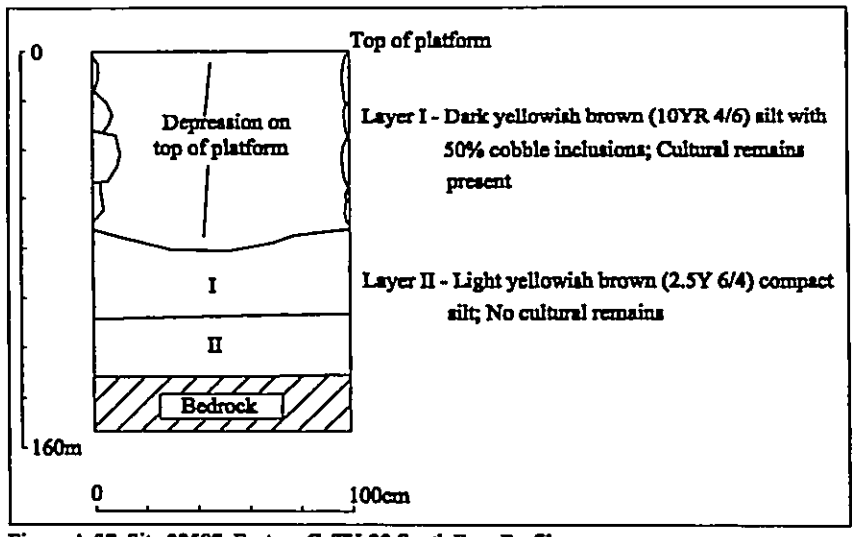


Figure A-37. Site 22587, Feature C, TU-20 South Face Profile

dark yellowish brown (10YR 4/6) silt with 50% cobble inclusions. Cultural remains from this deposit consisted of fragments of possible human long bones left in the feature, along with a brass washer with a 3.4 mm diameter hole in the center (1.1 cm in diameter, 0.25 cm thick, 1.64 grams) and 11 fragments of rusted metal (8.59 grams). Layer II was comprised of 0.24 to 0.26 m of a light yellowish brown (2.5Y 6/4) compact silt with no cultural remains. Feature C is interpreted as burial platform from which the human remains have been disinterred.

Feature D: C-shape
Function: Permanent Habitation
Dimensions: 4.83 by 3.9 m
Condition: Fair
Integrity: Altered
Description: Feature D is a C-shaped enclosure constructed on the exterior side of the Feature A enclosure along the western side. The enclosure is open to the north and is 4.83 m long (north-south) by 3.9 m wide. Many of the stones appear to have been removed from the feature, which is constructed of stacked subangular cobbles and small boulders. The wall varies in width from 0.85 to 1.25 m and in height from 0.46 to 0.6 m. Portions of the C-shaped wall on the interior and exterior are faced. The interior floor of the feature is level soil with scattered surface stones. No cultural remains were noted. Feature D is interpreted as a permanent habitation that probably formed the foundation for a roofed structure. This is based on its formal type, substantial construction (faced walls) and its area (18.8 m).

Feature E: C-shape
Function: Permanent Habitation, Special Purpose Structure
Dimensions: 3.05 by 1.25 m
Condition: Fair
Integrity: Unaltered
Description: Feature E is a C-shaped enclosure located 3.4 m east of the eastern wall of Feature A, on the side of a slope angling to the south-southeast. The C-shape is open to the northwest and is constructed of one to two wide and tall of subangular basalt cobbles and small boulders. The wall ranges in width from 0.36 to 0.55 m and in height from 0.28 to 0.33 m. The interior of the C-shape consists of level soil with scattered surface stones. No cultural remains were observed. Feature E is interpreted as a special purpose structure associated with the permanent habitation of the site based on its spatial association with the other features at the site and its small area (3.8 sq m).

State No.: 22588
Site Type: Complex (2)
Topography: Level ridge top
Elevation: 2,290 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 10.7 by 5.2 m
Condition: Fair
Integrity: Unaltered
Description: Site 22588 is a complex of two features located on a level ridge top. The features consist of an enclosure (Feature A) and an associated wall (Feature B). *Figure A-38* illustrates the Site 22588 features, which are described below.

Feature A: Enclosure
Function: Permanent Habitation, Special Purpose Structure
Dimensions: 4.75 by 3.5 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a rectangular enclosure that is 4.75 m long (north-northwest by south-southeast), and 3.5 m wide. The interior floor of the enclosure is situated below ground surface, ranging in depth from 0.35 to 0.93 m. The walls of structure vary in width from 0.37 to 0.92 m and are built of stacked and piled subangular basalt cobbles and small boulders. Portions of the interior walls are faced and the floor is

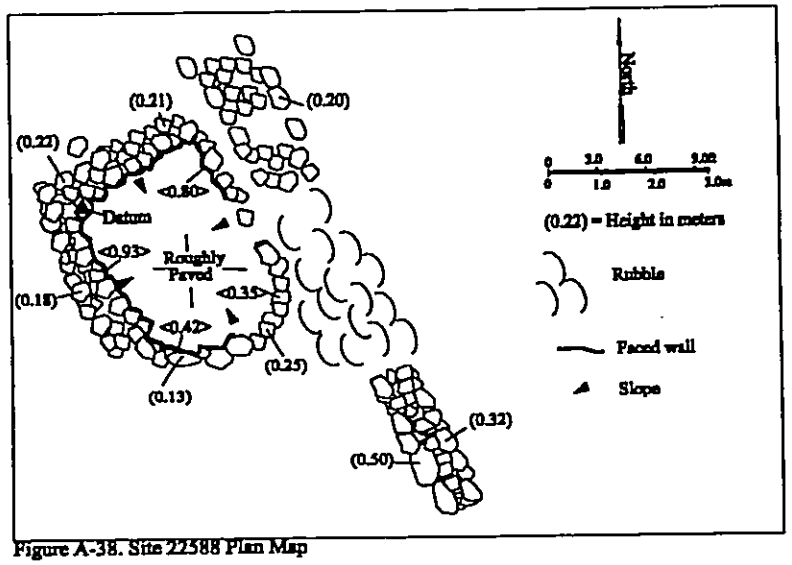


Figure A-38. Site 22588 Plan Map

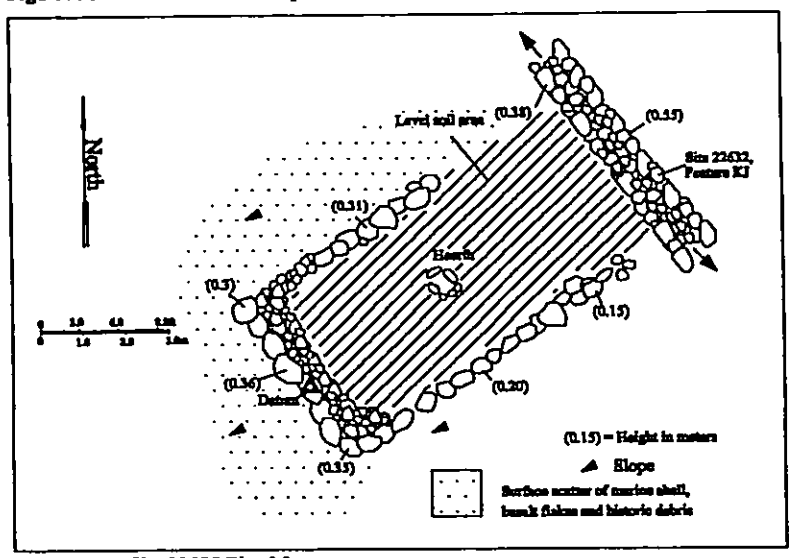


Figure A-39. Site 22589 Plan Map

roughly paved with small basalt cobbles. The exterior height of the walls range from 0.13 to 0.25 m above the surrounding ground surface. No cultural remains were observed. Feature A is interpreted as a permanent habitation special purpose structure based on its formal type, substantial construction (faced walls, pavement), small area (16.6 m), and association with the nearby Site 22589 permanent habitation site.

Feature B: Wall
Function: Permanent Habitation, Ancillary Feature
Dimensions: 10.7 by 1.3 m
Condition: Fair
Integrity: Altered
Description: Feature B is a linear wall located adjacent to Feature A to the east. The wall is 10.7 m long (north-northwest by south-southeast), 0.91 to 1.3 m wide and 0.2 to 0.5 m in height. Many of the wall stones appear to have been removed. Feature B is constructed of stacked and piled subangular basalt cobbles and small boulders. The north and south ends of the wall are built two to three courses in height with the center of the wall comprised of collapsed and scattered stones. No cultural remains were noted. Feature B is interpreted as an ancillary feature associated with the permanent habitation of the site. This is based on its proximity to the Feature A enclosure. The wall may have formed a wind break or a wall for a larger structure incorporating Feature A.

State No.: 22589
Site Type: Terrace
Topography: Ridge top
Elevation: 2,292 feet
Probable Age: Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 9.1 by 4.6 m
Condition: Fair
Integrity: Unaltered
Description: Site 22589 is a terrace located on a ridge top that slopes slightly to the southwest. The structure is built on the southwestern side of an agricultural enclosure (Site 22632, Feature KJ). The terrace is rectangular in shape and is 9.1 m long (northeast by southwest) and 4.6 m wide (*Figure A-39*). A stone retaining wall is built along the southwest with alignments forming the northwest and southeastern sides of the structure. Cobble and pebble fill is present behind the retaining wall on the interior side. The walls range in width from 0.46 to 1.09 m, and in height from 0.15 to 0.36 m.

The interior of the terrace is comprised of level soil. There is a small surface hearth located in the center of the structure that is 0.7 m long (northwest by southeast) and 0.55 m wide. It is constructed of large cobbles that vary in height from 0.02 to 0.08 m above the surface of the terrace. The interior of the hearth is 0.11 m deep, and is filled with a brown silty soil. No cultural remains were observed on the surface of the terrace or within the hearth.

A scatter of cultural remains extends to the southwest and northwest from the edge of the terrace, encompassing an area 7.7 m long by 6.9 m wide. These remains consist of sun-bleached marine shell, basalt flakes, a basalt core, fragments of dark green bottle glass, and blue and white glazed ceramic fragments.

Site 22589 is interpreted as a permanent habitation based on its formal type, substantial construction (internal hearth) and its area (41.86 m).

State No.: 22590
Site Type: Walled Terrace
Topography: Base of slope
Elevation: 2,272 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 8.9 by 8.09 m

Condition: Fair
Integrity: Unaltered
Description: Site 22590 is a walled terrace located at the base of a slope that angles down to the southwest overlooking a series of agricultural fields. The terrace is rectangular and is 8.9 m long (northwest by southeast) and 8.09 m wide. Portions of the northeast and southeast walls appear relatively intact consisting of stacked subangular basalt cobbles and small boulders with faced sides and a narrow core-filled interior (*Figure A-40* and *A-41*). These walls range in width from 0.95 to 1.21 m and in height from 0.1 to 0.7 m. The northwest and southwest sides of the structure are defined by discontinuous alignments of small boulders that vary in height from 0.12 to 0.2 m. The surface of the terrace is level consisting of soil with scattered stones. Several pieces of sun-bleached marine shell and a basalt flake were observed on the surface of the site. Site 22590 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and its area (72.0 sq m).

State No.: 22591
Site Type: Cairn
Topography: Level ridge top
Elevation: 2,283 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Marker
Overall Dimensions: 0.85 by 0.65 m
Condition: Fair
Integrity: Unaltered
Description: Site 22591 is a small cairn located on top of a level ridge. It is constructed of three to four courses of stacked subangular basalt cobbles that are 0.85 by 0.65 at the base, 0.42 by 0.38 m at the top and 0.71 m in height. No cultural remains were observed at the site. Site 22591 is interpreted as a marker based on its size and formal type.

State No.: 22592
Site Type: Complex (4)
Topography: Below top of ridge
Elevation: 2,284 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 25.8 by 22.4 m
Condition: Fair
Integrity: Altered
Description: Site 22592 is a complex of four features situated just below the top edge of a ridge that angles down to the southeast and southwest. The features consist of a large enclosure (Feature A), two terraces (Features B and D) and a trail (Feature C). The features are depicted in *Figure A-42* and are described below.

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 25.8 by 22.4 m
Condition: Fair
Integrity: Altered
Description: Feature A is a large, roughly rectangular enclosure that originates south of a vertical basalt outcrop, just below the upper edge of a ridge. The enclosure is 25.8 m long (north-northwest by south-southeast) and 17.6 to 22.4 m wide. Many of the wall stones appear to have been removed from the structure. The south and west walls are comprised of a series of upright subangular basalt boulders set in the ground that range in height from 0.33 to 0.62 m on the interior side and 0.39 to 0.83 m on the exterior, downslope side. Small boulders and large cobbles are piled one to two course high between the boulders along the western side. The eastern side of the structure consists of several large boulders, with small boulders and cobbles piled between them. This wall varies in width from 1.2 to 1.6 m and in height from 0.28 to 0.49 m. The interior of the enclosure slopes slightly to moderately to the southeast, and consists of soil with scattered stones. Sun-bleached marine shell was noted on the ground surface at the southeastern end of the

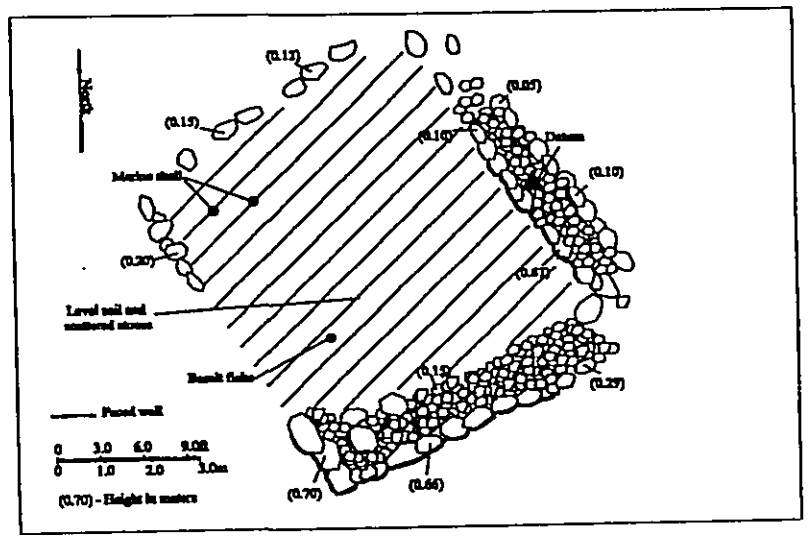


Figure A-40. Site 22590 Plan Map

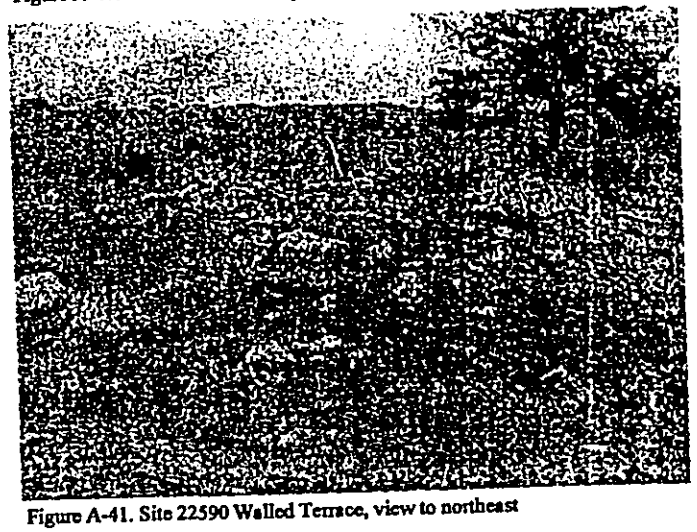


Figure A-41. Site 22590 Walled Terrace, view to northeast

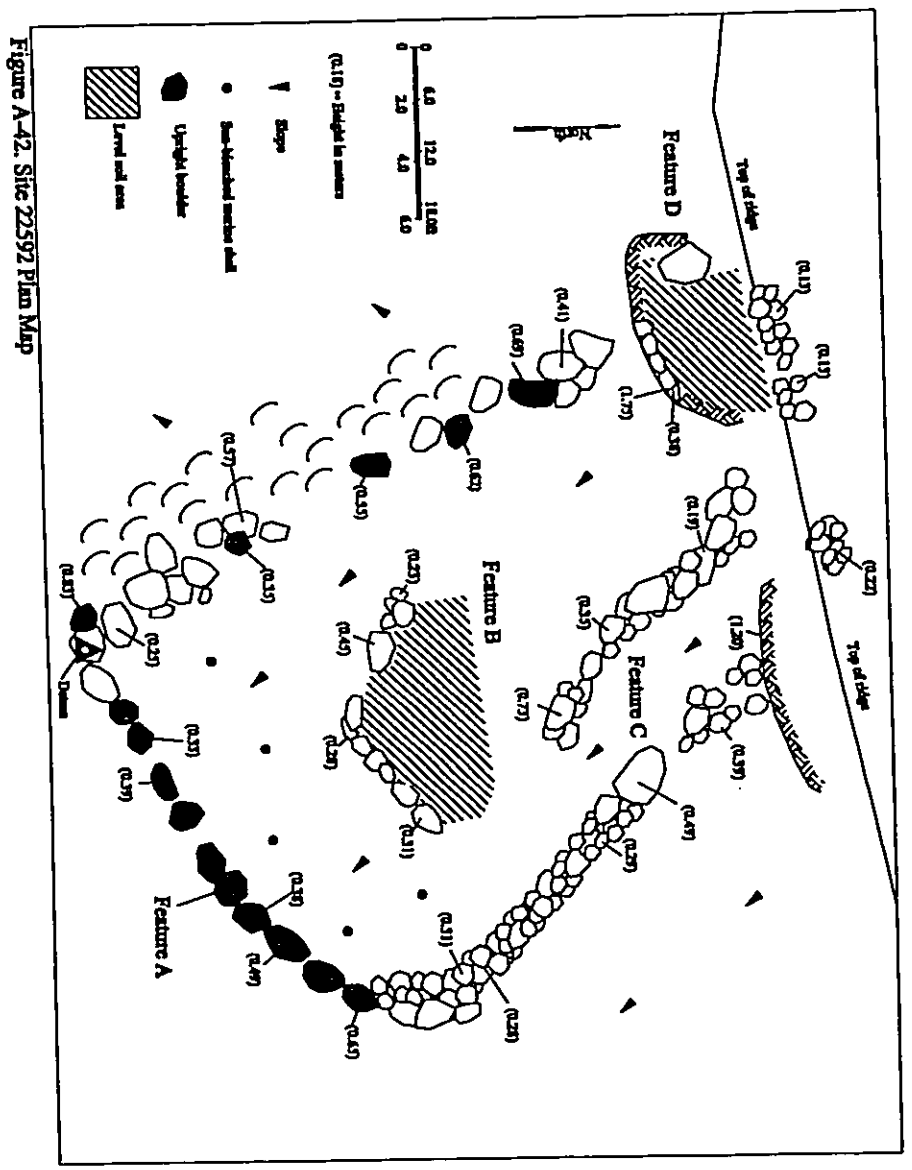


Figure A-42. Site 22592 Plan Map

enclosure. The Feature B terrace and the Feature C trail are located within Feature A. The Feature D terrace is situated above the enclosure to the north. Several low piles of cobbles and small boulders are located on the crest of the ridge, above Feature A.

Feature A is interpreted as ancillary feature associated with the permanent habitation of the site based on its formal type, area (577.9 sq m), and on the presence of permanent habitation features within and adjacent to the enclosure. The nature of the feature suggests it functioned to define the boundaries of a yard.

Feature B: Terrace
Function: Permanent Habitation
Dimensions: 9.2 by 5.6 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a roughly rectangular terrace situated within the Feature A enclosure. It is 9.2 m long (east-west) and 3.0 to 5.6 m wide with a retaining wall comprised of aligned small boulders and large cobbles located on the southern, downslope side. This retaining wall ranges in height from 0.23 to 0.45 m. The surface of the terrace consists of a level soil deposit. No cultural remains were observed. Feature B is interpreted as a permanent habitation feature based on its formal type and size (39.6 sq m), though it lacks attributes of substantial construction.

Feature C: Trail
Function: Permanent Habitation, Ancillary feature
Dimensions: 11.8 by 3.2 m
Condition: Fair
Integrity: Unaltered
Description: Feature C is a linear, lined trail segment situated within the Feature A enclosure. The trail is bordered on the east by the eastern wall of Feature A and on the west by a piled cobble and boulder wall. The feature originates just below the upper edge of the ridge and extends downslope to the southeast for 11.8 m. The trail averages 3.2 m wide with the western wall varying in width from 0.8 to 1.6 m and in height from 0.19 to 0.73 m. The surface of the trail is comprised of soil with scattered stones. No cultural remains were noted. Feature C is interpreted as an ancillary feature associated with the permanent habitation of the site, based on its location within the Feature A enclosure. The trail probably functioned as a means of accessing the site from the ridge crest.

Feature D: Terrace
Function: Permanent Habitation
Dimensions: 8.6 by 4.6 m
Condition: Fair
Integrity: Unaltered
Description: Feature D is an oval-shaped terrace built on a vertical bedrock outcrop, above the northwestern corner of Feature A. The surface of the terrace consists of a level soil deposit that is 8.6 m long (east-west) by 4.6 m wide. No cultural remains were noted. Large basalt cobbles have been piled one course wide and two to three courses high along the southern side of the outcrop. The top of this retaining wall averages 0.38 m in height on the interior side and 1.75 m in height on the exterior, downslope side. Feature A is interpreted as a possible permanent habitation based on its formal type and size (39.5 sq m), though no evidence of substantial construction was noted.

State No.: 22593
Site Type: Terrace
Topography: Level ridge top
Elevation: 2,285 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 4.05 by 2.35 m
Condition: Fair
Integrity: Unaltered

Description: Site 22593 is a small terrace located on a narrow level ridge crest. The terrace is 4.05 m long (east northeast by west southwest) and 2.35 m wide (*Figure A-43*). The north, east and west sides have low retaining walls that vary in width from 0.36 to 1.06 m and in height from 0.19 to 0.48 m. These walls are built of one to four courses wide and one to three courses tall of piled subangular basalt cobbles and small boulders. The southern side of the site consists of a low soil terrace that is 0.05 m in height. The surface of the terrace consists of level soil with no cultural remains present. Site 22593 is interpreted as a temporary habitation based on its formal type, informal construction and area (9.5 sq m).

State No.: 22594
Site Type: Complex (3)
Topography: Level ridge top
Elevation: 2,286 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 20.2 by 5.3 m
Condition: Fair
Integrity: Altered
Description: Site 22594 is a complex of three features located on the top of a level ridge. The features consist of an L-shaped enclosure (Feature A), an oval enclosure (Feature B) and a surface hearth (Feature C). The distribution of the Site 22594 features is depicted in *Figure A-44*.

Feature A: L-shape
Function: Permanent Habitation
Dimensions: 5.8 by 5.15 m
Condition: Fair
Integrity: Altered
Description: Feature A is the remnant of an enclosure located along the northern edge of a narrow ridge at the northwest end of the site. Many of the wall stones appear to have been removed. The feature consists of an L-shaped wall that is 5.8 m (northwest by southeast) and 5.15 m (northeast by southwest). These walls range in width from 0.51 to 0.62 m and 0.11 to 0.4 m in height. The walls are built of stacked subangular basalt cobbles and small boulders, two to four courses wide and one to three courses high. Several boulders are situated at the northern end of the northwestern wall.

There is a 0.45 m gap in the southern wall which potentially represents a doorway. The interior of the enclosure consists of level soil and scattered surface stones. No cultural remains were observed. Feature A is interpreted as a permanent habitation based on its formal type and size (29.9 sq m). The disturbed condition of the feature makes it difficult to determine the original size and shape of the enclosure; however its area (29.9 sq m) and the presence of the doorway suggests that it functioned as the foundation for a roofed permanent habitation structure.

Feature B: Enclosure
Function: Permanent Habitation
Dimensions: 6.1 by 5.3 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is an oval-shaped enclosure located 4.6 m southeast of Feature A, near the southern edge of the narrow ridge. The feature is constructed on the north side of a low bedrock outcrop, and is 6.1 m long (northwest by southeast) and 5.3 m wide. The south and southwest sides of the structure consist of large to medium sized subangular basalt boulders. The north and eastern sides consist of a stacked wall of cobbles and small boulders that ranges in width from 0.55 to 0.65 m and 0.38 to 0.61 m in height. The interior of the enclosure consists of level soil with no cultural remains present. Feature B is interpreted as a possible permanent habitation based on its formal type, size (32.3 sq m) and association with Feature A.

Feature C: Hearth
Function: Permanent Habitation, Ancillary Feature

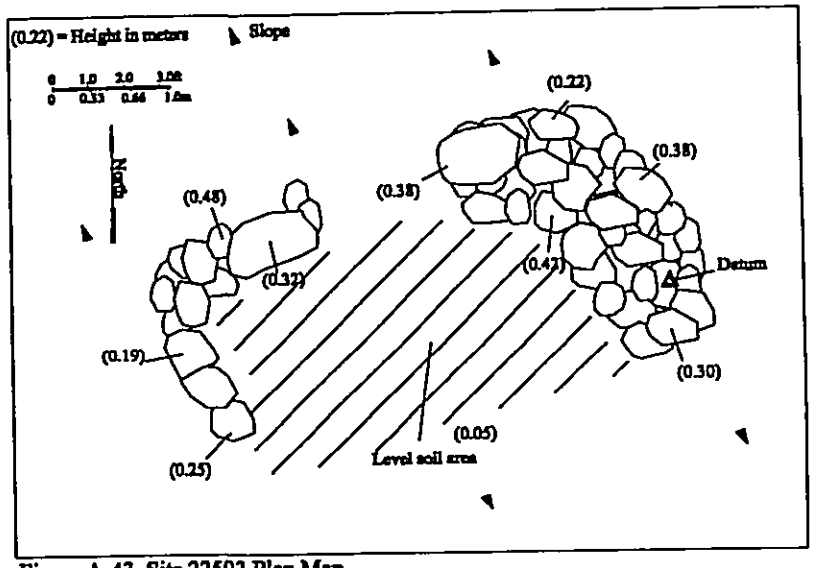


Figure A-43. Site 22593 Plan Map

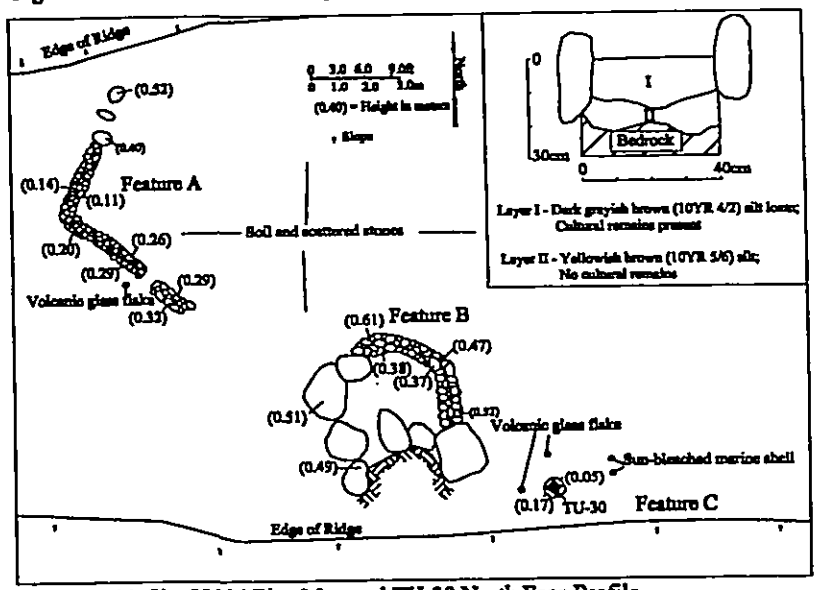


Figure A-44. Site 22594 Plan Map and TU-30 North Face Profile

Dimensions: 0.65 by 0.65 m
Condition: Fair
Integrity: Unaltered
Description: Feature C is a small surface hearth located 2.2 m southeast of Feature B. The hearth is square-shaped and is 0.65 m on each side. It is bordered by subangular basalt slabs set on edge. These slabs range in height from 0.05 to 0.17 m above ground surface. The interior of the hearth is 0.25 m in depth below the top of the slabs and contains a brown soil with several volcanic glass and waterworn basalt pebbles present. Volcanic glass flakes and sun-bleached marine shell were observed on the ground surface to the east and west of the hearth.

A 0.4 by 0.4 m test unit (TU-30) was excavated within the hearth. This excavation revealed two soil deposits over bedrock. Layer I consisted of 0.13 to 0.14 m of a dark grayish brown (10YR 4/2) silt loam (see *Figure A-44*). Cultural remains recovered from Layer I consisted of one unidentified marine shell fragment (0.54 grams), one piece of waterworn coral (53.54 grams) and six volcanic glass flakes (2.85 grams). Layer II was comprised of 0.05 to 0.07 m of yellowish brown (10YR 5/6) silt with no cultural remains present. Feature C is interpreted as an ancillary feature associated with the permanent habitation of Site 22594 based on its formal type and proximity to the other features at the site.

State No.: 22595
Site Type: Walled terrace
Topography: Base of slope
Elevation: 2,270 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 7.52 by 7.48 m
Condition: Fair
Integrity: Unaltered
Description: Site 22595 is a square walled terrace located in a level area at the base of a slope that angles down to the southwest. The structure is 7.52 m long (northeast by southwest) and 7.48 m wide. The northwest and southeast walls of the structure are constructed of stacked subangular basalt cobbles and small boulders that range in width from 1.2 to 1.5 m, and in height from 0.25 to 0.7 m (*Figure A-45*). Portions of these walls are faced. The northeast and southwest walls are generally collapsed, consisting of linear piles of cobbles and boulders that vary in width from 1.2 to 1.8 m, and in height from 0.32 to 0.6 m. There is a 1.3 m wide gap in the southwestern wall that may represent a entrance into the structure.

The interior of the walled terrace is comprised of level soil with scattered surface stones. An oval-shaped depression is located in the northeast portion of the interior, which may represent a hearth. It is 0.9 m long (northwest by southeast), 0.7 m wide, and 0.3 m in depth. Several small waterworn cobbles were noted on the wall at the southwest corner. No other cultural remains were noted. Site 22595 is interpreted a permanent habitation structure based on its formal type, substantial construction (faced walls), and area (56.2 sq m).

State No.: 22596
Site Type: Walled terrace
Topography: Base of slope
Elevation: 2,265 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 9.6 by 8.1 m
Condition: Fair
Integrity: Unaltered
Description: Site 22596 is a walled terrace located at the base of a large swale that angles down to the southwest. The structure is rectangular in shape and is 9.6 m long (northwest by southeast) by 8.1 m wide (*Figure A-46*). The northeast and northwest sides of the structure are comprised of stacked subangular basalt cobbles and small boulders. The walls range in width from 0.9 to 1.18 m and in height from 0.08 to 1.34 m. Portions of the interior sides of these walls are faced. The southeast and southwest sides of the site

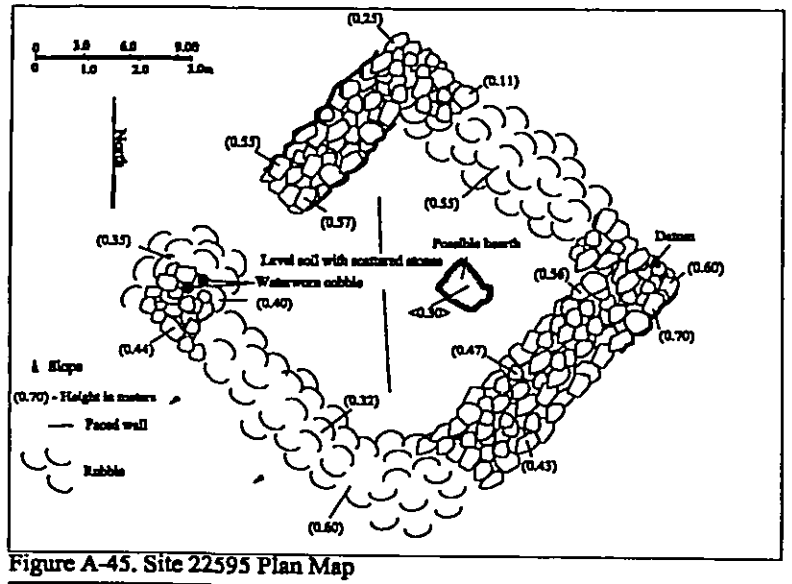


Figure A-45. Site 22595 Plan Map

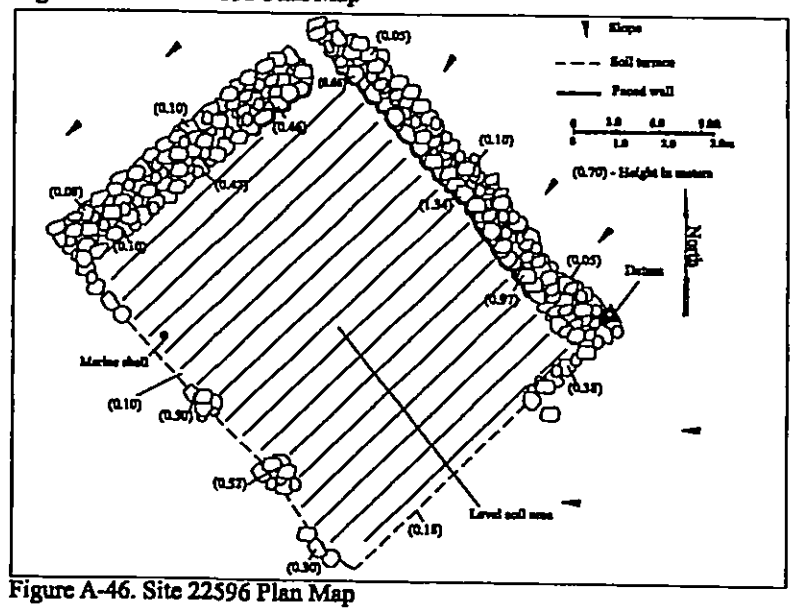


Figure A-46. Site 22596 Plan Map

consist of low soil terraces that vary in height from 0.1 to 0.18 m. The surface of the terrace is comprised of level soil. A fragment of sun-bleached marine shell was noted on the terrace at the southwest corner. Site 22596 is interpreted as a permanent based on its formal type, substantial construction (faced walls) and area (77.7 sq m).

State No.: 22597
Site Type: Enclosure
Topography: Level area
Elevation: 2,235 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 12.3 by 7.15 m
Condition: Fair
Integrity: Unaltered
Description: Site 22596 is an oval-shaped enclosure located in a level area, on the southern side of a dirt road. The enclosure is 12.3 m long (northwest by southeast), and 7.15 m wide, with the walls constructed of stacked and piled subangular basalt cobbles and small boulders (*Figure A-47*). The walls range in width from 0.88 to 1.05 m and in height from 0.15 to 0.85 m. The northern ends of the structure have collapsed outward. The interior of the enclosure is comprised of level soil with scattered stones. Several Christmas Berry trees are growing within and adjacent to the site. A groundstone fragment was noted in the northwestern corner of the interior.

Site 22597 is interpreted as permanent habitation, ancillary based on its formal type and area (87.9 sq m). It is likely that a pole and thatch structure once existed within the enclosure, which functioned to define the boundaries of a yard.

State No.: 22598
Site Type: Complex (2)
Topography: Level ridge top
Elevation: 2,250 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 7.4 by 3.9 m
Condition: Fair
Integrity: Unaltered
Description: Site 22598 is a complex of two features located on the top of a level ridge. The features consist of an enclosure (Feature A) and a U-shaped alignment (Feature B). The features are depicted in *Figure A-48* and are described below.

Feature A: Enclosure
Function: Temporary Habitation
Dimensions: 3.9 by 3.9 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a small, low enclosure located along the eastern side of the site within a depression. The feature is square and is 3.9 m along each side. The walls are three to four courses wide and one to two courses high and are built of subangular basalt cobbles and small boulders. The walls range in width from 0.85 to 1.3 m and in height from 0.04 to 0.11 m above ground surface. The interior of the enclosure is comprised of soil. No cultural remains were noted within the feature though sun-bleached marine shell and a piece of waterworn coral were noted adjacent to the structure to the south.

A 1.0 by 0.5 m test unit (TU-3) was excavated into the center of Feature A. The excavation revealed two soil deposits (Layers I and II; see *Figure A-48*). Layer I consisted of 0.32 to 0.34 m of a brown (10YR 4/3) silt with 20% subangular cobble inclusions. Cultural remains from Layer I consisted of two fragments of cowrie (*Cypraeidae*) shell (1.86 grams), one *kukui* nut shell (1.36 grams), two cow vertebrae (61.12 grams), two volcanic glass flakes (1.11 grams) 5.14 grams of charcoal and nine fragments of green bottle glass

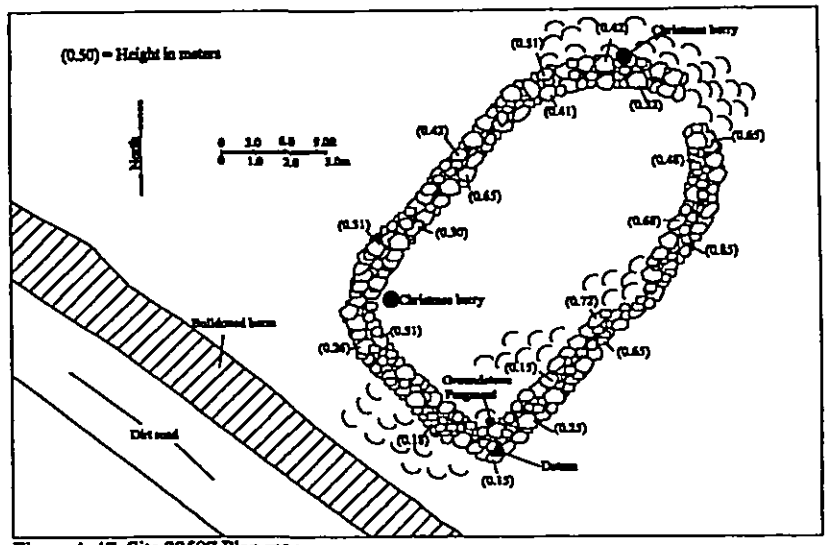


Figure A-47. Site 22597 Plan map

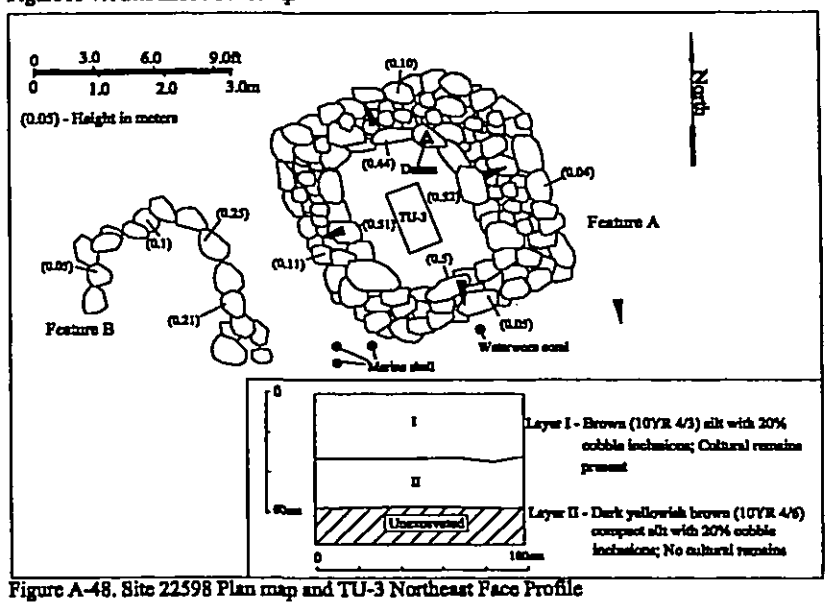


Figure A-48. Site 22598 Plan map and TU-3 Northeast Face Profile

(11.41 grams). Layer II was comprised dark yellowish brown (10YR 4/6) compact silt with 50% cobble inclusions. No cultural remains were recovered from Layer II. The excavation of TU-3 was terminated 0.23 to 0.28 into the Layer II deposit. Feature A is interpreted as a temporary habitation based on its formal type, informal construction and area (7.8 sq m).

Feature B: U-shape
Function: Temporary Habitation
Dimensions: 3.05 by 2.15 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a U-shaped alignment located 1.2 m to the west-southwest of Feature A. The U-shape is open along the south side and is 3.05 m long (north-northwest by south-southeast) and 2.15 m wide. The walls of the feature are defined by one course of small subangular basalt boulders and large cobbles that range in height from 0.05 to 0.25 m above ground surface. The interior consists of level soil with no cultural remains observed. Feature B is also assigned a temporary habitation function based on its formal type, informal construction and area (6.55 sq m).

State No.: 22599
Site Type: Complex (2)
Topography: Level ridge top
Elevation: 2,255 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 12.3 by 10.85 m
Condition: Fair
Integrity: Altered
Description: Site 22599 is a complex of two features located on the top of a level ridge. The features consist of a large enclosure (Feature A) and a surface hearth (Feature B). The features are illustrated in *Figure A-49* and are discussed below.

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 12.3 by 10.85 m
Condition: Fair
Integrity: Altered
Description: Feature B is a large roughly rectangular-shaped enclosure located on top of a level ridge. The enclosure is 12.3 m long (east northeast by west southwest) and 10.85 m wide. Many of the wall stones appear to have been removed. The west wall and portions of the east and south walls are relatively intact ranging in width from 0.82 to 1.09 m and in height from 0.38 to 0.62 m. These walls are constructed of stacked subangular basalt cobbles and small boulders with faced sides. The south, north and southeastern portion of the enclosure consist of one to four courses wide and one to two courses tall of cobbles and boulders, varying in width from 0.55 to 1.65 m and in height from 0.05 to 0.49 m. The interior of the enclosure consists of level soil with scattered stones. No cultural remains were noted. Feature A is interpreted as an ancillary feature associated with the permanent habitation of the site based on its formal type, substantial construction (faced walls) and area (133.5 sq m). The feature probably functioned to define the boundaries of a yard in which a pole and thatch structure once existed.

Feature B: Hearth
Function: Permanent Habitation, Ancillary Feature
Dimensions: 0.54 by 0.5 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a small surface hearth situated within the approximate center of the Feature A enclosure. The hearth is comprised of four large, flat cobbles that have been set in the ground on their sides. The exterior of the hearth is 0.54 m long (north-south) by 0.5 m wide and 0.08 m in height above ground

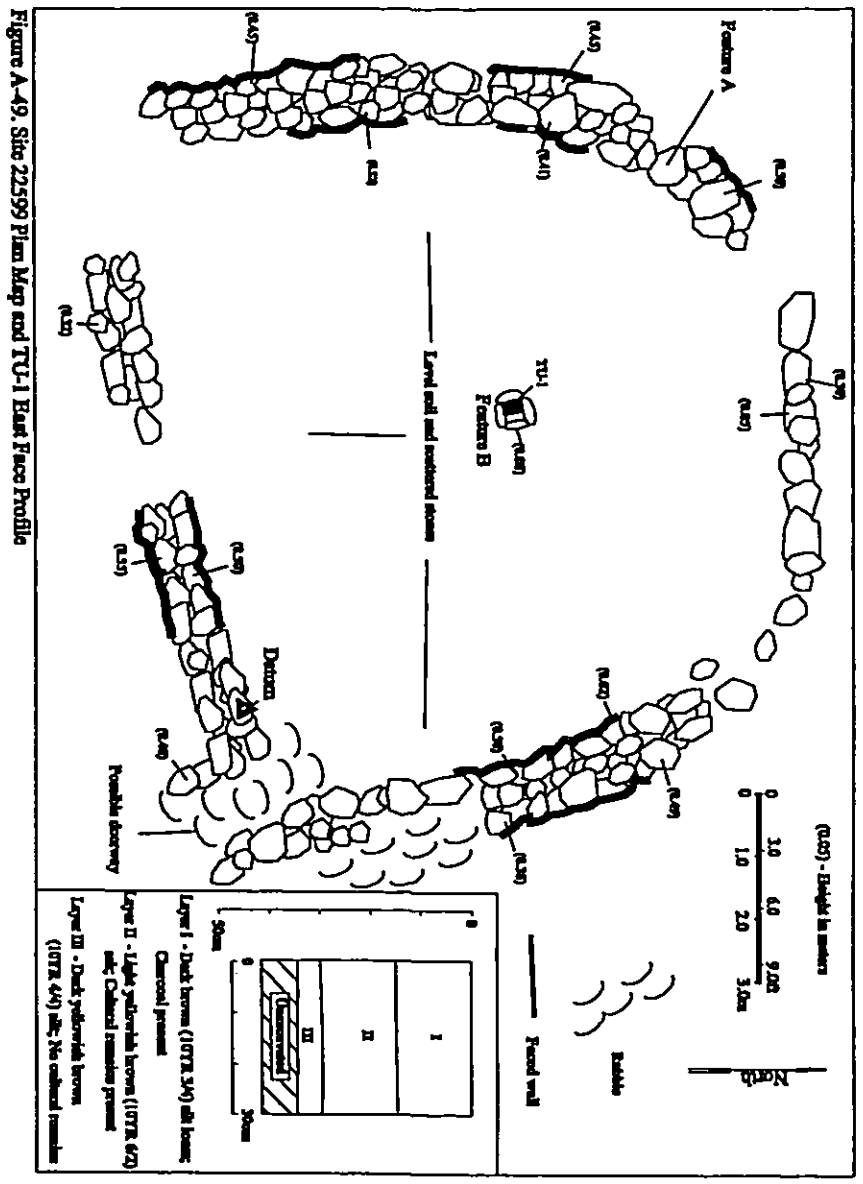


Figure A-49. Site 22599 Plan Map and TU-1 East Face Profile

surface. The interior of the hearth is level with the surrounding ground surface with no cultural remains present.

A 0.3 by 0.15 m test unit (TU-1) was excavated in the western portion of the hearth. This excavation revealed three soil deposits (see *Figure A-49*). Layer I consisted of 0.14 to 0.15 m of a dark brown (10YR 3/4) silt loam from which 0.55 grams of charcoal were recovered. Layer II was comprised of 0.15 to 0.16 m of a light yellowish brown (10YR 6/2) silt. Cultural remains recovered from Layer II consisted of three pieces of bird bone (0.71 grams), eight fish bone fragments (0.7 grams), 28 fragments of partially burned unidentified medium-sized mammal bone (3.31 grams) and 8.40 grams of charcoal. A sample of the charcoal recovered from Layer II was submitted for radiometric age determination, yielding multiple calibrated age ranges at two standard deviation of AD 1530 to 1560, 1630 to 1680, 1740 to 1800 and 1930 to 1950 (Beta No. 161776; Appendix D).

Layer III consisted of a dark yellowish brown (10YR 4/4) silt with no cultural remains present. The excavation was terminated 0.06 m into the Layer III deposit. Feature B is interpreted as an ancillary feature associated with the permanent habitation of Site 22599. The size of the hearth is typical of such features found within residential structures and implies the former presence of a pole and thatch structure centered on the hearth. Interior hearths probably primarily functioned to provide heat and light.

State No.: 22600
Site Type: Complex (2)
Topography: Level ridge top
Elevation: 2,245 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Burial
Overall Dimensions: 28.5 by 10.15 m
Condition: Fair
Integrity: Altered
Description: Site 22600 is a complex of two features located on a level ridge top. The features consist of a burial platform (Feature A) and a walled terrace (Feature B). The features are illustrated in *Figure A-50* and are described below.

Feature A: Platform
Function: Burial
Dimensions: 4.85 by 4.05 m
Condition: Fair
Integrity: Altered
Description: Feature A is a well-built platform located along the southern edge of the ridge crest. The platform is rectangular in shape and is 4.85 m long (north-south) by 4.05 m wide. The base of the feature is bordered by small to medium subangular basalt boulders set on edge that range in height from 0.35 to 0.8 m above the surrounding ground surface. The surface of the platform is domed-shaped and is comprised of soil and stones.

The platform has been disturbed, evidenced by two excavations on the north and south sides. These excavations revealed an interior crypt that is 2.45 m long (north-south) and 1.25 m wide with a domed ceiling that is 0.65 m in height above the interior floor (*Figure A-51*). The corbelled ceiling is supported by linear slabs positioned perpendicular to the long axis of the platform. The floor is comprised of scattered surface stones. No cultural remains were noted inside the crypt.

A 1.0 by 0.5 m test unit (TU-33) was excavated inside the crypt to test for the presence of human remains. This excavation revealed a deposit of dark brown (10YR 3/4) silt loam (see *Figure A-50*). Cultural remains from this deposit consisted of two cowrie (*Cypraeidae*) shells (3.6 grams), two *kukui* nut shells (2.34 grams), and one piece of waterworn coral (1.41 grams), and a small fragment of molded plastic (0.6 grams). Disarticulated adult human remains consisting of two ulnas and several unidentified bone fragments were observed within this deposit at 0.26 m below the interior floor of the crypt. The excavation was terminated upon identification of the disturbed burial.

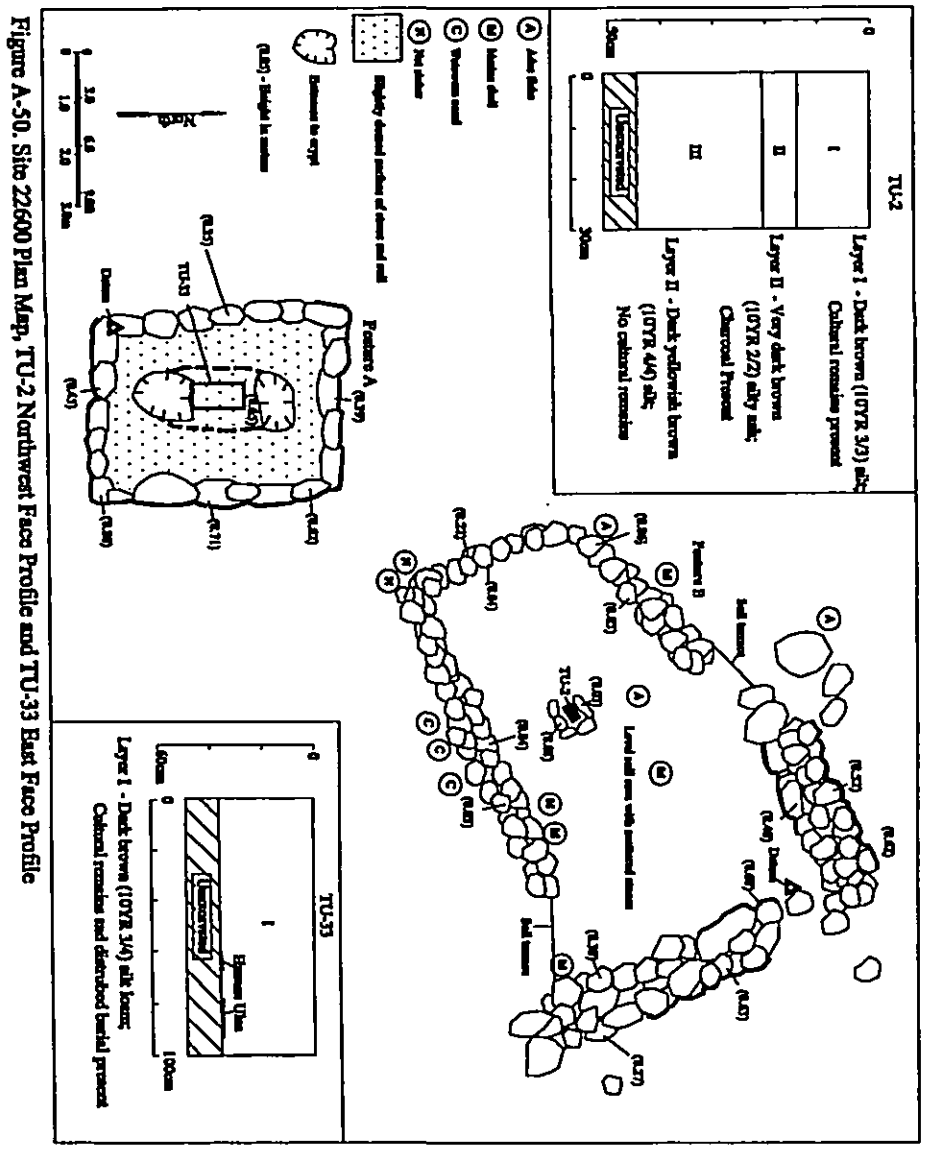


Figure A-51. Site 22600, Feature A Burial Crypt, view to south

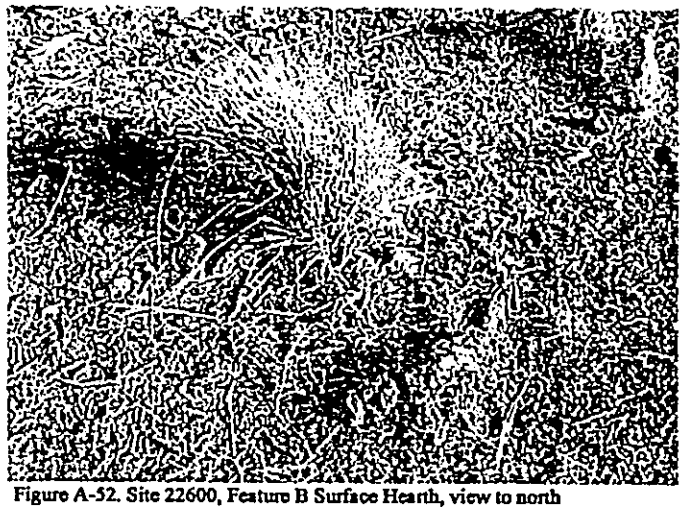


Figure A-52. Site 22600, Feature B Surface Hearth, view to north

Feature A is interpreted a burial platform based on the discovery of the human remains. The excavations at the north and south ends of the structure potentially represent past efforts to remove the remains from the crypt, potentially by looters.

Feature B: Walled Terrace
Function: Permanent Habitation
Dimensions: 9.76 by 7.75 m
Condition: Fair
Integrity: Altered
Description: Feature B is a walled terrace situated 1.95 m northeast of Feature A. The feature is roughly rectangular in shape and is 9.76 m long (northeast by southwest) and 4.15 to 7.75 m wide. Some of the wall stones appear to have been removed from the structure. The walls are constructed of two to four courses wide and one to four courses tall of subangular basalt boulder and cobbles. These walls range in width from 0.55 to 1.35 m and 0.04 to 0.63 m in height above ground surface. The walls along the north and northeast sides of the terrace are faced. The southwestern portion of the structure consists of aligned small boulders. The interior of the feature consists of level soil with scattered stones.

Cultural remains consisting of sun-bleached marine shells, waterworn coral and incised pebbles were noted within or adjacent to the structure. The incised pebbles ranged in length from 5.51 to 6.83 cm, 3.33 to 3.49 cm wide and 2.27 to 3.34 cm in thickness, and evidenced linear grooves across their surfaces (*Figure B-2, Images C* and *D*). These pebbles are potentially net sinkers.

A rectangular surface hearth bordered by small upright slabs and cobbles is located on the surface of the terrace. The hearth is 0.7 m long (northeast by southwest), 0.61 m wide, and 0.06 m in height (*Figure A-52*). A 0.3 by 0.15 m test unit (TU-2) was excavated inside the hearth, revealing three soil deposits (see *Figure A-50*). Layer I consisted of 0.13 to 0.14 m of a dark brown (10YR 3/3) silt. Cultural remains from Layer I consisted of one cowrie (*Cypraeidae*) shell (0.61 grams), one *kukui* nut shell (0.84 grams), and 5.77 grams of charcoal. Layer II was comprised of 0.06 to 0.07 m of a very dark brown (10YR 2/2) silty ash from which 26.62 grams of charcoal were collected. A sample of the charcoal recovered from Layer II was submitted for radiometric age determination, yielding a calibrated age range of AD 1650 to beyond 1960 (Beta No. 161775; Appendix D)

The Layer III deposit was comprised of a dark yellowish brown (10YR 4/4) silt with no cultural remains present. The excavation was terminated 0.23 m into the Layer III deposit.

Feature B is interpreted as a permanent habitation terrace based on its formal type, substantial construction (faced walls, internal hearth) and area (35.1 sq m). The stratified cultural deposits observed within TU-2 indicate that the structure was recurrently utilized.

State No.: 22601
Site Type: Enclosure
Topography: Level ridge top
Elevation: 2,245 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 4.4 by 4.3 m
Condition: Fair
Integrity: Altered
Description: Site 22601 is a roughly square shaped enclosure located on top of a level ridge. The enclosure is 4.4 m long (northeast by southwest) and 4.3 m wide, with no apparent entrance (*Figures A-53* and *54*). Some of the wall stones appear to have been removed from the site. The west wall and portions of the south and north walls are relatively intact consisting of three to four courses of stacked subangular basalt cobbles and small boulders. These walls range in width from 0.7 to 0.9 m and in height from 0.35 to 0.7 m. The interior side of these walls and the exterior of the northern wall are faced.

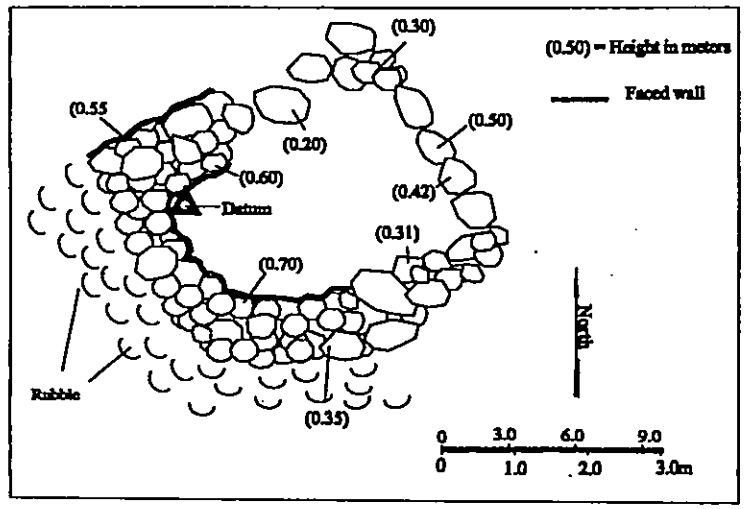


Figure A-53. Site 22601 Plan Map

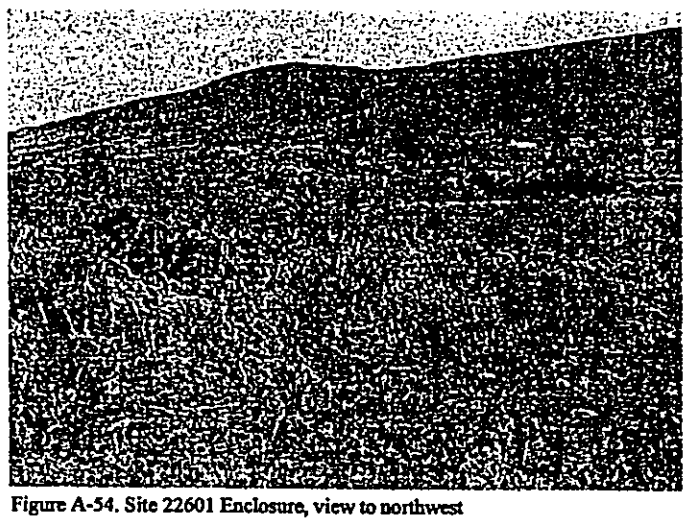


Figure A-54. Site 22601 Enclosure, view to northwest

The remaining walls are comprised of one to three courses wide and one to two courses high of cobbles and boulders. These portions of the structure vary in width from 0.45 to 0.8 m wide and 0.2 to 0.5 m. The interior of the enclosure consists of level soil with no cultural remains noted. Site 22601 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and area (18.9 sq m).

State No.: 22602
Site Type: Cairn
Topography: Side of slope above stream
Elevation: 2,250 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Marker
Overall Dimensions: 1.3 by 1.0 m
Condition: Fair
Integrity: Unaltered
Description: Site 22602 is a stone cairn located on a level bench above Keanuiomano Stream to the south. The cairn is constructed of two to four courses tall of stacked subangular cobbles and small boulders and is 1.3 m long by 1.0 m wide at the base, 0.65 m long by 0.5 m wide at the top and 0.55 m in height. No cultural remains were noted. Site 22602 is interpreted as a marker based on its size and formal type.

State No.: 22603
Site Type: Enclosure
Topography: Level ridge top
Elevation: 2,245 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 11.6 by 10.7 m
Condition: Fair
Integrity: Altered
Description: Site 22603 is a large enclosure located on top of a level ridge. The enclosure is rectangular in shape and is open at the northeastern end. It is 11.6 m long (northeast by southwest) and 10.7 m wide (*Figure A-55*). Many of the wall stones appear to have been removed. The northwest and southwest walls are relatively intact built of stacked and piled subangular basalt cobbles and small boulders. These walls range in width from 0.95 to 1.35 m and in height from 0.1 to 1.2 m. The southeastern wall is comprised one to two courses wide and one course high of small boulders and large cobbles varying in width from 0.27 to 0.9 m wide and 0.24 to 0.5 m in height. The interior of the enclosure consists of level soil with scattered surface stones. A volcanic glass flake was noted inside the enclosure at the southwestern end and two fragments of sun-bleached marine shell were observed at the northeast end. Site 22603 is interpreted as a permanent habitation, ancillary feature, based on its formal type, substantial construction (faced walls) and area (124.1 sq m). The enclosure probably functioned to define the boundaries of a yard in which a pole and thatch structure once existed.

State No.: 22604
Site Type: U-shape
Topography: Level ridge top
Elevation: 2,242feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 7.55 by 4.3 m
Condition: Fair
Integrity: Altered
Description: Site 22604 is U-shaped enclosure located on a level ridge, west of Site 22603. The U-shape is open to the southwest and is 7.55 m long (northeast by southwest) and 4.3 m wide (*Figure A-56*). Some of the wall stones appear to have been removed from the site. The northwestern wall originates against the northeast side of a low bedrock outcrop and extends 7.55 m to the northeast. This wall is one to five courses wide and one to four courses high. It is built of subangular basalt boulders and cobbles. The walls

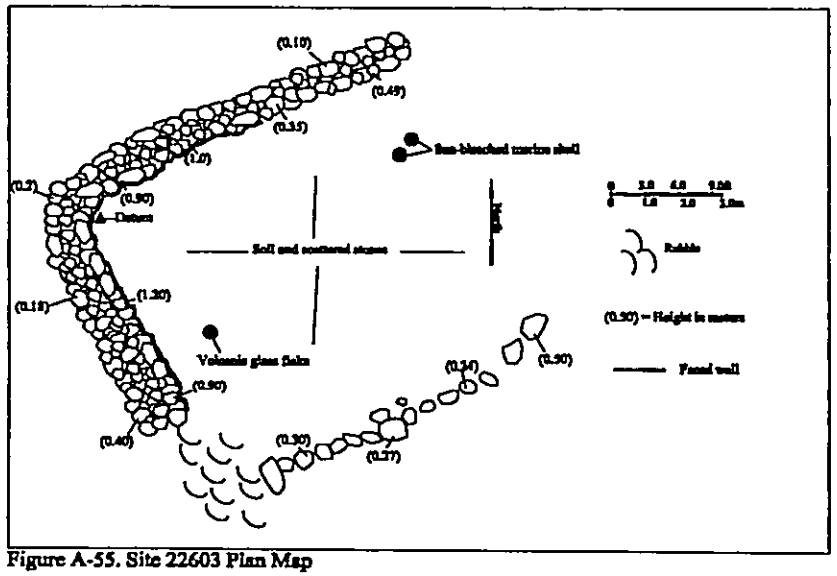


Figure A-55. Site 22603 Plan Map

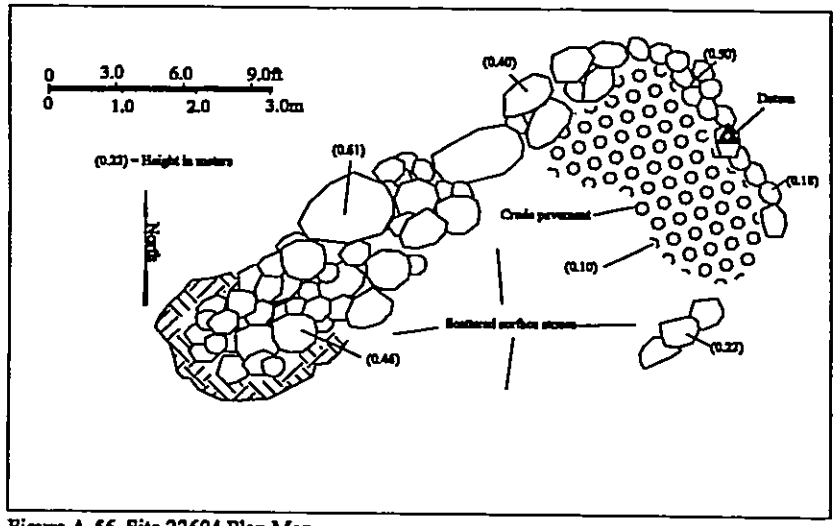


Figure A-56. Site 22604 Plan Map

range in width from 0.67 to 1.8 m and in height from 0.4 to 0.61 m. The northeast and southeast walls are comprised of one to two courses wide and one course tall of large cobbles.

There is a crude pavement of small cobbles located within the enclosure at the northeastern end. This pavement is 3.2 m long (northwest by southeast), 1.55 to 2.15 m wide, and 0.05 m in height above the interior floor of the enclosure. The remaining portion of the interior is comprised of level soil with scattered surface stones. A basalt adze fragment was recovered from the interior surface of the site. It is 8.0 cm long, 5.1 cm wide and 1.71 cm in thickness and is missing the beveled edge (*Figure B-1, Image D*). Site 22604 is interpreted as a permanent habitation based on its formal type, substantial construction (pavement) and size (32.4 sq m).

State No.: 22605
Site Type: C-shape
Topography: Level ridge top
Elevation: 2,247feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.85 by 2.5 m
Condition: Fair
Integrity: Unaltered
Description: Site 22605 is C-shaped enclosure located on a level ridge top 25 m north-northwest of Site 22603. The C-shape is open to the northeast. It is 3.8 m long (northwest by southeast) and 2.5 m wide with the walls comprised of an alignment of small subangular basalt boulders (*Figure A-57*). These boulders range in height from 0.2 to 0.6 m. There is a small pile of one to two courses of cobbles (0.96 by 0.42 m) located on the southwestern side of the enclosure. The interior of the C-shape is comprised of level soil with scattered surface stones. No cultural remains were noted. Site 22605 is interpreted as a temporary habitation based on its formal type, informal construction and area (9.6 sq m).

State No.: 22606
Site Type: Platform
Topography: Level area above stream
Elevation: 2,200 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Burial
Overall Dimensions: 3.6 by 3.5
Condition: Fair
Integrity: Altered
Description: Site 22606 is a small platform located on a level bench north of Waikoloa Stream. The platform is roughly square and is 3.6 m long (north-south) by 3.5 m wide (*Figure A-58*). The sides of the platform are bordered by small subangular basalt boulders. The interior of the platform is roughly paved with tightly packed cobbles. The platform ranges in height from 0.15 to 0.35 m. The west and south sides of the platform have collapsed outward. A large waterworn basalt cobble (0.57 m long by 0.32 m wide by 0.5 m tall) is located on the surface of the platform at the northern end. No cultural remains were noted on or around the structure.

A 1.0 by 1.0 m test unit (TU-4) was excavated into the surface of the platform. The excavation revealed a stone architectural layer (Layer I) over two soil deposits (Layers II and III; see *Figure A-58*). Layer I consisted of 0.15 to 0.19 m of tightly packed subangular basalt cobbles and pebbles with no cultural remains. The base of Layer I intrudes into the Layer II soil. No evidence was found to suggest that the architectural layer had been built during more than a single construction episode.

Layer II consisted of 0.21 to 0.25 m of dark brown (10YR 3/3) silt with 50 % cobble and pebble inclusions. Cultural remains from Layer II consisted of a cowrie (*Cypraeidae*) shell (2.55 grams), 27.32 grams of charcoal and a brass bullet casing (9.6 grams). Layer III was comprised of a brown (10YR 4/3) silt. Two human teeth were encountered within the Layer III deposit at 0.63 m below the surface of the platform, 0.25 m into the Layer III soil. Additional cultural remains present within Layer III consisted 11.43 grams of charcoal.

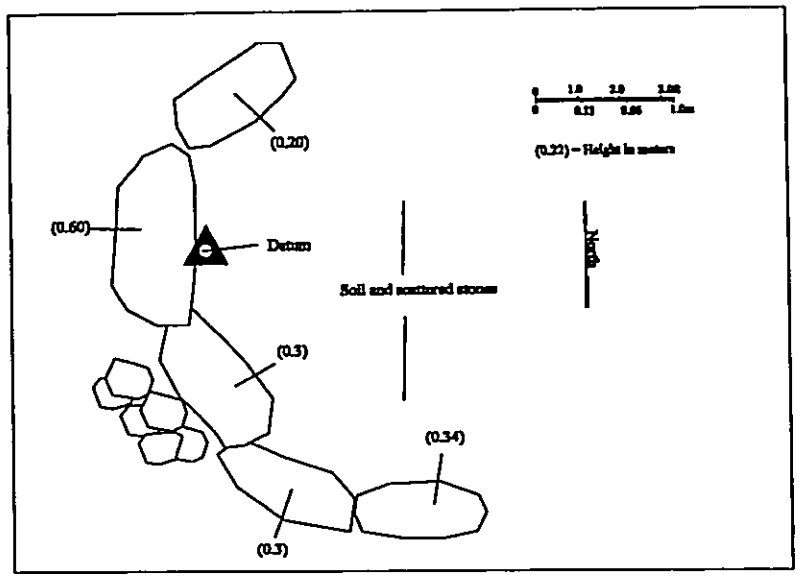


Figure A-57. Site 22605 Plan Map

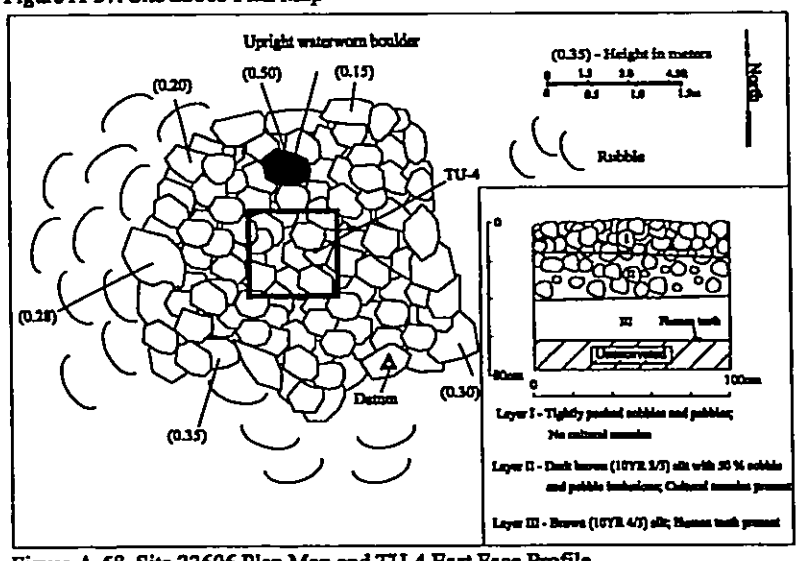


Figure A-58. Site 22606 Plan Map and TU-4 East Face Profile

Site 22606 is interpreted as a burial platform based on the presence of the human remains. The disarticulated remains indicate that the burial has likely been removed.

State No.: 22607
Site Type: Enclosure
Topography: Level ridge top
Elevation: 2,195 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 4.25 by 2.7 m
Condition: Fair
Integrity: Altered
Description: Site 22607 is a small enclosure located on a level, narrow ridge above Keanuiomano Stream to the south. The wall is built on the southwest side of an agricultural wall (Site 22632, Feature GT) that extends along the northern side of the ridge in this area. The structure is roughly triangular in shape and is 4.25 m long (northwest by southeast) and 2.7 m wide (*Figure A-59*). The northeastern side of the enclosure is formed by the agricultural wall with the western and southern wall comprised of stacked and piled subangular basalt cobbles and small boulders. These walls range in width from 0.41 to 0.52 m and in height from 0.27 to 0.51 m. The agricultural wall in this area is built over and around several low bedrock outcrops. The interior of the enclosure is comprised of level soil and a low outcrop with no cultural remains present. Site 22607 is interpreted as a temporary habitation based on its formal type, insubstantial construction, and area (11.4 sq m). The association between this site and the agricultural wall indicate that the use of the enclosure is contemporaneous or post-dates the agricultural activity in the area.

State No.: 22608
Site Type: L-shape
Topography: Level area
Elevation: 2,190 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 4.09 by 2.88 m
Condition: Fair
Integrity: Altered
Description: Site 22608 is an L-shaped enclosure located in an area of agricultural features south of a large agricultural enclosure (Site 22632, Feature FI). The site is comprised of a wall on the east side that is 4.09 m long (north-northwest by south-southeast) with a second wall that extends 2.88 m to the west-southwest from the northern end of the first wall (*Figure A-60*). Many of the wall stones appear to have been removed from the site. The walls are comprised of aligned small subangular basalt boulders with cobbles piled between them. The walls range in width from 0.47 to 0.56 m and in height from 0.19 to 0.55 m. The interior of the L-shape is comprised of level soil with scattered surface stones. No cultural remains were present. Site 22608 is interpreted as a temporary habitation based on its formal type, insubstantial construction, and area (11.7 sq m).

State No.: 22609
Site Type: L-shape
Topography: Side of knoll
Elevation: 2,175 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.65 by 2.72 m
Condition: Fair
Integrity: Altered
Description: Site 22609 is an L-shaped enclosure located on the northern side of a low knoll in an area of agricultural features. The site is comprised of a wall on the east side that is 3.65 m long (north-south) with a second wall that extends 2.72 m to the west from the southern end of the first wall (*Figure A-61*). Many of the wall stones appear to have been removed from the site. The walls are comprised of stacked and piled

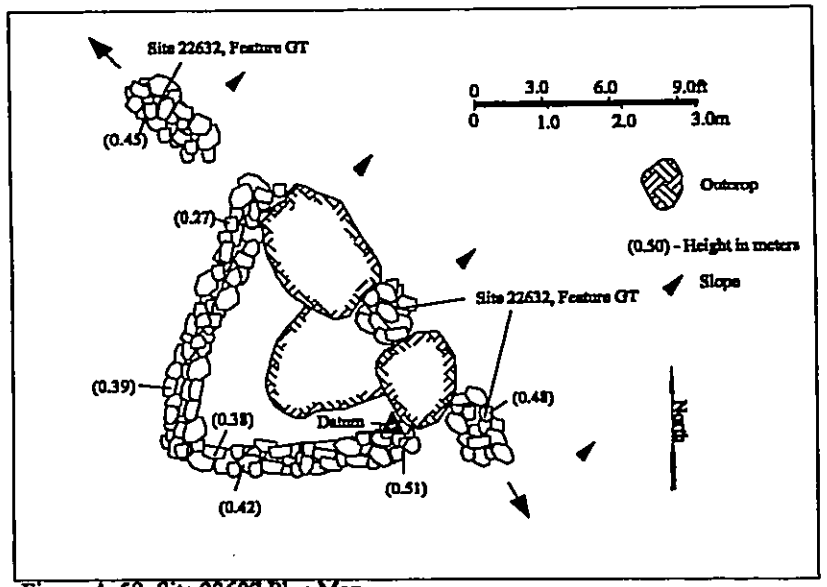


Figure A-59. Site 22607 Plan Map

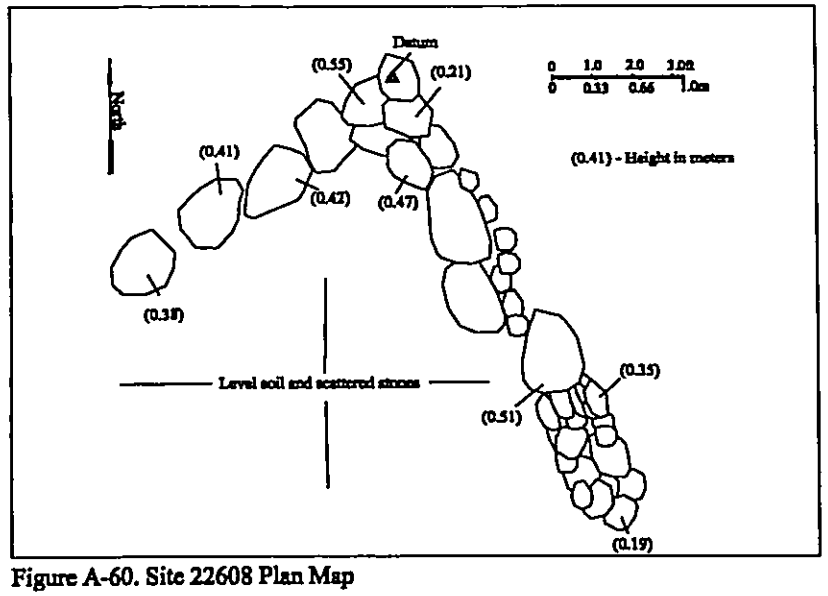


Figure A-60. Site 22608 Plan Map

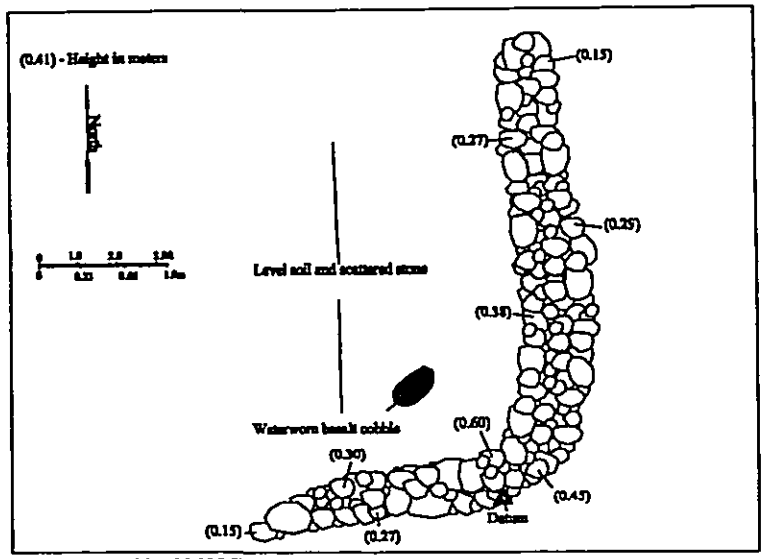


Figure A-61. Site 22609 Plan Map

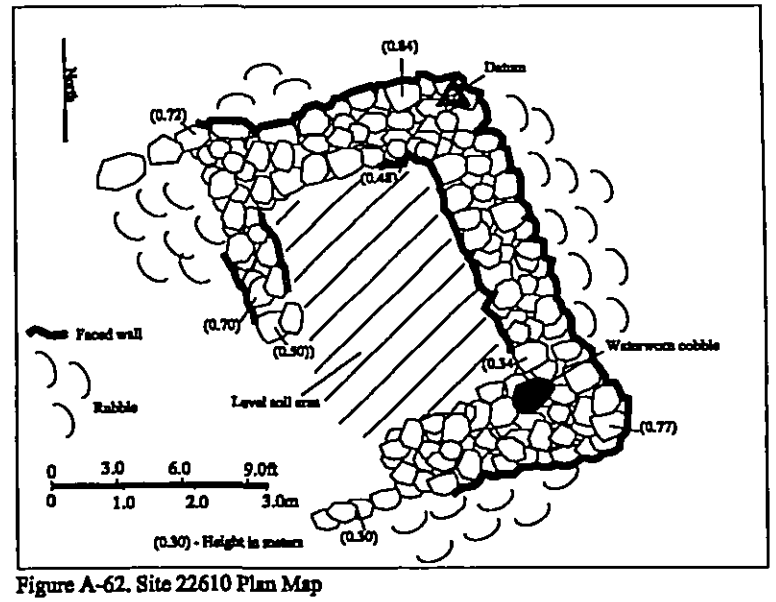


Figure A-62. Site 22610 Plan Map

subangular basalt cobbles and small boulders ranging in width from 0.32 to 0.6 m and in height from 0.15 to 0.6 m. These walls are one to four courses wide and one to two courses tall. The interior of the enclosure is comprised of level soil with scattered surface stones. A large waterworn cobble (0.44 m long by 0.25 m wide and 0.18 m in thickness) is located at the southern end of the structure. No other cultural remains were observed. Site 22609 is interpreted as a temporary habitation based on its formal type, informal construction and area (9.85 sq m).

State No.: 22610
Site Type: Enclosure
Topography: Side of ridge
Elevation: 2,162 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 5.8 by 4.06 m
Condition: Fair
Integrity: Unaltered
Description: Site 22610 is an enclosure located just below the top of a narrow ridge on the southern side. The structure is rectangular and is 5.8 m long (north-northwest by south-southeast) and 4.06 m wide (*Figure A-62*). The walls are constructed of stacked subangular basalt cobbles and small boulders with a slightly core-filled interior. The walls range in width from 0.71 to 1.06 m and in height from 0.3 to 0.84 m on the exterior and 0.34 to 0.5 m on the interior. Portions of the interior and exterior sides of the structure are faced. The interior of the enclosure is comprised of level soil. A large waterworn basalt cobble (0.64 m long, 0.46 m wide and 0.32 m thick) is located on top of the wall at the southeast corner. No other cultural remains were present. Site 22610 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and area (23.5 sq m).

State No.: 22611
Site Type: Terrace
Topography: Side of ridge
Elevation: 2,162 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 5.1 by 3.75 m
Condition: Fair
Integrity: Altered
Description: Site 22611 is a terrace located just below the top of a ridge on the northern side. The structure is rectangular and is 5.1 m long (east-west) by 3.75 m (*Figure A-63*). Low retaining walls are present on the north, east and west sides built of stacked and piled subangular basalt cobbles and small boulders. Many of the wall stones appear to have been removed from the site. These walls range in width from 0.35 to 0.95 m and in height from 0.2 to 0.4 m. The southern side of the terrace abuts the side of the slope. The interior is comprised of level soil with no cultural remains present. Site 22611 is interpreted as a permanent habitation based on its formal type and area (19.2 sq m). No substantial construction was observed at the site but this may be attributed to cattle grazing in the area and/or the removal of stones from the site. A permanent habitation interpretation is supported by its association with permanent habitation sites 22610 and 22613 and associated agricultural features in the area.

State No.: 22612
Site Type: C-shape
Topography: Top of ridge
Elevation: 2,145 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 4.35 by 1.7 m
Condition: Fair
Integrity: Altered
Description: Site 22612 is a C-shaped enclosure located on top of a level ridge. The C-shape is open to the northwest and is 4.35 m long (northeast by southwest) by 1.7 m wide (*Figure A-64*). The walls are built of

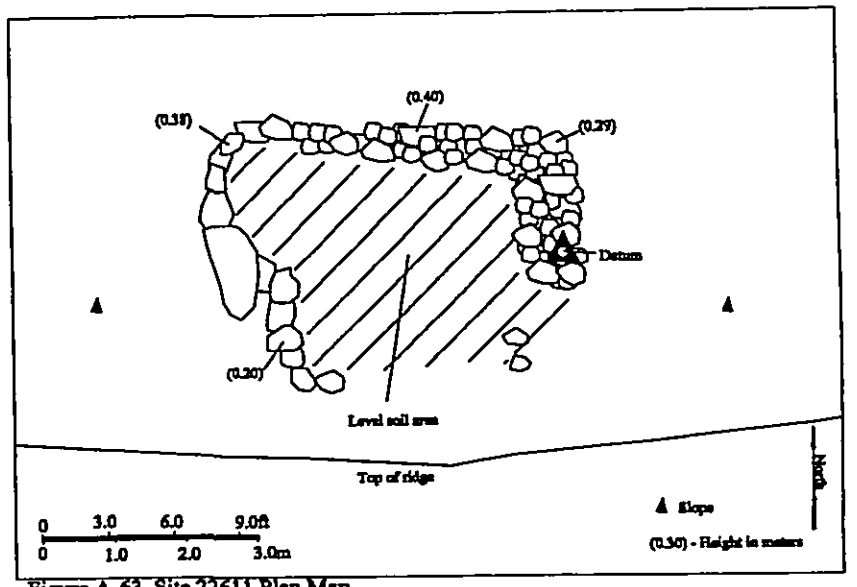


Figure A-63. Site 22611 Plan Map

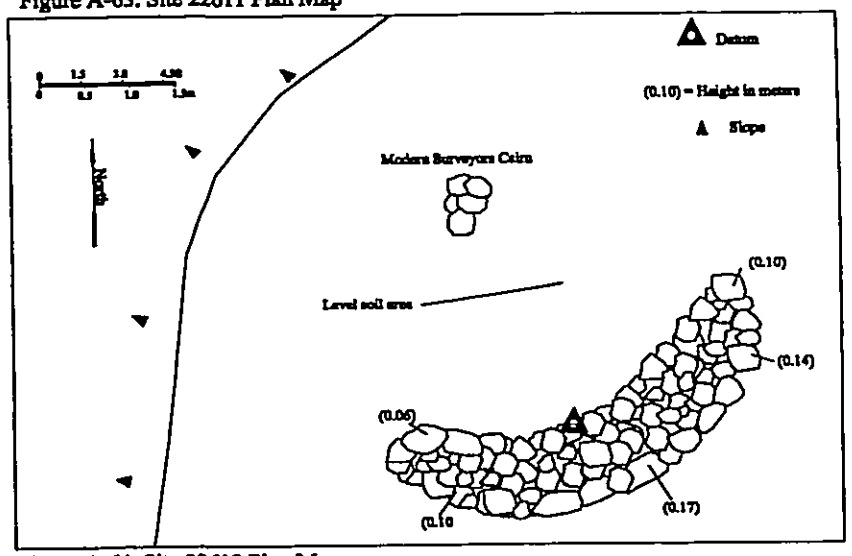


Figure A-64. Site 22612 Plan Map

one to four courses wide and one to two courses high of subangular basalt cobbles and small boulders. The walls range in width from 0.89 to 1.05 m and in height from 0.06 to 0.17 m. Many of the stones appear to have been removed from the site. The interior of the C-shape is comprised of level soil with no cultural remains present. A modern surveyor's cairn built of stacked cobbles that have been mortared together is located to the northwest of the site. Site 22612 is interpreted as a temporary habitation based on its formal type, informal construction, and area (7.4 sq m).

State No.: 22613
Site Type: Complex (6)
Topography: Side of slight slope
Elevation: 2,170 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Agriculture
Overall Dimensions: 33.5 by 28.0 m
Condition: Fair
Integrity: Altered
Description: Site 22613 is a complex of six features located on the side of a low knoll north of Waikoloa Stream and south of a small seasonal drainage. The features consist of a U-shaped enclosure (Feature A), four terraces (Features B-E) and a large enclosure (Feature F). The features are illustrated in *Figure A-65* and are described below.

Feature A: U-shape
Function: Permanent Habitation
Dimensions: 6.84 by 6.15 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is a U-shaped enclosure located at the southeastern end of the Feature F enclosure (discussed below). The U-shape is open to the west-northwest, opening into the interior of Feature F. The structure is 6.84 m long (west-northwest by east-southeast) and 6.1 m wide. The walls are built of stacked subangular basalt cobbles and small boulders and range in width from 1.1 to 1.5 m and in height from 0.54 to 0.72 m. The walls of the structure are faced except along a collapsed area at the eastern end. There is 1.05 m wide faced opening into the structure in the center of the southern wall. The interior floor is comprised of level soil with scattered stones with no cultural remains noted.

A 0.5 by 0.5 m test unit (TU-12) was excavated within the enclosure, revealing two soil deposits over bedrock (*Figure A-66*). Layer I consisted of 0.28 to 0.29 m of a very dark grayish brown (10YR 3/2) silt. Cultural remains from this deposit consisted of four fragments of unidentified marine shell (0.17 grams). Layer II was comprised of 0.09 to 0.11 m of a dark yellowish brown (10YR 4/4) silt with no cultural remains present. Feature A is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and area (42.0 sq m).

Feature B: Terrace
Function: Permanent Habitation
Dimensions: 6.49 by 4.27 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a rectangular terrace located within the Feature F enclosure, 2.9 m northwest of Feature A. The terrace is 6.49 m long (northeast by southwest) and 4.27 m wide. Low stone retaining walls are present along the northwest and southwest sides of the feature. These walls are made from one to three courses wide and one to two courses high of subangular basalt cobbles and small boulders. The walls vary in width from 0.35 to 0.8 m and in height from 0.21 to 0.38 m. The northeastern side of the terrace abuts the eastern wall of Feature F and the southeastern abuts the base of a slight slope. The surface of the terrace is comprised of level soil with scattered surface stones. No cultural remains were noted.

A 0.5 by 0.5 m test unit (TU-14) was excavated into the surface of the terrace revealing two soil deposits overlying bedrock (*Figure A-67*). Layer I consisted of 0.07 to 0.08 m of a dark brown (10YR 3/3) loose silt.

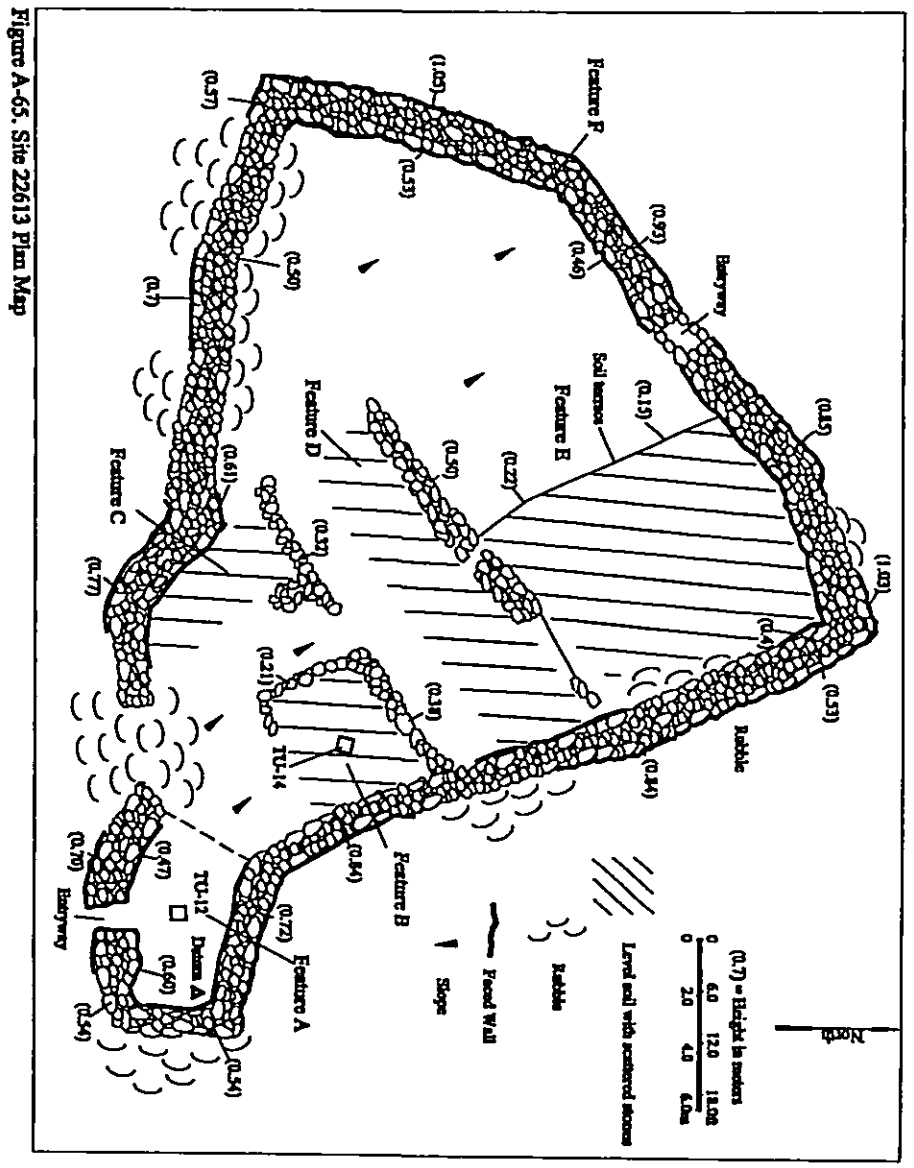


Figure A-65. Site 22613 Plan Map

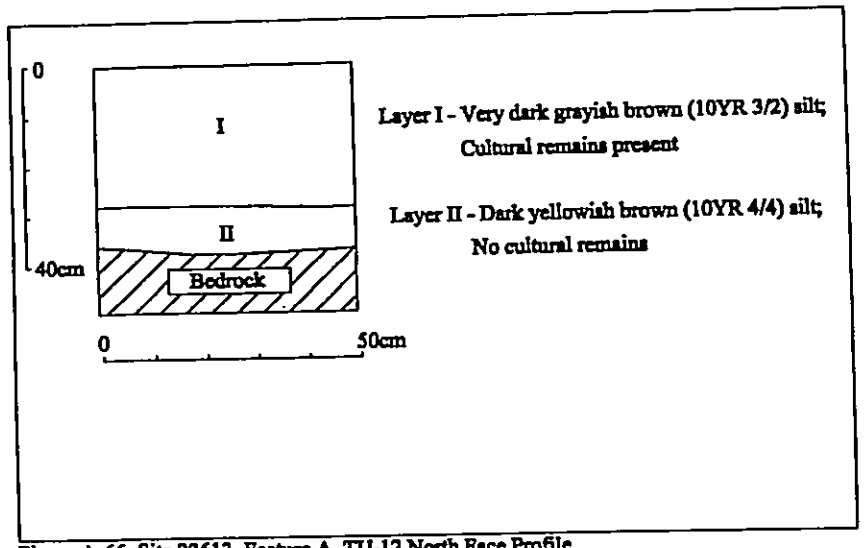


Figure A-66. Site 22613, Feature A, TU-12 North Face Profile

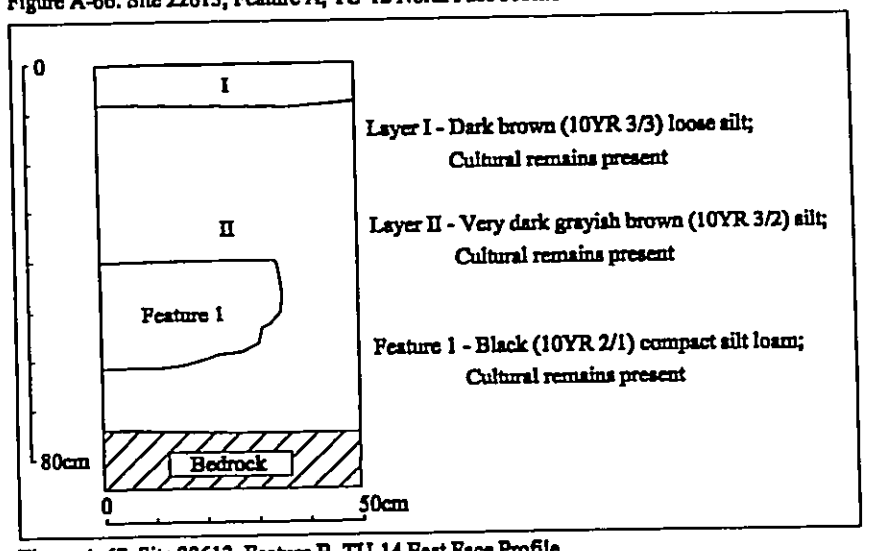


Figure A-67. Site 22613, Feature B, TU-14 East Face Profile

Cultural remains from this deposit consisted of one *opihi* (*Patellidae*) shell (0.44 grams), four *cowrie* (*Cyproeidae*) shells (3.05 grams), five *kukui* nut shells (1.86 grams), five fragments of an unidentified medium sized mammal (4.11 grams), 14 pieces of burned coral (51.37 grams), 12.61 grams of charcoal and 4.10 grams of an unidentified carbonized plant material. Layer II was comprised of 0.66 to 0.69 m of a very dark grayish brown (10YR 3/2) silt. Cultural remains recovered from Layer II consisted of one fragment of burned coral (0.18 grams), 1.13 grams of charcoal and 15.14 grams of an unidentified carbonized plant material.

A basin-shaped pit was observed within this deposit at depths ranging from 0.41 to 0.63 m below surface (Feature 1). The pit is 0.36 m long (north-south), 0.3 m wide and 0.22 m in thickness, extending out of the unit to the north. The pit contained a black (10YR 2/1) compact silt loam soil with one unidentified marine shell fragment (1.3 grams), 4.06 grams of charcoal, and 31.59 grams of carbonized plant material. The nature of the Feature 1 pit suggests it functioned as a hearth or earth oven.

Feature B is interpreted as a permanent habitation based on formal type, area (27.7 sq m), and association with the Feature A permanent habitation structure.

Feature C: Terrace
Function: Permanent Habitation, Ancillary Feature
Dimensions: 6.8 by 5.9 m
Condition: Fair
Integrity: Unaltered
Description: Feature C is a roughly rectangular-shaped terrace located within the Feature F enclosure, 2.2 m southwest of Feature B. The terrace is 6.8 m long (north-northwest by south-southeast) and 2.22 to 5.9 m wide. There are low stone retaining walls located along the northwest and portions of the northeast sides of the structure. These walls consist of two to four courses wide by one to two courses high of cobbles and small boulders. The walls range in height from 0.11 to 0.32 m. The southwestern and south sides of the terrace abut the southwest wall of Feature F and the eastern side abuts a slight slope that angles to the northwest. The interior of the terrace is comprised of level soil with no cultural remains noted. Feature C is interpreted as an ancillary feature associated with the permanent habitation of the site based on its location within the Feature F enclosure. The informal construction of the retaining walls and the level surface suggest that this feature functioned as an activity area.

Feature D: Terrace
Function: Agriculture
Dimensions: 12.8 by 3.07 m
Condition: Fair
Integrity: Unaltered
Description: Feature D is a long, rectangular terrace located within the Feature F enclosure, 2.05 m to the north-northwest of Features B and C. The terrace is 12.8 m long (northeast by southwest) and 3.07 m wide. There is a stone retaining wall along the northwestern side of the structure that ranges in width from 0.68 to 1.1 m in height on the downslope side from 0.42 to 0.5 m. The northeast end of the terrace abuts the northeast wall of Feature F and the south and southwest sides abut a slight slope that angle to the northwest, The surface of the terrace is comprised of level soil with scattered stones. No cultural remains were noted. The informal construction of the retaining wall and the level surface suggest that this feature may have functioned as a garden area.

Feature E: Terrace
Function: Agriculture
Dimensions: 9.06 by 7.95 m
Condition: Fair
Integrity: Unaltered
Description: Feature E is a rectangular terrace located within the Feature F enclosure, in the northern corner. The feature is 8.7 to 9.06 m long (northwest by southeast) and 7.95 m wide. The northwest and northeast sides of the terrace abut the interior walls of Feature F. The southeastern wall is bordered by Feature D's retaining wall and the southwestern side is formed by a low soil retaining wall. This wall is 0.15 to 0.22

m in height. The surface of the terrace is comprised of level soil with scattered stones. No cultural remains were noted. The informal construction of the retaining wall and the level soil covered surface suggest that this feature may have functioned as a garden.

Feature F: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 28.2 by 24.5 m
Condition: Fair
Integrity: Unaltered
Description: Feature F is a large roughly triangular-shaped enclosure that abuts the Feature A U-shape to the northwest. The structure is 28.2 m long (northeast by southwest) along the northwest side, 23.0 to 24.5 m long along the northeast and southwest sides and 5.6 m long where it abuts Feature A. Features B-E are situated within Feature F. The walls are constructed of stacked subangular basalt cobbles and small boulders and range in width from 1.1 to 1.5 m and 0.5 to 1.03 m in height. Interior and exterior portions of the walls are faced. There is a 1.25 m wide opening into the enclosure at the northern end which appears to have served as a entryway. Alignments of cobbles extend across the opening on the interior and exterior sides. Feature F is interpreted is interpreted as a permanent habitation, ancillary feature which functioned to define the boundaries of a yard based on its formal type, area (424.4 sq m) and on the presence of associated permanent habitation features within and adjacent to the enclosure.

State No.: 22614
Site Type: Walled Terrace
Topography: Side of slope
Elevation: 2,162 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation/Burial
Overall Dimensions: 10.0 by 7.92 m
Condition: Fair
Integrity: Unaltered
Description: Site 22614 is a large walled terrace located on the side of gentle slope that angles to the west. The terrace is rectangular in shape and is 10.0 m long (north-northwest by south-southeast) and 7.92 m wide (*Figure A-68*). The walls are built of stacked subangular basalt cobbles and small boulders. These walls range in width from 0.92 to 1.3 m. The height of the walls range from 0.43 to 0.92 m on the interior and 0.48 to 1.02 m on the exterior. The majority of the walls are faced although collapsed sections are present. There is a 1.15 m wide gap in the wall at the northwestern corner which may represent an entryway.

The interior surface of the terrace is level soil with scattered surface stones. Two volcanic glass flakes were observed on the ground surface outside the structure to the southwest. A raised rectangular platform is situated on the surface of the terrace along the northeastern wall. The platform is 3.61 m long (northeast by southwest) and 2.53 m wide. The sides of the platform consist of small subangular boulders stacked two to three courses tall, ranging in height from 0.28 to 0.6 m above the surface of the terrace. The northwestern side of the platform is faced. The surface of the platform is level and consists of tightly packed cobbles.

A 1.0 by 1.0 m test unit (TU-6) was excavated into the center of the platform. This excavation revealed an architectural layer (Layer I) over a soil deposit (Layer II; see *Figure A-68*). Layer I consisted of 0.28 to 0.3 m of tightly packed cobbles and small boulders with 18.44 grams of charcoal recovered. The base of Layer I intrudes into the Layer II soil, and no evidence was found to suggest that the structure had been built during more than a single construction episode.

Layer II consisted of a dark grayish brown (10YR 4/2) silt with 70% cobble inclusions. Cultural remains from this deposit consisted of one unidentified marine shell fragment (0.46 grams), seven pieces of burned coral (1.34 grams), 6.84 grams of charcoal and a fragment of basalt groundstone (0.28 grams). An adult human burial was encountered within Layer II at 0.57 m below the surface of the platform, or 0.29 m into the deposit. The excavation of TU-6 was terminated on identification of the undisturbed burial.

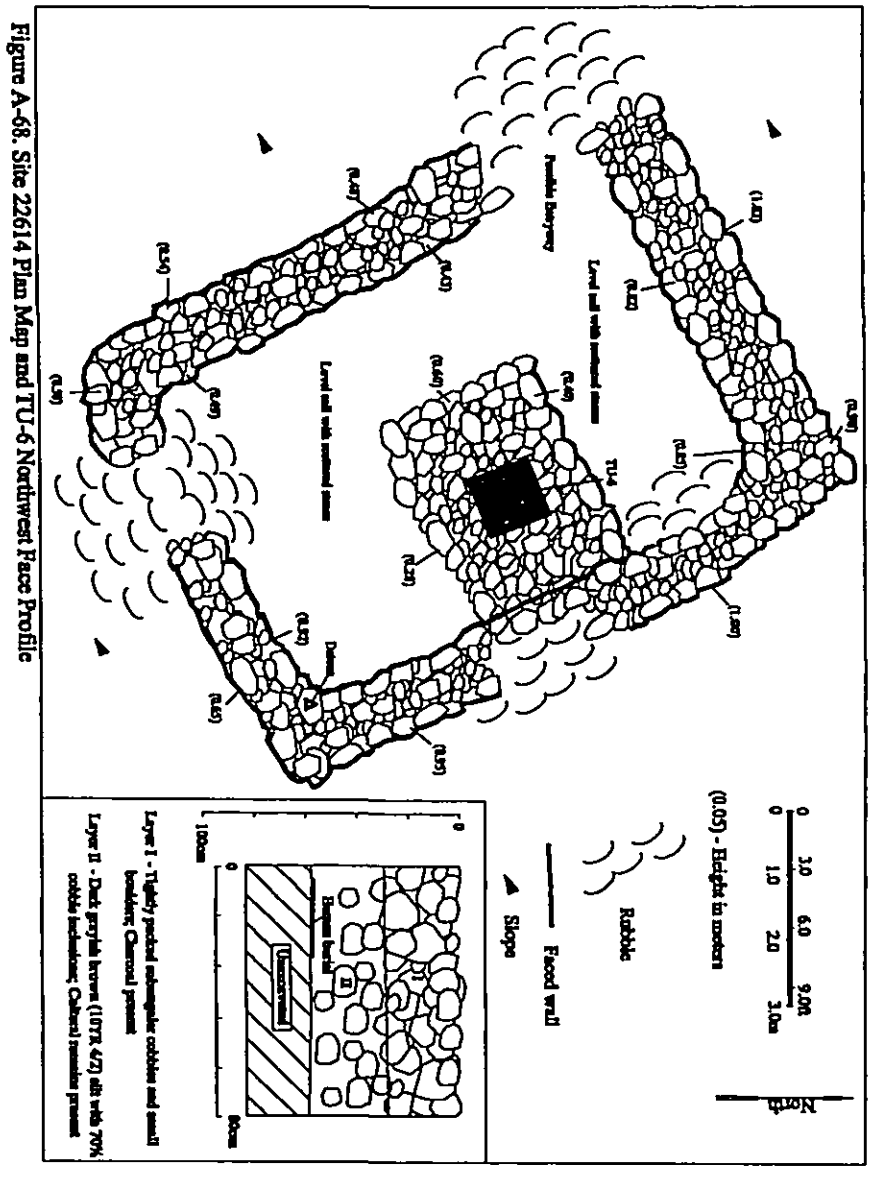


Figure A-68. Site 22614 Plan Map and TU-6 Northwest Face Profile

A sample of the charcoal recovered from Layer II was submitted for radiometric age determination, yielding multiple calibrated age ranges at two standard deviation of AD 1680 to 1730, 1810 to 1930 and 1950 to beyond 1960 (Beta No. 161774; Appendix D).

Site 22614 is interpreted a permanent habitation structure with a probable post-occupation burial. This is based on its formal type, substantial construction (faced walls, internal platform) and area (79.2 sq m).

State No.: 22615
Site Type: Complex (2)
Topography: Level Area
Elevation: 2,140 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 16.8 by 7.15 m
Condition: Fair
Integrity: Altered
Description: Site 22615 is a complex of two walled terraces (Features A and B) located in a level rocky area near the western project area boundary. The features are illustrated in *Figure A-69* and are discussed below.

Feature A: Walled terrace
Function: Permanent Habitation
Dimensions: 8.37 by 4.05 m
Condition: Fair
Integrity: Altered
Description: Feature A is a rectangular walled terrace located west of a dirt road. The feature is 8.37 m long (northwest by southeast) and 4.05 m wide. Many of the wall stones appear to have been removed from the feature. The north and south ends of the structure consist of alignments of small subangular basalt boulders and large cobbles that vary in height from 0.03 to 0.2 m. The central portion of the eastern wall is relatively intact consisting of stacked cobbles and small boulders. This wall varies in width from 0.98 to 1.1 m. The exterior of the wall has collapsed outward averaging 0.4 m in height. The interior of the wall is faced and is 0.9 m in height above the surface of the terrace. The western side of the structure consists of a low soil terrace that varies in height from 0.05 to 0.08 m above the surrounding ground surface.

The interior surface of the feature is comprised of level soil with scattered stones. No cultural remains were present. There is a crude pavement of cobbles located along the western side of the feature. This pavement is 1.7 m long (northeast by southwest), 0.88 m wide, and 0.1 m in height above the surface of the terrace. A 1.0 by 0.5 m test unit (TU-9) was excavated into the surface of the terrace at the northern end. This excavation revealed two soil deposits over bedrock (see *Figure A-69*). Layer I consisted of 0.05 to 0.06 m of a brown (10YR 4/3) silt with 20% small cobble inclusions. No cultural remains were present. Layer II was comprised of 0.23 to 0.25 m of a dark yellowish brown (10YR 4/6) compact silt with 70% cobble inclusions. No cultural remains were recovered from Layer II though a portion of a basin-shaped pit was observed in the northern sidewall of the unit (Feature 1). The portion of the pit within TU-9 was 0.25 m long and 0.13 m in depth and extended out of the unit to the west. The soil matrix within this feature was comprised of a very dark grayish brown (10YR 3/2) silt with no cultural remains. The shape and size of the pit feature suggests it likely functioned as a hearth.

Feature A is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls, pavement), and area (33.8 sq m).

Feature B: Walled Terrace
Function: Permanent Habitation
Dimensions: 7.56 by 2.8 m
Condition: Fair
Integrity: Altered

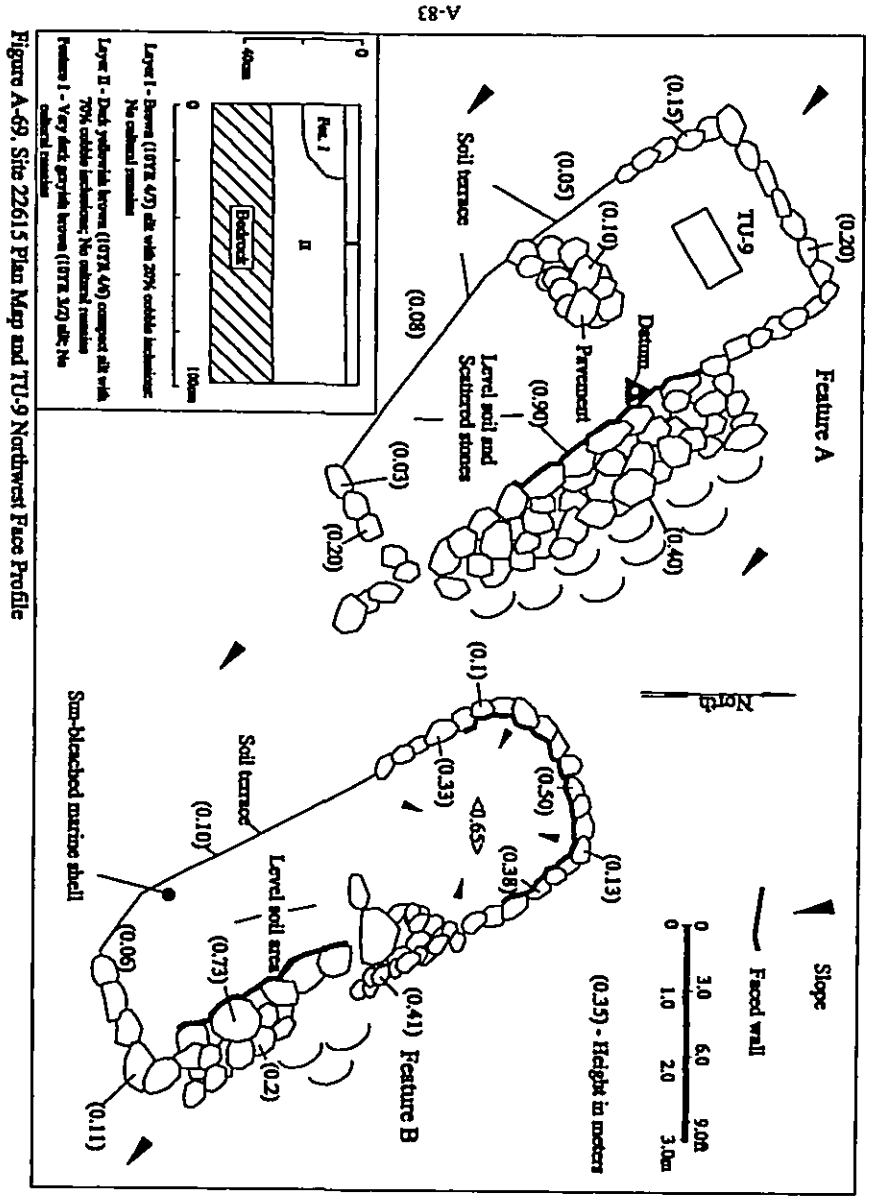


Figure A-69. Site 22615 Plan Map and TU-9 Northwest Face Profile

Description: Feature B is a roughly rectangular-shaped walled terrace located adjacent to Feature A 1.6 m to the southeast. The feature is 7.56 m long (northwest by southeast) and 2.8 m wide. Many of the wall stones appear to have been removed. The north and south ends of the structure consist of alignments of small subangular basalt boulders and large cobbles that range in height from 0.06 to 0.13 m above ground surface. The eastern wall is more intact consisting of two to four courses wide and tall of small boulders and cobbles. The walls range in width from 0.8 to 1.05 m and in height from 0.2 to 0.73 m. The interior side is faced with the exterior side collapsed outward. The western side of the feature consists of a low soil terrace that averages 0.1 m in height. The southern portion of the terrace is comprised of level soil. A sun-bleached marine shell fragment was noted in the southwestern corner. The northern end of the feature consists of a depression that is 2.3 m long (northeast by southwest), 2.1 m wide, and 0.65 m deep below the surface of the terrace. No cultural remains were found in this portion of the feature. The interior of the depression consists of stacked and faced cobbles and small boulders that range in height from 0.33 to 0.5 m above the base of the depression. Feature B is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and area (21.2 sq m).

State No.: 22616
Site Type: L-shape
Topography: Top of low knoll
Elevation: 2,170 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 2.75 by 2.13 m
Condition: Fair
Integrity: Unaltered
Description: Site 22616 is a small L-shaped enclosure located on a low knoll in an area of agricultural feature near the western project area boundary. The site is comprised of a wall on the northeast side that is 2.75 m long (northwest by southeast) with a second wall that extends 2.13 m to the southwest from the northern end of the first wall (*Figure A-70*). The walls are three to four courses wide and one to three courses high stacked and piled subangular basalt cobbles and small boulders. The walls vary in width from 0.6 to 0.66 m and in height from 0.15 to 0.47 m. The interior of the L-shape is comprised of level soil with no cultural remains present. Site 22616 is interpreted as a temporary habitation based on its formal type, informal construction and area (5.85 sq m).

State No.: 22617
Site Type: Enclosure
Topography: Side of slope
Elevation: 2,160 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 47.4 by 24.3 m
Condition: Fair
Integrity: Altered
Description: Site 22617 is a large enclosure situated on the side of a gentle slope that angles to the south in the southwest corner of the project area. The enclosure is rectangular in shape and is 47.4 m long (north-northwest by south-southeast) and 21.75 to 24.3 m wide. The extent of the enclosure is depicted in *Figure 11*. Many of the wall stones appear to have been removed. The remnants of the enclosure walls are constructed of stacked subangular cobbles and small boulders ranging in width from 0.72 to 1.1 m and in height from 0.20 to 0.78 m. The northern half of the interior is relatively level and consists of soil with scattered stones. Several waterworn basalt cobbles and pieces of coral were observed in this portion of the enclosure. The southern half of the interior slopes to the south with no cultural remains noted. No internal features were present. Site 22617 is interpreted as a permanent habitation, ancillary feature based on its formal type and size (1,091.3 sq m). This enclosure appears to have functioned to delineate the boundaries of a yard which would probably have contained a pole and thatched structure.

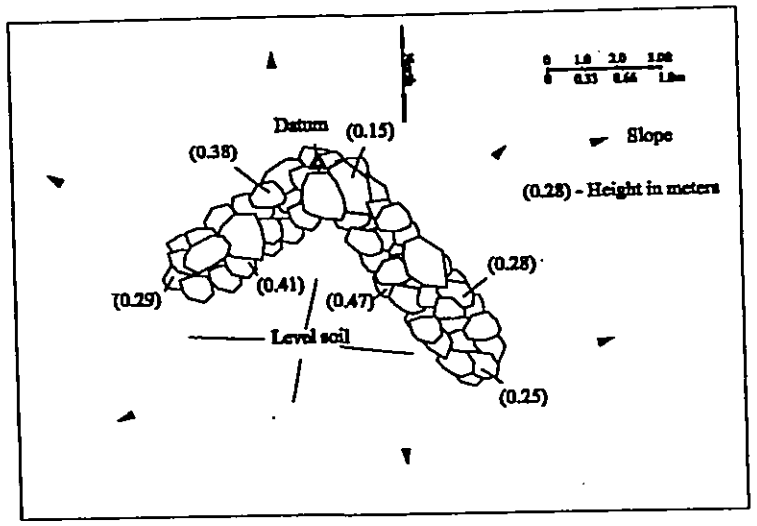


Figure A-70. Site 22616 Plan Map

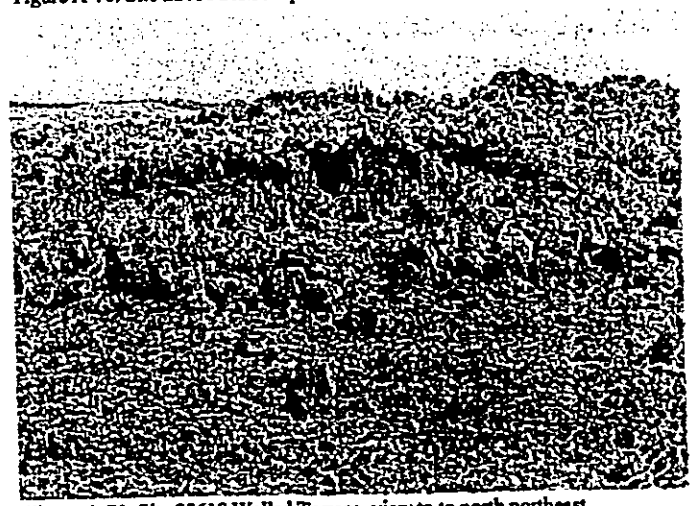


Figure A-71. Site 22618 Walled Terrace, view to to north northeast

State No.: 22618
Site Type: Walled terrace
Topography: Side of slope
Elevation: 2,162 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 7.87 by 7.36 m
Condition: Fair
Integrity: Unaltered
Description: Site 22618 is a walled terrace located on the side of a slope that angles to the southwest near the western project area boundary. The structure is rectangular in shape and is 7.87 m long (northwest by southeast) and 7.36 m wide (*Figures A-71* and *A-72*). The walls are built of stacked subangular basalt cobbles and small boulders ranging in width from 1.0 to 1.95 m and in height from 0.15 to 0.7 m. Although the walls are disturbed, there are several faced wall sections remaining; one on the interior portion of the southeastern wall and another on the exterior side of the southwestern wall. There is a 0.95 m wide gap in the center of the northwestern wall which may represent an entryway.

The southwestern half of the interior is comprised of level soil with the northeastern half sloping moderately to the southwest. A portion of a bifacially flaked basalt tool was recovered from the interior of the site, and volcanic glass and basalt flakes were observed on the side of the slope below the terrace to the southwest. The basalt tool is 6.3 cm long, 4.38 cm wide and 2.88 cm in thickness, and represents a portion of a possible knife or scraper (*Figure B-2, Image B*). Site 22618 is interpreted as a permanent habitation that probably functioned as the foundation for a roofed structure. This is based on its formal type, substantial construction (faced walls) and area (57.9 sq m).

State No.: 22619
Site Type: Walled terrace
Topography: Side of slope
Elevation: 2,162 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 10.5 by 7.59 m
Condition: Fair
Integrity: Altered
Description: Site 22619 is a large walled terrace above the base of a slope that angles to the southwest near the western project area boundary. The structure is rectangular in shape and is 10.5 m long (northeast by southwest) and 7.58 m wide (*Figure A-73*). The southeast, northeast and western sides of the terrace are collapsed consisting of linear mounds of stone. The remaining portions are relatively intact and are comprised of stacked and faced subangular basalt cobbles and small boulders. These walls range in width from 0.92 to 1.3 m and in height from 0.52 to 1.03 m. The northeastern half of the interior slopes moderately to the southwest. The southwestern half is comprised of a level soil deposit. No cultural remains were observed in the interior of the structure although a surface scatter of marine shell and volcanic glass flakes is present adjacent to the terrace to the southwest. These remains extend over an area 13.5 m long (northwest by southeast) and 5.8 m wide.

A 1.0 by 0.5 m test unit (TU-7) was excavated inside the terrace adjacent to the southwestern wall. The excavation revealed four soil deposits (see *Figure A-73*). Layer I consisted of 0.15 to 0.17 m of a dark yellowish brown (10YR 3/4) silt with 50% cobble and pebble inclusions. No cultural remains were present. Layer II consisted of 0.19 to 0.21 m of dark yellowish brown (10YR 4/4) silt with 90 % cobble and pebble inclusions, with no cultural remains. This was underlain by 0.16 to 0.18 m of a dark brown (10YR 3/3) compact silt (Layer III). Cultural remains from this deposit consisted of 0.7 grams of charcoal, one volcanic glass flake (0.12 grams) and a fragment of volcanic glass angular waste (0.62 grams). Layer IV was comprised of a yellowish brown (10YR 5/4) compact silt with no cultural remains. The excavation was terminated 0.17 to 0.19 m into Layer IV. Site 22619 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls) and area (79.6 sq m).

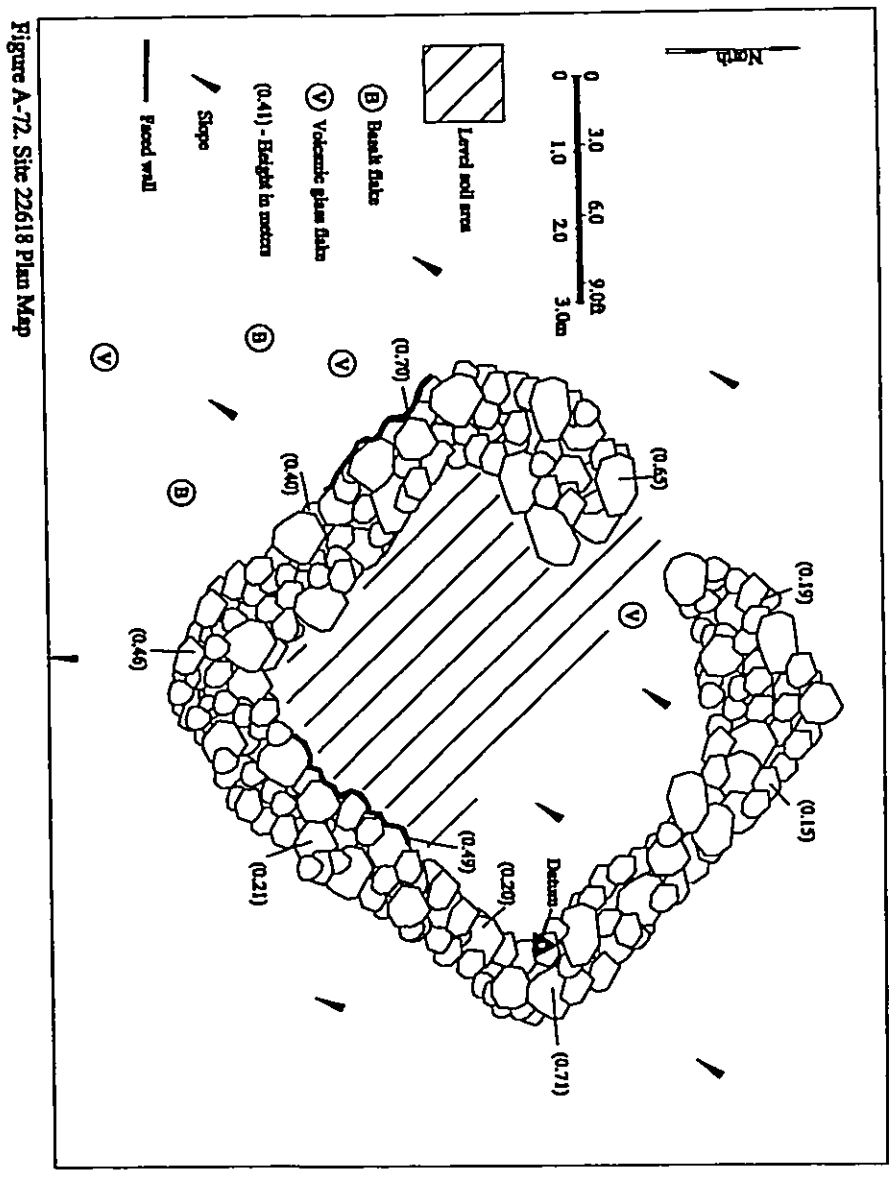


Figure A-72. Site 22618 Plan Map

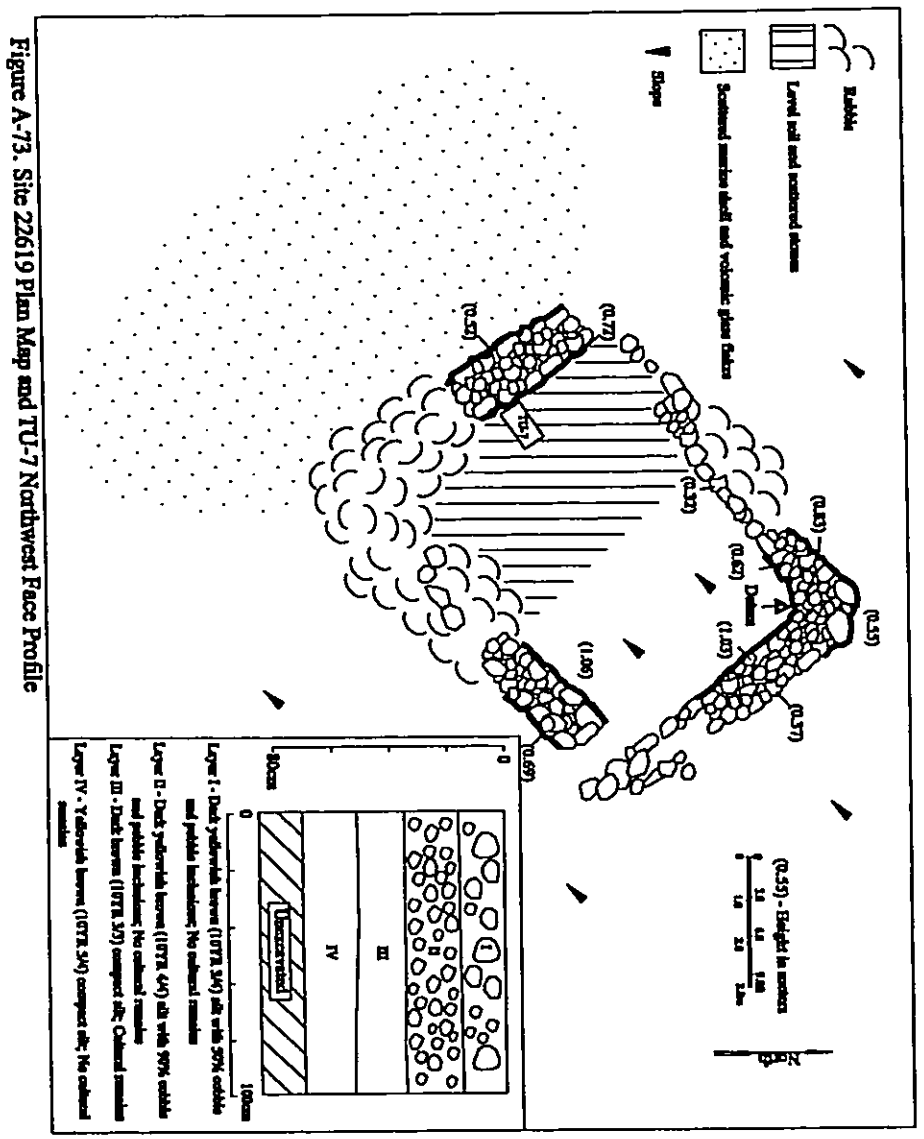


Figure A-73. Site 22619 Plan Map and TU-7 Northwest Face Profile

State No.: 22620
Site Type: Complex (4)
Topography: Top of ridge
Elevation: 2,165 feet
Probable Age: Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 55.4 by 49.3 m
Condition: Fair
Integrity: Altered
Description: Site 22620 is a complex of four features located on a broad level ridge. The features consist of a large enclosure (Feature D) that contains three internal habitation features (Features A-C). The site is constructed along the northwestern wall of a large agricultural enclosure (Site 22632, Feature F1). The extent of the Feature D enclosure is illustrated in *Figure 11*. Features A-C are depicted in *Figure A-74*.

Feature A: Terrace
Function: Permanent Habitation
Dimensions: 7.31 by 4.96 m
Condition: Fair
Integrity: Unaltered
Description: Feature A is the remnants of a terrace located in the approximate center of the Feature D enclosure. The terrace is rectangular in shape and is 5.7 m long (northeast by southwest) and 4.95 m wide (*Figure A-75*). The northwest, southwest and southeast sides are comprised of linear alignments of small subangular basalt boulders and large cobbles that range in height from 0.09 to 0.12 m above ground surface. The northeastern side is comprised of two courses wide by one to two courses high of large cobbles that average 0.2 m in height. An alignment of three large cobbles extends 1.6 m to the northeast from the northeastern corner of the terrace.

The interior of the terrace is comprised of level soil. A small rectangular hearth is located inside the terrace north of the southeastern wall. The hearth is 0.66 m long (east-west) by 0.58 m wide and is constructed of aligned cobbles that average 0.1 m in height (*Figure A-76*). A pavement of a rounded and subangular cobbles is located along the exterior southwestern side of the terrace measuring 2.6 m long (northwest by southeast) by 1.6 m wide. The pavement averages 0.03 m in height above the surrounding ground surface. This pavement appears to have functioned as a porch or *lanai* in front of the structure.

A variety of cultural remains were observed within or adjacent to Feature A. A large metal rotating fishhook was collected from outside the feature, 1.0 m to the northeast. The fishhook is 9.75 cm long, 1.14 m in diameter with a curved hook that is 7.69 cm wide and an attachment nob at the opposite end. The fishhook weighs 106.64 grams and is depicted in *Figure B-3, Image I*. Cultural remains noted on the surface of the terrace consisted of a metal belt buckle (6.35 cm long, 3.55 cm wide. 0.4 cm thick, 16.11 grams; *Figure B-3, Image H*), two chert flakes interpreted as possible gun flints (*Figure B-7, Image* A), a basalt flake and a waterworn cobble. Feature A is interpreted as a permanent habitation based on its formal type, substantial construction (pavement, internal hearth) and area (28.2 sq m).

Feature B: Possible Seat
Function: Permanent Habitation, Ancillary Feature
Dimensions: 1.42 by 1.38 m
Condition: Fair
Integrity: Unaltered
Description: Feature B consists of two large basalt boulders located 4.9 m southwest of Feature A. The nature of the boulders are not typical of the stones that naturally occur in this area and were obviously transported to the site. The boulders vary in size from 1.0 to 1.38 m long (north-south) and 0.42 to 1.0 m wide. The westernmost boulder is 0.35 m in height and evidences a flat surface. A basalt hammerstone (11 cm long, 7 cm wide and 6.5 cm thick was recovered from the surface of the western stone. The second boulder abuts the first to the east and has been positioned on its end. The feature is interpreted as an ancillary feature associated with the permanent habitation of the site based on its appearance. The western stone appears to have functioned as a seat with the eastern stone serving as a backrest.

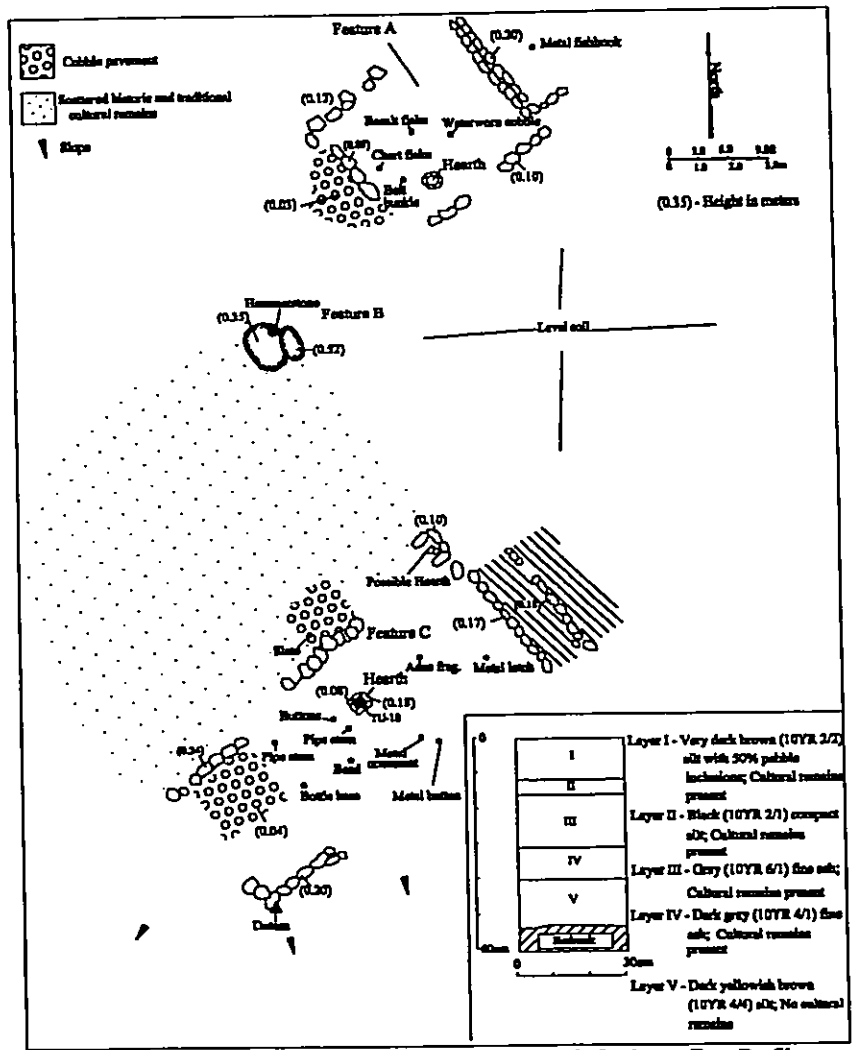


Figure A-74. Site 22620, Features A-C Plan Map and TU-10 Northwest Face Profile

Figure A-75. Site 22620, Feature A Terrace, view to east

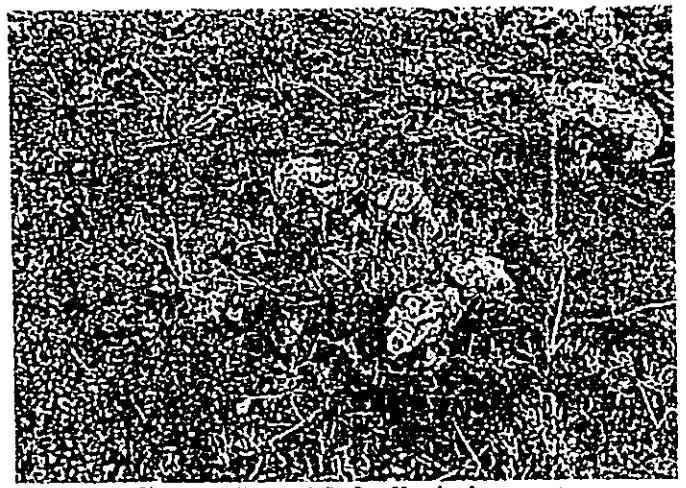


Figure A-76. Site 22620, Feature A Surface Hearth, view to west

Feature C: Terrace
Function: Permanent Habitation
Dimensions: 13.4 by 6.4 m
Condition: Fair
Integrity: Unaltered
Description: Feature C consists of a low terrace located near the southeastern corner of the Feature D enclosure, 8.0 m southeast of Feature B. The terrace is defined by alignments of large subangular basalt cobbles and small boulders that range in width from 0.3 to 0.6 m wide and 0.17 to 0.24 m above ground surface. The main portion of the structure is rectangular in shape and is 10.9 m long (northeast by southwest) and 4.45 m wide. A low two-tiered terrace extends off the main structure to the northeast. This portion of the feature is 3.8 m long (north-northwest by south-southeast) with the terrace surfaces ranging from 1.1 to 1.2 m in width. Aligned cobbles form the retaining walls along the downslope, southwestern side of these terraces. These alignments range in height from 0.17 to 0.18 m.

There are two pavements associated with Feature C. Both pavements are comprised of rounded basalt cobbles set in the ground. The first pavement is situated along the northwestern side of the structure. It is roughly square-shaped measuring 1.68 m long (northeast by southwest), 1.5 m wide and 0.05 m in height. Two small pieces of slate were recovered from the surface of this pavement (10.94 grams; *Figure B-7, Image B*). The location of this pavement suggests it functioned as an entryway or porch.

The second pavement is located on the interior of the feature in the northwestern corner. This pavement is 1.9 m long (northeast by southwest) by 1.8 m wide and 0.03 m in height above the surface of the feature. The location of this pavement on the surface of the terrace suggests it was utilized as a floor.

A square-shaped surface hearth is located in approximate center of Feature C. This hearth is comprised of large basalt cobbles set on their sides. It is 0.65 m on each side and 0.08 to 0.18 m in height above the surface of the terrace. A 0.3 by 0.3 m test unit (TU-10) was excavated in the center of the hearth. A piece of flaked marine shell was collected from the surface of the unit (0.1 grams). The excavation revealed five soil layers over bedrock (see *Figure A-74*). Layer I consisted of 0.12 m of a very dark brown (10YR 2/2) silt with 50% pebble inclusions. Cultural remains from this layer consisted of two *kukui* nut shells (1.36 grams), one unidentified marine shell fragment (0.65 grams), and 1.88 grams of charcoal. Layer II consisted of 0.04 m of a black (10YR 2/1) compact silt. Cultural remains from Layer II consisted of four pieces of fish bone (0.75 grams), one *kukui* nut shell (0.38 grams), and 17.71 grams of charcoal.

Layer III was comprised of 0.15 m of a gray (10YR 6/1) fine ash with ten pieces of fish bone (1.21 grams), 16 fragments of burned unidentified medium sized mammal bone (3.75 grams), a *Conidae* marine shell (1.21 grams), 2.54 grams of charcoal and fragments of two square headed nails (18.9 grams) and two rusted metal fragments (8.78 grams). The Layer IV deposit consisted of 0.09 m of a dark gray (10YR 4/1) fine silt. Cultural remains from Layer IV were comprised of a fragment of bird bone (possible chicken bone; 2.17 grams), 6.25 grams of charcoal and a basalt groundstone fragment (1.64 grams), two fragments of a clay pipe bowl (0.79 grams), a shell bead with a 2.2 mm hole in the center (1.71 cm long, 0.22 cm in diameter, 1.63 grams), a flaked basalt core (2.87 cm long, 2.8 cm wide, 1.98 cm in thickness, 20.04 grams), three fragmented square headed nails (1.9 grams) and three pieces of clear bottle glass (1.5 grams). Layer V consisted of 0.14 m of a dark yellowish brown (10YR 4/4) silt with no cultural remains present

A second possible surface hearth is present outside of the terrace along the northwestern wall. It consists of a small, U-shaped alignment of upright large cobbles, measuring 1.02 m long (northwest by southeast), 0.64 m wide and 0.1 m in height. The U-shape is open to the southwest, and may have functioned as small windbreak.

A variety of cultural remains were observed at Feature C. A large scatter of sun-bleached marine shell, volcanic glass and basalt flakes, waterworn cobbles and coral, glazed ceramics, glass fragments and rusted metal were noted in the area between Features B and C, encompassing an area 11.7 m long (northeast by southwest) and 9.2 m wide. Samples of the glass and ceramics were collected. These consist of a fragment of green on white glazed ceramics (7.74 grams; *Figure B-5, Image B*), four fragments of a porcelain cup with a blue on white design (6.16 grams; *Figure B-5, Image C*), two pieces of glazed ceramics with a blue

herringbone pattern (4.76 grams; *Figure B-5, Image D*), a small fragment of pearl colored ceramics (1.84 grams; *Figure B-5, Image E*), an aqua colored fragment of glass (4.84 grams; *Figure B-6, Image B*) and a piece of dark green bottle glass (3.5 grams; *Figure B-6, Image C*).

Cultural remains were also collected from the surface of the terrace. These consist of a basalt adze fragment (4.8 cm long, 4.4 cm wide, 1.9 cm thick, 89 grams; *Figure B-1, Image A*), two clay pipe stems (1.92 to 2.31 cm long, 0.19 to 0.2 cm in diameter with 1.9 to 2.0 mm holes, 0.97 to 1.51 grams; *Figure B-3, Images A and B*), a gold plated metal ornament (2.09 cm long, 1.73 cm wide, 0.99 grams; *Figure B-3, Image D*), a metal button with a 1.5 mm loop on top (1.18 cm diameter, 1.91 grams; *Figure B-3, Image E*), a glass bead (1.07 cm diameter with 2mm hole in center, 1.83 grams; *Figure B-3, Image F*), a ceramic button 1.1 cm diameter with four holes, 0.4 grams; *Figure B-3, Image G on left*), a shell button (1.2 cm diameter with two holes, 0.49 grams; *Figure B-3, Image G on right*), a metal latch (8.8 cm long, 2.84 cm wide, 0.55 cm thick, 67.29 grams; *Figure B-3, Image J*), and a portion of a dark green glass bottle with a kick-up base (94.42 grams; *Figure B-6, Image A*).

Feature C is interpreted as a permanent habitation based on its formal type, substantial construction (pavements, internal hearths) and area (48.5 sq m). The stratified deposits noted during the excavation of the interior surface hearth indicates that the feature was recurrently utilized.

Feature D: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 55.4 by 49.3 m
Condition: Fair
Integrity: Unaltered
Description: Feature D is a large roughly rectangular enclosure that contains Features A-C. The enclosure is constructed against the northwestern wall of the Site 22632, Feature F1 agricultural enclosure (see *Figure 11*). It is 55.4 m long (northwest by southeast) and 45.0 to 49.3 m wide. The walls vary in width from 0.65 to 0.8 m and in height from 0.35 to 0.71 m. Feature D is interpreted as an ancillary feature associated with the permanent habitation of Site 22620 serving to define the boundaries of a yard. This is based on the presence of Features A-C within the interior of the enclosure. An agricultural ditch (Site 22632, Feature GS) enters the enclosure at the northern end, suggesting that the interior area may have also been used for gardening.

State No.: 22621
Site Type: Enclosure
Topography: Top of ridge
Elevation: 2,185 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation, Ancillary Feature
Overall Dimensions: 40.9 by 20.2 m
Condition: Fair
Integrity: Altered
Description: Site 22621 is a large, roughly rectangular enclosure constructed against the northern side of the Site 22632, Feature F1 agricultural enclosure, northeast of Site 22620. The enclosure is 40.9 m in length (east-west) and 15.4 to 20.2 m wide (see *Figure 11*). The walls are built of stacked subangular basalt cobbles and small boulders, varying in width from 0.5 to 0.75 m and in height from 0.35 to 0.6 m. No cultural remains or internal features were observed within the enclosure. Site 22621 is interpreted as a permanent habitation, ancillary feature based on its formal type and size (723.9 sq m). It is likely that one or more pole and thatch structures once existed within the enclosure which functioned to define the boundaries of a yard.

State No.: 22622
Site Type: Complex (2)
Topography: Top of ridge
Elevation: 2,190 feet
Probable Age: Late Prehistoric/Early Historic

Functional Interpretation: Permanent Habitation
Overall Dimensions: 18.5 by 14.7 m
Condition: Fair
Integrity: Altered
Description: Site 22622 is a complex of two features located along the northern side of the Site 22632, Feature FI agricultural enclosure adjacent to Site 22621 to the east. The features consist of an enclosure (Feature A) and a surface hearth (Feature B). The features are described below.

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 18.5 by 14.7 m
Condition: Fair
Integrity: Altered
Description: Feature A is a rectangular enclosure that is 18.5 m long (east-west) by 14.7 m wide. The southern wall of the enclosure is formed by the northern wall of the Site 22632, Feature FI agricultural enclosure. The western side of Feature A is comprised of the eastern wall of Site 22621, discussed above. The extent of the Feature A enclosure is depicted in *Figure 11*. The Feature B surface hearth, described below is situated within Feature A. The walls are built of stacked and piled subangular basalt cobbles and small boulders ranging in width from 0.52 to 0.71 m and in height from 0.25 to 0.65 m. Scattered marine shell, volcanic glass flakes and a piece of waterworn coral was observed within the interior. Feature A is interpreted as an ancillary feature associated with the permanent habitation of Site 22622 serving to define the boundaries of a yard. This is based on formal type, area (271.9 sq m) and on the presence of Feature B within the interior. One or more pole and thatch structures probably were once present within the enclosure.

Feature B: Hearth
Function: Permanent Habitation, Ancillary Feature
Dimensions: 0.56 by 0.45 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a small surface hearth situated within the interior of the Feature A enclosure. The hearth is comprised of a rectangular alignment of small subangular cobbles set in the ground that is 0.56 m long (east-west) by 0.45 m (*Figure A-77*). The cobbles vary in height from 0.01 to 0.04 m above ground surface. The interior of the hearth is comprised of a brown surface soil. A 0.3 by 0.3 m test unit (TU-31) was excavated in the interior of the hearth. This excavation revealed three soil deposits overlying bedrock (see *Figure A-77*). Layer I consisted of 0.17 m of a dark grayish brown (10YR 4/2) silt loam with 10% cobble and pebble inclusions. Cultural remains from Layer I consisted of one unidentified marine shell fragment (0.44 grams), one piece of waterworn coral (3.94 grams), 3.22 grams of charcoal and ten basalt flakes (27.26 grams). Layer II consisted of 0.11 m of a light gray (10YR 7/2) fine ash, with two volcanic glass flakes (2.42 grams), 8.2 grams of charcoal and a basalt flake (7.61 grams). A sample of the charcoal from Layer II was submitted for radiometric age determination, yielding multiple calibrated age ranges at two standard deviations of AD 1510 to 1600, 1620 to 1700, 1720 to 1820, 1840 to 1880 and 1920 to 1950 (Beta No. 162001; Appendix D).

The Layer III deposit was comprised of a yellowish brown (10YR 5/4) silt with no cultural remains present. Feature B is interpreted as an ancillary feature associated with the permanent habitation of the site, based on its formal type and its location within the Feature A enclosure.

State No.: 22623
Site Type: C-shape
Topography: Level bench
Elevation: 2,185 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.6 by 3.35 m
Condition: Fair

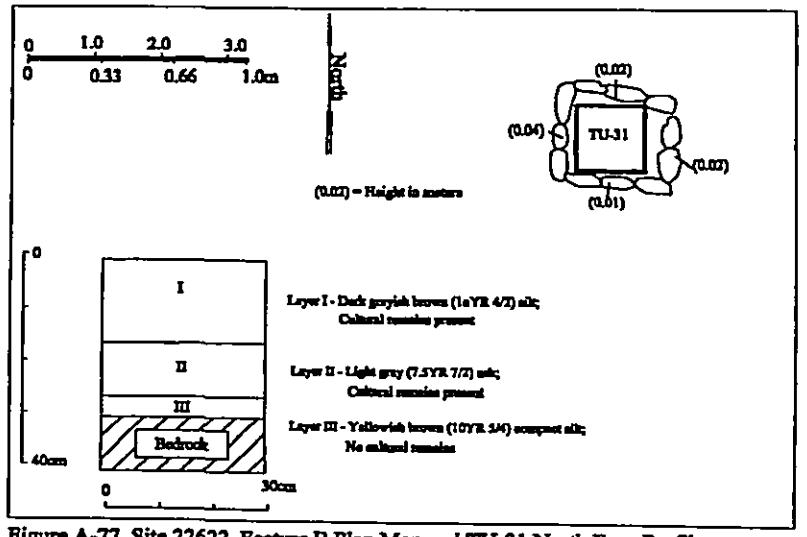


Figure A-77. Site 22622, Feature B Plan Map and TU-31 North Face Profile

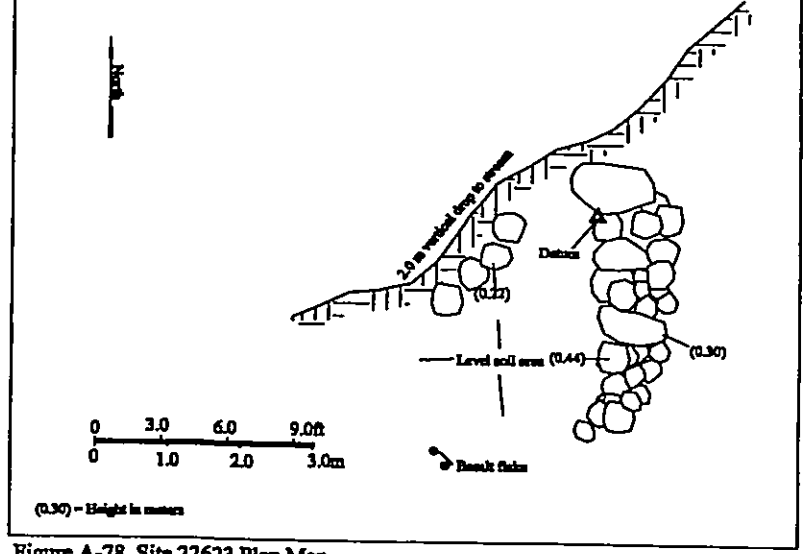


Figure A-78. Site 22623 Plan Map

Integrity: Unaltered
Description: Site 22623 is a C-shaped enclosure located on a level bench adjacent to Keanuiomano Stream to the south. The northern side of the bench is bordered by a 2.0 m vertical drop to the stream below. The C-shape is open to the southwest and is 3.6 m long (north-northeast by south-southwest) and 3.35 m wide (*Figure A-78*). The eastern wall is built of piled subangular basalt boulders and cobbles ranging in width from 0.7 to 1.25 m and in height from 0.3 to 0.44 m. The wall along the northwest side is comprised of an alignment of four large cobbles that average 0.22 m in height. The interior of the enclosure is comprised of level soil. Two basalt flakes are present on the ground surface south of the structure. Site 22623 is interpreted as a temporary habitation based on its formal type, informal construction, and area (12.0 sq m).

State No.: 22624
Site Type: Lithic Scatter
Topography: Top and base of knoll
Elevation: 2,175 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Quarry
Overall Dimensions: 102.2 by 73.4 m
Condition: Fair
Integrity: Unaltered
Description: Site 22624 is a large surface scatter of fine grained basalt flakes and debitage located on and around a knoll south of Keanuiomano Stream in the northwestern portion of the project area (see *Figure 11*). The majority of the lithics are located on the top and sides of the knoll (*Figure A-79*) although basalt flakes were also noted on a level bench on the northern side of Keanuiomano Stream, directly north of the knoll. A vertical exposed basalt face is located on the north side of the level bench appears to be one of the sources for the raw material (*Figure A-80*). The lithics are scattered over an area 102.2 m long (northeast by southwest) and 73.4 m wide, encompassing an area of 5,241 sq m. No other cultural remains were observed. Site 22624 is interpreted as a quarry site and potentially as the location for the initial stages of tool manufacture. The large scatter of flakes suggests that the raw materials were obtained in this location, followed by a preliminary reduction of the material.

State No.: 22625
Site Type: Concrete Piers
Topography: Side of stream
Elevation: 2,170 feet
Probable Age: Historic
Functional Interpretation: Foundation
Overall Dimensions: 13.2 by 5.4 m
Condition: Fair
Integrity: Altered
Description: Site 22625 is a series of concrete piers located on a level bench above Keanuiomano Stream to the north in the northwestern portion of the project area. A 3.0 m tall cut bank is located along the northern side of the site. There are six rectangular formed concrete piers all oriented in a north-northwest by south-southeast direction (*Figure A-81*). The two main piers are located at the southern end of the site, 5.3 m north of the stream. These piers are 1.9 m (74"), 30.4 m (12") wide and 0.64 to 0.65 m (25") in height, and are positioned parallel to each other, 0.64 m apart. There are two 0.025 m (1") diameter threaded bolts located on top of the piers at the north and south ends.

A third concrete pier is situated 1.45 m to the west of the first two. This pier is 1.09 m (43") long, 0.43 m wide (17") and 0.44 m (17") in height. There is a rectangular recessed area on top of this pier that is 0.45 m (18") long, 0.15 m (6") wide and 0.025 m (1") deep. Threaded bolts are present at the north and south ends of the recessed area.

A fourth pier is located 2.7 m south of the third. It appears to be identical to the third pier, but is buried at the southern end. A fifth and sixth pier are situated 4.0 m to the north of the third pier. These piers are identical to the third pier but have a metal plate bolted over the recessed area. A wooden pole (1.6 m [63"] long

Figure A-79. Site 22624 Lithic Scatter, view to west

Figure A-80. Site 22624, Possible Quarry Site, view to north northeast

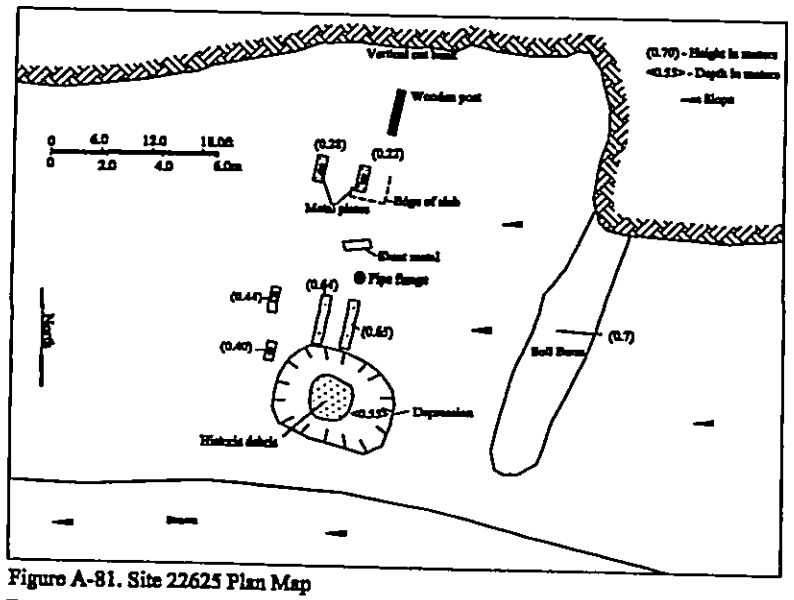


Figure A-81. Site 22625 Plan Map

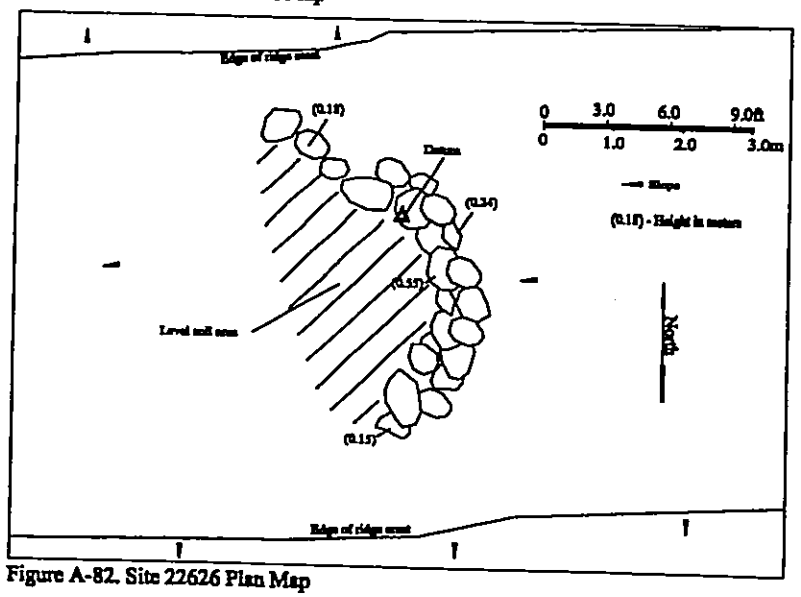


Figure A-82. Site 22626 Plan Map

by 0.25 [10"] diameter) is located to the north of these piers. The eastern pier in this area is constructed on a partially buried concrete slab, suggesting that the other piers are also constructed on buried slabs.

There is a linear soil berm located to the east of the piers, and an oval-shaped depression situated to the south. The berm is 9.45 m long, 2.18 m wide and 0.7 m in height. The depression is 4.5 m long, 3.3 m wide and 0.55 m deep. A metal ring (0.15 m in diameter), pieces of sheet metal, a metal rod, and hog wire fencing were noted inside the depression. A metal pipe flange for a 0.15 m (6") diameter pipe and a piece of sheet metal is present in the center of the site, and links from a chain drive were scattered throughout the site.

Site 22625 is interpreted as the historic foundation for a piece of machinery such as a pump or generator that utilized the adjacent stream.

State No.: 22626
Site Type: C-shape
Topography: Top of ridge
Elevation: 2,203 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 5.15 by 2.3 m
Condition: Fair
Integrity: Unaltered
Description: Site 22626 is a C-shaped enclosure located on top of a narrow ridge north of Keanuiomano Stream and south of Lanikepu Stream. The C-shape is open to the west and is 5.15 m long (north-south) by 2.3 m wide (*Figure A-82*). The structure is built of one to two courses wide and one to three courses tall of piled subangular basalt cobbles and small boulders. The wall is 0.35 to 0.72 m wide and 0.15 to 0.55 m in height. The interior of the C-shape is comprised of level soil with no cultural remains present. Site 22626 is interpreted as a temporary habitation based on its formal type, informal construction, and area (11.8 sq m).

State No.: 22627
Site Type: C-shape
Topography: Top of ridge
Elevation: 2,205 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.75 by 2.09 m
Condition: Fair
Integrity: Unaltered
Description: Site 22627 is a C-shaped enclosure located on top of a narrow ridge north of Keanuiomano Stream and south of Lanikepu Stream east of Site 22626. The C-shape is open to the west and is 3.75 m long (north-south) by 2.09 m wide (*Figure A-83*). The northern side of the structure abuts a low bedrock outcrop. The structure is built of one to three courses wide and two to three courses high of piled subangular basalt cobbles and small boulders. The wall is 0.4 to 1.6 m wide and 0.35 to 0.51 m in height. The interior of the C-shape is comprised of level soil with no cultural remains present. Site 22627 is interpreted as a temporary habitation based on its formal type, informal construction, and area (7.83 sq m).

State No.: 22628
Site Type: Walled Terrace
Topography: Top of ridge
Elevation: 2,207 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 5.4 by 4.35 m
Condition: Fair
Integrity: Altered

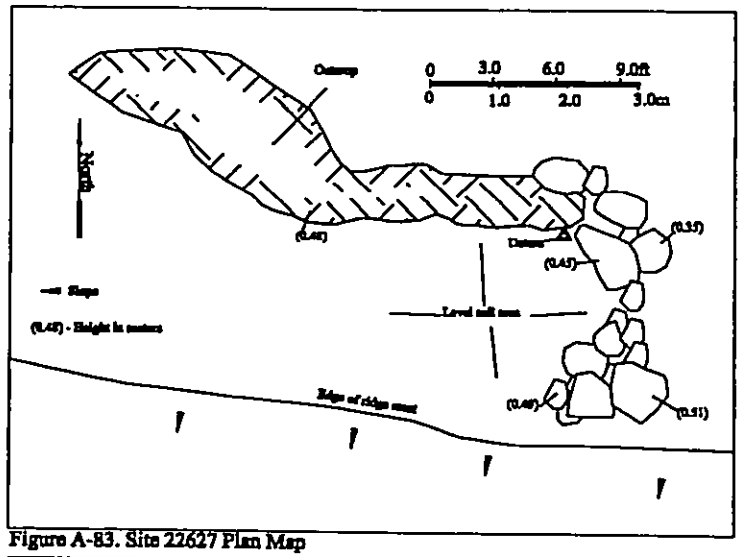


Figure A-83. Site 22627 Plan Map

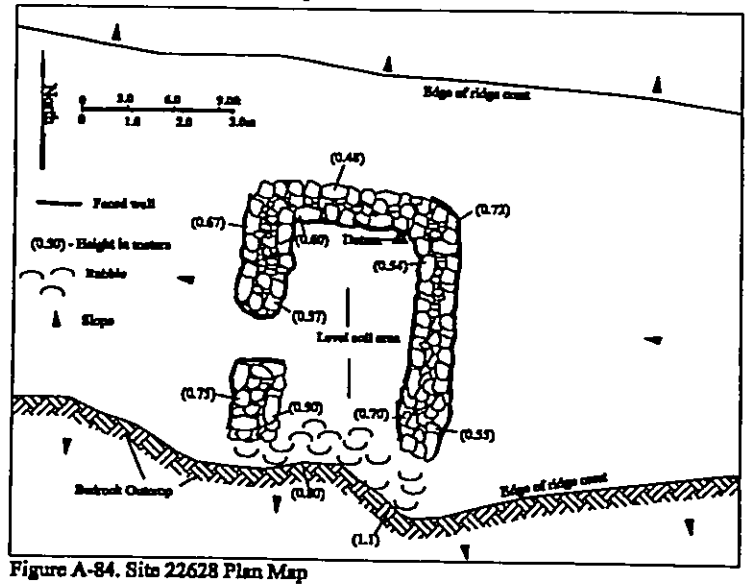


Figure A-84. Site 22628 Plan Map

Description: Site 22628 is a walled terrace located on top of a narrow ridge north of Keanuiomano Stream and south of Lanikepu Stream, east of Site 22627. The structure is rectangular in shape and is 5.4 m long (north-south) by 4.35 m wide (*Figure A-84*). The north, east and west walls are relatively intact though the southern wall is collapsed consisting of a low rubble pile. The intact walls vary in width from 0.87 to 1.06 m and in height from 0.48 to 0.75 m and are constructed of stacked subangular basalt cobbles and small boulders. The majority of the structure is faced on the interior and exterior. There is a 0.82 m wide faced gap in the western wall that appears to be an entryway into the interior. The surface of the interior is comprised of level soil with no cultural remains present. Site 22628 is interpreted as a permanent habitation based on its formal type, substantial construction (faced walls), and area (23.5 sq m).

State No.: 22629
Site Type: Terrace
Topography: Top of ridge
Elevation: 2,210 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Temporary Habitation
Overall Dimensions: 3.35 by 2.34 m
Condition: Fair
Integrity: Unaltered
Description: Site 22629 is a small terrace located on top of a narrow ridge north of Keanuiomano Stream and south of Lanikepu Stream east of Site 22628. The terrace is rectangular in shape and is 3.35 m long (north-south) by 2.34 m wide (*Figure A-85*). There are low retaining walls on the west and south sides of the site, built of one to two courses of subangular basalt cobbles and small boulders. These walls are 0.21 to 0.48 m in height on the downslope sides. The surface of the terrace is comprised of level soil. No cultural remains were noted on top of the structure, although numerous sun-bleached marine shells were observed downslope from the terrace to the west. Site 22629 is interpreted as a temporary habitation based on its formal type, informal construction, and area (7.8 sq m).

State No.: 22630
Site Type: Cairn
Topography: Level area
Elevation: 2,235 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Marker
Overall Dimensions: 1.05 by 1.0 m
Condition: Fair
Integrity: Unaltered
Description: Site 22630 is a small cairn located in a level area north of Lanikepu Stream and south of Kawaihae Road. The cairn is constructed of stacked subangular cobbles and one waterworn cobble. It is 1.05 m by 1.0 m at the base, 0.6 by 0.35 m at the top and 0.72 m in height. No cultural remains were found in association with the site. Site 22630 is interpreted as a marker based on its size and formal type.

State No.: 22631
Site Type: Complex (2)
Topography: Level area
Elevation: 2,150 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Permanent Habitation
Overall Dimensions: 29.5 by 23.0 m
Condition: Fair
Integrity: Altered
Description: Site 22631 is a complex of two features located in a level, rocky area west of a dirt road, near the western project area boundary. The features consists of a large enclosure (Feature A) with an adjoining platform (Feature B). The features are illustrated in *Figure A-86* and are discussed below.

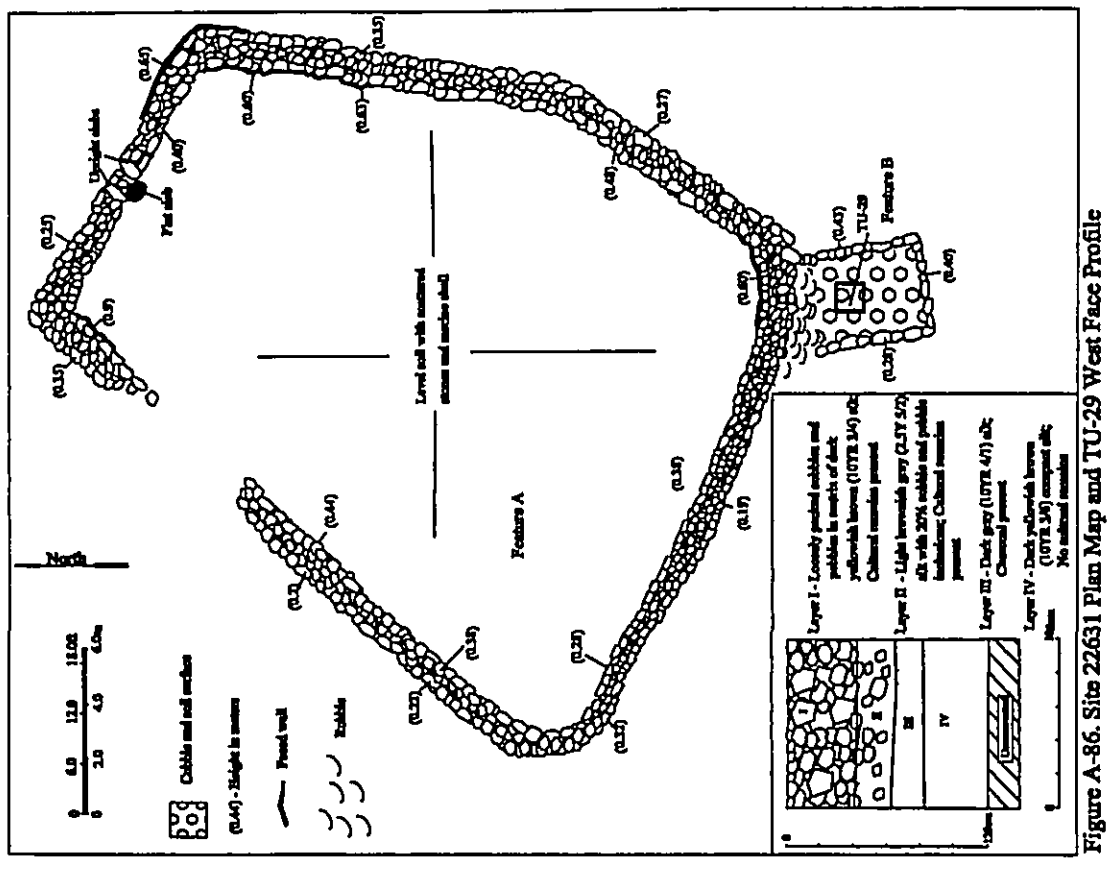


Figure A-85. Site 22629 Plan Map

Figure A-86. Site 22631 Plan Map and TU-29 West Face Profile

Feature A: Enclosure
Function: Permanent Habitation, Ancillary Feature
Dimensions: 25.6 by 20.8 m
Condition: Fair
Integrity: Altered
Description: Feature A is a large roughly rectangular enclosure that is 25.6 m long (north-northeast by south-southwest) and from 12.9 to 20.8 m in width. Many of the wall stones appear to have been removed from the site. The walls are constructed of stacked subangular basalt cobbles and small boulders. The walls range in width from 0.86 to 1.45 m and in height from 0.19 to 0.9 m. Faced wall sections are present in the northwest, northeast and southwest interior corners and at the northeastern exterior corner.

Portions of the western wall near the northwest corner are missing. A flat basalt slab is positioned adjacent to the northern wall on the interior side. Two upright slabs are situated on either side of the flat within the wall. The space between the two upright slabs is 0.83 m. These slabs potentially represent an entryway into the enclosure.

The interior of the enclosure is comprised of level soil with scattered surface stones. Numerous sun-bleached marine shells were scattered throughout the interior. Feature A is interpreted as an ancillary feature associated with the permanent habitation of the site potentially functioning to define the boundaries of a yard, within which one or more pole and thatch structures probably existed. This is based on the features formal type, substantial construction and area (431.0 sq m).

Feature B: Platform
Function: Permanent Habitation
Dimensions: 4.9 by 3.6 m
Condition: Fair
Integrity: Unaltered
Description: Feature B is a rectangular platform that is built against the southern side of the enclosure at the exterior southeastern corner. The area between the enclosure wall at the north side of the platform is collapsed and comprised of scattered wall rubble. The platform is 4.9 m in length (north-south) and 3.6 m wide. The perimeter of the feature is bordered by one to two courses of small subangular basalt boulders and large cobbles that vary in height from 0.28 to 0.43 m. The surface of the platform is level and is comprised of soil and cobbles. A fragment of a metal hand grenade was observed on the surface of the feature.

A 1.0 by 1.0 m test unit (TU-29) was excavated into the platform. This excavation revealed four deposits (see *Figure A-86*). Layer I consisted of 0.38 to 0.41 m of loosely packed subangular basalt cobbles and pebbles in a dark yellowish brown (10YR 3/4) silt matrix. Cultural remains from Layer I consisted of one unidentified marine shell fragment (1.83 grams). The base of Layer I intruded slightly into the Layer II soil and no evidence was found to suggest that the architectural layer had been built during more than a single construction episode.

Layer II consisted of 0.21 to 0.24 m of a light brownish gray (2.5Y 5/2) silt with 20% cobble and pebble inclusions. Cultural remains from Layer II consisted of three unidentified marine shell fragments (4.36 grams). Layer III was comprised of 0.15 to 0.2 m of a dark gray (10YR 4/1) silt with 1.12 grams of charcoal recovered. Layer IV consisted of a dark yellowish brown (10YR 3/6) compact silt with no cultural remains present. The excavation of TU-29 was terminated 0.4 m into the Layer IV soil. Feature B is interpreted as a permanent habitation based on its formal type, substantial construction (paving) and area (17.9 sq m).

State No.: 22632
Site Type: Complex (697)
Topography: Varying locations throughout project area
Elevation: 2,120 – 2,480 feet
Probable Age: Late Prehistoric/Early Historic
Functional Interpretation: Agriculture
Condition: Fair

Integrity: Altered
Description: Site 22632 is a complex of 700 agricultural features that are scattered throughout the project area. The features consist of 368 terraces and field boundaries, 280 agricultural clearing piles, 21 irrigation ditches, 22 walls, seven enclosures and two pond fields. The 700 features were designated as Features A through AAB of this complex, with feature letters BB, KK, QZ and TT not assigned. The distribution of he Site 22632 features are illustrated in *Figure 11* and are briefly summarized below.

370 of the features are comprised of 339 linear terraces, 29 linear field boundaries, and two rectangular pond fields. The terraces functioned to create level on the side of slopes for cultivation. The field boundaries were used to subdivide the agricultural fields into smaller plots. Detailed information concerning the length, width, upslope and downslope heights, orientation and elevation of the planting features is presented in *Table C-1*.

The 280 clearing piles consist of 275 mounds and five modified outcrops. These features consist of piles of stones that were cleared from adjacent planting areas. The physical characteristics of these features (length, width, height, shape, method of construction and elevation) are presented in *Table C-3*. Six of the clearing features evidenced unique characteristics and were subjected to subsurface testing to positively determine their function. These consist of Features CB, HT, NA, UD, ZI and ZJ.

Feature CB is an oval-shaped mound located in an area of numerous agricultural features near the western project area boundary at the 2,161 feet elevation. The mound is well-built and is 3.05 m long (north-south), 2.3 m in width and is bordered by small subangular basalt boulders (*Figure A-87*). These boulders vary in height from 0.35 to 0.5 m. The surface of the mound is convex and is comprised of piled cobbles and small boulders. The center of the feature is 0.68 m in height above the surrounding ground surface. No cultural remains were noted on the surface.

The well-built nature of Feature CB suggested that it might be a burial feature. A 1.0 by 1.0 m test unit (TU-27) was excavated in the center of the mound. This excavation revealed a layer of stones associated with the surface structure (Layer I), over a soil deposit (see *Figure A-87*). Layer I consisted of 0.58 to 0.61 m of loosely packed cobbles and small boulders mixed with a dark brown (10YR 3/3. No cultural remains were recovered. The base of Layer I rests on the surface of the Layer II soil deposit and no evidence was found to indicate that the mound had been built during more than a single construction episode.

Layer II was comprised of 0.23 to 0.26 m of a dark yellowish brown (10YR 4/6) compact silt with 20 % cobble inclusions. No cultural remains were present in Layer II. The excavation of TU-27 was terminated on bedrock. Feature CB is assigned an agricultural function due to the absence of cultural remains.

Feature HT is an oval-shaped mound similar in construction to Feature CB. It is situated in a level area on the south side of Lanikepu Stream. It is 3.6 m long (northwest-southeast) and 2.88 m wide (*Figure A-88*) and is bordered by small water rounded basalt boulders. The ground surface in this area is scattered with water rounded stones, likely deposited during periods of flooding of the stream. The boulders vary in height from 0.35 to 0.49 m. The surface of the mound is convex and is comprised of water rounded cobbles and small boulders. The center of the feature is 0.72 m in height. No cultural remains were noted.

A 1.0 by 1.0 m test unit (TU-32) was excavated in the center of the mound to test for the potential presence of the human remains. This excavation revealed a stone layer associated with the surface structure, over two soil deposits (see *Figure A-88*). Layer I consisted of 0.43 to 0.49 m of loosely packed rounded cobbles and small boulders, mixed with a brown (10YR 4/3) silt. No cultural remains were present. The base of Layer I intrudes slightly into the Layer II deposit and no evidence was found to indicate that the mound had been built during more than a single construction episode.

Layer II was comprised of 0.38 to 0.41 m of a dark grayish brown (10YR 4/2) silt with 10% cobble and pebble inclusions. No cultural remains were recovered from Layer II. Layer III consisted of 0.37 to 0.42 m of dark yellowish brown (10YR 4/6) compact silt with no cultural remains present. The excavation of TU-32 was terminated on bedrock. Feature HT is interpreted as an agricultural mound based on the lack of cultural remains.

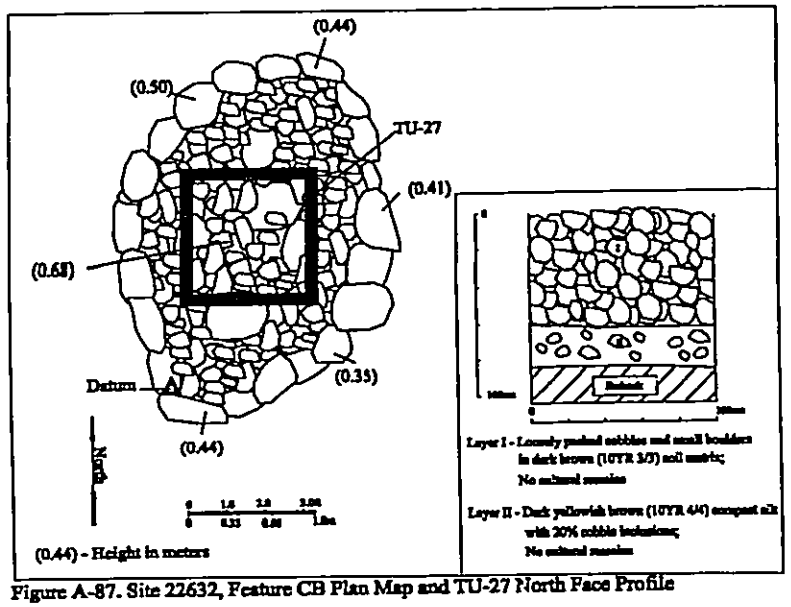


Figure A-87. Site 22632, Feature CB Plan Map and TU-27 North Face Profile

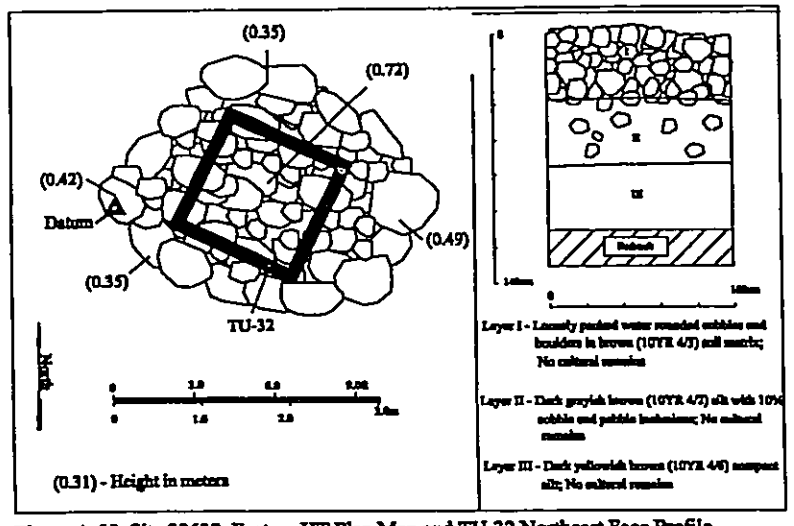


Figure A-88. Site 22632, Feature HT Plan Map and TU-32 Northeast Face Profile

Features NA, UD, ZI and ZJ are comprised of relatively small, roughly oval-shaped alignments of subangular basalt cobbles and/or small boulders, all located on the tops of ridges at varying locations throughout the project area. These features were initially interpreted as possible surface hearths based on their appearance. They varied 1.1 to 3.5 m long, 1.02 to 2.8 m wide and 0.02 to 0.37 m in height and were comprised of a single course of stones (*Figures A-89* through *A-92*). No cultural remains were observed at any of the four features.

Subsurface testing was undertaken at each of the four features to determine their function. The excavations consisted of TU-26 at Feature NA, TU-8 at Feature UD, TU-11 at Feature ZI and TU-13 at Feature ZJ (see *Figures A-89* through *A-92*). These excavations revealed a single soil deposit overlying bedrock, with no cultural remains present. The absence of charcoal or burned food remains suggest that these features were not utilized as surface hearths. Their locations on ridge tops, where they were subjected to strong winds, potentially suggest the alignments sheltered small planting plots.

Site 22632 contains 26 stone wall segments and three complete enclosures. Nine wall segments and the walls along three irrigation ditches (Features JM, QK, and ST), form three partially complete enclosures. The distribution of several other wall segments suggests that the walls were once part of two very large enclosures. Most of the features appear to have functioned to protect agricultural fields from cattle. Eleven of the 26 walls relatively short isolated wall segments scattered in the southern and central portions of the project area. No cultural remains were noted in association with any of these features that would suggest that the segments are remnants of habitation features. The walls are probably remnants of former agricultural enclosures that have largely been dismantled and the stones used elsewhere for constructing walls or other features.

The 26 wall segments are summarized in *Table 6* and the six enclosures are summarized in *Table 7*. These tables summarize length, width, height, elevation and method of construction of the features, with *Table 7* also providing overall area information and associated sites and features.

The 21 irrigation ditches are summarized in *Table 8*, which presents the length, width, depth, orientation, and elevation of the ditches, along with associated sites and features. The majority of the ditches are shallow, averaging c. 0.5 m in depth. Undoubtedly, the ditches were originally much deeper, but have been filled in by wind and water-borne sediment. These depositional processes, and erosion in the stream drainages, probably have buried or destroyed portions of the remaining ditches, especially the intakes, and numerous small ditch branches. Portions of five ditches (Features JM, JN, NJ, QK and ST) have stacked and/or piled stone walls on the downslope sides where the ditches traverse steeper slopes. The 15 remaining trenches are comprised of shallow linear depressions with no visible stone retaining walls.

The 21 ditches extend over nearly three miles (4,362.6 m) and represent at least five separate irrigation systems. Four of the systems were fed by Keanuiomano Stream and one by Lanikepu Stream. The four systems fed by Keanuiomano Stream are situated in the western, west-central, east-central, and eastern portions of the project area. The simplest system consists of a single ditch Feature K, which was fed by Lanikepu Stream in the northwestern portion of the project area. A detailed discussion of the ditches is presented in the Findings section of this report.

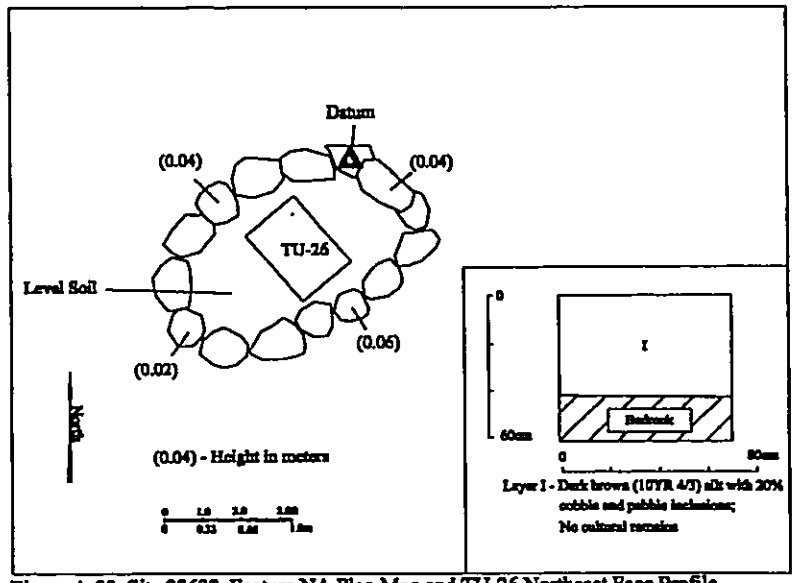


Figure A-89. Site 22632, Feature NA Plan Map and TU-26 Northeast Face Profile

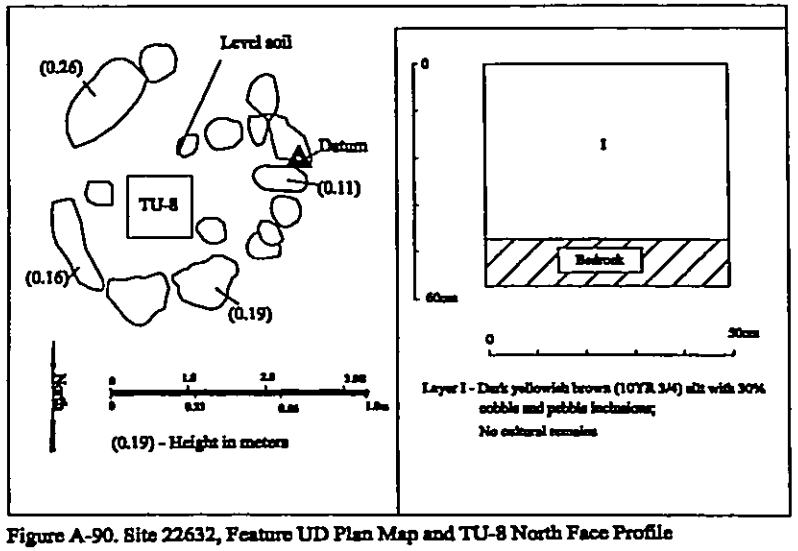


Figure A-90. Site 22632, Feature UD Plan Map and TU-8 North Face Profile

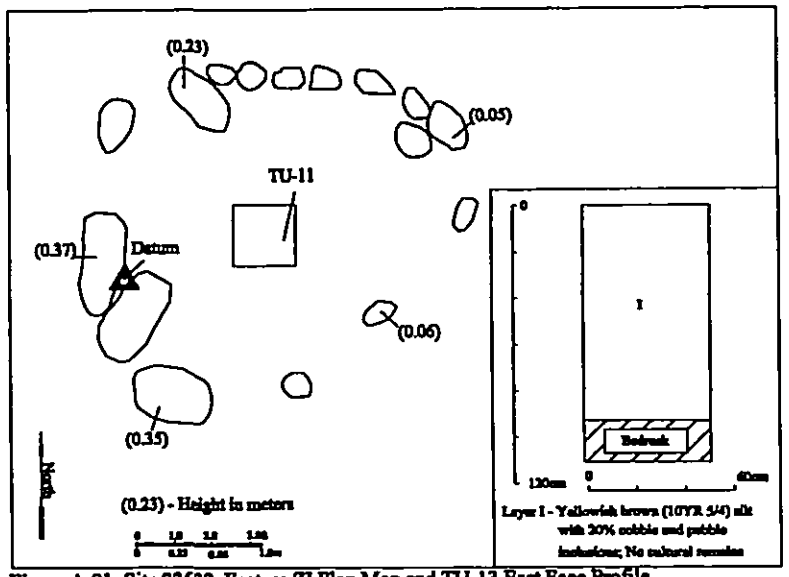


Figure A-91. Site 22632, Feature ZI Plan Map and TU-13 East Face Profile

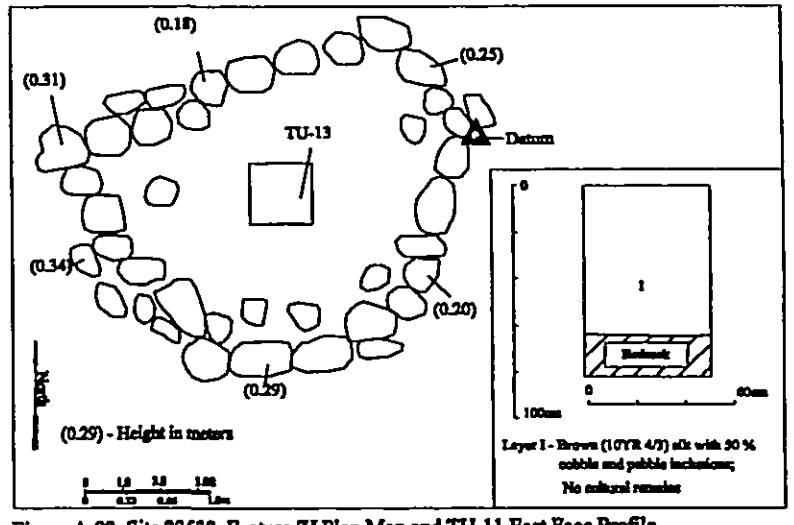


Figure A-92. Site 22632, Feature ZJ Plan Map and TU-11 East Face Profile

APPENDIX B – ARTIFACT ILLUSTRATIONS

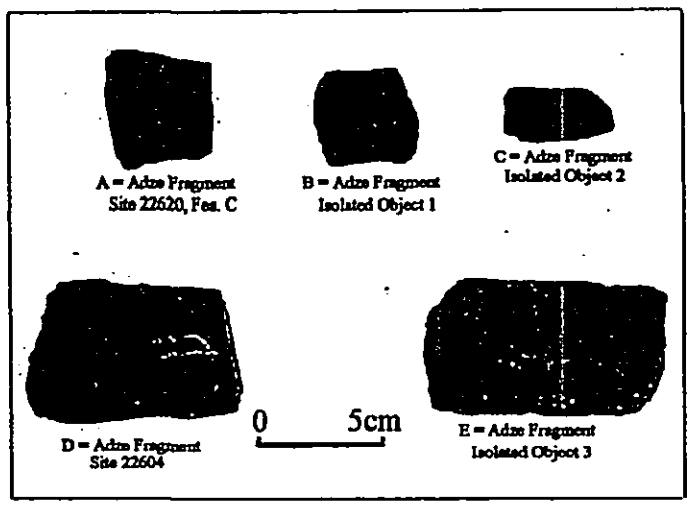


Figure B-1. Basalt Adzes

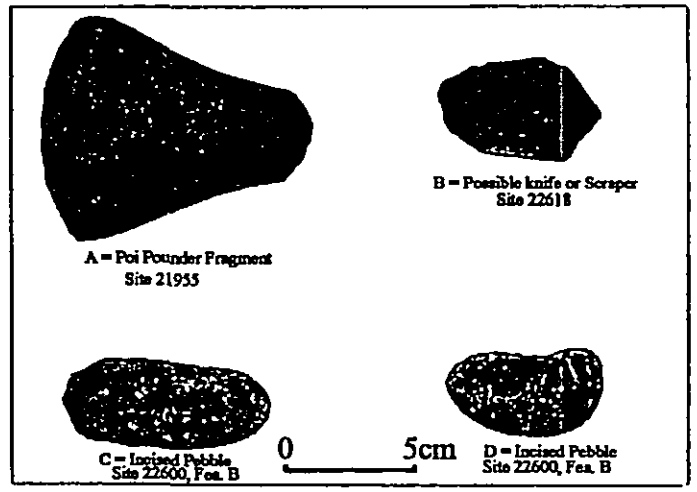


Figure B-2. Stone Tools

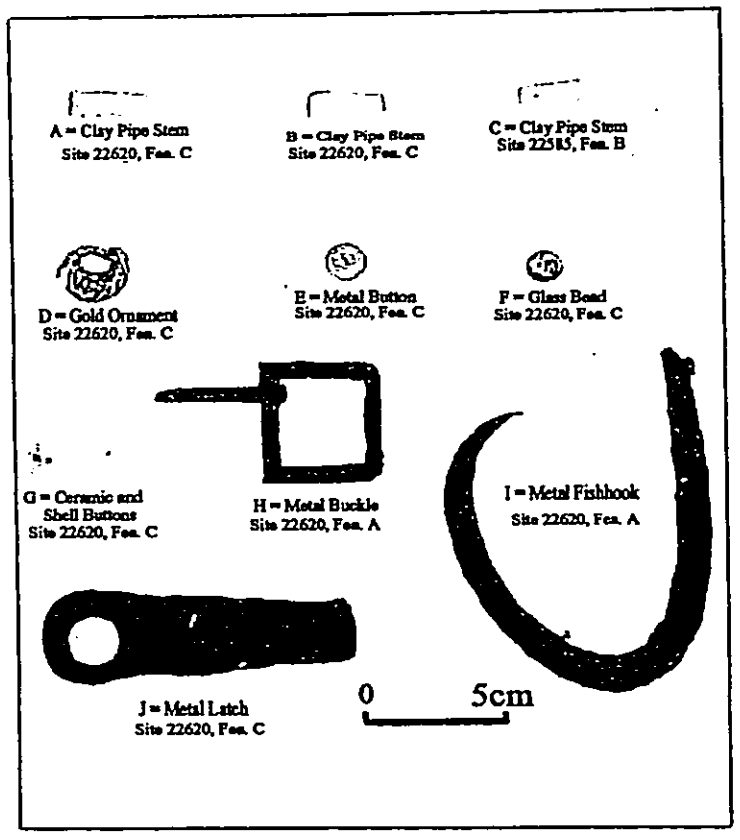


Figure B-3. Historic Artifacts

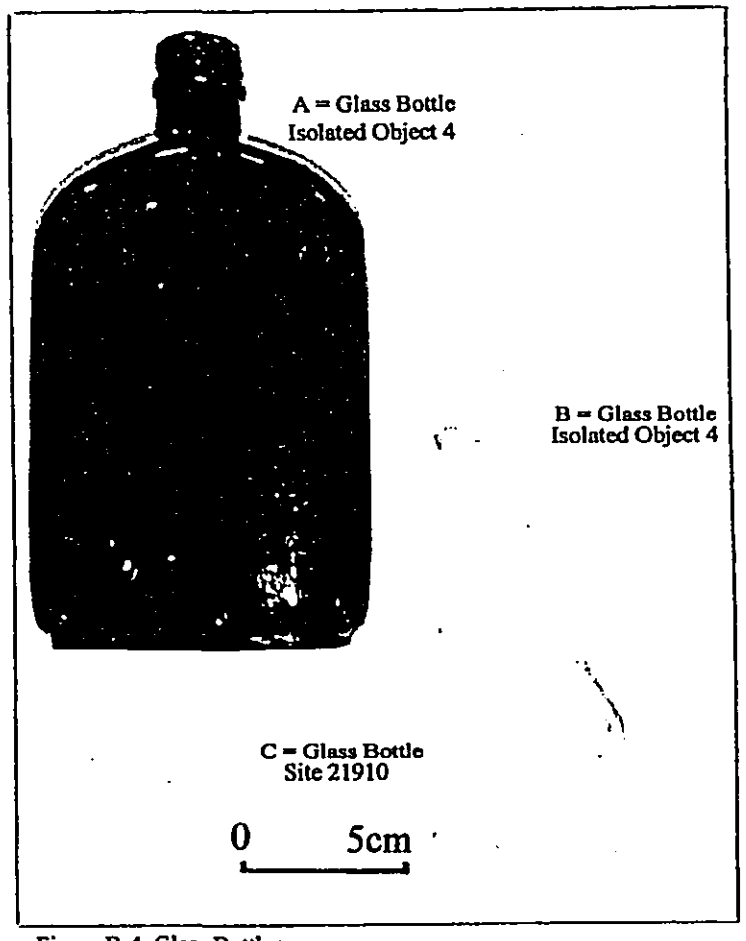


Figure B-4. Glass Bottles

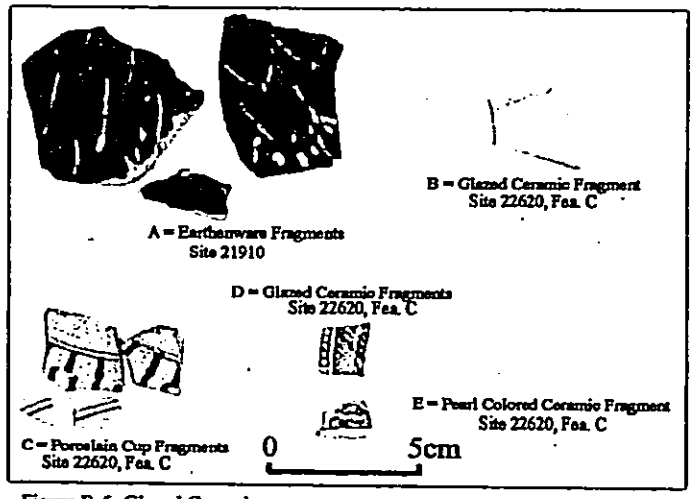


Figure B-5. Glazed Ceramics

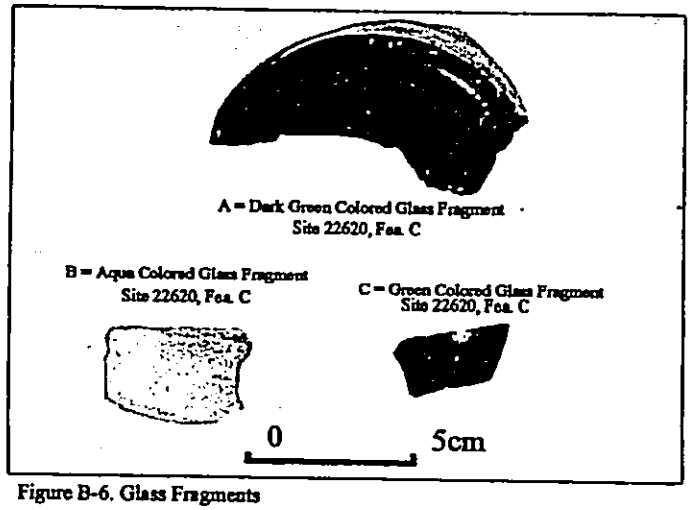


Figure B-6. Glass Fragments

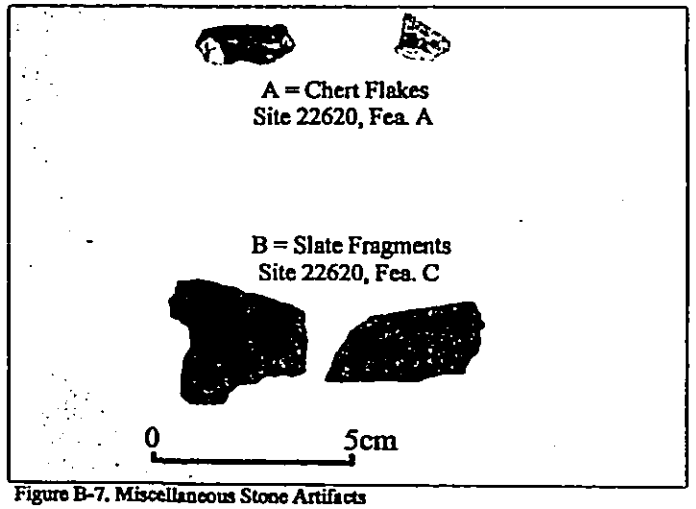


Figure B-7. Miscellaneous Stone Artifacts

APPENDIX C – SITE 22632 AGRICULTURAL FEATURE TABLES

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No	Comment
A	Terrace	23.20	1.20	0.00	0.45	2,178	West	780	
B	Terrace	22.40	1.90	0.00	0.50	2,182	West	781	
C	Terrace	25.80	1.40	0.00	0.45	2,180	West	782	
D	Terrace	27.00	2.20	0.10	0.85	2,182	West	783	Inside Feature F1 Enclosure
E	Terrace	34.50	1.20	0.00	0.50	2,185	Southwest	764	Inside Feature F1 Enclosure
F	Terrace	60.10	2.20	0.30	0.50	2,200	Northeast	808	
G	Terrace	18.10	1.40	0.10	0.50	2,195	East	804	
L	Terrace	33.20	1.80	0.00	0.52	2,200	East-northeast	789	Inside Feature LT Enclosure
P	Terrace	18.40	1.90	0.00	0.45	2,205	East	787	
Q	Terrace	32.30	1.50	0.10	0.75	2,235	South-southwest	786	
R	Terrace	65.90	1.80	0.00	0.45	2,238	South-southwest	783	
S	Terrace	72.50	1.40	0.30	0.60	2,240	Southwest	782	
T	Terrace	16.70	1.90	0.20	0.50	2,237	West-southwest	778	
U	Terrace	18.80	1.80	0.30	0.50	2,238	West-southwest	777	
Z	Terrace	20.40	1.50	0.00	0.35	2,160	West	736	
AA	Terrace	33.20	1.50	0.10	0.80	2,158	West-southwest	735	
AB	Terrace	34.90	2.50	0.00	0.50	2,159	West-southwest	732	
AC	Terrace	57.00	1.70	0.05	0.50	2,150	North	662	
AD	Terrace	24.70	2.50	0.05	0.40	2,148	Northeast	661	
AE	Terrace	58.00	1.50	0.30	0.80	2,149	Northeast	524	
AF	Terrace	29.00	3.10	0.00	0.40	2,150	North	734	
AG	Terrace	36.00	1.80	0.00	0.40	2,149	Northeast	564	
AJ	Terrace	84.40	4.10	0.25	0.70	2,155	Northwest	569	
AK	Terrace	27.00	3.50	0.35	0.70	2,150	Northwest	858	
AL	Terrace	61.20	2.40	0.35	0.75	2,158	West	661-662	
AN	Terrace	21.10	1.75	0.15	0.90	2,160	West	864	
AZ	Terrace	8.20	1.70	0.15	0.55	2,162	West	810	
BC	Terrace	25.80	1.80	0.10	0.55	2,170	Southwest	870	
BG	Terrace	21.90	2.50	0.10	0.55	2,171	Southwest	678	
BR	Terrace	31.00	1.50	0.00	0.35	2,173	South-southwest	684	
BS	Terrace	35.90	1.80	0.00	0.45	2,174	Southwest	683	
BW	Terrace	32.70	1.50	0.10	0.60	2,170	South-southwest	637	
BX	Terrace	38.90	1.70	0.30	0.65	2,172	Southwest	634	
BY	Terrace	20.80	1.50	0.00	0.45	2,185	Northwest	641	
BZ	Terrace	33.4	2.50	0.00	0.75	2,183	Southwest	642	
CC	Terrace	19.70	1.40	0.30	0.50	2,190	Southwest	645	
CD	Terrace	11.40	1.50	0.00	0.40	2,158	Southwest	644	Inside Feature F1 Enclosure
CG	Terrace	34.20	1.80	0.15	0.80	2,168	East-northeast	835	Inside Feature F1 Enclosure
CH	Terrace	11.00	1.70	0.05	0.40	2,167	East	636	Inside Feature F1 Enclosure
CI	Terrace	58.70	1.70	0.00	0.75	2,167	Northeast	630	Inside Feature F1 Enclosure
CL	Terrace	48.80	3.50	0.10	0.75	2,155	West	601	Inside Feature F1 Enclosure
CM	Terrace	19.30	2.70	0.10	0.65	2,156	West	602	Inside Feature F1 Enclosure
CO	Terrace	39.80	3.50	0.40	0.70	2,140	West-southwest	800	Inside Feature F1 Enclosure
CQ	Terrace	8.95	2.20	0.00	0.86	2,164	Northeast	633	Inside Feature F1 Enclosure
CR	Terrace	55.30	1.50	0.20	0.50	2,158	West-southwest	808	Inside Feature F1 Enclosure
CT	Terrace	28.20	1.75	0.30	0.80	2,158	West-southwest	812	Inside Feature F1 Enclosure
CU	Terrace	35.10	1.50	0.30	0.50	2,160	West	811	Inside Feature F1 Enclosure
CW	Terrace	36.70	1.90	0.30	0.70	2,164	Southwest	812	Inside Feature F1 Enclosure
CX	Terrace	18.70	2.50	0.10	0.50	2,165	West	815	Inside Feature F1 Enclosure
DB	Terrace	29.40	3.20	0.15	0.50	2,158	Southwest	629	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No.	Comment
DC	Terrace	28.90	1.90	0.10	0.45	2,158	Southwest	825	Inside Feature FI Enclosure
DD	Terrace	78.60	3.20	0.25	0.55	2,160	West-southwest	824	Inside Feature FI Enclosure
DI	Field Boundary	81.90	1.80	0.3-0.65	-	2,161	East-west	550	
DK	Terrace	58.90	1.90	0.35	0.65	2,170	Southwest	821	Inside Feature FI Enclosure
EI	Terrace	41.00	1.80	0.25	0.50	2,157	West-southwest	813	
EJ	Terrace	18.90	1.65	0.40	0.85	2,172	Northwest	695	
EK	Terrace	25.80	2.20	0.00	0.40	2,175	Southwest	703	
EL	Terrace	36.00	2.50	0.10	0.50	2,173	West	690	
EM	Terrace	19.20	2.70	0.10	0.50	2,177	West-southwest	691	
EN	Terrace	44.70	1.50	0.05	0.40	2,180	Southwest	694	
EP	Terrace	30.70	1.50	0.10	0.55	2,179	West-southwest	704	
EQ	Terrace	7.20	1.50	0.00	0.45	2,183	Southwest	707	
EU	Terrace	26.40	3.50	0.10	0.70	2,192	Southwest	697	
FA	Terrace	12.70	1.40	0.30	0.50	2,192	Southwest	706	
FJ	Terrace	41.90	2.70	0.00	1.40	2,180	South	724	
FL	Terrace	78.00	2.00	0.10	0.55	2,180	East-northeast	680	
FM	Terrace	27.80	2.30	0.00	0.45	2,175	East-northeast	674	
FO	Terrace	15.90	1.50	0.00	0.50	2,178	Southeast	678	
FP	Terrace	36.40	1.60	0.10	0.65	2,178	Northeast	677	
FQ	Terrace	22.00	2.20	0.35	0.60	2,178	Northwest	682	
FR	Terrace	27.50	1.55	0.00	0.80	2,178	West-northwest	686	
FS	Terrace	45.10	1.80	0.05	0.40	2,180	Southwest	687	
FT	Terrace	30.40	3.50	0.00	1.20	2,184	Northwest	692	
FU	Terrace	38.40	1.60	0.00	0.50	2,185	West-southwest	689	
FV	Terrace	28.20	1.50	0.20	0.45	2,190	Southwest	693	
FX	Terrace	41.80	2.90	0.10	0.80	2,185	West-southwest	685	
FY	Terrace	34.50	1.00	0.20	0.50	2,195	Northwest	718	
FZ	Terrace	3.70	1.50	0.00	0.30	2,193	Southwest	720	
GA	Terrace	25.20	1.75	0.00	0.55	2,197	Southwest	719	
GB	Terrace	47.40	2.50	0.00	0.35	2,186	Southwest	723	
GC	Terrace	18.80	2.00	0.00	0.65	2,189	Southwest	722	
GD	Terrace	8.90	2.90	0.00	1.10	2,192	Southwest	721	
GH	Terrace	30.00	1.50	0.10	0.55	2,205	Northwest	711	
GN	Terrace	31.70	1.70	0.00	0.45	2,205	Northwest	713	
GO	Terrace	5.70	2.50	0.30	0.40	2,184	South	554	
GP	Terrace	5.40	1.20	0.47	1.10	2,175	South	553	
GQ	Terrace	21.90	1.50	0.00	0.55	2,215	West-southwest	709	
HN	Terrace	50.90	1.70	0.10	0.45	2,207	Southeast	748	
HI	Field Boundary	20.20	1.50	0.45-0.65	-	2,212	North northwest-south southeast	746	
HX	Terrace	80.40	1.50	0.10	0.55	2,207	Southeast	747	
HN	Terrace	22.30	1.70	0.00	0.45	2,202	East	753	
HP	Terrace	29.70	1.80	0.25	0.55	2,214	Northeast	772	
HZ	Terrace	31.80	1.50	0.00	0.40	2,241	Northwest	818	
IO	Terrace	20.20	2.90	0.25	0.45	2,230	East-northeast	625	
IE	Terrace	22.40	4.50	0.00	0.97	2,215	East-northeast	523	
IU	Terrace	18.90	4.00	0.00	0.60	2,220	Southeast	518	
IW	Terrace	36.40	4.50	0.00	0.80	2,225	Southeast	520	
IY	Field Boundary	35.60	2.50	0.3-0.35	-	2,230	Northwest-southeast	501	
IZ	Terrace	19.30	2.10	0.00	0.30	2,230	Southeast	500	
JA	Terrace	25.50	4.30	0.00	0.44	2,331	Southeast	498	
JB	Field Boundary	48.20	2.10	0.3-0.35	-	2,235	West northwest-south southeast	497	
JC	Terrace	27.00	4.20	0.00	0.48	2,238	East	495	
JD	Field Boundary	97.80	2.80	0.5-0.65	-	2,238	Northwest	502	
JF	Terrace	23.70	3.00	0.00	0.27	2,240	Southeast	503	
JG	Terrace	21.50	2.20	0.00	0.38	2,255	Southeast	504	
JH	Terrace	21.80	3.00	0.00	0.40	2,250	Southwest	819	
JI	Terrace	35.70	2.70	0.00	0.35	2,260	Southeast	620	
JJ	Terrace	29.20	3.00	0.00	0.35	2,261	Southwest	821	
JK	Terrace	33.90	3.50	0.00	0.88	2,240	East-northeast	514	
JP	Terrace	40.50	5.80	0.00	0.70	2,275	Southwest	490	
JO	Terrace	80.80	3.00	0.60	0.78	2,263	Southwest	472+493	
JT	Terrace	58.50	4.00	0.05	0.52	2,249	Southwest	468	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No.	Comment
JU	Terrace	20.80	1.30	0.15	0.80	2,260	Southwest	471	
JV	Terrace	8.40	1.50	0.10	0.35	2,265	Northwest	478	
JW	Terrace	8.30	1.90	0.05	0.48	2,262	West-northwest	469	
JX	Terrace	17.30	2.40	0.25	0.40	2,257	West-southwest	467	
JY	Terrace	84.70	3.80	0.20	0.43	2,275	West-northwest	462/466	
KA	Terrace	43.80	3.00	0.00	0.40	2,275	Northwest	458	Inside Feature LS Enclosure
KB	Terrace	35.10	1.90	0.20	0.75	2,277	West	474	Inside Feature LS Enclosure
KC	Terrace	30.40	2.70	0.00	0.85	2,283	South	459	Inside Feature LS Enclosure
KD	Terrace	31.40	1.80	0.00	0.85	2,282	West-northwest	475	Inside Feature LS Enclosure
KF	Terrace	35.30	3.50	0.00	0.80	2,285	West-southwest	453	Inside Feature KM Enclosure
KG	Terrace	19.20	2.70	0.00	0.65	2,286	West-northwest	452	Inside Feature KM Enclosure
KH	Terrace	6.00	2.50	0.00	0.75	2,287	West-southwest	823	Inside Feature KM Enclosure
KN	Terrace	9.00	2.00	0.00	0.80	2,291	West	455	Inside Feature KM Enclosure
KO	Terrace	36.70	3.50	0.05	0.75	2,287	Southwest	460	Inside Feature KM Enclosure
KP	Terrace	23.40	3.20	0.00	0.55	2,285	Southwest	461	Inside Feature KM Enclosure
KQ	Terrace	18.30	1.80	0.15	0.45	2,285	Southeast	464	Inside Feature KM Enclosure
KR	Terrace	46.90	3.80	0.00	0.65	2,283	Southwest	432	
KS	Terrace	49.70	2.90	0.10	0.70	2,285	Northwest	430	
KT	Field Boundary	56.50	2.60	0.35-0.6	-	2,283	Northwest-southeast	428	
KU	Terrace	35.60	2.80	0.00	0.50	2,296	Northwest	427	
LE	Field Boundary	29.10	1.70	0.5-0.6		2,295	East-west	375	
LF	Terrace	92.20	3.50	0.35	0.70	2,297	West northwest	378	Inside Feature LT Enclosure
LG	Terrace	24.00	2.50	0.10	0.35	2,295	West	378	Inside Feature LT Enclosure
LH	Terrace	28.40	3.10	0.20	0.45	2,298	West northwest	425	Inside Feature LT Enclosure
LI	Terrace	18.30	2.50	0.00	0.35	2,294	West northwest	428	Inside Feature NM Enclosure
LJ	Terrace	42.00	3.00	0.00	0.58	2,295	South southwest	424	Inside Feature NM Enclosure
LK	Terrace	9.20	2.50	0.10	0.48	2,294	West northwest	421	Inside Feature NM Enclosure
LL	Terrace	18.00	1.90	0.00	0.35	2,291	West	422	Inside Feature NM Enclosure
LM	Terrace	25.00	3.10	0.25	0.65	2,290	West	423	Inside Feature NM Enclosure
LN	Terrace	40.50	3.50	0.10	1.10	2,298	South	380	Inside Feature NM Enclosure
LX	Field Boundary	15.40	2.70	0.4-0.55	-	2,303	North northwest-south southeast	418	
LY	Terrace	37.00	3.00	0.00	0.41	2,305	Southeast	385	
LZ	Terrace	33.20	2.75	0.00	0.52	2,305	South southwest	386	
MA	Field Boundary	26.30	3.00	0.45-0.75		2,307	Northeast-southwest	388	
MH	Terrace	22.30	2.00	0.00	0.40	2,308	East	439	
ML	Terrace	25.50	2.50	0.00	0.85	2,308	Southeast	416	
MM	Terrace	39.20	3.20	0.00	0.65	2,311	Southwest	389	
MN	Terrace	50.40	3.50	0.00	0.78	2,313	Southwest	390	
MX	Terrace	56.80	3.60	0.10	0.75	2,318	Southwest	394	
MY	Terrace	31.90	3.00	0.10	0.40	2,319	Southwest	395	
MZ	Terrace	34.20	3.75	0.05	0.85	2,318	South	405	
NC	Terrace	36.00	1.90	0.30	0.80	2,315	South	400	
ND	Field Boundary	85.80	1.80	0.35-0.6	-	2,310	East northeast- west southwest	442	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No.	Comment
NF	Terrace	20 10	2.50	0 00	0 35	2,318	Southwest	390	
NG	Terrace	21 40	2 70	0 00	0 45	2,330	South southwest	334	
NH	Terrace	24 80	2 50	0 00	0 51	2,318	Southwest	336	
NI	Terrace	49 30	4 50	0 20	0 75	2,312	Southwest	387	
NK	Terrace	13 90	3 00	0 00	0 45	2,310	East southeast	341	
NN	Terrace	12 10	1 80	0 00	0 40	2,358	North	330	
NO	Field Boundary	26.10	1.50	0 1-0 32	-	2,362	East northeast- west southwest	329	
NP	Terrace	13 40	3 50	0 10	0 55	2,363	Northeast	327	
NQ	Terrace	25 50	3 10	0 00	0 42	2,363	Northeast	328	
NR	Terrace	27 00	4 20	0 05	0 25	2,364	East	325	
NS	Terrace	18 00	3 00	0 00	0 35	2,365	East	369	
NT	Terrace	25 60	1 50	0 30	0 50	2,339	Southwest	321	
NU	Terrace	18 80	3 50	0 10	0 50	2,340	Southwest	629	
NV	Terrace	63 10	3 50	0 00	0 80	2,315	Northwest	314	
NW	Terrace	44 00	3 80	0 00	0 51	2,312	West	315	
NX	Field Boundary	13 50	1 85	0 4-0 45	-	2,313	East-west	317	
NY	Field Boundary	39 00	3 00	0 5-0 8	-	2,312	East-west	349	
NZ	Terrace	33 00	3 20	0 00	0 65	2,311	West-southwest	346	
OA	Terrace	149 80	3 90	0 45	0 80	2,305	Northwest	347	
OB	Terrace	78 40	2 40	0 30	0 80	2,309	West-northwest	345	
OC	Terrace	26 00	1 70	0 00	0 15	2,307	South-southeast	348	
OD	Terrace	57 30	3 50	0 00	0 80	2,302	West	358	
OE	Field Boundary	52 30	1 80	0 25-0 45	-	2,301	East-west	331	
OU	Terrace	43 00	3 00	0 05	0 45	2,305	South	354	
OV	Terrace	10 30	2 90	0 00	0 51	2,307	West	356	
OW	Field Boundary	50 00	1 70	0 4-0 5	-	2,310	East-west	312	
OX	Terrace	36 40	4 45	0 10	0 71	2,310	West-northwest	310	
OY	Terrace	29 80	3 30	0 00	0 39	2,307	Southwest	357	
PQ	Terrace	50 20	3 00	0 15	0 55	2,267	Northwest	370	
PH	Terrace	57 30	2 90	0 05	0 40	2,290	Northwest	368	
PJ	Terrace	63 90	3 50	0 25	0 70	2,295	Northwest	361	
PQ	Field Boundary	44.80	1.40	0 35-0.75	-	2,296	Northwest-southeast	827	
PR	Terrace	49 60	3 20	0 13	0 55	2,297	Northwest	363	
PS	Terrace	35 70	2 50	0 05	0 87	2,299	Northwest	364	
PT	Terrace	57 90	2 70	0 05	0 45	2,302	Northwest	365	
PU	Terrace	20 60	1 40	0 35	0 52	2,304	West-northwest	828	
PX	Terrace	23 40	1 70	0 00	0 22	2,305	West-northwest	301	
PZ	Terrace	73 50	2 90	0 05	0 38	2,307	Southwest	306	
QB	Terrace	87 80	3 10	0 15	0 45	2,308	West-southwest	298	
QC	Terrace	39 00	4 30	0 27	0 40	2,311	West-southwest	829	
QD	Terrace	38 00	2 80	0 15	0 30	2,310	West	300	
QG	Terrace	38 4	3 50	0 20	0 45	2,312	West-northwest	293	
QH	Field Boundary	40 10	2 20	0 15-0 35	-	2,315	East-west	295	
QI	Terrace	35 80	4 14	0 15	0 32	2,315	West-southwest	296	
QJ	Terrace	54 80	4 20	0 30	0 58	2,317	West-southwest	289	
QN	Terrace	19 40	2 70	0 00	0 15	2,319	Southwest	290	
QO	Terrace	45 60	3 70	0 00	0 75	2,312	West	313	
QP	Terrace	42 30	4 00	0 00	0 61	2,311	West	307	
QY	Field Boundary	68 60	4.20	0 5-0 81	-	2,312	East northeast- west southwest	311	
QZ	Terrace	85 80	3 70	0 00	0 58	2,310	West-northwest	308	
RA	Terrace	57.20	4 00	0 00	0 32	2,317	West	283	Bordered by Feature OK ditch
RB	Field Boundary	17.90	1.80	0.3-0.29	-	2,316	Northeast-southwest	316	
RD	Terrace	78 90	4 00	0 00	0 52	2,318	West	284	
RE	Field Boundary	29 60	3 00	0.29-0.3	-	2,318	East northeast- west southwest	285	
RF	Terrace	32.30	2 90	0 00	0 38	2,319	Southwest	287	
RG	Terrace	78 10	4 20	0 00	0 41	2,320	West-southwest	282b	
RH	Terrace	30 60	3 00	0 00	0 42	2,320	West-northwest	282	
RI	Terrace	63 70	3 00	0 00	0 62	2,325	Southwest	281	
RJ	Terrace	80 40	1 80	0 00	0 45	2,335	Southwest	253	
RK	Field Boundary	19 90	4 50	0.1-0.71	-	2,338	Northeast-southwest	280	
RL	Terrace	48 00	2 50	0 00	0 48	2,340	Southwest	254	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No	Comment
RO	Terrace	18 10	1 80	0 00	0 50	2,355	West-northwest	274	
RP	Terrace	20 60	1 80	0 00	0 30	2,352	South southwest	277	
RQ	Pond	35 0 X 30 1	1 80	0 45	0 92	2,362	Northwest-southeast	271	
RS	Terrace	8 50	1 80	0 00	0 51	2,366	Northeast	263	
RT	Field Boundary	24 10	1 50	0 25-0 8	-	2,368	East-west	204	
RU	Terrace	8 50	2 50	0 00	0 42	2,365	Northeast	209	
RV	Terrace	48 00	3 50	0 20	0 50	2,370	West	203	
RW	Terrace	71 80	3 40	0 00	0 45	2,377	Southwest	206	
RX	Terrace	53 00	2 50	0 25	0 85	2,373	West	210	
RY	Field Boundary	8 90	1 80	0 15-0 45	-	2,372	Northeast-southwest	205	
RZ	Terrace	22 80	1 50	0 00	0 50	2,375	Northwest	202	
SA	Terrace	17 80	1 70	0 00	0 35	2,378	Southeast	199	
SB	Terrace	32 70	1 80	0 25	0 50	2,378	Northeast	198	
SC	Terrace	32 80	3 50	0 00	0 85	2,367	Southeast	830	
SD	Terrace	76 50	4 80	0 25	0 41	2,360	Southwest	144	
SF	Terrace	58 50	3 50	0 20	0 41	2,361	Southwest	150	
SG	Terrace	23 80	1 90	0 31	0 68	2,361	Southwest	148	
SH	Terrace	63 90	4 40	0 15	0 78	2,361	Northwest	152	
SI	Terrace	30 10	3 70	0 00	0 35	2,362	South	193	
SJ	Terrace	53 00	3 00	0 08	0 45	2,358	Southwest	188	
SK	Terrace	87 80	3 00	0 39	0 65	2,363	West	215	
SL	Terrace	123 00	2 90	0 30	0 65	2,363	West southwest	212	
SM	Terrace	101 50	1 80	0 00	0 50	2,360	Southwest	213	
SW	Terrace	187 70	3 60	0 20	0 60	2,348	Southwest	214	
SX	Terrace	23 10	2 00	0 15	0 70	2,355	Southeast	191	
SY	Terrace	86 70	3 10	0 00	0 25	2,352	Southwest	186	
TA	Terrace	65 10	2 50	0 35	0 55	2,355	Southwest	189	
TB	Field Boundary	17.50	2.10	0 3-0 55	-	2,340	Northeast-southwest	223	
TC	Terrace	102 00	4 50	0 15	0 40	2,340	Southwest	224	
TD	Terrace	63 50	1 90	0 00	0 29	2,342	Southwest	832	
TE	Terrace	37 60	3 70	0 00	0 45	2,346	Southwest	184	
TF	Terrace	67 90	3 20	0 15	0 45	2,337	Southwest	225	
TG	Terrace	54 90	2 30	0 50	0 36	2,335	Southwest	228	
TH	Terrace	66 50	2 90	0 10	0 50	2,334	Southwest	229	
TI	Terrace	66 00	2 10	0 10	0 65	2,332	Southwest	227	
TJ	Terrace	40 70	3 60	0 15	0 65	2,330	Southwest	226	
TK	Terrace	16 90	2 70	0 10	0 32	2,328	Southwest	243	
TL	Terrace	33 10	2 70	0 35	0 80	2,326	Northwest	244	
TP	Terrace	30 00	1 50	0 00	0 30	2,329	West	247b	
TY	Terrace	21 40	1 90	0 20	0 70	2,331	West southwest	241	
UA	Terrace	19 10	1 60	0 00	0 35	2,326	South-southeast	234	
UF	Terrace	9 40	1 50	0 10	0 55	2,343	Southwest	231	
UG	Terrace	16 50	2 50	0 30	0 50	2,346	Southwest	175	
UJ	Terrace	23 70	2 10	0 20	0 50	2,353	Southwest	178	
UK	Terrace	34 50	3 50	0 40	0 80	2,355	Southwest	176	
UN	Terrace	41 30	3 80	0 00	1 00	2,355	South southeast	170	
UO	Terrace	26 00	3 10	0 00	0 30	2,355	South	172	
UP	Terrace	61 70	3 10	0 38	0 72	2,358	Southwest	185	
UQ	Terrace	29 10	4 10	0 00	1 15	2,256	West-southwest	171	
UT	Terrace	25 20	1 80	0 10	0 75	2,362	South	131	
UV	Terrace	36 00	3 10	0 42	0 78	2,369	West-southwest	126	
UW	Terrace	28 60	2 70	0 05	0 45	2,370	West-southwest	125	
UX	Terrace	27 80	2 40	0 25	0 45	2,367	Southwest	124	
UY	Terrace	57 40	2 50	0 30	0 65	2,368	Southwest	127	
VF	Terrace	14 80	1 80	0 31	0 55	2,361	Southwest	168	
VI	Terrace	18 00	3 10	0 00	0 32	2,363	West-southwest	167	
VK	Terrace	38 00	3 00	0 00	0 50	2,367	South-southeast	160	
VL	Terrace	27 80	3 50	0 00	0 75	2,366	Southwest	123	
VM	Terrace	44 80	3 50	0 10	0 50	2,365	Southwest	157	
VN	Terrace	51 30	3 50	0 05	0 55	2,362	Southwest	158	
VO	Terrace	22 10	3 00	0 00	0 35	2,366	West-southwest	155	
VP	Terrace	65 10	4 10	0 15	0 51	2,371	West-southwest	121	
VQ	Terrace	104 70	3 50	0 10	0 40	2,376	West-southwest	119	
VS	Terrace	143 40	4 10	0 00	0 82	2,380	West-southwest	63	
VT	Terrace	10 00	1 70	0 00	0 32	2,384	West-southwest	61	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No.	Comment
VU	Terrace	34.90	4.20	0.10	0.55	2,384	West-southwest	82	
VZ	Terrace	38.90	3.50	0.15	0.61	2,387	West-southwest	85	
WC	Terrace	21.40	1.80	0.06	0.31	2,375	Northwest	117	
WG	Terrace	6.90	1.50	0.00	0.55	2,367	Northwest	153	
WH	Terrace	29.40	2.80	0.05	0.73	2,365	Northwest	148	
WI	Terrace	22.80	4.10	0.00	0.58	2,362	Northwest	147	
WJ	Terrace	109.00	3.00	0.00	0.35	2,360	Southwest	143	
WK	Terrace	32.70	1.80	0.00	0.55	2,372	South-southwest	141	
WL	Terrace	54.60	3.70	0.00	0.45	2,372	West-southwest	114	
WM	Terrace	38.40	4.00	0.00	0.60	2,375	West-southwest	110	
WN	Terrace	29.30	2.45	0.30	0.50	2,375	Northwest	112	
WO	Terrace	37.00	3.00	0.05	0.67	2,378	North	113	
WP	Terrace	34.10	4.50	0.00	0.82	2,381	Southwest	108	
WQ	Terrace	36.30	3.50	0.00	0.69	2,385	West-southwest	107	
WR	Terrace	39.00	1.50	0.00	0.70	2,372	Southwest	140	
WS	Terrace	33.70	4.00	0.00	0.80	2,381	South-southwest	139	
WT	Terrace	45.30	2.75	0.25	0.65	2,383	Southwest	137	
WU	Terrace	46.90	3.80	0.40	0.82	2,386	Southwest	136	
WV	Terrace	118.70	2.90	0.25	0.50	2,390	Southwest	135	
WW	Terrace	68.00	3.50	0.15	0.75	2,392	West-southwest	134	
WX	Terrace	72.70	1.90	0.30	0.75	2,395	Southwest	101	
WY	Terrace	18.70	2.00	0.00	0.80	2,383	South-southwest	103	
WZ	Terrace	11.70	3.50	0.30	1.20	2,390	South-southwest	105	
XA	Terrace	79.00	2.80	0.20	0.35	2,399	Southwest	98	
XB	Pond	11.2 X 9.2	1.50	0.15	0.30	2,398	Northwest-southwest	96	
XC	Terrace	57.20	3.00	0.30	0.75	2,401	South-southwest	88	
XD	Terrace	65.30	3.20	0.40	0.70	2,402	Southwest	95	
XE	Terrace	272.10	2.50	0.15	0.55	2,410	North	35	
XG	Terrace	47.20	3.50	0.05	0.30	2,404	Northeast	81	
XH	Terrace	73.40	3.70	0.25	0.72	2,410	Southwest	78	
XI	Terrace	72.30	4.10	0.10	0.51	2,411	Southwest	81	
XJ	Terrace	78.00	2.50	0.00	0.85	2,408	North	84	
XK	Terrace	24.10	2.10	0.00	0.35	2,404	West	93	
XL	Terrace	25.10	1.90	0.05	0.35	2,407	West-southwest	92	
XM	Terrace	47.30	2.50	0.10	0.45	2,411	Southwest	76	
XN	Terrace	70.10	4.00	0.21	0.70	2,419	Southwest	82	
XO	Terrace	197.50	3.50	0.08	0.65	2,425	Southwest	21	
XP	Terrace	87.70	2.75	0.25	0.72	2,428	Southwest	33	
XQ	Terrace	148.80	3.20	0.00	0.35	2,435	Southwest	23	
XS	Terrace	77.10	3.50	0.15	0.65	2,437	Southwest	28	
XT	Field Boundary	71.50	1.70	0.2-0.41	-	2,445	Northeast-southwest	29	
XU	Terrace	73.80	3.50	0.45	0.75	2,442	Southwest	27	
XV	Field Boundary	12.20	1.90	0.3-0.5	-	2,447	Northwest-southeast	30	
XW	Terrace	77.60	4.10	0.35	0.60	2,440	Southwest	24	
XX	Field Boundary	21.20	1.80	0.2-0.4	-	2,424	Northeast-southwest	36	
YA	Terrace	41.80	4.30	0.00	0.41	2,442	Southwest	20	
YB	Field Boundary	129.20	1.30	0.25-0.45	-	2,420	East northeast- west southwest	39	
YC	Terrace	88.70	2.90	0.10	0.42	2,418	Southwest	40	
YD	Terrace	44.60	3.50	0.00	0.43	2,413	West-southwest	41	
YE	Terrace	33.00	3.50	0.00	0.56	2,411	West-southwest	71	
YF	Terrace	57.40	4.80	0.00	0.55	2,406	West-southwest	70	
YG	Terrace	22.80	3.00	0.00	0.92	2,405	Northwest	72	
YH	Terrace	42.90	3.20	0.05	0.45	2,405	Southwest	73	
YI	Terrace	37.00	1.90	0.00	0.33	2,400	Southeast	67	
YJ	Terrace	25.30	2.70	0.15	0.40	2,400	East	89	
YK	Terrace	21.90	3.80	0.10	0.81	2,398	Southwest	66	
YL	Terrace	15.10	3.50	0.10	0.52	2,412	South	43	
YM	Terrace	47.70	2.30	0.15	0.40	2,435	Southwest	17	
YO	Terrace	20.00	2.00	0.00	0.35	2,433	Southwest	15	
YP	Terrace	25.20	1.90	0.15	0.32	2,430	Southwest	13	
YQ	Terrace	45.60	3.20	0.00	0.48	2,424	Southwest	12	
YR	Terrace	33.70	4.00	0.20	0.85	2,418	Southwest	11	
YS	Terrace	78.90	3.20	0.00	0.7	2,420	South-southwest	8	

Table C-1. Summary of Site 22632 Agricultural Terraces, Field Boundaries and Pond Fields (cont.)

Feature	Type	Length	Width	Height (upslope)	Height (downslope)	Elevation (feet)	Slope direction	Temp. Field No.	Comment
YT	Terrace	9.90	3.70	0.00	0.88	2,418	Southwest	9	
YU	Terrace	50.60	3.50	0.15	0.45	2,396	Southwest	6	
YV	Terrace	47.80	3.90	0.00	0.35	2,398	Southwest	7	
YW	Field Boundary	26.00	4.00	0.7-0.8	-	2,400	Northwest-southeast	5	
YX	Terrace	27.50	3.70	0.00	0.4	2,407	Southwest	4	
YY	Terrace	11.00	2.60	0.00	0.8	2,402	South	4b	
YZ	Terrace	45.40	3.90	0.20	0.70	2,390	South-southeast	48	
ZA	Terrace	109.80	3.00	0.15	0.82	2,385	Southwest	54b	
ZE	Terrace	30.10	4.10	0.00	0.71	2,375	West-southwest	56	
ZF	Terrace	55.30	4.20	0.10	0.48	2,385	West	54	
ZG	Terrace	31.10	2.70	0.00	0.32	2,375	Southwest	55	
ZH	Terrace	26.70	4.50	0.00	0.73	2,385	West-northwest	2	
ZK	Terrace	68.80	3.00	0.00	0.65	2,439	South-southwest	780	
ZL	Terrace	70.00	2.80	0.00	0.85	2,445	South	781	
ZM	Terrace	72.00	2.50	0.00	0.80	2,450	Southwest	787	
ZN	Terrace	87.00	2.80	0.00	1.10	2,460	South-southeast	794	
ZO	Terrace	104.40	1.90	0.00	0.75	2,464	South-southeast	795	
ZP	Terrace	37.10	2.90	0.00	0.70	2,462	Southwest	783	
ZQ	Terrace	51.80	1.80	0.00	0.55	2,462	South-southeast	796	
ZR	Terrace	64.40	2.50	0.00	0.45	2,462	West	798	
ZS	Terrace	34.10	3.00	0.10	0.50	2,466	West-southwest	797	
ZT	Terrace	54.90	2.00	0.00	0.58	2,458	South-southwest	802	
ZU	Terrace	41.50	1.40	0.00	0.80	2,470	South-southwest	801	
ZV	Terrace	32.40	1.80	0.00	0.75	2,470	West	800	
AAA	Terrace	24.80	2.50	0.25	0.75	2,339	West	833	
AAB	Terrace	21.90	3.30	0.00	0.45	2,330	West	834	

Table C-2. Summary of Site 22632 Agricultural Fields

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
1	596.5	2,178	A	B	-	-	
2	886.7	2,186	B	C	-	-	
3	448.2	2,191	C	D	-	-	
4	814.1	2,193	D	E	-	-	
5	1706.0	2,197	G	F	-	-	
6	1506.1	2,197	F	G	-	-	Feature K ditch along north side
7	1614.5	2,197	L	G	-	-	Feature K ditch along north side
8	1018.3	2,198	P	L	-	-	Feature K ditch along north side
9	970.6	2,236	Q	-	-	-	Truncated by Kawaihae Road to north
10	1039.5	2,239	R	S	-	-	
11	1058.0	2,241	S	-	-	-	Truncated by Kawaihae Road to north
12	366.0	2,237	T	U	-	-	
13	832.9	2,207	HH	HK	HI	-	
14	353.8	2,158	AA	AB	AC	-	
15	1017.0	2,149	AC	AE	AB	-	
16	652.6	2,148	AE	AG	AF	-	
17	469.1	2,148	AD	AE	-	-	
18	149.6	2,159	Z	AA	-	-	
19	337.5	2,159	AB	-	AC	-	Bordered by slope on upslope side
20	287.4	2,149	AK	-	AJ	-	Bordered by slope on upslope side
21	1494.1	2,156	AJ	-	AK	-	Bordered by slope on upslope side
22	961.9	2,152	AF	AJ	-	-	
23	838.1	2,159	AL	AN	-	-	
24	130.4	2,163	AZ	-	AN	-	Bordered by slope on upslope side
25	330.2	2,171	BC	-	-	-	Bordered by Feature FI well on upslope side
26	175.0	2,159	CD	CC	-	-	
27	525.5	2,155	CM	CL	-	-	
28	556.3	2,164	BZ	-	BY	CA	Bordered by slope on upslope side
29	272.3	2,162	CC	BZ/CA	-	-	
30	499.5	2,170	BW	BY	BX	-	
31	297.6	2,170	BW	BR	BX	-	
32	823.5	2,167	CG	BX/CQ	BW	CI	
33	1194.1	2,173	BX	EL	BR	FI	
34	184.3	2,168	CG	CH	-	-	
35	818.0	2,175	EL	EM	-	-	
36	1047.0	2,178	EM	EN	EJ	-	
37	1938.1	2,186	EN	EU	EJ	-	
38	300.0	2,193	EU	-	-	-	Bordered by slope on upslope side
39	98.7	2,193	FA	-	-	-	Bordered by slope on upslope side
40	571.8	2,177	EK	EP	-	-	
41	243.3	2,183	EP	EQ	-	-	
42	308.5	2,216	GQ	-	-	-	Bordered by slope on upslope side
43	299.8	2,205	GH	GN	-	-	
44	415.7	2,180	GN	-	-	-	Bordered by slope on upslope side
45	1590.1	2,158	DO	EI	DI	-	
46	1717.4	2,171	DK	DI	-	-	
47	847.5	2,165	DO	DK	DI	-	
48	318.6	2,163	CX	DO	DI	-	
49	947.0	2,164	CW	CX	-	-	
50	570.8	2,162	CU	CW	-	-	
51	796.0	2,159	CR	CT/CU	-	-	

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
52	734.9	2,158	CT	DB	-	-	
53	493.9	2,158	DB	DC	-	-	
54	826.2	2,159	DC	DD	DI	-	
55	276.2	2,178	FM	FI	-	-	Inside Feature FI enclosure
56	1418.4	2,177	FL	FM	FO	-	Inside Feature FI enclosure
57	511.0	2,181	FJ	-	FL	-	Bordered by slope on upslope side; Inside Feature FI enclosure
58	582.3	2,178	FP	FI	FQ	-	Inside Feature FI enclosure
59	392.8	2,178	FQ	FR	FI	-	Inside Feature FI enclosure
60	621.3	2,179	FR	FS	FW	FI	Inside Feature FI enclosure
61	165.9	2,184	FT	FI	FS	-	Inside Feature FI enclosure
62	815.7	2,183	FS	FU	FT	FW	Inside Feature FI enclosure
63	1021.9	2,187	FU	FV	FT	-	Inside Feature FI enclosure
64	1224.9	2,195	FV/FY	FI	-	-	Inside Feature FI enclosure
65	346.6	2,195	FZ	GA	FY	-	Inside Feature FI enclosure
66	533.9	2,196	GA	FI	-	-	Inside Feature FI enclosure
67	68.2	2,193	GD	-	-	-	Bordered by slope on upslope side; Inside Feature FI enclosure
68	173.2	2,190	GC	GD	-	-	Inside Feature FI enclosure
69	359.1	2,186	GB	GC	-	-	Inside Feature FI enclosure
70	375.1	2,186	FX	GB	FW	-	Inside Feature FI enclosure
71	434.4	2,242	HZ	-	-	-	Bordered by slope on upslope side
72	443.7	2,241	JK	-	-	-	Bordered by slope on upslope side
73	157.5	2,230	ID	-	-	-	Bordered by slope on upslope side
74	232.4	2,215	IE	-	-	-	Bordered by slope on upslope side
75	152.7	2,220	IU	-	-	-	Bordered by slope on upslope side
76	943.0	2,223	IW	IU	-	-	
77	584.1	2,230	IZ	-	IY	JO	Bordered by slope on upslope side
78	919.9	2,227	IZ	IW	IY	-	
79	796.8	2,225	JA	IZ	JO	-	
80	512.6	2,240	JF	-	JO	-	Bordered by slope on upslope side
81	934.3	2,235	JC	JA	JB	JO	Bisected by Feature JM ditch
82	380.2	2,239	JC	JF	JO	-	
83	610.8	2,260	JI	-	JJ	-	Bordered by slope on upslope side
84	407.6	2,260	JI	-	JJ	-	Bordered by slope on upslope side
85	628.1	2,260	JH	JI	-	-	
86	221.6	2,225	JG	-	-	-	Bordered by slope on upslope side
87	998.5	2,258	JO	JP	JR	-	Bisected by Feature JM ditch
88	562.6	2,275	JP	-	JR	-	Bordered by slope on upslope side; Bisected by Feature JM ditch
89	1450.3	2,280	KB/KD	KF	JR	-	
90	373.0	2,265	KF	KG	JR	-	
91	254.6	2,286	KG	KH	-	-	
92	35.8	2,291	KH	KM	-	-	
93	550.7	2,283	KC	-	-	-	Bordered by slope on upslope side
94	2321.2	2,277	JM/JX/KA	JY	KC	-	
95	816.9	2,255	JT	JU	-	-	
96	191.1	2,260	JU	-	-	-	Bordered by slope on upslope side
97	4583.8	2,280	JY	KS	KR	JS	
98	168.9	2,275	KR	KQ	KP	JY	
99	341.9	2,285	KP	KO	KQ	-	
100	402.4	2,287	KO	KM	-	-	

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
101	255.5	2,285	KR	KQ	KQ	KM	
102	3114.3	2,290	KS	KU	KT	-	
103	2345.4	2,290	KS	KU	KT	JS	
104	677.9	2,290	KU	-	-	-	Bordered by slope on upslope side
105	354.6	2,294	LM	LL	-	-	
106	370.0	2,292	LL	LK	LJ	-	
107	292.5	2,295	LK	LI	LJ	-	
108	370.9	2,295	LJ	-	LH	-	Bordered by slope on upslope side
109	178.2	2,295	LI	LH	LJ	-	
110	327.9	2,295	LH	LG	-	-	
111	866.7	2,295	LG	LF	LE	LN	
112	841.6	2,298	LN	LS	LF	-	
113	879.6	2,297	LF	OD	OE	LT	
114	1172.8	2,297	LF	OD	OE	-	
115	551.6	2,302	OD	OB	OC	-	
116	579.1	2,307	OC	LT	-	-	
117	775.0	2,302	OD	OB	OE	-	
118	878.9	2,305	OB	OA	NZ	LT	
119	1486.3	2,312	OA	NW	NZ	NX/NY	
120	4155.3	2,309	OA	OV	OU	-	
121	440.0	2,311	NZ	-	OA	-	Bordered by slope on upslope side
122	1226.9	2,307	OA	NW	NY	OU/OW	
123	953.1	2,307	OY	OX	OW	-	
124	235.4	2,310	OX	OZ	OW	OY	
125	459.5	2,310	OX	OZ	OY	-	
126	685.7	2,315	NV	OZ	OW	-	
127	846.7	2,313	NW	NV	OW	-	
128	1011.0	2,310	OZ	RA	RB	-	
129	1604.9	2,310	OZ	RA	OY	RB	
130	424.0	2,310	OZ	OP	OY	-	
131	391.7	2,311	OP	OO	OY	-	
132	914.3	2,312	OO	RA	OY	-	
133	362.0	2,317	RA	RD	-	-	
134	432.2	2,316	RD	RH	-	-	
135	851.6	2,318	RD	RF	RE	-	
136	283.1	2,319	RF	RG	-	-	
137	636.2	2,320	RG	RI	-	-	
138	297.3	2,320	RH	RG	-	-	
139	1433.8	2,325	RI	RJ	RK	-	
140	251.1	2,325	RI	RJ	RK	-	
141	183.2	2,335	RJ	RL	RK	-	
142	851.8	2,335	RJ	RL	RK	-	
143	516.6	2,340	RL	-	-	-	Bordered by slope on upslope side
144	135.0	2,319	QN	-	-	-	Bordered by slope on upslope side; Feature QK ditch to east
145	883.7	2,317	QJ	QN	QK	-	Feature QK ditch to east
146	1575.8	2,312	QG	QJ	QH	QK	Feature QK ditch to east
147	823.1	2,315	QI	QJ/QK	QH	-	Feature QK ditch to east
148	593.2	2,311	QC	QI	QH	-	Feature QK ditch to south
149	841.1	2,310	QD	QG	-	-	
150	2088.5	2,308	QB	QC/QD	-	-	
151	1305.6	2,307	PZ	QB	-	-	

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
152	298.3	2,305	PX	PZ	-	-	
153	228.0	2,304	PU	PX	-	-	
154	782.1	2,302	PT	PU	-	-	
155	977.8	2,295	PJ	PT	PQ	-	
156	350.9	2,299	PS	PT	PQ	-	
157	722.8	2,297	PR	PS	PQ	-	
158	1350.3	2,295	PJ	PR	PQ	-	
159	2277.2	2,290	PH	PJ	-	-	
160	1173.2	2,287	PG	PH	-	-	
161	330.6	2,310	NK	-	LT	-	Bordered by slope on upslope side,Inside Feature LT enclosure
162	1300.7	2,312	NI	NH	LT	NJ	Inside Feature LT enclosure, Feature NJ ditch to east
163	873.3	2,318	NH	NG	LT	NJ	Inside Feature LT enclosure, Feature NJ ditch to east
164	499.5	2,330	NG	LT	-	-	Inside Feature LT enclosure
165	656.5	2,305	LY	LZ	LX	-	Inside Feature LS enclosure
166	682.4	2,305	LZ	MM	ML	MA	Inside Feature LS enclosure
167	710.5	2,311	MM	MN	LT	-	Inside Feature KM enclosure
168	1171.4	2,313	MN	MX	LT	-	Inside Feature KM enclosure
169	609.2	2,318	MX	MY	LT	-	Inside Feature KM enclosure
170	1353.8	2,319	MY	KM	-	-	Inside Feature KM enclosure
171	670.5	2,318	MZ	KM	-	-	Inside Feature KM enclosure
172	234.9	2,308	MH	-	-	-	Bordered by slope on upslope side,Inside Feature KM enclosure
173	565.9	2,315	NC	ND	-	-	
174	219.8	2,318	NF	-	ND	-	Bordered by slope on upslope side
175	149.8	2,359	NH	NO	NM	-	Inside Feature NM enclosure
176	133.8	2,363	NP	-	NO	NL	Bordered by slope on upslope side,Inside Feature NM enclosure; Feature NL ditch along south side
177	208.5	2,363	NQ	NP	NL	-	Inside Feature NM enclosure, Bisected by Feature NL ditch
178	702.9	2,364	NR	NQ	NL	-	Inside Feature NM enclosure, Bisected by Feature NL ditch
179	872.9	2,365	NS	NR	-	-	Inside Feature NM enclosure, Bisected by Feature NL ditch
180	206.6	2,339	NT	-	-	-	Bordered by slope on upslope side; Feature NJ ditch enters field on north side
181	144.8	2,340	NU	-	-	-	Bordered by slope on upslope side
182	354.2	2,352	RP	-	RO	-	Bordered by slope on upslope side
183	1010.0	2,362	RQ	QK	-	-	Pond bordered on northwest and southwest by Feature QK ditch
184	47.5	2,366	RS	-	-	-	Bordered by slope on upslope side
185	1326.2	2,365	RU	RV	RT	-	
186	1307.9	2,370	RV	RW	RX	-	
187	236.4	2,372	RW	RX	RY	-	
188	547.1	2,372	RW	-	RY	OL	Bordered by slope on upslope side; Feature OL ditch along north side
189	258.3	2,375	RZ	-	OL	-	Bordered by slope on upslope side; Feature OL ditch along north side
190	991.7	2,373	RX	-	-	-	Bordered by slope on upslope side
191	303.8	2,379	SA	-	SB	-	Bordered by slope on upslope side
192	402.1	2,378	SB	-	SA	-	Bordered by slope on upslope side
193	1966.3	2,363	SK	-	SI	-	Bordered by slope on upslope side

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
194	1783.0	2,363	SL	SK	-	-	
195	1106.5	2,360	SM	SL	-	-	
196	1949.6	2,348	SW	SM	-	-	
197	3469.8	2,348	SW	SY	-	-	
198	2060.2	2,352	SY/SK	SX	ST		
199	2098.8	2,358	SJ	SF	-	-	
200	483.3	2,355	TA	SJ	-	-	
201	1261.9	2,352	SY	TA	-	-	
202	1562.3	2,362	VN	VM	-	-	Bisected by Feature TQ ditch
203	1759.7	2,358	UP	VN	VF	TQ	Bisected by Feature TQ ditch
204	1116.1	2,355	UK	UP	TQ	-	Feature TQ ditch along north side
205	651.4	2,353	UJ	UK	TQ	-	Feature TQ ditch along north side
206	1084.0	2,348	TE	SW	TQ	-	Feature TQ ditch along south side
207	1171.9	2,342	TD	TE	TQ	-	Feature TQ ditch along south side
208	842.1	2,340	TC	TD	TQ	-	Feature TQ ditch along south side
209	2662.1	2,337	TF	TC	TQ	TB	Feature TQ ditch along south side
210	1184.8	2,335	TG	TF	TQ	-	Feature TQ ditch along south side
211	266.0	2,334	TH	TG	TQ	-	Feature TQ ditch along south side
212	1265.9	2,332	TI	TH	TQ	-	Feature TQ ditch along south side
213	957.4	2,330	TJ	TI	TQ	-	Feature TQ ditch along south side
214	555.0	2,328	TK	TJ	TQ	-	Feature TQ ditch along south side
215	662.5	2,325	TP	TK	TQ	-	Feature TQ ditch along south side
216	222.4	2,326	TL	-	-	-	Bordered by slope on upslope side
217	144.2	2,331	TY	-	-	-	Bordered by slope on upslope side
218	158.0	2,334	TH	UE	TQ	UA	Feature TQ ditch along north side
219	282.1	2,334	TH	UE	TQ	UA	Feature TQ ditch along north side
220	473.1	2,346	UG	UH	-	-	
221	487.3	2,355	UN	-	-	-	Bordered by slope on upslope side
222	847.5	2,355	UO	UN	UQ	-	Feature UQ ditch enters field at southeast corner
223	394.2	2,362	UT	UR	-	-	Feature UR ditch along north side
224	256.6	2,365	VI	UY	-	-	
225	452.5	2,366	UY	UX	-	-	Feature UR ditch to south
226	648.3	2,367	UX	UV	-	-	Feature UR ditch to south
227	199.1	2,369	UV	UW	-	-	Bisected by Feature UR ditch
228	227.8	2,370	UW	-	-	-	Bordered by slope on upslope side, Bisected by Feature UR ditch
229	795.0	2,365	VM/VK	VL	-	-	
230	997.4	2,367	VK/VL	VP	-	-	
231	847.6	2,366	VO	VP	TQ	-	Feature TQ ditch along north side
232	3492.5	2,371	VP	VQ	TQ	-	Feature TQ ditch along north side
233	3552.7	2,378	VQ	VS	-	-	Feature UR ditch potentially originated in Field 233
234	8396.2	2,380	VS	VT/VU/VZ	-	-	Feature VV ditch to southeast
235	446.1	2,384	VU	VV	-	-	Feature VV ditch along east side
236	545.0	2,387	VZ	-	-	-	Bordered by slope on upslope side
237	1042.5	2,396	YU	YV	-	-	
238	1311.7	2,398	YV	-	YW	-	Bordered by slope on upslope side
239	637.7	2,402	YY	YX	-	-	
240	313.4	2,407	YX	-	-	-	Bordered by slope on upslope side
241	1324.4	2,390	YZ	-	-	-	Bordered by slope on upslope side
242	314.7	2,385	ZH	-	-	-	Bordered by slope on upslope side

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
243	547.7	2,385	ZF	ZH	-	-	
244	2329.4	2,385	ZA	ZF	YZ	-	
245	661.7	2,375	ZG	ZA	-	-	
246	455.3	2,375	ZE	ZG	-	-	
247	253.9	2,415	YT	YS	-	-	
248	753.7	2,420	YS	-	-	-	Bordered by slope on upslope side
249	980.8	2,419	YR	YQ	-	-	
250	730.7	2,424	YQ	YP	-	-	
251	372.8	2,430	YP	YO	-	-	
252	428.7	2,433	YO	XZ	-	-	Feature XC ditch along northeast side
253	748.5	2,435	YM	-	-	-	Bordered by slope on upslope side, Bisected by Feature XC ditch
254	262.1	2,396	YK	-	-	-	Bordered by slope on upslope side
255	314.3	2,400	YJ	YI	-	-	Bisected by Feature TQ ditch
256	429.3	2,400	YI	-	-	-	Bordered by slope on upslope side, Bisected by Feature TQ ditch
257	94.8	2,390	WZ	-	-	-	Bordered by slope on upslope side
258	590.9	2,385	WQ	-	-	-	Bordered by slope on upslope side
259	596.2	2,381	WP	WQ	-	-	
260	170.5	2,375	WN	WO	-	-	
261	492.3	2,375	WO	WC	-	-	
262	258.9	2,375	WC	TQ	-	-	Bordered by Feature TQ ditch on southeast side
263	191.7	2,367	WG	-	WJ	-	Bordered by slope on upslope side
264	474.0	2,365	WH	WG	WJ	-	
265	190.2	2,362	WI	WH	WJ	-	
266	786.1	2,375	WM	WP	WN	-	
267	838.3	2,372	WL	WM	-	-	
268	1648.7	2,360	WJ	WL	WK	WI	
269	409.5	2,360	WJ	WL	WR	WK	
270	641.1	2,372	WR	WS	-	-	
271	637.1	2,381	WS	-	-	-	Bordered by slope on upslope side
272	2468.8	2,360	SD	WJ	SH	-	
273	1053.8	2,361	SF	SD	SG	-	
274	1073.3	2,361	SF	SD	SG	SH	
275	1445.3	2,383	WT	WU	-	-	
276	1193.9	2,386	WU	WV	-	-	
277	1463.8	2,390	WV	WW	-	-	
278	1024.8	2,392	WW	WX	-	-	
279	1855.5	2,395	WX	XZ	XB	-	XB pond located in Field 279
280	103.0	2,398	XB	XA	-	-	Pond
281	353.4	2,393	WY	-	-	-	Bordered by slope on upslope side
282	1216.8	2,401	XC	YF	-	-	
283	201.8	2,405	YH	YF	YG	-	
284	1505.1	2,406	YF	YE	TS	-	Feature TS ditch along southeast side
285	561.9	2,411	YE	YD	YB	-	Bisected by Feature TS ditch
286	1498.3	2,413	YD	YC	YB	YL	Bisected by Features TQ, TR and TS ditches
287	2182.1	2,418	YC	-	YB	-	Bordered by slope on upslope side, Bisected by Features TQ, TR and TS ditches
288	895.5	2,442	YA	-	TR	-	Bordered by slope on upslope side, Feature TR ditch along north side

Table C-2. Summary of Site 22632 Agricultural Fields (cont.)

Field	Area (sq m)	Elevation (feet)	Associated Features				Comment
			Downslope side	Upslope side	Other 1	Other 2	
289	1841.4	2,440	XY	XU	-	-	Bisected by Feature XR ditch; Feature TR ditch to south
290	1121.2	2,442	XU	XV	XT	-	
291	1660.0	2,442	XU	-	XT	-	Bordered by project area boundary on upslope side
292	550.0	2,437	XS	XU	XR	-	Feature XR ditch along south side
293	1067.9	2,437	XS	XU	-	-	
294	1722.2	2,435	XQ	XS	XT	-	Bisected by Feature XR ditch
295	1820.5	2,435	XQ	XW	TR	-	Bisected by Feature XY ditch; Feature TR ditch along south side
296	2533.4	2,425	XO	XQ	-	-	Bisected by Feature XY ditch
297	1843.7	2,428	XP	XQ	XR	-	Feature XR ditch along north side
298	2095.5	2,425	XO	XP	-	-	
299	921.9	2,419	XH	XO	-	-	
300	2506.1	2,411	XI	XH	-	-	Bisected by Feature TS ditch
301	648.8	2,410	XH	XI	-	-	
302	3933.0	2,404	XG	XH	XE	-	
303	1796.8	2,404	XG	XF	XE	-	Feature XF ditch along northwest side
304	641.9	2,404	XK	XL	XE	XJ	
305	1203.3	2,407	XL	XM	XE	XJ	
306	896.2	2,411	XM	-	XE	-	Bordered by slope on upslope side
307	1708.7	2,399	XA	XD	-	-	
308	2122.5	2,402	XD	YH	YG	XJ	
309	395.7	2,410	YH	-	YG	-	Bordered by slope on upslope side
310	844.4	2,470	ZV	-	ZU	-	Bordered by slope on upslope side
311	555.1	2,470	ZU	-	ZV	-	Bordered by slope on upslope side
312	748.8	2,468	ZT	ZU	-	-	
313	852.8	2,466	ZS	ZV	-	-	
314	1151.1	2,462	ZR	ZS	ZQ	ZT	
315	3236.6	2,484	ZO	ZQ	ZP	-	
316	997.6	2,484	ZO	ZQ	ZP	-	
317	1432.0	2,480	ZN	ZO	-	-	
318	1142.2	2,450	ZM	-	-	-	Bordered by slope on upslope side
319	1595.3	2,445	ZL	ZM	-	-	
320	2337.0	2,439	ZK	ZL	-	-	
321	614.7	2,175	BO	BS	BR	-	
322	1602.2	2,130	CO	CL	-	-	
323	219.2	2,330	AAA	-	-	-	Bordered by slope on upslope side
324	519.8	2,339	AAB	-	-	-	Bordered by slope on upslope side

Table C-3. Summary of Site 22632 Clearing Features

Feature	Type	Length	Width	Height	Shape	Construction	Elevation (feet)	Temp. Field No.	Comment
H	Mound	2.6	1.7	0.65	Oval	Piled cobbles and boulders	2,178	758	
I	Mound	1.75	1.4	0.45	Oval	Piled cobbles and boulders	2,198	810	
J	Mound	2.1	1.45	0.55	Irregular	Piled cobbles and boulders	2,195	805	
M	Mound	1.4	1.15	0.35	Oval	Piled cobbles and soil	2,200	788A	
N	Mound	1.8	1.2	0.4	Oval	Piled cobbles and soil	2,200	788B	
O	Mound	1.1	0.85	0.3	Oval	Piled cobbles and soil	2,201	788C	
V	Mound	2.2	1.4	0.72	Oval	Piled cobbles and soil	2,238	779	
X	Mound	1.35	1.15	0.68	Oval	Piled cobbles with soil	2,180	739	
Y	Mound	0.92	0.70	0.42	Oval	Piled cobbles and boulders	2,175	738	
AH	Mound	1.60	1.05	0.42	Oval	Piled cobbles	2,155	567	
AI	Mound	2.10	1.80	0.50	Oval	Piled cobbles	2,158	733	
AM	Mound	1.40	1.20	0.55	Oval	Piled cobbles and boulders	2,159	659	
AO	Mound	2.10	1.45	0.59	Irregular	Piled cobbles and boulders	2,159	667B-A	
AP	Mound	1.10	0.95	0.58	Oval	Piled cobbles and boulders	2,160	667B-C	
AQ	Mound	3.50	2.20	0.65	Irregular	Piled cobbles and boulders	2,159	667B-D	
AR	Mound	1.30	1.00	0.40	Oval	Piled cobbles and boulders	2,160	667B-b	
AS	Mound	1.30	1.00	0.35	Oval	Piled cobbles and boulders	2,161	668i	
AT	Mound	0.95	0.75	0.40	Oval	Piled cobbles and boulders	2,162	668g	
AU	Mound	1.05	0.90	0.42	Oval	Piled cobbles and boulders	2,162	668h	
AV	Mound	1.50	1.30	0.68	Oval	Piled cobbles and boulders	2,165	668c	
AW	Mound	1.20	1.00	0.51	Oval	Piled cobbles and boulders	2,165	668d	
AX	Mound	1.30	0.95	0.45	Oval	Piled cobbles and boulders	2,165	668b	
AY	Mound	1.80	1.00	0.35	Oval	Piled cobbles and boulders	2,169	668a	
BA	Mound	1.30	1.00	0.55	Oval	Piled cobbles and boulders	2,162	668f	
BD	Modified outcrop	1.40	1.40	0.72	Circular	Piled cobbles and boulders	2,159	672	
BE	Mound	1.40	1.30	0.55	Irregular	Piled cobbles and boulders	2,164	669a	
BF	Mound	1.60	1.20	0.50	Irregular	Piled cobbles and boulders	2,165	669b	
BG	Mound	1.90	1.20	0.33	Oval	Piled cobbles and boulders	2,165	667e	
BH	Mound	1.05	0.85	0.35	Oval	Piled cobbles and boulders	2,164	667c	
BI	Mound	1.80	1.20	0.41	Irregular	Piled cobbles and boulders	2,169	673d	
BJ	Mound	1.60	1.20	0.55	Irregular	Piled cobbles and boulders	2,165	673a	
BK	Mound	1.30	0.95	0.51	Oval	Piled cobbles and boulders	2,162	667b	
BL	Mound	1.70	1.05	0.72	Oval	Piled cobbles and boulders	2,162	667a	
BM	Mound	1.35	1.00	0.29	Oval	Piled cobbles and boulders	2,163	667d	
BN	Mound	1.57	1.00	0.35	Oval	Piled cobbles and boulders with soil	2,167	673b	
BO	Mound	1.10	0.85	0.25	Oval	Piled cobbles and boulders	2,187	673c	
BP	Mound	1.30	1.10	0.35	Oval	Piled cobbles and boulders with soil	2,169	639d	
BT	Mound	1.55	1.20	0.61	Oval	Piled cobbles and boulders	2,168	639c	
BU	Mound	1.85	1.30	0.55	Oval	Piled cobbles and boulders with soil	2,169	639b	
BV	Mound	2.10	1.40	0.75	Oval	Piled cobbles and boulders	2,169	639a	
CB	Mound	3.05	2.3	0.68	Oval	Piled cobbles and boulders with sides bordered by small boulders	2,181	646	TU-27
CE	Mound	2.90	1.20	0.75	Linear	Piled cobbles and boulders	2,150	648a	
CF	Mound	1.20	0.85	0.32	Oval	Piled cobbles	2,151	648b	
CJ	Mound	1.50	0.30	0.75	Oval	Piled cobbles and boulders	2,160	811	
CK	Mound	2.80	1.70	0.59	Irregular	Piled cobbles and boulders	2,154	640	
CN	Modified outcrop	1.10	0.45	1.30	Irregular	Piled cobbles	2,150	805	
CP	Mound	3.50	2.70	0.50	Oval	Piled cobbles and boulders with soil	2,183	629	
CV	Mound	1.80	1.45	0.50	Oval	Piled cobbles and boulders	2,161	613	
CY	Mound	1.30	1.00	0.33	Irregular	Piled cobbles and boulders	2,159	609a	
CZ	Mound	1.10	1.00	0.45	Irregular	Piled cobbles and boulders	2,159	609c	
DA	Mound	0.95	0.82	0.71	Irregular	Piled cobbles and boulders	2,159	609b	
DE	Mound	1.20	0.65	0.30	Oval	Piled cobbles	2,159	619p	
DF	Mound	0.95	0.70	0.25	Oval	Piled cobbles	2,160	619o	
DG	Mound	1.30	1.00	0.35	Oval	Piled cobbles and boulders	2,159	619n	
DH	Mound	0.65	0.75	0.18	Irregular	Piled cobbles	2,159	619m	
DJ	Mound	1.80	1.25	0.51	Oval	Piled cobbles and boulders	2,164	619c	

Table C-3. Summary of Site 22632 Clearing Features (cont.)

Feature	Type	Length	Width	Height	Shape	Construction	Elevation (feet)	Temp. Field No.	Comment
DL	Mound	0.85	0.72	0.21	Oval	Piled cobbles	2,164	619b	
DM	Mound	1.05	0.85	0.32	Oval	Piled cobbles and boulders	2,164	619a	
DN	Mound	1.70	1.40	0.55	Oval	Piled cobbles and boulders	2,170	622	
DO	Mound	1.30	1.00	0.35	Oval	Piled cobbles and boulders	2,171	623	
DQ	Mound	1.30	1.00	0.35	Oval	Piled cobbles	2,175	548	
DT	Mound	2.90	1.30	0.75	Linear	Piled cobbles and boulders	2,160	551	
DU	Mound	1.40	1.10	0.35	Oval	Piled cobbles	2,161	552a	
DV	Mound	1.05	0.69	0.25	Irregular	Piled cobbles	2,159	552c	
DW	Mound	1.00	0.85	0.40	Irregular	Piled cobbles and boulders	2,158	552b	
DX	Mound	0.85	0.75	0.19	Oval	Piled cobbles	2,159	552d	
DY	Mound	1.20	1.00	0.30	Oval	Piled cobbles	2,160	552e	
DZ	Mound	1.30	1.00	0.32	Oval	Piled cobbles and boulders	2,160	619d	
EA	Mound	1.20	1.00	0.75	Oval	Piled cobbles	2,161	619g	
EB	Mound	0.85	0.80	0.32	Oval	Piled cobbles	2,160	619f	
EC	Mound	0.80	0.70	0.25	Oval	Piled cobbles	2,158	619e	
ED	Mound	1.30	1.00	0.35	Oval	Piled cobbles	2,157	619i	
EE	Mound	0.92	0.79	0.32	Oval	Piled cobbles	2,157	619h	
EF	Mound	2.00	1.60	0.45	Irregular	Piled cobbles and boulders	2,158	619l	
EG	Mound	1.22	1.00	0.40	Oval	Piled cobbles	2,157	619k	
EH	Mound	1.50	1.20	0.35	Oval	Piled cobbles	2,157	619m	
EO	Mound	1.40	1.30	0.42	Oval	Piled cobbles	2,179	699	
ER	Mound	2.10	1.30	0.72	Irregular	Piled cobbles and boulders	2,188	700a	
ES	Mound	1.20	1.00	0.35	Oval	Piled cobbles and boulders	2,188	700b	
ET	Mound	1.30	0.94	0.65	Oval	Piled cobbles and boulders	2,190	701	
EV	Mound	1.05	0.85	0.28	Oval	Piled cobbles and boulders	2,193	705e	
EW	Mound	1.10	1.00	0.38	Oval	Piled cobbles and boulders	2,195	705d	
EX	Mound	0.92	0.71	0.28	Oval	Piled cobbles and boulders	2,194	705c	
EY	Mound	0.85	0.80	0.32	Oval	Piled cobbles and boulders	2,195	705b	
EZ	Mound	1.70	1.20	0.55	Oval	Piled cobbles and boulders	2,195	705a	
FB	Mound	1.20	0.85	0.41	Oval	Piled cobbles and boulders	2,198	707e	
FC	Mound	1.41	1.20	0.30	Oval	Piled cobbles and boulders	2,220	702d	
FD	Mound	1.30	1.00	0.25	Oval	Piled cobbles and boulders	2,199	702c	
FE	Mound	1.10	0.82	0.31	Oval	Piled cobbles and boulders	2,199	702b	
FF	Mound	1.70	1.40	0.45	Irregular	Piled cobbles and boulders	2,198	702a	
FG	Mound	1.30	1.10	0.42	Oval	Piled cobbles and boulders	2,198	814a	
FH	Mound	1.45	1.20	0.50	Oval	Piled cobbles and boulders	2,198	814b	
FK	Mound	2.20	1.95	0.72	Oval	Piled cobbles and boulders with soil	2,179	725	Inside Feature FI Enclosure
FN	Mound	1.30	1.10	0.49	Oval	Piled cobbles	2,175	676	Inside Feature FI Enclosure
GE	Mound	0.75	0.70	0.22	Oval	Piled cobbles and boulders	2,203	710c	
GF	Mound	1.25	0.83	0.21	Irregular	Piled cobbles and boulders	2,204	710d	
GG	Mound	1.05	0.82	0.31	Oval	Piled cobbles and boulders	2,205	710b	
GI	Mound	1.60	0.75	0.42	Oval	Piled cobbles and boulders	2,204	710a	
GJ	Mound	1.30	1.00	0.42	Oval	Piled cobbles and boulders	2,205	710e	
GK	Mound	1.25	1.00	0.38	Oval	Piled cobbles and boulders	2,205	710f	
GL	Mound	1.80	1.35	0.60	Oval	Piled cobbles and boulders	2,206	710h	
GM	Mound	1.15	0.85	0.40	Oval	Piled cobbles and boulders	2,206	710g	
GR	Mound	1.90	0.89	0.31	Oval	Piled cobbles and boulders	2,214	717	
GV	Modified outcrop	2.90	1.80	0.50	Irregular	Piled cobbles and boulders	2,228	718	
GW	Mound	1.30	1.00	0.35	Oval	Piled cobbles	2,205	750b	
GX	Mound	0.85	0.75	0.15	Oval	Piled cobbles	2,205	750a	
GY	Mound	1.70	1.25	0.51	Oval	Piled cobbles	2,208	750d	
GZ	Mound	1.50	1.50	0.40	Oval	Piled cobbles	2,208	750c	
HA	Mound	1.50	1.30	0.65	Oval	Piled cobbles	2,210	750k	
HB	Mound	1.05	0.82	0.19	Oval	Piled cobbles	2,210	750j	
HC	Mound	1.62	1.40	0.45	Oval	Piled cobbles	2,209	750e	
HD	Mound	1.75	1.40	0.59	Oval	Piled cobbles	2,211	750g	
HE	Mound	1.20	1.10	0.40	Oval	Piled cobbles	2,211	750h	
HF	Mound	1.30	0.95	0.31	Oval	Piled cobbles	2,210	750f	
HG	Mound	1.20	0.89	0.35	Oval	Piled cobbles	2,210	750i	
HJ	Mound	1.20	0.89	0.35	Oval	Piled cobbles	2,210	750i	
HL	Mound	1.40	1.30	0.52	Oval	Piled cobbles	2,205	751a	

Table C-3. Summary of Site 22632 Clearing Features (cont.)

Feature	Type	Length	Width	Height	Shape	Construction	Elevation (feet)	Temp. Field No.	Comment
HM	Mound	1.75	1.42	0.61	Oval	Piled cobbles	2,205	751b	
HO	Mound	1.40	1.15	0.29	Oval	Piled cobbles	2,211	817	
HQ	Mound	3.6	1.6	0.51	Irregular	Piled cobbles and boulders	2,215	773D	
HR	Mound	3.2	2.1	0.56	Oval	Piled cobbles and boulders	2,216	773C	
HS	Mound	1.8	1.6	0.31	Oval	Piled cobbles and boulders	2,217	773B	
HT	Mound	3.6	2.88	0.72	Oval	Piled cobbles and boulders with sides bordered by small boulders	2,218	773A	TU-32
HU	Mound	1.25	0.95	0.31	Oval	Piled cobbles	2,242	715	
HV	Mound	4.30	1.55	0.65	Linear	Piled cobbles and boulders	2,242	714	
HW	Mound	1.05	0.72	0.15	Oval	Piled cobbles with soil	2,240	530a	
HX	Mound	0.80	0.60	0.20	Circular	Piled cobbles with soil	2,241	530b	
HY	Mound	1.40	1.30	0.22	Oval	Piled cobbles with soil	2,241	530c	
IA	Mound	1.60	1.40	0.35	Oval	Piled cobbles and boulders	2,250	531	
IH	Mound	0.92	0.70	0.25	Oval	Piled cobbles	2,195	548A	
II	Mound	0.75	0.68	0.18	Irregular	Piled cobbles	2,195	548B	
IJ	Mound	1.20	0.85	0.24	Irregular	Piled cobbles and boulders	2,196	548C	
IK	Mound	0.91	0.88	0.18	Circular	Piled cobbles and boulders	2,198	522d	
IL	Mound	1.03	0.89	0.21	Oval	Piled cobbles and boulders	2,198	522c	
IM	Mound	1.41	0.64	0.26	Oval	Piled cobbles and boulders	2,198	522b	
IN	Mound	1.25	0.91	0.31	Oval	Piled cobbles and boulders	2,199	522a	
IO	Mound	1.11	1.10	0.82	Circular	Piled cobbles and boulders	2,201	522h	
IP	Mound	0.93	0.90	0.31	Circular	Piled cobbles and boulders	2,202	522g	
IQ	Mound	1.80	1.00	0.25	Oval	Piled cobbles and boulders	2,202	522j	
IR	Mound	1.10	1.10	0.20	Circular	Piled cobbles and boulders	2,202	522k	
IS	Mound	1.28	1.01	0.23	Oval	Piled cobbles and boulders	2,201	522l	
IT	Mound	1.41	0.95	0.18	Oval	Piled cobbles and boulders	2,201	522h	
IV	Mound	2.60	2.40	0.52	Oval	Piled cobbles and boulders	2,220	519	
IX	Mound	1.70	1.15	0.34	Irregular	Piled cobbles	2,225	499	
JE	Mound	2.20	1.60	0.44	Oval	Piled cobbles and boulders	2,238	517	
JO	Mound	1.20	1.00	0.29	Oval	Piled cobbles	2,269	481	
JZ	Mound	1.50	1.35	0.42	Irregular	Piled cobbles and boulders	2,270	465	
KE	Mound	1.90	0.75	0.72	Linear	Piled cobbles and boulders with soil	2,284	456	
KI	Mound	1.5	1.32	0.35	Oval	Piled cobbles	2,291	449	
KV	Mound	1.35	1.10	0.49	Oval	Piled cobbles	2,287	429	
KW	Mound	0.95	0.84	0.19	Oval	Piled cobbles	2,292	374d	
KX	Mound	1.00	1.00	0.75	Oval	Piled cobbles	2,292	374c	
KY	Mound	2.10	1.40	0.35	Irregular	Piled cobbles and boulders	2,292	374b	
KZ	Mound	1.30	0.95	0.22	Oval	Piled cobbles	2,292	374a	
LA	Mound	1.60	1.30	0.72	Oval	Piled cobbles	2,293	374f	
LB	Mound	1.82	1.50	0.61	Oval	Piled cobbles	2,294	374g	
LC	Mound	1.30	1.10	0.55	Oval	Piled cobbles	2,294	374h	
LD	Mound	1.30	1.10	0.35	Irregular	Piled cobbles	2,293	374e	
LO	Mound	1.60	1.20	0.35	Irregular	Piled cobbles	2,301	379d	
LP	Mound	0.89	0.74	0.32	Oval	Piled cobbles	2,302	379c	
LQ	Mound	1.30	1.20	0.55	Oval	Piled cobbles	2,302	379e	
LR	Mound	2.10	1.80	0.82	Oval	Piled cobbles	2,302	379b	
LU	Mound	1.40	1.00	0.27	Oval	Piled cobbles	2,302	419e	Inside Feature LS Enclosure
LV	Mound	1.20	1.10	0.19	Irregular	Piled cobbles	2,302	419b	Inside Feature LS Enclosure
LW	Mound	1.05	0.72	0.25	Irregular	Piled cobbles	2,302	419c	Inside Feature LS Enclosure
MB	Mound	0.55	0.42	0.18	Irregular	Piled cobbles	2,298	415a	Inside Feature KM Enclosure
MC	Mound	1.30	0.85	0.22	Oval	Piled cobbles	2,301	415b	Inside Feature KM Enclosure
MD	Mound	1.05	0.72	0.31	Oval	Piled cobbles	2,301	415c	Inside Feature KM Enclosure
ME	Mound	1.40	1.10	0.42	Oval	Piled cobbles	2,301	415d	Inside Feature KM Enclosure
MJ	Mound	0.71	0.65	0.41	Irregular	Piled cobbles and boulders	2,308	413a	Inside Feature KM Enclosure

Table C-3. Summary of Site 22632 Clearing Features (cont.)

Feature	Type	Length	Width	Height	Shape	Construction	Elevation (feet)	Temp. Field No.	Comment
MK	Mound	1.25	0.81	0.51	Irregular	Piled cobbles and boulders	2,308	413b	Inside Feature KM Enclosure
MO	Mound	1.00	0.72	0.27	Irregular	Piled cobbles and boulders	2,316	392e	Inside Feature KM Enclosure
MP	Mound	1.10	0.95	0.35	Oval	Piled cobbles and boulders	2,315	392d	Inside Feature KM Enclosure
MQ	Mound	1.90	1.50	0.51	Oval	Piled cobbles and boulders	2,315	392c	Inside Feature KM Enclosure
MR	Mound	2.10	1.50	0.65	Oval	Piled cobbles and boulders	2,316	392a	Inside Feature KM Enclosure
MS	Mound	1.55	1.20	0.47	Oval	Piled cobbles and boulders	2,315	392b	Inside Feature KM Enclosure
MT	Mound	1.20	0.85	0.29	Irregular	Piled cobbles and boulders	2,317	392h	Inside Feature KM Enclosure
MU	Mound	1.80	1.35	0.65	Oval	Piled cobbles and boulders	2,318	392i	Inside Feature KM Enclosure
MV	Mound	0.95	0.49	0.18	Irregular	Piled cobbles and boulders	2,317	392g	Inside Feature KM Enclosure
MW	Mound	1.80	1.40	0.39	Oval	Piled cobbles and boulders	2,316	392f	Inside Feature KM Enclosure
NA	Mound	2.24	1.64	0.08	Oval	Aligned cobbles	2,310	404	TU-26
NB	Mound	2.10	1.15	0.29	Oval	Piled cobbles and boulders	2,312	402	
NE	Mound	1.65	1.20	0.35	Oval	Piled cobbles	2,311	825	
OF	Mound	1.50	1.10	0.29	Oval	Piled cobbles	2,304	381a	
OG	Mound	1.15	0.72	0.19	Irregular	Piled cobbles	2,304	381b	
OH	Mound	1.45	1.30	0.59	Irregular	Piled cobbles	2,304	381c	
OI	Mound	1.60	1.21	0.70	Irregular	Piled cobbles	2,304	381d	
OJ	Mound	1.10	0.90	0.35	Oval	Piled cobbles	2,296	373e	
OK	Mound	0.95	0.75	0.30	Oval	Piled cobbles	2,297	373d	
OL	Mound	1.30	1.00	0.39	Oval	Piled cobbles	2,298	373f	
OM	Mound	1.05	0.84	0.29	Oval	Piled cobbles	2,297	373c	
ON	Mound	1.30	1.30	0.47	Circular	Piled cobbles	2,196	373a	
OO	Mound	1.40	1.20	0.32	Oval	Piled cobbles	2,196	373b	
OP	Mound	1.90	1.30	0.52	Oval	Piled cobbles	2,301	355e	
OQ	Mound	1.60	1.35	0.65	Oval	Piled cobbles	2,302	355d	
OR	Mound	1.20	0.73	0.25	Oval	Piled cobbles	2,304	355a	
OS	Mound	0.75	0.70	0.19	Oval	Piled cobbles	2,303	355c	
OT	Mound	1.43	1.00	0.30	Oval	Piled cobbles	2,304	355b	
OZ	Mound	1.20	0.85	0.30	Irregular	Piled cobbles	2,302	356e	
PA	Mound	1.00	0.92	0.21	Oval	Piled cobbles	2,302	356b	
PB	Mound	1.31	1.11	0.27	Oval	Piled cobbles	2,301	356c	
PC	Mound	1.20	1.00	0.30	Oval	Piled cobbles	2,301	356a	
PD	Mound	1.29	1.00	0.25	Oval	Piled cobbles	2,299	356d	
PE	Mound	1.30	1.10	0.35	Oval	Piled cobbles	2,287	371a	
PF	Mound	1.05	0.83	0.15	Oval	Piled cobbles	2,287	371b	
PI	Mound	1.45	1.20	0.40	Oval	Piled cobbles	2,291	367	
PK	Mound	0.80	0.80	0.25	Circular	Piled cobbles	2,295	362d	
PL	Mound	0.71	0.62	0.18	Oval	Piled cobbles	2,295	362e	
PM	Mound	1.20	0.89	0.30	Irregular	Piled cobbles	2,295	362f	
PN	Mound	0.75	0.60	0.15	Oval	Piled cobbles	2,297	362a	
PO	Mound	1.30	1.00	0.22	Oval	Piled cobbles	2,297	362b	
PP	Mound	1.25	1.10	0.30	Oval	Piled cobbles	2,297	362c	
PV	Mound	0.89	0.67	0.32	Oval	Piled cobbles	2,304	304	
PW	Mound	1.45	1.05	0.29	Oval	Piled cobbles	2,303	366	
PY	Mound	0.82	0.71	0.31	Oval	Piled cobbles	2,305	299	
QE	Mound	1.10	0.82	0.36	Oval	Piled cobbles	2,311	305	
QF	Mound	0.70	0.70	0.18	Circular	Piled cobbles	2,311	302	
QM	Mound	1.30	1.10	0.45	Oval	Piled cobbles	2,317	292	
QQ	Mound	1.10	0.85	0.32	Oval	Piled cobbles and boulders	2,311	309h	
QR	Mound	1.20	0.75	0.30	Oval	Piled cobbles and boulders	2,312	309b	
QS	Mound	1.60	1.20	0.39	Oval	Piled cobbles and boulders	2,312	309a	
QT	Mound	1.00	0.75	0.30	Oval	Piled cobbles and boulders	2,312	309c	
QU	Mound	0.60	0.60	0.25	Circular	Piled cobbles and boulders	2,312	309d	
QV	Mound	1.10	0.95	0.37	Oval	Piled cobbles and boulders	2,312	309e	

Table C-3. Summary of Site 22632 Clearing Features (cont.)

Feature	Type	Length	Width	Height	Shape	Construction	Elevation (feet)	Temp Field No	Comment
QW	Mound	0.72	0.70	0.13	Circular	Piled cobbles and boulders	2,312	309f	
QX	Mound	1.30	1.00	0.22	Oval	Piled cobbles and boulders	2,311	309g	
RC	Mound	1.40	0.83	0.33	Irregular	Piled cobbles	2,317	286	
RM	Modified outcrop	1.50	1.00	0.35	Irregular	Piled cobbles	2,349	279	
RN	Modified outcrop	1.60	1.00	0.42	Irregular	Piled cobbles and boulders	2,357	276	
RR	Mound	1.40	0.95	0.31	Oval	Piled cobbles and boulders	2,362	262	
SE	Mound	2.20	1.80	0.55	Oval	Piled cobbles and boulders	2,361	146	
SN	Mound	0.95	0.67	0.25	Oval	Piled cobbles	2,359	217	
SO	Mound	1.70	1.35	0.40	Oval	Piled cobbles	2,360	216	
SP	Mound	1.10	1.00	0.30	Oval	Piled cobbles	2,361	255c	
SQ	Mound	0.85	0.60	0.15	Irregular	Piled cobbles	2,360	255b	
SR	Mound	1.30	1.10	0.35	Oval	Piled cobbles	2,360	255a	
SU	Mound	1.20	1.00	0.22	Oval	Piled cobbles	2,353	218b	
SV	Mound	1.05	0.85	0.32	Oval	Piled cobbles	2,353	218a	
SZ	Mound	1.15	1.00	0.21	Oval	Piled cobbles	2,352	187	
TM	Mound	1.10	0.72	0.26	Irregular	Piled cobbles	2,324	246	
TN	Mound	2.10	1.30	0.40	Oval	Piled cobbles	2,322	247	
TO	Mound	1.80	1.40	0.40	Oval	Piled cobbles and boulders	2,323	297	
TU	Mound	1.00	0.75	0.30	Oval	Piled cobbles	2,330	240b	
TV	Mound	1.20	0.80	0.29	Irregular	Piled cobbles	2,330	240c	
TW	Mound	0.87	0.59	0.31	Irregular	Piled cobbles	2,330	240d	
TX	Mound	1.40	0.95	0.27	Oval	Piled cobbles	2,330	240a	
TZ	Mound	1.20	0.78	0.30	Oval	Piled cobbles	2,333	239	
UB	Mound	1.20	1.00	0.31	Oval	Piled cobbles	2,337	236b	
UC	Mound	0.75	0.68	0.31	Oval	Piled cobbles	2,337	236a	
UD	Mound	1.10	1.02	0.26	Oval	Aligned cobbles	2,337	238	TU-8
UI	Mound	3.40	1.65	0.51	Oval	Piled cobbles	2,352	177	
UL	Mound	3.20	1.70	0.45	Oval	Piled cobbles and boulders	2,356	181	
UM	Mound	1.20	0.98	0.29	Oval	Piled cobbles	2,357	183	
UU	Mound	1.20	0.90	0.31	Oval	Piled cobbles	2,363	129	
UZ	Mound	1.50	1.20	0.40	Irregular	Piled cobbles	2,365	128d	
VA	Mound	1.00	0.80	0.31	Oval	Piled cobbles	2,365	128c	
VB	Mound	1.20	0.89	0.27	Irregular	Piled cobbles	2,365	128b	
VC	Mound	1.40	1.00	0.39	Irregular	Piled cobbles and boulders	2,365	128a	
VD	Mound	1.70	1.00	0.41	Oval	Piled cobbles	2,362	169a	
VE	Mound	0.85	0.72	0.29	Oval	Piled cobbles	2,362	169b	
VG	Mound	1.20	0.90	0.35	Oval	Piled cobbles	2,362	168	
VH	Mound	1.70	1.21	0.65	Oval	Piled cobbles	2,361	183	
VJ	Mound	1.30	1.10	0.40	Oval	Piled cobbles	2,365	164	
VR	Mound	2.20	1.60	0.71	Oval	Piled cobbles and boulders with soil	2,378	60	
VW	Mound	1.30	1.10	0.35	Oval	Piled cobbles	2,377	58	
VY	Mound	0.72	0.53	0.25	Irregular	Piled cobbles and boulders	2,364	53	
WA	Mound	0.85	0.85	0.27	Circular	Piled cobbles	2,375	115b-b	
WB	Mound	1.22	0.89	0.30	Oval	Piled cobbles	2,375	115b-a	
WD	Mound	3.10	1.70	0.55	Oval	Piled cobbles	2,372	115a	
WE	Mound	1.20	0.85	0.27	Oval	Piled cobbles	2,372	115b	
WF	Mound	1.60	1.30	0.41	Oval	Piled cobbles and boulders	2,367	118	
YN	Mound	1.30	0.85	0.32	Oval	Piled cobbles	2,436	14	
ZB	Mound	0.89	0.63	0.31	Irregular	Piled cobbles	2,365	52c	
ZC	Mound	1.20	0.85	0.20	Irregular	Piled cobbles	2,365	52b	
ZD	Mound	1.30	1.00	0.30	Irregular	Piled cobbles	2,365	52a	
ZI	Mound	3.40	2.8	0.37	Oval	Aligned cobbles	2,390	1	TU-13
ZJ	Mound	3.50	2.5	0.34	Oval	Aligned cobbles	2,392	3	TU-11
ZW	Mound	1.50	1.30	0.25	Oval	Piled cobbles	2,474	803c	
ZX	Mound	1.40	1.00	0.29	Oval	Piled cobbles	2,474	803b	
ZY	Mound	2.10	1.30	0.38	Irregular	Piled cobbles	2,473	803d	

APPENDIX D -- RADIOCARBON CALIBRATION

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.7:lab. mult=1)

Laboratory number: Beta-161774

Conventional radiocarbon age: 20±60 BP

2 Sigma calibrated results[2]: (95% probability) Cal AD 1680 to 1730 (Cal BP 260 to 220) and Cal AD 1810 to 1930 (Cal BP 140 to 20) and Cal AD 1950 to beyond 1960 (Cal BP 0 to 0)

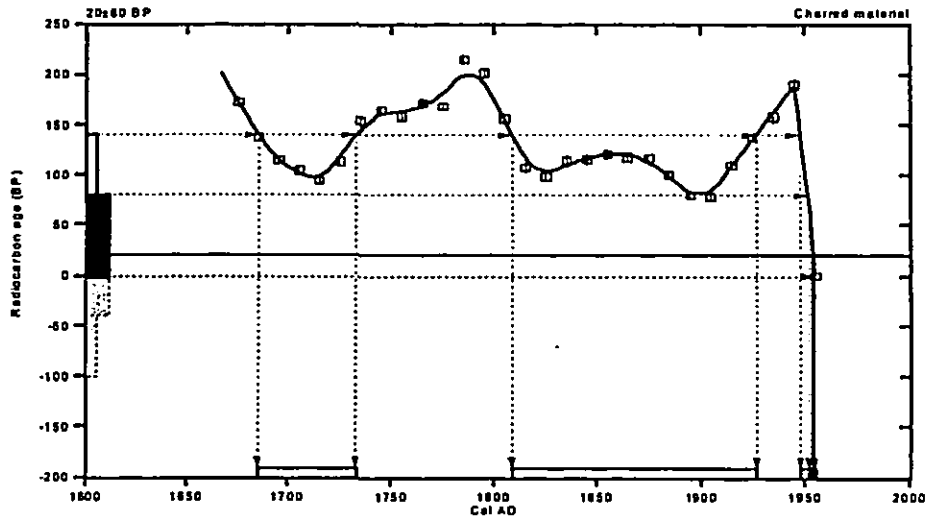
[2] Sigma range being quoted is the maximum antiquity based on the minus 2 Sigma range

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1950 (Cal BP 0)

1 Sigma calibrated result[1]: (68% probability) Cal AD 1950 to beyond 1960 (Cal BP 0 to 0)

[1] Sigma range being quoted is the maximum antiquity based on the minus 1 Sigma range



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Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.2:lab. mult=1)

Laboratory number: Beta-161775

Conventional radiocarbon age: 130±70 BP

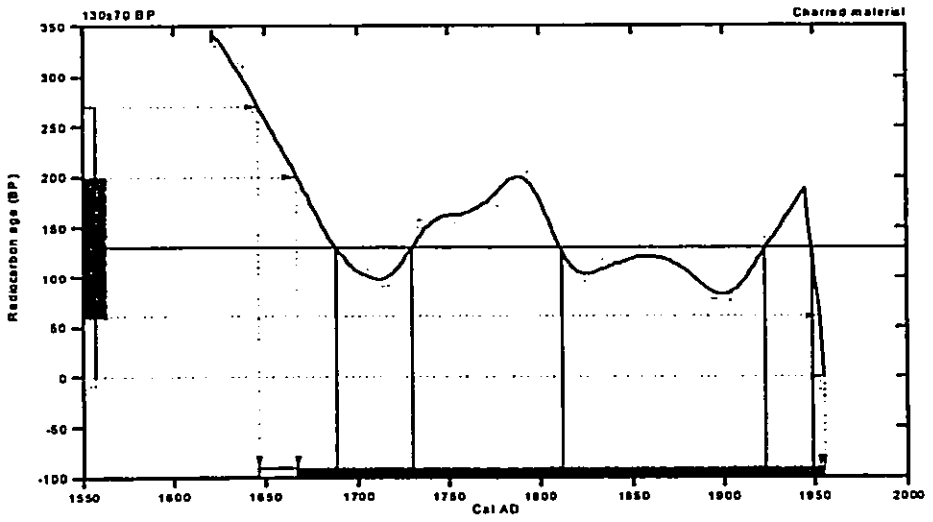
2 Sigma calibrated result*: (95% probability) Cal AD 1650 to beyond 1960 (Cal BP 300 to 0)

*2 Sigma range being quoted to the maximum antiquity based on the minus 2 Sigma range

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal AD 1690 (Cal BP 260) and
Cal AD 1730 (Cal BP 220) and
Cal AD 1810 (Cal BP 140) and
Cal AD 1920 (Cal BP 30) and
Cal AD 1950 (Cal BP 0)

1 Sigma calibrated result: (68% probability) Cal AD 1670 to 1950 (Cal BP 280 to 0)



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.9:lab. mult=1)

Laboratory number: Beta-161776

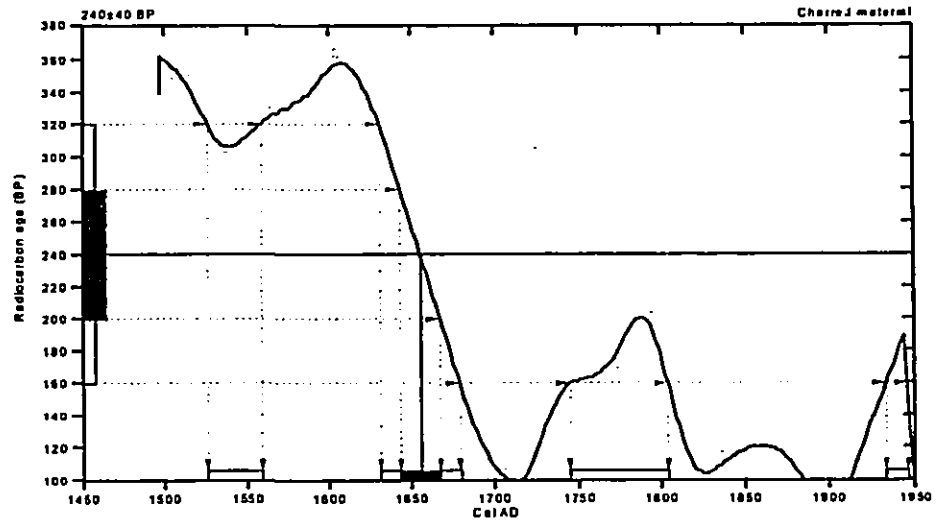
Conventional radiocarbon age: 240±40 BP

2 Sigma calibrated results: (95% probability) Cal AD 1530 to 1560 (Cal BP 420 to 390) and
Cal AD 1630 to 1680 (Cal BP 320 to 270) and
Cal AD 1740 to 1800 (Cal BP 200 to 150) and
Cal AD 1930 to 1950 (Cal BP 20 to 0)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1660 (Cal BP 290)

1 Sigma calibrated result: (68% probability) Cal AD 1640 to 1670 (Cal BP 310 to 280)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
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Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A.S., Vogel, J.C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.1:lab. mult=1)

Laboratory number: Beta-162001

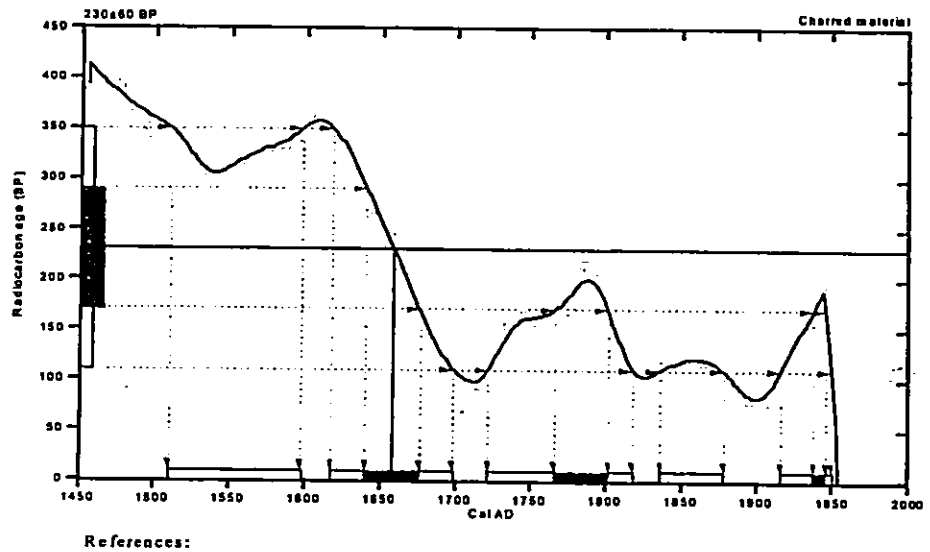
Conventional radiocarbon age: 230±60 BP

2 Sigma calibrated results: (95% probability)
Cal AD 1510 to 1600 (Cal BP 440 to 350) and
Cal AD 1620 to 1700 (Cal BP 330 to 250) and
Cal AD 1720 to 1820 (Cal BP 230 to 130) and
Cal AD 1840 to 1880 (Cal BP 110 to 70) and
Cal AD 1920 to 1950 (Cal BP 30 to 0)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1660 (Cal BP 290)

1 Sigma calibrated results: (68% probability)
Cal AD 1640 to 1680 (Cal BP 310 to 270) and
Cal AD 1770 to 1800 (Cal BP 180 to 150) and
Cal AD 1940 to 1950 (Cal BP 10 to 0)



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Appendix F

Cultural Impact Assessment

Report 117-013102

CULTURAL IMPACT ASSESSMENT
DHHL RESIDENTIAL DEVELOPMENT AT LĀLĀMILO
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'I
(TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Keaau, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

CULTURAL IMPACT ASSESSMENT
DHHL RESIDENTIAL DEVELOPMENT AT LĀLĀMILO
SOUTH KOHALA DISTRICT, ISLAND OF HAWAI'I
(TMK: 6-6-01: 10, 54 & 77, and TMK: 6-6-04: 12-17)

By

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July 2002

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SUMMARY

At the request of PBR Hawai'i on behalf of the Department of Hawaiian Home Lands, Haun & Associates conducted a cultural impact assessment of TMK: 6-6-01: 10, 54 & 77; and 6-6-04: 12-17 of an approximately 266.4-acre area located at Koali'ula, Lālāmilo, district of South Kohala, Island of Hawai'i.

The study did not identify any cultural practices occurring within the study area at the present time. As for the gathering of plants for medicinal uses, several cultural practitioners indicated the project area was not ideal to gather due to past military use and the presence of unexploded ordinance. Past cultural practices related to traditional Hawaiian methods of agriculture were identified. Testimony from the Waimea Water Rights Case (Carter v. Territory of Hawai'i, 1914-1915) indicated the lands of Lālāmilo were in previous times heavily inhabited. The remains of a large network of *'auwai* or ditch system can be seen on the landscape and within the project area.

The lack of cultural practices are attributed to the negative impacts of the introduction of cattle, the sandalwood trade and ranching activities, all of which displaced people from their kuleana and disrupted their agricultural practices. Early 20th century testimonies indicated that major environmental changes occurred during the 19th century: the denudation of the Waimea forest zone, higher evapotranspiration resulting in less rain fall. By the late 1800s - very early 1900s, there were very few *hoa'āina* living in Lālāmilo Uka.

CONTENTS

ILLUSTRATIONS

TABLES

INTRODUCTION

At the request of PBR Hawai'i on behalf of their client the Department of Hawaiian Home Lands (DHHL), Haun & Associates conducted a Native Hawaiian Cultural Assessment of nine parcels (TMK: 6-6-01: 10, 54, & 77; 6-6-04: 12-17) for the proposed Department of Hawaiian Home Lands Lālāmilo Residential Lots and Commercial/Industrial Mixed Uses development located in Lālāmilo, South Kohala on the Island of Hawai'i (*Figure 1*). The property comprised of approximately 266.4 acres of pasture lands, is near the vicinity of Kawaihae Road (Highway 19), the South Kohala Distribution Road, and Kohala Mountain Road (Highway 250).

This Cultural Assessment is intended to be informational for the purpose of disclosing any cultural impacts to native rights and practices the proposed development might have on Hawaiian culture, and to address Act 50 passed by the 20th Legislature and approved by Governor Cayetano on April 26, 2000. The thrust of Act 50 is to consider the effects a proposed development may have on native Hawaiians as it pertains to the culture and their right to practice traditional customs. In addition, the Hawai'i State Constitution, Article XII, Section 7 protects "all rights" of native Hawaiians that are "customarily and traditionally exercised for subsistence, cultural and religious purposes".

The suggested "Guidelines for Assessing Cultural Impacts" issued by the Office of Environmental and Quality Control (OEQC) discusses the types of cultural practices and beliefs that might be assessed. The Guidelines (11/19/1997) read:

> The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational and religious and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

This assessment does not address social impact issues, which would be another area of discipline.

Scope of Work

The Scope of Work (SOW) was designed to meet the cultural impact assessment requirements of the Office of Hawaiian Affairs (OHA), the Office of Environmental Quality Control (OEQC) and any other state and county agencies involved in the review process for the proposed project. Based on OEQC Guidelines, the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing ethnographic, historical, and anthropological documentary literature relating to traditional cultural practices and resources in the project area and its immediate vicinity;

2. Identify and consult with individuals and organizations to identify knowledgeable individuals with expertise concerning the types of cultural resources, practices, and beliefs found in the vicinity of the project area;

3. Conduct ethnographic/oral historical interviews. Formal interviews were transcribed and the transcripts appended to this report. Interview transcripts were reviewed by the interviewees for accuracy and interviewee consent for transcript publication was obtained subject to any requested constraints or limitations; and

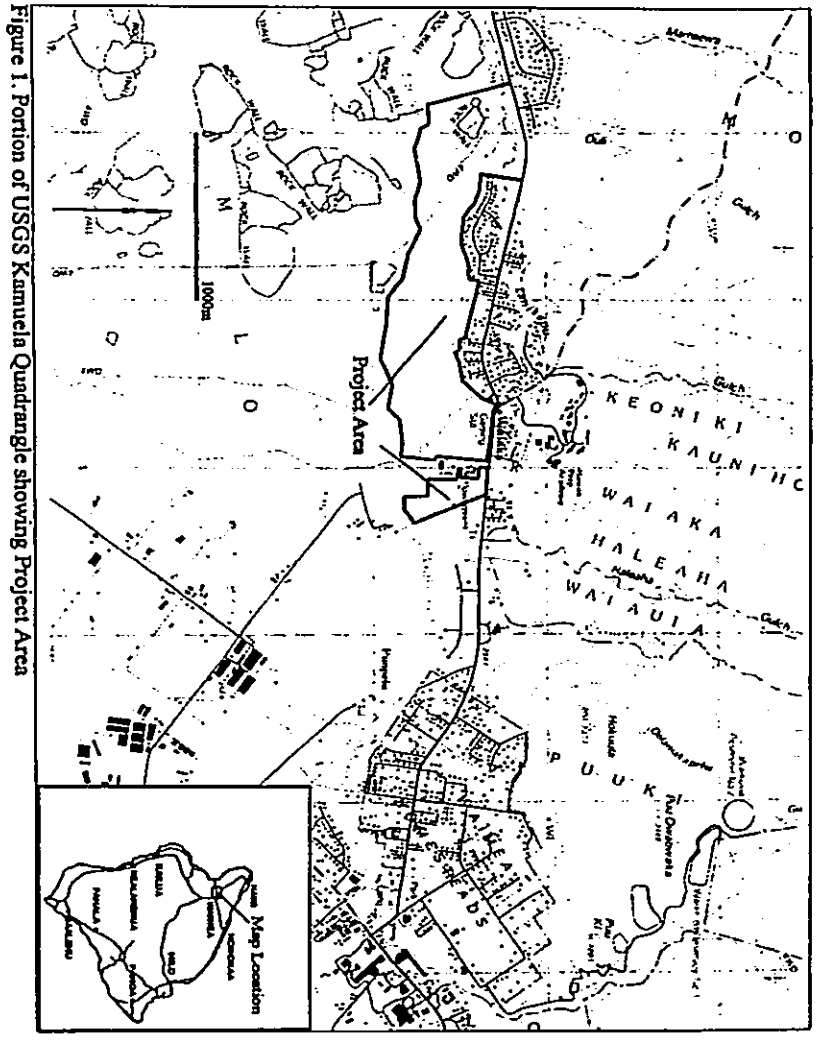

Figure 1. Portion of USGS Kamuela Quadrangle showing Project Area

4. Prepare and submit a Cultural Assessment report in conformance with regulatory agency requirements for such reports. The Cultural Assessment report includes: (a) a discussion of all methods and procedures used for data collection; (b) identification of identified cultural resources, practices, and beliefs within the vicinity of the project area; (c) an assessment of the potential effects of the proposed project on any identified resources, practices, and beliefs; and (d) recommendations for mitigating any potential adverse effects.

Methodology

Historical documents, maps and reports and native testimony were researched at the Hawai'i State Archives, Bernice Pauahi Bishop Museum, Hawai'i State Library, the Hawai'i State Law Library, the Supreme Court records, Hawai'i State Survey Office and the State Historic Preservation Division (SHPD) library. The Waihona 'Aina Database was utilized to extract Land Commission Awards and Boundary Commission Records.

Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the project area and the surrounding vicinity.

Based on communication with the above groups, one formal interview was conducted and several informal talk-story sessions as well.

Project Background and Location

The project study area, comprising a total of 266.4 acres, is located on the Waimea plains in Lālāmilo Uka, approximately 2 miles west of Waimea Town, off Highway 19 (Kawaihae Road), at the 2600 ft elevation A.M.S.L. For the most part, the northern boundary (Kohala) is defined by Keamu'l'omanō and Lanikepu streams and the southern boundary (Waikoloa) by Waikoloa Stream. State of Hawai'i lands form the western boundary and the elite Sandalwood Estates form the eastern most boundary. The parcels are contiguous except for Parcel 10, which is a separate parcel located east of South Kohala Distribution Road and the HELCO Waimea Base yard and Standby Generating Plant, and County of Hawai'i Base yard and Solid Waste Transfer Station.

The Department of Hawaiian Home Lands proposes to build 400 single-family homestead lots, to be implemented in two phases of 200 lots each. Additionally, a portion of the proposed development will include commercial and industrial space, as well as parks and open space.

CULTURAL BACKGROUND

Traditional Land Tenure

The *ahupua'a*, or traditional land unit, is often described as a pie-shaped piece of land extending from the mountains to the sea. Ideally, each *ahupua'a* was comprised of all the major environmental zones (marine, agricultural, forest) and was for the most part, self-sustaining. However, this was not always so and there were no specific rules that determined the size of an *ahupua'a*.

It is not certain when the system of dividing the islands into major land units (*moku*) was instituted. Some say the system was already in place at the time of Līloa, 'Umi's father. Others say 'Umialiloa was the first to establish this tradition. Nevertheless, when 'Umi became king (*circa* A.D. 1600), he divided the island of Hawai'i into six major districts among the lesser chiefly lineages who helped him in his rise to power. His rationale for doing so was that the chiefs would remain loyal to him if they owed him an obligation -- mainly, their political and social status (Kamakau 1992:1; Kame'eleihiwa 1992:53-54).

When Kamehameha became king, he followed this same tradition and maintained the major divisions of Hāmākua, Hilo, Puna, Ka'ū, Kona and Kohala. Within each major land unit, smaller divisions of *ahupua'a, kalana, 'ili 'āina, 'ili kūpono, lele, mo'o, paukū, kihāpai* and *kō'ele* were made. During the *Māhele, kuleana* or native tenant rights were also acknowledged. These major land units (moku) were carried forward into the *Māhele* (formal land division of 1848) and up to the present day with the following exceptions. In 1859, Kona and Kohala were divided into North and South districts. In 1886, Hilo was likewise divided into North and South districts (King *in* Coulter 1935:214-224).

Traditional and Legendary Associations to Waimea

The Winds and Rains of Waimea

Following is a brief summary of the traditional and legendary associations of Waimea, to give the project area a frame of reference for cultural importance and use during traditional times. Although place names around and near Lālāmilo are mentioned in traditional sources, archival and historical research did not reveal any legends specific to Lālāmilo and, in particular, the project area. This does not denote a lack of importance but rather shows the incompleteness of the historic record.

"In the early days Waimea meant all the plateau between the Kohala Mountains and Mauna Kea, inland from Kawaihae. This area is from eight to ten miles long and from three to five miles wide" (Judd: 1932:14). The name Waimea means "reddish water" (Pukui, et al., 1976:226) due to the discoloration of the water from the rich fertile soil found there. Albert Lyons described Waimea's water as ". . . no sweeter or purer water anywhere on earth, despite the sherry-like tint it has taken from the forest morass at its source" (Lyons *in* Doyle 1945:45).

Traditionally, Waimea is renowned for its strong gusty winds and its chilly rain. The two famous winds of Waimea are the *Kīpu'upu'u* and the *Kolo 'āpu'upu'u*. The *Kīpu'upu'u* is the name of a rain as well. The *Kolo 'āpu'upu'u* (*Lit.*, rough creep) is a wind usually accompanied by rain and common to the Waimea area (Kent 1986:440; Pukui & Elbert 1986:163). In *mele* (song/chant), *Waimea i ka ua kīpu'upu* (Waimea, land of the KIpu'upu'u rain) is a famous reference to Waimea and the cold drenching rain which pelts the skin (Pukui 1983: 319; O.N. #2913). In fact, Kamehameha had a trained army of spear fighters and runners from Waimea who called themselves the KIpu'upu'u after the cold wind and icy rain of their homeland (*Ibid.*:169; O.N. #1571). In the story of "The Wind Gourd of La'amaomao", Kūāpāka'a chants the names of the winds of Hawai'i Island:

The *Kīpu'upu'u* is of Waimea,
A cold wind that hurts the skin,
A wind that whips the kapa of that land about,
Tossing up dust before it,
Frightening the procession of travelers
(Nakuina 1992:41; Translated by Mookini & Nākoa)

Another reference to the elements is the *'e'elekoa*, a storm which approaches Waimea from the northeast (Kent 1986:438). From this storm name comes the saying *Kū 'ia ka mālama 'e'elekoa* which is an allegory for enduring hardships (stormy weather) (Pukui & Elbert 1986:37). The *mālana* rain of Waimea is a fine rain that "comes from the northeast, as it moves along before the trade wind" (Kent 1986: 441). The *mālana* was also the name of one of Kamehameha's regiments (Desha 2000: 191). The *mumuku* is the renowned wind of Kawaihae. However, this fierce wind accompanied by a misty rain is said to originate near the Waimea area and blows over the land between the Kohala mountains and Mauna Kea, as if cut off from the main wind, especially in the late afternoons (*Ibid.*: 441; Cordy 2000:23). An 1840 description of this wind was given by the Charles Wilkes of the U. S. Exploring Expedition:

> The trade wind is exceedingly strong, bringing with it a mist toward sunset. It rushes furiously down between the mountains which bound the valley of Waimea and becomes very dangerous to shipping in the bay. It is called by the natives "*mumuku*" and is foretold by them from an illuminated streak that is seen far inland. This is believed to be caused by a reflection of the twilight on the mist that always accompanies this *mumuku* . . . (Wilkes *in* Doyle 1945:50)

Waimea in 'Ōlelo No'eau (Proverbs and Sayings)

Because Hawaiians worked the land and depended on it for sustenance, they had a special affinity to their surroundings. They were very observant of nature, weather patterns, changes in the winds, seasonal variations and so forth. Many of these observations were recorded and passed down through the medium of poetic imagery in the language. As a result, there are poetic references ('*ōlelo no'eau*) to Waimea, especially relating to the cold rainy weather, the enveloping fog, the winds and the rains of Waimea. Following are cultural expressions that reveal some of Waimea's attributes through poetic imagery, painting a picture of the natural environment and the people.

Ka ua kīpu'upu'u o Waimea i ka la'i. A reference to the chilly rain (and wind) for which Waimea is famous. (Kent 1986:269)

Ka ua nounou 'ili o Waimea. The wind which blows the gales of Waimea. *Lit.*, the rain of Waimea that pelts the skin. (*Ibid.*: 270)

Ka ua pu'upu'u o Waimea. The rain that raises the goose flesh. (Doyle 1945:43)

Eō mai ana ka ua līpu'upu'u lipālāwai o Waimea. The rain of Waimea will wet through. Said of quarrels that hurt both parties. (*Ibid.*: 349)

Ke Kīpu'upu'u ho'ānu 'ili o Waimea. The KIpu'upu'u rain of Waimea that chills the skin of the people. (Pukui 1983:188; O.N. #1748)

Ka ua Paliloa o Waimea. The tall-cliffs rain of Waimea. A reference to the rain of Waimea that sweeps down the cliffs. (*Ibid.*: 172; O.N. #1593)

Ku I ke Kīpu'upu'u. Buffeted by the KIpu'upu'u. Said of hurt feelings; a reference to the chilly wind and rain at Waimea. (*Ibid.*: 202; O.N. #1882)

Hele pō`ala i ke anu o Waimea. Said of a person who goes in circles and gets nowhere. Waimea is a cold place and when foggy, it is easy for one unfamiliar with the place to lose his way. (*Ibid.*: 83; O.N. #757)

Ho`i hou ka pa`akai i Waimea. The salt has again returned to Waimea. A man from Waimea was on his way to Waipi`o with salt to exchange for poi. He got into a fog and lost his way. He finally arrived back at Waimea again, with the salt. (Judd 1988:58)

Hemahema Kahuwā me Waimea. Kahuwā and Waimea are awkward. This is in reference to its upland location far from the coast where people are said to be awkward in handling canoes. (*Ibid.*: 86; O.N. #777)

The above expressions intimate that the nature elements of wind and rain were dominating factors that Waimea Hawaiians dealt with as part of their daily lives -- factors that were very different from those who lived along the coastal areas. We also learn something of the exchange system of native Hawaiians. Waipi`o supplied the bulk of the poi for the upland people of Waimea who were farmers and traded vegetable produce with people along the coast for salt and fish.

Waimea in Mo`olelo (Story)

Interestingly, the Hawaiian Legends Index (1989) has no listing for Waimea or Lālāmilo. The adjacent *ahupua`a* of Waikoloa and `Ōuli has one and three listings respectively. However, there are traditional references to Waimea which indicate it was at one time a very populated and important place culturally.

The Famous Kīpu`upu`u Warriors of Waimea

From ancient times, Waimea has been associated with royalty and chiefly lineages. Waimea was one of the lands which was highly valued by the *ali`i* (chiefs) and traditional stories indicate they maintained a dominant presence there. After the death of Kalani`ōpu`u, Keawema`uhili, acting on behalf of Kīwala`ō, divided the lands of Hawai`i Island. In doing so, he reserved the best and largest portions for himself and the rest he apportioned out to the other chiefs and warriors. Upon hearing this, Keoua Kuahu`ula went to his brother Kīwala`ō and asked, "Waipi`o and Waimea are ours?" Kīwala`ō answered, "They have been given away; they are not ours . . . You and I are left without land in this division. Our uncle has taken it . . ." (Kamakau 1992:120).

Native testimony from Lucy Peabody, the grand-daughter of Hū`eo, reveals that "The land where the Waimea Village lots now are was known as "Laualii" - meaning *Many Chiefs* . . . presumably because there were many chiefs living at that place at the time the name was given" (Waimea Water Rights Case: 1914-1915).

Besides being associated with royalty, Waimea was a renowned training ground for young chiefly warriors from ancient times. In the battle at Kakanilua between Kahekili of Maui and Kalani`ōpu`u of Hawai`i, the Hawai`i armies were defeated. Kalani`ōpu`u's armies were made up of the `Ālapa and Pī`ipī`i regiments and were "chosen from the chiefs of the land who had been instructed in the profession of war and who were ready for battle" (Desha 2000:37). Desha gives a colorful description of these chiefly warriors numbering 800 strong, "These men were of equal height and were garbed in feather cloaks of various colors. They were those of whom King Kalani`ōpu`u thought a great deal, for they were skilled in the martial arts of those days (*Ibid.*: 34). Of the battle at Kakanilua Desha writes:

> Those persons who had been slain and whose bones were laid in the sand dunes of Wailuku and Waikapū were of the chiefly blood of Hawai`i. It was also said that half of those people were the young chiefs of Waimea, who had been most carefully selected by King Kalani`ōpu`u. They were persons accomplished in

> performing warlike deeds . . . Pī`ipī`i armies were the foremost warriors of Kalani`ōpu`u, chosen from amongst the chiefs of the entire island of Hawai`i. Half of them were from the famous land of Waimea. (*Ibid.*: 43-44)

The story of Kekūhaopi`o (Desha 2000) sheds much light on Waimea as a center of training for Kamehameha's best and fiercest warriors. But, in fact, Desha reiterates that Waimea was a famous "battlefield for numerous *ali`i* from ancient times" (*Ibid.*: 192).

Kekūhaopi`o, was an expert in the art of war and weaponry and was especially skilled in *lua* (a bone-breaking form of wrestling). He was Kamehameha's mentor and trainer during his youth and became his trusted advisor later on during his rise to power. It was during this time that Kamehameha sent his most skilled warrior, Kekūhaupi`o to Waimea for the purpose of training the men there and to

> ". . . to instruct the young men of that place in the ancient ways of preparedness for battle. The land of Waimea was one of the lands where there were many warriors from ancient times. That place, Waimea, furnished Kamehameha with armies of men trained in battle. Under this war instructor of Kamehameha, those young men were taught proficiency in whirling spears and also in defending against the enemy's spears. At this same time Kekūhaupi`o instructed in defense against the *mākini* type of fighting of the Maui people. This type of fighting encountered by the people of Hawai`i at the Battle of Kepaniwai o `Īao became as *wai `au`au* [bath water] to Hawai`i's young warriors. (Desha 2000: 188)

This special group of warriors called themselves the Kīpu`upu`u, a group of runners and messengers, known for their speed who were trained in warfare and in "body-strengthening". They were particularly adept in spear fighting as well as using various other types of weaponry such as the *olonā* bow strings, slings and battle-adzes. (*Ibid.*: 191-192, 197). The traditional chant, *Hole Waimea*, makes reference to these *Kīpu`upu`u* warriors of old (Elbert & Mahoe 1970: 52).

Hole Waimea i ka ihe a ka makani	Waimea is stripped by the spear of the wind
Hao mai nā `ale a ke Kīpu`upu`u	Blown by the gusts of the Kīpu`upu`u
He lā`au kala`ihi ia na ke anu	A staff made still in the cold
`Ō`ō i ka nahele o Mahiki.	Pierced is the forest of Ma hiki.

(Translation follows Frazier *in* Desha 2000: 192)

Desha explains his understanding of this chant:

> There is a hidden meaning in this old *mele*, as that forest of Mahiki was a place for making spears for the warriors in ancient times. In times of peace, the *ali`i* and the men would go there to prepare for the times of war to come.
>
> When Kamehameha was staying at Kawaihae, he went with his many warriors to that forest for the making of spears. Some of his court accompanied them, in other words, the chiefly women. At this place of the story, the writer conceals the hidden meaning of the "stripping of Waimea by the spear of the wind" and it is for the reader to guess the meaning. (*Ibid.*) [An allusion to love-making.]

The story of Kekūhaupi`o lists some of the famous battles (12) either fought in Waimea or fought by Waimea warriors. They are:

1. The battle of ʻUmi and Hīkau, his *hoahānau*, at a certain time of their lives.

2. Battle of ʻUmi and Holoholoku, the *aliʻi* of Waimea, when ʻUmi was victorious.

3. Rebellion of Mahīʻolōlī against Mahiaee, the *aliʻi* of Kona, also known as Mahiua I.

4. Battle of Kuahuʻia, the *aliʻi* of Hilo against Keakealaniwahine. This was a battle joined in by all of Waimea.

5. Battle of Kauauanuimahi [Kauauamahi] against Mokulani, the *aliʻi* of Hāmākua. This was the battle at Kahuenaha. This was a very long-fought war lasting five years. It was said that the warriors were scattered from Hokuula, down to Mahiki, ascending up Mauna Kea, and descending seaward of Kalaieha, ascending up Mauna Loa, and going down seaward at Manukā, and as far as Kapuʻa in Kona. This war was called "The House of Fragmented Warriors (*He Hale Māmala Koa*)."

6. The war of Alapaʻinui which went to Molokaʻi and as far as Oʻahu. However, this fight was not begun on the Waimea battlefield, but his warriors were from Waimea, together with those from Kohala.

7. The battle between Keaweʻōpala and Kalaniʻōpuʻu, which was started by Keʻeaumoku, the war-loving father of Kaʻahumanu, later of one of Kamehameha's great generals. Keʻeaumoku supported Keaweʻōpala and they were put to flight by Kalaniʻōpuʻu. Keaweʻōpala was killed and Keʻeaumoku fled to Maui.

8. From Waimea also came numerous warriors of Kalaniʻōpuʻu when he went to battle with Kahekili on Maui. Waimea had brave warriors in those days.

9. Battle at Hakalau with Kahekili's warriors, nicknamed Kahekili's Black. This battle was described in a past issue of this story. Most of Kamehameha's men were from Waimea and Kohala in that battle.

10. The famous battle of Mokuʻōhai when Kamehameha was victorious over his *hoahānau* Kīwalaʻō. Most of Kamehameha's men came from Waimea, Kohala, and the Kona districts.

11. The battle at Pāʻieʻie and Puaʻaloa, previously described, called the Bitter Rain. Most of Kamehameha's men were from Waimea.

12. The very last Battle of Hīpuʻu. Most of Kamehameha's warriors were from Waimea in this battle with the intruders from Maui. (*Ibid.*: 192-193)

Another battle of note is the war between Kamalālāwalu of Maui and Lonoikamahakihi from Hawaiʻi (ca. late 16th to early 17th century). There are several varying accounts of this story as told by Kamakau (1992) and Fornander (1918-1919). Encouraged to battle by two old men who were spies of Lonoikamakahi, Kamalālāwalu and his forces landed at Kawaihae. Ignoring his own counselors, he followed the advice of the two old men to carry the war canoes inland and remove the outriggers to prevent the escape of Lonoikamakahiki's troops should they try to escape by the sea route. Kamakau's version places the battle of Puʻoaʻoaka (Puʻuʻowīʻowaka Hill) on the "grassy plain of Waimea" where the Maui warriors could not find water except for rain water caught in the hollows of rocks in Lanimaumau Stream (Kamakau 1992: 58-60). In the Fornander

version, the battle occurs at Hōkūʻula. The Hawaiʻi warriors were placed in various strategic positions across Waimea: the Kona warriors were at Puʻupā to Haleopla, the Kaʻū and Puna troops spread out from Holoholokū to Waikoloa, while Hilo and Hāmākua covered the area from Mahiki to Puʻukanikanihia, and those of Kohala were stationed at Momoualoa to Waiaka (Fornander 1916: IV, 344). In this particular battle, the Hawaiʻi forces were the victors over the invaders from Maui (*Ibid.*: 348).

Waimea's warrior background presents a picture of people who were not only skilled in warfare, but were brave and fearless in fighting and were trustworthy and loyal to their *aliʻi* during times of war.

A natural response to the economic support of warfare and the support of numerous troops and chiefly personages during the pre-historic period probably led to the development of the large agricultural field systems still evident in Waimea today. This field system can be seen on a clear day from the top of Kohala Mountain Road as one looks down over the plains below -- especially in the Lālāmilo and Waikoloa areas. On this subject, Barrere writes:

> It may well have been that during the times of Alapaʻinui and of Kalaniʻōpuʻu that the cultivating places at Waimea were first expanded to supply the chiefs' needs while they sojourned there and at Kawaihae. The abandoned cultivated patches, so often attributed to the decrease in the Hawaiian populations, were, in fact, as much the result of this practice of chiefs of traveling about their domains, feeding off the land until supplies were exhausted, then moving off to another. (Barrere *in* Clark & Kirch 1983: 27)

Though sparse, there is some mention of *heiau* in traditional and early historic accounts. One of the earliest legends tells of a *heiau* dedicated to training young virgins in the healing arts. This *heiau* is attributed to Hoopiliahae, the wife of Keawenui aʻUmi and daughter of Pae a Molenole -- *kahuna* to Liloa. There are two similar versions of the story in the Edgar Henriques Collection [n.d.].

> Hoopiliahae, the Alii of Waimea, built and dedicated a heiau at Ouli, a little mauka of where Spencer's residence now stands at Puuiki, and called it Haleino. Hoopilihae had five children and named them after the rains of this Heiau.

The second version adds more detail to the legend.

> On the way from Kawaihae, some two miles before reaching the village of Waimea, Hawaii, are the Lanikepu hills in the Ahupuaa of Ouli. The home of the High Chiefess Kaoanacha grandmother of her late Majesty Queen Emma, near the old Spencer premises Puuiki. Directly back of this place was once a beautiful forest where the Heiau of Haleino was located.
>
> The only Heiau ever founded, dedicated and consecrated by a woman, the High Chiefess Hoopiliahae, an ancestor of the sovereigns of Hawaii and the ruling High Chiefs of Waimea.
>
> Haleino noted for the red rain and vivid rainbow symbols of the sacredness of this locality, was exclusively for girls of the age of purity who performed the duties of dedicating and participating in the different ceremonies, in which the spirit of love, purity of body and mind was imbued; also the science of healing was taught, thus consecrating their lives for the betterment of others..
>
> Haleino today, although neglected still stands as a memorial to the High Chiefess Hoopiliahae, to which her descendants and off-spring of her subjects point with pride to the travelers who visit the Waimea plains.

There is reference to another *heiau*, built on a nearby ridge by:

> . . . another Akua or God, named Makuakuamana who came with Paao the High Priest from Tahiti. He also built a Heiau. While he was building his heiau, he noticed a fine red rain called uakoko or blood, falling in front of Hokuula on the land of Waiaka. Noticing this rain every day, accompanied by a very brilliant rain-bow, one day he flew to a high mountain ridge to get a better view, to try to find out the cause of this beautiful sight. To his great surprise he beheld a beautiful goddess, whose only clothing was a great quantity of very long and silky hair. He was so entranced with her great beauty, he immediately flew down to where she was. He was pleased to learn it was the High Chiefess Wao being greatly impressed by his handsome face and Apollo form, and learning that he was the great Akua from Tahiti, she could not refuse him. The marriage ceremony was performed before all the High Chiefs of the surrounding country, and a great concourse of their followers. After the ceremonies, which lasted for days, were over, they with all their followers went to reside at Hokuula. Often would Wao go to Laelae, the hill above Kohakohau Falls on the land of Waiaka, where she would give birth to her children. For that reason the hill was called Palikapu o na `lii o Waimea or sacred hill of the Chiefs of Waimea.
>
> The servants of Wao would roll a stone down the hill to a flat of land and wherever the stone would stop, that would be the tabu line, and no one would be allowed to pass. Especially would it be a sign for the people who lived below the hill called Pekepekelaui who were a class known as Kauas or low born.
>
> At night Wao would change her servants to stone and would then return to the spring where she spent the night; a little before the dawn of day, she would return and turn them back to their human selves.
>
> It is said that Wao can be seen when any of the Waimea Chiefs or Monarchs die at this same spring, to this day. (Edgar Henriques Collection: [n.d.])

In 1867, Kamakau wrote about a *heiau* being restored at Uli in Waimea sometime between the years of 1797 - 1811. The Hawaiian text reads:

> *I ka noho `ana o Kamehameha ma uka o Waimea me nā ali`i, a ho`āla ihola i nā heiau kahiko, a ua ho`āla a`ela iā Uli; a pa`a pono kona mau paehumu, nā `ānu`unu`u a me nā kīpapa, iho akula nā ali`i a me nā kanaka a pau i kai o Puakō i ka nui, a ua lawe nā mea a pau loa i ka niu; akā, ua koe iho na`e ho`okahi lau niu a me nā kanahā `elua (`o ia ho`i 430) i koe iho me ka pa`a nō i ka pulu. Ua pau loa aku nā mea a pau i ka pi`i, a koe na`e ho`i ho`okahi kanaka, a `o Kamehameha nō ka lua. `Ōlelo iho `o Kamehameha, "`A`ole paha auane`i e pau ka niu o ka heiau o ke akua o ke ali`i?" "Ua pau," wahi a ke kanaka. Pane hou nō `o Kamehameha, "Aia a pau kēia niu, a laila, noa ka heiau a ke ali`i i kakahiaka o ka lā `apōpō." Ua `ike paha kēia kanaka, `o Kamehameha kēia, a ua `ike `ole paha. Ua `ike `ole `o Kamehameha i kēia kanaka i nā wā ma mua a`e. Hana ihola lāua nei i ka hā`awe, `a`ole nō ho`i i kana mai ua mea he nui. A pa`a ua hā`awe nei i ke kīpapa `ia, ua ha`aha`a iho ke kanaka i lalo, a ua ki`eki`e a`e ua hā`awe nei i luna. He lō`ihi ho`i ke alanui e pi`i ai mai Puakō a hiki i uka o Waimea, ua `ane`ane paha e hiki aku i ka iwakāluа ka nui o nā mile. I ka pi`i `ana na`e o lāua nei, ua kōkua aku nō `o Kamehameha ma ka hā`awe aku nō `o Kamehameha i ua hā`awe nei a hala mai kekahi mau mile. Pēlā nō lāua i ka`ana like ai a hiki i ka `ane`ane `ana e hiki i uka. A no ke kokoke loa i ka wā pule o ke ahiahi, no laila, ha`alele ihola `o Kamehameha i ua kanaka nei, me ke kauoha ino nō ho`i, "A hiki aku `oe i kahi kokoke i ka heiau, e kipa a`e `oe i kauhale kama`āina, a ma laila `oe e moe ai, me ka `ōlelo `ole aku, ua hā`awe `ia e Kamehameha."*

> *`O ka ikaika i ka hā`awe niu, a me ka ikaika o ua kanaka nei i kā lāua mau pua`a anana `elua [i kupu ma hope aku], me ke kōkua `ole mai o kekahi kanaka, `o ia nō nā kumu i `oi loa aku ai ka punahele o kēia kanaka, a lilo a`ela i kanaka nui, ki`eki`e a hanohano nō ho`i. `O Kūihelani ka inoa o ua kanaka nei. A no kona lilo `ana i mea nui i mua o ko Kamehameha aloali`i, ua loa`a iā ia he `umi wahine; `a`ole ho`i he mau ali`i `ē a`e i like me Kūihelani ma ia `ano. `A`ole nō ho`i he hale i piha i ka hoihoi e like me ko Kūihelani. `A`ole nō ho`i he ali`i i kū i ka moku e like me Kūihelani. (Kā`oko`a 6/13/1867)*

Translation:
While Kamehameha was living with the chiefs of Waimea [he] was engaged in restoring the old heiaus. When the fence of images (*paehumu*), the oracle tower (*anu'unu'u*), and the pavement (*Kipapa*) of the heiau of Uli had been restored, all the people had to go down to Puako after coconuts. When each had taken up his load to return there remained still 480 nuts unhusked. All had gone except Kamehameha and one other to whom the chief was unknown. Kamehameha turned to him and said, "It looks as if there would not be enough coconuts for the dedication in the morning." It is possible that the man recognized the chief for he replied, "They will all be there." The two put the nuts into nets and fastened them together into a huge load that stood taller than either of them. The road from Puako to Waimea is twenty miles in length. Occasionally when the man seemed tired Kamehameha took a turn at the load. At dusk as they neared their destination, and it came time for evening prayer, Kamehameha left the man, saying, "When you get to the heiau spend the night with the people of that place, but do not tell them that Kamehameha helped to carry the load on his back." Because of this feat of strength and another later, when he took up two hogs each more than a fathom long and carried them without help, this Ku-i-helani, as his name was, became a great favorite of the chief and held an important office under him. He was allowed to have ten wives, an honor allowed to no other chief besides, and there was no home happier than his, no governor of a district to be compared with Ku-i-helani. (Translation follows Kamakau 1992:183)

This is the same *heiau* Thrum (1908:42) recorded as being opposite the church in Waimea. This *heiau* had already been destroyed at the time of his visit but Thrum was able to glean a few details from local informants. Initially, this *heiau* had been dedicated by Hakau and rebuilt by Kamehameha.

PREVIOUS ARCHAEOLOGICAL RESEARCH

A search of DLNR-SHPD archaeological report database and other sources identified 31 reports covering portions of Lalamilo and adjacent areas. *Table 1* summarizes the studies and *Figure 2* shows the project locations. Not included in the table or figure are the early surveys by Thrum (1908), Stokes (Stokes and Dye 1991), Reineke (n.d.), and an unreported survey by the Department of Hawaiian Homelands (DHHL). Thrum (1908:42) reported the former presence of a *heiau* at Uli in Waimea.

In 1906, John Stokes, then Curator of Polynesian Ethnology at Bishop Museum, did fieldwork on the island of Hawai`i, documenting *heiau* and drawing plans of the better-preserved ones. Using Thrum's list as a guide, Stokes began his fieldwork in Kailua-Kona. "Once in the field, however, Stokes discovered that local Hawaiians could identify many more *heiau* than appeared on Thrum's list" (Stokes & Dye 1991:10). In the South Kohala District, Stokes recorded only two *heiau*, Mailekini and Pu`ukoholā, at Kawaihae. He recorded none in the vicinity of Waimea. In addition, Stokes heard about four other *heiau* at Puakō, near the coast, but he was unable to gather any information about these sites from local informants (Stokes & Dye 1991).

During his 1930 survey conducted for the Bishop Museum, Reinecke examined the western coast of the island and, " walked along the coast from Kalahuipua'a [near Puako] to Kawaihae, but considered it not worth while to attempt a survey of this algarroba-covered [*kiawe*] coast unless… [he]… had a base there" (Reinecke 1930.). He makes no mention of archaeological sites within Lalamilo.

During the mid-1990s, DHHL archaeologists conducted a reconnaissance survey of several hundred acres immediately south of the project area (Ross Cordy, personal communication). The survey area extended from Waikoloa Stream to the southern boundary of Lalamilo, and from approximately 1,200 ft and 2,300 ft elevation. The survey demonstrated that agricultural features are rare below 1,900 ft elevation. The survey identified burials, small shrines, and habitation sites.

The surveys in *Table 1* cover nearly 8,000 acres identifying 776 sites with 5,399 features. Clark (1981, 1987) reports a total of 321 sites including 182 nonagricultural sites with 458 features; however, only 422 features are listed in his tables. A rough count of features depicted on the site maps yields 63 *auwai* branches, 297 field ridges, and approximately 1,379 other, presumably agricultural features that consist of terraces, swales, mounds, and modified outcrops. The feature count is exaggerated by the Bishop Museum study of the Puako petroglyph field that documented nearly 2,000 petrogyphs. If these are removed from the feature count the total number of identified features is 3,412.

To aid in reconstructing settlement patterns, features were quantified by probable age and function, and the studies are ordered by elevation. The data from the studies connected within the Mudlane-Waimea-Kawaihae road corridor (Barrera and Kelly 1974, Clark and Kirch 1983) are subdivided into four entries in *Table 1* based on elevation. Traditional Hawaiian features were categorized as habitation, agricultural, burial (including possible burials), ritual, trail, *ahu*, and rock art. Features not assignable to these categories were categorized as miscellaneous/indeterminate. Traditional sites in this category include saltpans, *papamu*, fishponds, and pahoehoe excavations. Habitation sites are further subdivided into temporary and permanent for studies making this distinction.

Density per acre values are given for sites, features, and habitation and agricultural features. Overall, the studies have identified 640 habitation features including 104 permanent habitation features and 276 temporary habitations, 1,988 agricultural features, 112 burials, 4 ritual features, 18 trail segments, 84 *ahu*, and 2,007petroglyphs. Two hundred and sixty habitation features were not categorized by residential permanence. Historic features were not segregated by function. The majority of the historic features are ranch walls.

Table 1. Land Commission Award Claims

LCA	Claimant	Apana claimed	Apana awarded	Ahupua'a	Ili	Section No.	Land Use	Boundary Mauka	*Boundary Waimea/Kona	Boundary Makai	*Boundary Kawaihae Kohala	Date Rec'd	Grant/Seller	Acreage	Royal Patent	Sources	Comment
[illegible]	Nahalewa	1	1	Waimea	Puuopelu		house lot and 2 kula	konohiki	konohiki	konohiki	konohiki	1848	Beckley	4.88	8082	FT 80v6	
976	William Beckley	2	2	Waimea	Waikoloa		house lot and farm	konohiki	konohiki	konohiki	konohiki	NO	Kam. III	28.38	8085	NR 57v2, FT 201v3, 83v5	awarded 2 apana
990	John Davis	1	1	Waimea	Napuuolahala		enclosed house lot with 2 houses and 3 kula	konohiki	konohiki	stream	konohiki	1838	Mr. Gardner	4.83	4487A	NR 130v2, FT 88v6	
3271B	Mokuhi	1	0	Waimea	Pu'ukapu		NO	NO	NO	NO	NO	NO	NO	0.00	none	NT 146v4	
3332B	Jose Bowers	1	1	Waimea	Puuopelu		house lot and 2 kula	NO	NO	NO	NO	NO	NO	7.8	8443	FT83v4	
3573	Ioikobe Mohoe	1	0	Waimea	Puako		house lot, enclosed with 2 houses	konohiki	konohiki	Bokolo (Beckley)	Bokolo (Beckley)	NO	parental konohiki	0.00	none	NR 379v6, NT 147v4	
3736	Wahahane	1	1	Waimea	Puako		house lot, enclosed with 2 houses	Waho	Pohale (Beckley)	Pohale (Beckley)	Pohale (Beckley)	1824	Manea	1.06	8010	NR 92v8, NT 19v4, 177v4	testimony also refers to Lalamilo as ili of Puako
3758	Akahi (wahine)	1	1	Waimea	Puako		house lot, enclosed with 4 houses	Uloma	Uloma	Huwe	Pohale (Beckley)	NO	NO	0.37	3658	NR 52v8, NT 20v4	Uloma described as konohiki
3762	Aoaoa	1	1	Waimea	Keanuiomano		taro farm	Bokio (Beckley)	Bokio (Beckley)	Bokio (Beckley)	Bokio (Beckley)	NO	NO	36.00	3782	NR 47v8, 30v4	awarded 2 apana; one in Waikoloa
3825	Paalualu	1	0	Waimea	Puako		12 or 18 coconut trees	NO	NO	NO	NO	time of Kam. I	NO	0.00	none	NR 380v8, NT 146v4	land taken by konohiki
3826	I.A. Paisa and wife	3	1	Waimea								1847	Huwe	46.00	8446	NR 380v8, NT 31v4	William Beckley described as konohiki
					Puako	1	house lot, formerly enclosed with 2 houses	Huwe	Huwe	Huwe	Beckley						
					Kaaikulu	2	farm and house lot	konohiki	konohiki	konohiki	konohiki						
					Waikoloa	3	house lot, partially enclosed	konohiki	konohiki	konohiki	konohiki						
4036	Kaawaluka	2	0	Waimea	Puako							before Kam. I	grand-parents	0.00	none	NR 348v8, NT 147v4	
						1	house lot, enclosed with 3 houses, 7 coconuts, 2 kalo trees, salt pond	Beckley	Beckley	Huwe	Huwe						
						2	4 salt ponds, sweet potato patches	konohiki	konohiki	konohiki	konohiki						
4102	Kamahiai	1	1	Waimea	Puako		house lot with 3 houses and 2 trees	NO	NO	NO	NO	NO	NO	0.36	7137	NR 85v8	

*Inland parcel boundaries are Waimea/Kawaihae and coastal parcels are Kona/Kohala
N/O= No data

Table 1. Land Commission Award Claims (cont.)

LCA	Claimant	Apana claimed	Apana awarded	Ahupua'a	RI	Section No.	Land Use	Boundary Mauka	*Boundary Waimea/Kona	Boundary Makai	*Boundary Kawaihae/ Kahoa	Date Rec'd	Orvert Seller	Acreage	Royal Patent	Sources	Comment
4188	Kanaholoa	3	1	Waimea	Kaluaopa							1848	Ulumia Paiaia (Wm. Beckley)	35.20	7382	RR 61v8, RT 17v8	
						1	1 house, 45 pandanus	Ulumia Paiaia (Wm. Beckley)	Ulumia Paiaia (Wm. Beckley)	Ulumia Paiaia (Wm. Beckley)	Ulumia Paiaia (Wm. Beckley)						
						2	1 patch	"	"	"	"						
						3	6 patches of taro and marsh	"	"	"	"						
4886	William French	2	1	Waimea	N/D		House and slaughter house with enclosure, grass house, coolhouse	N/D	N/D	N/D	N/D	1840	Wm. Hughes	21.80	87	FR 8v2, FT 167, 177v2; RT 483v2	also had claims in Honolulu and Kawaihoa, claimant built a wharf and was a bullock, butcher
88138	Honolulu	1	1	Waimea	Napoopoopu		Sold	Isenshild	Isenshild	Isenshild	Isenshild	1848	Wm. Beckley	28.44	8082	FT 8v8	
80508	Wm. C. Lunalilo	1	1	Puako	N/D		N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	8547	FT 551v3, 82v18, RT 482v10, 82v18	many other claims elsewhere
10260	Makole	1	0	Waimea	Puaeo		N/D	N/D	N/D	N/D	N/D	N/D	N/D	0.00	none	RR 110v8	

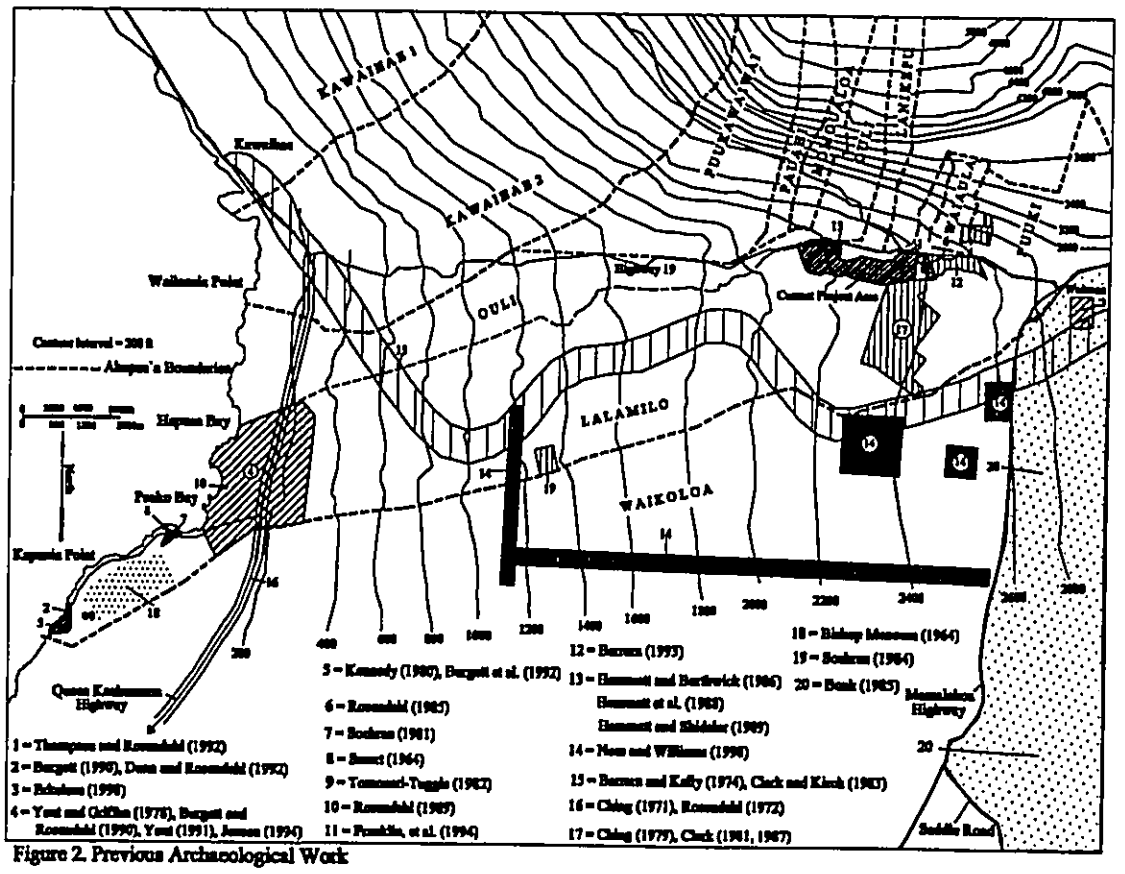

Figure 2. Previous Archaeological Work

Density values for surveys of at least 50 acres indicate the highest densities of habitation features between 2,280 ft and 2,480 ft elevation (0.77 features per acre) and at the coast (0.18). Agricultural feature density is high between 2,280 ft and 2,500 ft elevation. Overall feature density ranges from 0.03 to 7.37 features per acre. Habitation feature density ranges from 0 to 0.77 features per acre with an average of 0.16. Agricultural feature density ranges from 0 to 5.94 features per acre with an average of 1.13. Burial and ritual sites are concentrated near the coast, but nearly 27% of the burials are reported from inland sites between 2,000 ft and 2,740 ft elevation.

Seventy-four radiocarbon dates are reported in the studies by Clark and Kirch (1983), Rosendahl (1971), Hammatt et al. (1988), Hammatt and Shideler (1989), Burgett et al. (1992), Barrera (1993), and Jensen (1994). Most of the results were calibrated using older, and less precise calibration tables. When all potential age ranges are examined five ranges span the 1200s, eleven include the 1300s, twenty-four span the 1400s, thirty span the 1500s, forty-five include the 1600s, forty-eight span the 1700s, and fifty include the 1800s to early 1900s. One early age range, AD 791 to 1341, is discounted by Clark and Kirch (1983) as anomalous. The results indicate initial use of the area in the 1200s to 1300s followed by a rapid increase between the 1400s and 1500s. The most intensive use dates to between the 1600s to early 1900s.

Four studies included portions of the project area. Three studies by Cultural Surveys Hawaii (Hammatt and Borthwick 1986, Hammatt et al. 1988, Hammatt and Shideler 1989) included a reconnaissance survey of 50 acres, and subsequent intensive survey and data recovery within a 12 acre portion of the reconnaissance survey area, for a proposed residential subdivision (see *Figure* 2). The studies documented two groups of agricultural fields, walls, habitation enclosures, and agricultural mounds. One site, a series of pipeline stanchions (Site 11,100), was relocated during the current survey.

Thompson and Rosendahl (1992) conducted an inventory survey of an approximately 9.5 acre parcel on the south side of Kawaihae Road just inland of the bridge across Waiaka Stream (see *Figure* 2). The survey identified six agricultural fields designated Site 18054. Seven backhoe trenches excavated through the field boundaries all identified a layer interpreted to be a buried agricultural soil. The current survey identified several terraces and an irrigation ditch in the area surveyed by Thompson and Rosendahl, but the features could not be readily correlated with the previously identified ones.

In 1974, the State Historic Preservation Division designated a large area extending to the southwestern edge of the project area as the Lālāmilo *Kuleana* and Ranch District (Site 2292). The area includes three LCAs (3762, 4195 and 976:2) and one grant (2129) situated outside, south-southwest of the project area. The description of the site is as follows:

> The site consists of numerous stone walls, stone platforms, agricultural terraces, *auwai*, cattle pens, and stone wall-enclosed *kuleana* and house sties. A few structures show the use of mortar, plaster and ironware. Empty metal cartridge cases indicate military use of the area in recent years. (Historic Sites Information and Review Form:2).

The project area lies within Field Complex 2 of the Waimea Field System (Newman 1970; Clark and Kirch 1983, Clark 1981, 1987). Clark (1987) proposed a settlement pattern model for the Kawaihae-Waimea region that consists of four zones as follows:

Coastal Zone — Extends from the coast to between 200 m and 400 m inland, most sites below 30-45 m (98-148 ft) elevation. Subdivided into shoreline and inland subzones. Subsistence activity has a marine exploitation emphasis including fishing, collecting, and salt making. Agricultural crops included coconut, sweet potato, gourds, and other medicinal, utilitarian, and food plants. Archaeological features include "residential structures, community-oriented structures, burial monuments, agricultural features, military features [recent], and miscellaneous" (1987:247). Habitation sites include single use sites, extended and recurrent occupations, and permanently occupied sites. Habitation features include small walled shelters, caves, overhangs, terraces, platforms, and enclosures. The more intensively occupied habitation sites are clustered in neighborhoods sometimes larger wards.

Intermediate Zone — Extends from the Coastal Zone to between 7.3 and 9.7 km inland at approximately 585 m (1,919 ft) elevation. Subsistence activity limited to small scale seasonal cultivation of alluvial flats near drainages and bird catching. Archaeological features include short-term occupation sites including midden scatters, fireplaces, small walled shelters, caves, and overhangs, which are typically situated near drainages.

Kula Zone — Extends from the Coastal Zone to between 7.3 and 9.7 km inland. It ranges in elevation from 585 m to 830 m (1,919-2,722 ft) in elevation, with small sections extending to as much as 975 m (3,198 ft) elevation. Subsistence activity is dominated by agriculture. The zone is divided into two primary sub-zones based on the nature of cultivation. Sub-zone 1 is defined by the presence of formal fields mound complexes, small terraces, modified outcrops, and animal and garden enclosures. Sub-zone 2 is characterized by the absence of formal fields and limited to planting swales, clusters of mounds, and modified outcrops. Irrigation ditches occur in both sub-zones. Crops included sweet potatoes, dry-land taro, gourds, and *wauke*. Habitation sites include single use sites, extended and recurrent occupations, and permanently occupied sites. Habitation features include small walled shelters, caves, overhangs, terraces, platforms, and enclosures. The more intensively occupied habitation sites are clustered in neighborhoods sometimes larger wards.

Wilderness Zone — Zone extends inland from the *Kula* Zone to the mountain tops. Zone is divided into two sub-zones. Sub-zone 1 consists of areas that were exploited for a variety of resources including, wood, bark, birds, wild plants foods, fine-grained basalt for tool manufacture. Sub-zone 2 consists of the highest elevation areas that were not economically exploited and largely untouched except for some religious activity.

HISTORIC BACKGROUND

Looking at the Waimea area as we know it today, one may have difficulty imagining what it looked like during traditional times and a couple of hundred years before contact (1778). Descriptions from early visitors, *Māhele* records, and native testimony (Carter vs. Territory of Hawai'i:1914-1915) indicate the native forest once extended much lower into the upland plains than it does today. The project area itself was most likely comprised of sandalwood forest up until the early 1800s. Depletion of the forest zone no doubt affected general rainfall and precipitation patterns as well as the notoriously strong *mumuku* winds that originate in the Waimea area and blow down to Kawaihae. This is evident from reading native testimony from the Waimea Water Rights Case (1914-1915).

Early Historic Accounts of Waimea (1778-1848)

One of the earliest glimpses of Waimea from a distance was given in 1793 by Archibald Menzies, the British naturalist who traveled with Captain Vancouver's expedition. Landing at Kawaihae, Menzies took a short excursion inland in the hopes of collecting plants. He wrote:

> I traveled a few miles back . . . through the most barren, scorching country I have ever walked over . . . A little higher up, however, than I had time to penetrate, I saw in the verge of the woods several fine plantations, and my guides took great pains to inform me that the inland country was very fertile and numerously inhabited. Indeed, I could readily believe the truth of these assertions, from the number of people I met loaded with the produce of their plantations and bringing it down to the water side to market, for the consumption was now great, not only by the ship, but by the concourse of people which curiosity brought into the vicinity of the bay. (Menzies 1920: 55-56)

Vancouver's trip had monumental impacts for Waimea and the Hawaiian Islands. It was on two separate trips 1793 and 1794 that Vancouver presented Longhorn cattle, along with some sheep to Kamehameha as a gift. At the request of Vancouver, Kamehameha put a ten-year *kapu* on the cattle. They were not to be touched or hunted, but were left to breed and multiply. The cattle were taken to a large penned area in upland Waimea which was ". . . very rich and productive, occupying a space of several miles in extent, and winding at the foot of . . . lofty mountains far into the country. In this valley is a great tract of luxuriant, natural pasturage, whither all the cattle and sheep . . . were to be driven, there to roam unrestrained, to "increase and multiply" far from the sight of strangers" (Vancouver *in* Kuykendall 1965:28, 40-41). Along with cattle, other early western visitors introduced goats, horses, a new pig breed, and new vegetable, fruit and plant varieties. Kawaihae and its port became the impetus for the development of trade and commerce. Waimea provided much of the produce and later on, salted beef, to refurbish supplies for foreign ships.

Though the sandalwood trade did not really accelerate until 1810 or 1811, sandalwood was imported on a small scale as early as 1790 (on Kaua'i). In the early 1800s, Hawai'i began exporting sandalwood to the Orient. The early records say the first shipments were of poor quality and therefore unsellable. However, in 1811, three American entrepreneurs signed a contact with Kamehameha to have exclusive rights to export sandalwood from Hawai'i. In return, Kamehameha received one fourth of the net profits. Thus, trade in sandalwood became the strict monopoly of the *ali'i*. At the height of the sandalwood boom, Kamehameha bought foreign ships, including six vessels between 1816 to 1818, in order to transport his own wood to the Orient (Kuykendall 1965: 87). After Kamehameha's death in 1819, Liholiho (Kamehameha II) allowed his chiefs to share in the sandalwood trade, resulting in an unrestricted demand on the stocks of the wood and upon the commoners who did the harvesting. As a result, the common people of the land suffered many hardships to meet the demands of the *ali'i*. Kamakau writes:

> The chiefs, old and young, went into the mountains with their retainers, accompanied by the king and his officials, to take charge of the cutting, and some of the commoners cut while others carried the wood to the ships at the various landings; none was allowed to remain behind. Many of them suffered for food; because of the green herbs they were obliged to eat they were called "Excreters-of-green-herbs" (*Hilalele*), and many died and were buried there. The land was denuded of sandalwood by this means. (1992:252)

At Kawaihae, John Young supervised royal warehouses that were the central depository for the wood brought in from the surrounding district, including Waimea. A description of the magnitude of labor involved was witnessed by Rev. William Ellis during an 1823 visit to Kawaihae. He wrote:

> Before daylight on the 22d [*sic.*], we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku [Kalanimoku], by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach [at Kawaihae], for the purpose of its being shipped to O'ahu. There were between two and three thousand men, carrying each from one to six pieces of sandal wood, according to their size and weight. It was generally tied on their backs by bands made of *ti* leaves, passed over the shoulders and under the arms, and fastened across their breast. When they had deposited the wood at the storehouse, they departed to their respective homes. (Ellis 1969:397)

The commerce flourished until the supply dwindled in the mid-1830s and by early 1840s the industry came to a stand still. Wilkes reported that "there are now no trees left larger than mere saplings" (1845:217).

Actual early descriptions of Waimea come from early missionary accounts. In March of 1820, the first company of American missionaries arrived at Kawaihae and the first mission station in the district was established there for a brief period. In 1823, William Ellis wrote about the village of Waimea through the eyes of his fellow missionary peers who walked there from the Hāmākua Coast. Messrs. Bishop and Goodrich described the fertile countryside through which they passed: "Here a number of villages appeared on each side of the path, surrounded with plantations, in which plantations, sugar cane, and taro were seen growing unusually large" (Ellis 1969: 354).

Soon after, Asa Thurston walked to Waimea from Kawaihae. He stopped at Kalaloa, the home of Kumuokapūki, a chief of Waimea (*Ibid.*: 399). He goes on to say,

> Leaving Kalaloa, we walked on to Waiakea [Walaka], from thence to Waikaloa [Waikoloa], Pukalani, and Puukapu, which is sixteen or eighteen miles from the sea-shore, and is the last village in the district of Waimea . . .
>
> The soil over which he had traveled was fertile, well watered, and capable of sustaining many thousands of inhabitants. In his walks he had numbered 220 houses, and the present population is probably between eleven and twelve hundred (*Ibid.*).

A few years later, the missionary Hiram Bingham visited Waimea and left these observations:

> When we had . . . reached the height of about 2,000 feet, we were met by a chilly wind, which made our muscles shiver, though covered with a cloak . . . The clear rippling streams that wind their way along the verdant plain, through the alternating plats of shrubbery, grass, *kalo*, sugarcane, bananas, flowering bushes, and wild vines, occasionally crossed my path. Beyond the scattered cot-

tages, the wild cattle were grazing unrestricted on their own territories bordering on the mountain. The green hills and mountains of Kohala, covered with trees and shrubbery, and their sides partly cultivated and partly covered with grass of spontaneous growth, rose on the north side of the plain. (Bingham 1969:374)

In 1832, the Reverend Lorenzo Lyons and his wife Betsy settled in Waimea to start a mission station. His territory included the broad districts of Waimea, Kohala and Hāmākua. Lyons kept a detailed diary of his daily activities and impressions. Of their arrival at Waimea he wrote in his diary:

> 22 natives accompanied us. Our wives were carried in rocking chairs, there being no other way. The others carried our light baggage. Mr. Baldwin and I had an old worn out horse between us, and I walked most of the way. It is all up hill, some pretty steep up hill too. We soon came to where it was cool and rainy. We passed a stream, and a waterfall and also cultivated ground.
>
> About 11 AM we reached the place that is to be our home for a while at least, a grass house surrounded by shrubbery, a very comfortable place for us. Rain and wind soon set in and made it dismal indeed . . . (Doyle 1945:41)

A September 24th entry of the same year in Lyons' diary indicates that he traveled to an area called Kekula, four to five miles away. There he found a group of Hawaiians salting beef for drying. Of cultivation, he noted seeing watermelons, beans and corn as well as *wauke* and *mamaki* for making *kappa*. He also commented on the presence of prickly pear growing in the *kula* area (*Ibid.* 63). Testimony from Lucy Peabody, sheds some light on this area visited by Lyons in 1832.

> The lands below Lihue were known generally as Ke Kula and it was down here on Ke Kula that the people who lived mauka at Waimea used to do the most of their planting as this locality was much warmer than at Waimea. There were people living at Ke Kula and she thinks these people got their water from auwais. She remembers seeing water running in the ditches makai of Lihue . . . (Waimea Water Rights Case, 1914-1915)

In September 1837, Lyons reported on a famine due to an insect which was attacking and damaging the crops.

> Something like a famine has been raging for about a year. The common food of the people has failed and they have been compelled to resort to the use of roots such as grow wild in woods and mountains, and yielding but very little nourishment, just enough to prevent starvation and enable the people to walk about some and attend to some of their ordinary business. The famine does not arise from the indolence of the people, but from the ravages of a worm that abounds in Waimea. As soon as food begins to sprout the worm commences the work of destruction. The famine does not prevail in all parts of the field. But the people are very poor. (Doyle 1945:101)

Ironically, the California Gold Rush impacted the economy of Waimea as well as other parts of the Hawaiian Islands. There was a shortage of Irish potatoes and vegetables on the West Coast. Traditionally, Hawaiians had always grown sweet potatoes and had been supplying provisioning ships since contact (1778). Prior to the Gold Rush craze, Irish potatoes were already being grown in Waimea on a small scale. With the demand of early settlers in California, Waimea farmers were able to quickly benefit by increasing their production and shipping barrels of sweet potatoes and Irish potatoes to California. Other vegetables, along with sugar, molasses and coffee were also exported during this same time (Kuykendall 1965: 313-314; 322-321). In December 1849, Lyons wrote:

> A great call for potatoes from California. Never so much cash before! Large quantities of sweet potatoes brought to light, hitherto concealed - growing wild

> for years unknown. The demands have revealed them. People took to it like good fellows to get a few dollars each. Some have never had so much cash before - never had any before! Many natives growing rich. Potatoes bring 4 or 5 $ cash per bbl. (Doyle 1945: 151)

In actuality, the Hawaiian farmers had little to show by their profits when the Irish potato market collapsed about three years later.

Long-Horned Pests

Under the protection of the *kapu*, the Longhorn cattle left by Vancouver in 1793 and 1794 rapidly multiplied beyond manageable control. Left to roam the surrounding lands on their own, the cattle were undomesticated and feral. Less than ten years after their arrival in the islands, a visitor wrote that the *kapu* "... was most rigidly preserved till that time expired . . . Though the inhabitants themselves have frequently suffered thus severely from their [the cattle's] incursions, they have closely adhered to the condition of the original gift . . . The animals have become so wild, that none of the natives dare approach them; so that, ranging at their full liberty, they have destroyed the fences, trampled down the crops and done much other damage (Turnbull 1813: 243). By 1858, the wild cattle on Mauna Kea were estimated to number 10,000 (Doyle 1945:49).

The cattle caused havoc for Hawaiian farmers who traditionally did not put up fences around their gardens and who kept non-contiguous agricultural plots scattered here and there.

To combat the problem after the 10-year *kapu* was lifted, Kamehameha I hired bullock catchers to hunt the cattle and shoot them. As the cattle were originally a gift to Kamehameha I, they technically belonged to the Crown. Thus bullock hunting was controlled by the king and his chiefs. Selling salted beef to provisioning ships at Kawaihae became another economic market for the government. In 1831, Kuakini (Governor Adams) hired William Hughs, a foreigner, to act as his bullock catcher. In the 1830s cattle were hunted to such an extent that in 1841 the Government placed a five-year *kapu* on killing cattle only for their hides and tallow (Brundage 1971: 9). This suggests perhaps that some underhandedness on the part of the bullock hunters was taking place. The Government continued to be involved in the cattle business. In 1847, William Beckley was responsible for branding the Government cattle. In 1848, John Needles was employed by the Government to slaughter, butcher, pack and sell cattle for the Government. His pay was $40 per month plus 25 cents for each head killed and the offal to pay his work help (*Ibid.*). Lorenzo Lyons commented on the problem of cattle in Waimea:

> "Pilikia" enters cattle history in 1847 . . . two thirds of Waimea has been converted into government pasture land. People are compelled to leave their cultivated spots and seek distant corners of the woods beyond the reach of the roaming cattle, sheep and goats. But the cattle follow, and soon destroy the fruit of their labors. "There is a despairing spirit among my people, and great suffering among them."

One of the renowned bullock hunters was John Palmer Parker who settled in Hawai`i in 1815. He became friends with John Young and spent much of his early years at Kealakekua, where Kamehameha held court. After the death of Kamehameha in 1819, Parker moved to Waipuka in Kohala with his *ali`i* wife, Kipikane and their new-born daughter (Wellmon 1970: 20-26).

An 1823 account describes a visit to Waimea and Mauna Kea where John Parker was found shooting wild cattle.

> . . . several herds of wild cattle, which are very numerous in the mountains and inland parts of the island . . . became so wild and ferocious that the natives are afraid to go near them. Although there are immense herds of them, they do not attempt to tame any and the only advantage they derive is by employing persons, principally foreigners, to shoot and salt the meat in the mountains and bring it

down to the shore for the purpose of provisioning the native vessels. But this is attended by great labor and expense. They first carry all the salt to the mountains. When they have killed the animals, the flesh is cut off their bones, salted immediately and afterwards put in small barrels which are brought on men's shoulders, ten or fifteen miles to the seashore. (Ellis 1963: 291)

Several other methods were employed for capturing the wild cattle: bullock pits and pens. A description of a bullock pen was given in the *Sandwich Island Gazette*.

> Pens for catching the bullocks on the southward side of the plain of Waimea . . . are built of strong posts of hardwood with cross bars of the same, strongly lashed together with strips of rawhide; they are all varying dimensions. From the entrance of the pen are two diverging fences built of the same materials, extending from a quarter to half mile in length; through this funnel a herd of wild cattle are driven by a number of horsemen and propelled on until they enter the pen, the entrance of which is immediately closed . . . The bulls are mainly killed for their hides and tallow, the flesh is generally wasted; part of the cows are slaughtered but their flesh is either eaten or jerked for the Oahu market or packed in barrels for ship use; the rest of the cows and calves are sent by ship loads to Honolulu. (September 17, 1836)

An 1840 account by Francis Olmsted gives a very colorful description of these notorious and somewhat mysterious bullock hunters.

> In front of the door a bright fire was blazing in a cavity in the earthen floor displaying in strong light the dark features of the natives congregated around it in their grotesque attitudes. Immediately back of these a group of fine looking men in a peculiar costume were leaning against the counter of the store. Some of them were Spaniards from California and they were all attired in the poncho, an oblong blanket of various brilliant colors having a hole in the middle through which the head is thrust. The pantaloons are open from the knee downwards along the outside seam. A pair of boots armed with prodigiously long spurs completed their costume. They were bullock hunters that roam the mountains and had just returned from an expedition of eight or ten days in which they had been very successful. (Olmsted 1841:230)

In 1837 James Jarves noted that there were sixty foreigners in Waimea, "mostly mechanics and bullock hunters" (Jarves *in* Brundage 1971: 7). On the subject of foreigners, Lorenzo Lyons also reported to the A.B.C.F. M. (1839-1840), "In my field are sixty or seventy foreigners, from seven or eight different nations. They are beef catchers, sugar manufacturers, shoe makers, merchants, masons, doctors, farmers, and what not" (Doyle 1945: 118)

Bullock hunting was directly related to several other entrepreneurial pursuits -- tanning hides for leather and making tallow to supply factories in California and New England (Kuykendall 1938: 317; Judd 1932: 17). Despite the lack of proper facilities, Waimea had a reputation for the fine and durable leather it produced. Although ecologically, the tanning business had a negative impact to the landscape. The bark from native trees was used to tan hides. Lyons reports that the "*Konohikis* demanded high prices for bark gathering permits; and *koa* and *ohia* were used more than scarcer trees that made handsomer leather . . . "Kukui was richest in tannin" (Doyle 1945:50). Lyons' comment implies there had already been loss of the native forest besides sandalwood. The tanneries no doubt contributed to more loss of the native forest. There were several tanneries in operation during the 1840s and 1850s. One tan works was "under the direction of Chinamen" ; one owned by James Fay; and two others were at Waiemi and Pukalani, owned and run by William Burke (Olmsted 1841:233; Barrera & Kelly 1974: 45; Native Testimony, Waimea Water Rights Case 1914-1915).

Lihu`e Sugar Mill

The first sugar mill at Waimea is thought to have been established in the late 1820s (c. 1827) by a Chinese man named Laukí. However, research by Dorrance and Morgan (2000) indicate the first documented date of a mill at Lihu`e was 1835. The earlier date is based on a story told by Alfred W. Carter about his grandfather, Captain Joseph Carter. In 1825, Captain Carter, commandeered a brigantine that sailed from Boston to China via California. The following anecdote was told by Alfred Carter.

> On his [Captain Carter's] first trip to China, he brought to Honolulu a Chinese who afterwards became known as Lau Ki (Kalauki). My grandfather was a wonderfully skillful [*sic*] navigator and jovial company. He knew the Premier at that time (I think the King was in England) and took Lau Ki to the Palace to present tea to the rulers. They had never seen tea before. It was the first tea, I think, ever brought to Hawaii and hence the bearer was dubbed Lau Ki (Tea Leaf). (*In* Brundage 1971:30)

Sometime afterward [date uncertain] Laukí ended up in Waimea and established a mill at Lihu`e in Lalamilo. Prior to this, the Hawaiians had grown sugar cane at Lihu`e for their own use only. Laukí took on two Chinese partners, `Aiko and Apokani. He had a few native Hawaiians working for him as well. The mill was quite primitive, with the cane being ground by mule power. After the boiling process, the sugar was dried on mats and then bagged. The Lihu`e mill had the advantage of a water wheel utilizing water from Waikoloa Stream. The Hawaiians in the surrounding Waimea area and Kamaloo also grew cane for the mill in the hopes of making a profit. Laukí's business venture at Lihu`e was unsuccessful probably due to the variety of cane he was planting and after a number of years he gave up. He made two other unsuccessful attempts at starting sugar plantations before getting out of the sugar business completely (Brundage 1971: 30-31).

The mill at Lihu`e was known to operate until at least 1843 (Dorrance & Morgan 2000: 13), though it is uncertain if Laukí and his partners were still the ones running the mill then. Testimony from Kaina Pau states the following:

> Aiko and Kalauki were together planting cane. I knew Lihue before Aiko planted cane there. The Chinese went to Kohala after leaving here and later to Hilo . . . My aunt was Aiko's wife (Kaaopea). I remember when Aiko married my aunt. I did not know my aunt before she lived with Aiko. The cane was ground three times and then Aiko stopped and Aiko went to Kohala. I saw the cane ground all three times . . . Got married in 1852. Aiko had gone some time before I got married. (Testimony of Kainapau; Waimea Water Rights Case, 1914-1915)

Based on Kainapau's testimony, the normal growing cycle of cane (24 to 36 months to maturity), and the last known date of operation (1843), suggests that Laukí and his friends had the mill for a period of about 6 to 10 years, placing the beginnings of the mill in the early to mid-1830s.

The ending date of 1843, when Laukí and his partners moved on to North Kohala, seems to fit in with an agreement between Kuakini and A. H. Fayerweather to plant cane and produce sugar and molasses at Waimea. The agreement, which was to be effective in 1844, stated that Kuakini would supply the cane and the firewood while Fayerweather would furnish the machinery and labor. The agreement was for five years. However, these plans were foiled when Kuakini died in 1844. George Macy and James Louzada (Grant 1157) also unsuccessfully attempted to plant cane at Lihu`e (Judd 1932: 23-24). Testimony from Macy's son, Samuel indicated his father went to Lihu`e in 1846 or 1847 and that he bought the place from Fairweather (Waimea Water Rights Case, 1915-1915).

After several unsuccessful attempts to run the Lihu`e Sugar Mill by subsequent owners, cultivated sugar on a large scale was more or less abandoned in the Waimea area. Historically, the

sugar industry did not really gain momentum until the latter half of the 19th century and North Kohala dominated the sugar industry rather than South Kohala.

Early 19th Century Impacts and Changes to Hawaiian Culture

There were many changes that impacted the traditional lifestyle of the Hawaiians in the early half of the 19th century. Introduced cattle were allowed to overpopulate the land. Undomesticated and left to roam at will, the cattle destroyed and ate crops, knocked down fences and disrupted traditional agricultural practices. Sheep and goats left their mark on the land as well. The traditional lifestyle was further disrupted by the sandalwood trade which was controlled by the king and, after 1819, the chiefs. The working people were ordered to leave their fields to go to the mountains to cut sandalwood. The sandalwood trade was another main contributor to the loss of the native forest in the Waimea area.

Following is an observer's description of the Waimea plains in 1856:

> [The Waimea plains is an] . . . elevated plateau some ten miles long, four or five miles wide and perhaps four thousand feet above the level of the sea. At each end they are bounded by a steep slope towards the sea. On one side of the plains is Mauna Kea and on the other side, the Kohala range of hills . . . Some twenty-five or thirty years ago, woods extended over the whole of the plains and to the very edge . . . It is in the memory of many foreigners now living there, when the whole of these plains were covered with a thick wood. Where now hardly a tree is to be seen for miles, we were informed by an old resident that twenty-five years ago he lost himself with his team in the woods. This clearing of land has been almost entirely effected by the cattle. (*Sandwich Islands Monthly Magazine* February, 1856)

Another old-time Waimea resident concurred with the above.

> There were lots of trees, except immediately in Waimea, but some distance out and around the locale were mostly ohia and mauka were found mamane, pua, koa, aaka and naio. Makai grew koaei and wiliwili. Cactus [later to become a pest] was used for fencing around gardens to protect them from the cattle which roamed everywhere. (*In* Brundage 1971: 68)

What was once forest became pasture land which was further impacted by the cattle. In the 1840s, large tracts of land in Waimea were designated Government pasture lands. Any one who pastured "cattle, hogs, sheep, goats, horses" were taxed per head (Doyle 1945: 150). People were forced to relocate, not to mention the extra burden put on the people who had very little cash income. Additional changes were noted by Lyons in two 1845 diary entries:

> Feb. 8, 1945: Many moving from Waimea on Account of change of land holders. Waimea has fallen to the hands of a half foreigner, Mr. [William] Beckley.
>
> Dec. 5, 1845: People are driven to the mountains to cultivate secure from cattle. Kocle days have ceased. Population of Waimea rapidly diminishing by death and removal . . . (Doyle 1945: 140, 141)

The ending of *kō'ele* days, when native tenants were required to work on the *konohiki* or chief's farm land, is an indication that the traditional lifestyle had undergone dramatic changes and was coming to an end.

The following excerpt from a Hawaiian newspaper in 1867 aptly describes the many changes that took place in their homeland.

> News of the Mountain Land
>
> What the Land is Like: There is a great change in the land these days because there is something here to change it, that is, the increase of wild animals. So the grass is gone and the earth is bare instead. The sheep does most to put an end to low growing plants and therefore the sheep has done enough to hurt Waimea.
>
> The Way People are Living: Most of the natives are with the whites, working by the year (ku-makahiki_ and some by the month. They work hard for the whites and are called shepherds [*sic*] (kahu hipa), cow herders (kahu bipi), cowboys (paniolo hoohei), livery men (kahu kaa), and many other names. They work hard through the long wintry nights, bearing with patience the cold and chills that stiffen (koekoe maecle) in the pelting Klpuupuu rain of this land.
>
> Farming: The young people of this land do not farm much because their time is taken up by the whites. When I lived as a stranger in this land, I did not see any of the natives of the place farming except the old men who attempt to do as much as they are able to. For this reason, the land is left untilled. It isn't because the plants will not grow but because the hands do not work. The hands are occupied with the burdensome task of the whites and there they work with all their might.
>
> Where Food Comes From: Most of the food (poi) of this place is obtained from Waipio. Those who work for the whites receive their food from the whites, but they get it from Waipio. Some people buy their own but the price is high. A short time ago, it was only a quarter for a bundle of hard poi weighing forty pounds or more but now it ranges from ten to twenty-five pounds for half a dollar. It seems that the time will come when this place will have no poi to eat and the children are to be pitied. (Signed, Imiola) (Nūpepe Kū'oko'a, 4/13/1867)

The Mid-1800s

The Māhele

The most memorable event of this period was the *Māhele*. During this time span traditional land tenure changed from a feudal system to the privatization of land ownership. This new system was implemented through a series of government acts from the late 1840s to the mid-1850s.

At the time of the *Māhele*, there seemed to be some confusion of the different Hawaiian land classifications and use of the terms differed slightly from island to island (e.g., *kalana*, *'okana*) (Barrere 1983:25). An 1893 article published in the Hawaiian newspaper illustrates this.

> The island of Hawaii is divided into six districts, Kohala, Hamakua, Hilo, Puna, Ka'u and Kona. The chiefs appointed by the ali'i 'ai-aupuni over these districts were called 'ai-moku such as were mentioned in the days of Keawe-nui-a-'Umi. The very last of these were in the days of Hikikaukoli'I (Kamehameha III). Thus were they placed on Hawaii. It was not the same on other islands, because Maui was all cut up into moku, kalana and ahupua'a, which was not so on Hawaii, for its kalana and ahupua'a were within the moku (district). It is difficult now to distinguish the various kalana within the six districts of Hawaii. (Hawai'i Holomua, May 13, 1893)

There was also a confusion between the designations of different types of *'ili*. According to Curtis J. Lyons, surveyor and son of Lorenzo Lyons, *'ili* of the *ahupua'a* (*'ili 'āina*, according to Pukui & Elbert 1986: 97) belonged to the *ahupua'a* and were an integral part of the *ahupua'a*. *'Ili kūpono* were nearly politically independent of the *ahupua'a*. In other words, when an *ahupua'a* changed hands to a new chief, the *'ili kūpono* did not change hands as well -- the main difference being, who taxes were paid to -- the king or the *ahupua'a* chief.

The history of Waimea as a land unit is unclear. In earlier times, Waimea may have been its own district, separate from Kohala (Nakamura 1981: 29). This is alluded to in the Boundary Commission records (No. 1: 6) which indicate that "Waimea is an *ahupua'a* of Waimea, which is a kalana, with eight divisions." One native witness (Mi 1st) who testified for George Davis on the boundaries of Waikoloa described Waimea as being a kalana ". . . which is the same as an island divided into districts – there are eight Okana in Waimea. In those Okana are those lands said to extend out (*lele ma waho*)" [running to the sea] Boundary Commission *Ibid.*: 7).

C. J. Lyons, considered Waimea an *ahupua'a* comprised of predominantly ("Nine-tenths) two larger independent *'ili kūpono* of Waikoloa and Pu'ukapu and as well as smaller *'ili* (Lyons 1875: 119). Boundary Commission records and Land Commission Awards (LCAs) for Hawai'i Island indicate the lands of Waikoloa, Wai'aka 1st and 2nd, and 'Ōuli were considered *'ili* of Waimea rather than separate *ahupua'a*. The State of Hawai'i, in an attempt to clarify the matter determined that South Kohala District comprised only three *ahupua'a*: Kawaihae 1, Kawaihae 2 and Waimea (Kelly & Nakamura 1981: 29).

Likewise, Lālāmilo was designated an *'ili*, but in the early land records, Lālāmilo does not seem to be attached to any larger land unit such as an *ahupua'a*. It only appears as a land name, "The 'Ili of Lalamilo and Waimaa" within the "District of South Kohala" (Boundary Commission, Hawai'i, Vol. A, No. 1: 298). However, Lālāmilo seems to have shared a special relationship with Puako on the coast. The Boundary Commission records indicate Lālāmilo shared fishing rights with Puako. Testimony for Puako Ahupua'a from Kauwewahine who lived at Lālāmilo since the time of Kamehameha II indicate Puako had "Ancient fishing rights in the shallow waters near shore [and] the sea outside belongs to Lalamilo" (*Ibid.*: 297). It is interesting to note that Charles Kanaina claimed the "*'ili* of Lālāmilo in South Kohala" as part of his claim for Puako Ahupua'a (*Ibid.*: 456; Volume B: 298). An additional note follows the boundary testimony: "Note: His Honor, C. Kanaina only claims the beach and fishing rights. Lalamilo had ancient fishing rights extending out to sea" (*Ibid.*: 298).

At the *Māhele*, Waikoloa was deemed Crown land of which Isaac Davis. Waikoloa was sometimes referred to as "Waikoloa Nui" and "Waikoloa Iki", differentiating between the Crown land and Davis' land respectively (Boundary Commission No. 1: 11). Dorothy Barrere explains: "Later, the greater portion of the king's Waikoloa became known as the *ahupua'a* of Lālāmilo and the smaller portion as the *'ili 'āina* of Waikoloa-iki [Davis' portion] . . . It is not known when the name Lālāmilo was extended to most of the king's Waikoloa (1983:29).

Most people today seem to consider Lālāmilo as an *ahupua'a* within the South Kohala District, the other *ahupua'a* being Kawaihae 1, Kawaihae 2, 'Ouli, Waimea, Kalāhuipua'a, Waikoloa and 'Anaeho'omalu.

Land Commission Awards (LCAs)

Though the Boundary Commission records indicate the name of "Lālāmilo" was in use at the time of the Māhele, the listing of Land Commission Awards for South Kohala District (by location) does not list any awards under the land name of "Lālāmilo". However, examination of old maps indicated there were indeed lands awarded within Lālāmilo, listed under smaller 'ili names instead such as Koali'ula, a place name located within the bounds of the project study area and a name which people no longer seem to use today. In fact, Koali'ula is incorrectly identified as Kawailiula on modern USGS maps.

Within upper Lālāmilo, nine LCAs and two grants were awarded at the *Māhele*. This does not seem like very many for such a land section of this large size. As has been the case on Government lands, it is very likely that more native tenants than the nine who received awards lived on the lands, but saw no need to file a *Māhele* claim because the land belonged to the Government and the *hoa'āina* had native tenant or *kuleana* rights (Hawaiian Reports Vol. 24: 54).

The Waihona 'Aina Mahele Database (Waihona 'Aina Corp. 2000); which is a compilation of data from the Indices of Awards (Indices 1929), Native Register (NR n.d.), Native Testimony (NT n.d.), Foreign Register (FR n.d.) and Foreign Testimony (FT n.d.); does not list any Land Commission Award (LCA) claims for Lalamilo; however, examination of current tax maps and other historic maps identified thirteen awarded claims in Lalamilo for which most list the *ahupua'a* as Waimea. The database also lists four claims that were not awarded in Puako. There are probably other claims within Lalamilo that were not awarded, but it is not possible to distinguish them from the over 140 claims that are listed as being in the *ahupua'a* of Waimea. *Table 2* summarizes the testimony given in support of the claims and *Figure 3* shows the locations of awarded parcels.

Out of a total of twenty-five claimed parcels, fourteen parcels were awarded to thirteen claimants. The awarded parcels range from 0.37 to 48.0 acres in area with an average of 17.44 acres; however, if the small house lot parcels are omitted, then the average awarded parcel was 23.05 acres in area.

The testimonies refer to eight *ili* land divisions in Lalamilo: Puuapelu, Waikani, Nspo'oakolu, Puukapu, Puako, Keanu'Tomanō, Koaliula, and Kaluaana. The awarded parcels are concentrated in two areas, at the coast and inland between 2,100 ft and 2,900 ft elevation. House lots are described in the testimonies for coastal parcels. House lots and cultivation are described for the inland parcels. Fourteen claims included house lots with at least 28 houses. Enclosing walls are described for eight house lots. A slaughter house, an unspecified number of grass houses, four salt ponds, and a cookhouse are also mentioned in the testimony. Evidence of agriculture in the testimony includes references to two farms, a patch, ten fields, a taro farm, 6 patches of taro and *mamaki*. Specifically mentioned crops include taro, coconuts (19 to 26 trees), hala trees (2), *mamaki*, and two trees of unspecified types.

Within the project study area, one LCA (3828) was awarded to J. A. Palea. Three of the LCAs (3762, 4195 and 976:2) and one grant (2129) are in somewhat close proximity to Palea's award. Situated outside (south/southwest) of the project boundaries, these four awards are listed on the Hawai'i Register of Historic Places and are known as the Lālāmilo *Kuleana* and Ranch District. The description of the site is as follows:

> The site consists of numerous stone walls, stone platforms, agricultural terraces, *auwai*, cattle pens, and stone wall-enclosed *kuleana* and house sties. A few structures show the use of mortar, plaster and ironware. Empty metal cartridge cases indicate military use of the area in recent years. (Historic Sites Information and Review Form :2)

Testimony from the Native Register for Waimea indicate that many of the *kuleana* house lots already had enclosure walls built around them at the time of the *Māhele*. If there was no wall, most of the native tenants indicated they were either building or were planning to build a wall to enclose their house lot. No doubt, this was a response to dealing with the cattle problem.

<u>LCA 3828 to J. A. Palea</u> (Also listed as I. A. Palea in the Native Register)

The following testimony of Kauhini on behalf of Palea described his claim for two house lots and a land claim. One of the house lots was at Puako. Palea's testimony indicated he received it from Kuakini and the lot was "35 fathoms by 35 fathoms and is enclosed by a stone wall" (Native Register Vol. 8:380).

> I have seen/*it*/in three sections, two house-lots and one land section. The land section is in the ili land of Waikoloa[Waikoloa Nui or Lālāmilo] in Waimea, Hawaii. It had a fence at one time; it has fallen apart at this time. Two houses for Palea are in there. He had built them and the boundaries are:
>
> Mauka, Waho, also Makai by Hoeu's land
> Kohala, by Wiliama Pekele's [Beckley's] land

Table 2. Summary of Previous Archaeological Work

Study	Land	Elevation (Feet)	Area (ac)	Historic Use	Total sites	Sites/ acre	Total feat	Features	Hab Feat	Hab Feat/ acre	Perm Hab Feat	Temp. Hab Feat	Ag Feat	Ag Feat/ acre	Burial Feat	Ritual Feat	Trail	Adz	Rock art	Historic Feat	Shards/ Feat
Yent and Grillon (1979), Burgett and Rosendahl (1980), Yent (1981), Jensen (1984)	Lalamilo	0-330	790	Military/ Ranching	194	0.22	425	0.87	134	0.19	30	104	82	0.08	2	1	6	19		186	10
Burgett (1980)/Dunn and Rosendahl (1982)	Lalamilo	4-30	2.3	Ranching	25	10.87	75	32.61	56	25.22		56							18		1
Bowman (1981)	Lalamilo	5-10	7.42		0																
Smart (1984)	Lalamilo	5-6	0.5		1	2.00															
Rosendahl (1989)	Lalamilo	5-10	0.5		0	10.00	2	1(.00)	2	4.00			4					1			
Barrera Makekau (1990)	Lalamilo	5-10	800	Ranching	1	0.00	1987	2.48											1987		
Kennedy (1983), Burgett et al. (1992)	Lalamilo	5-14	7,438	Ranching	36	2.80	47	6.33	18	2.42		7	11	1.48	1	1			3	8	13
Tuggle (1982)	Lalamilo	10-30	0.34		2	5.88	2	5.88											1	1	
Barrera and Kelly (1974), Kirch and Clark (1981)	Kawaihae, Lalamilo, Ouli	10-1110	736	Ranching	44	0.06	242	0.33	95	0.13			47	0.06	78		1	6		11	2
Cheng (1971), Rosendahl (1972)	Waikoloa-Kawaihae	80-300	3.6		98	26.00	96	26.00	68	18.87								34		6	
Barrera and Kelly (1974), Kirch and Clark (1981)	Lalamilo	1100-2100	1880		25	0.02	108	0.07	13	0.01			27	0.06		3	8	23		37	
Hess and Williams (1989)	Lalamilo and Waikoloa	1200-3600	821	Military/ Ranching	2	0.00	3	0.00	2	0.00											
Bowman (1984)	Lalamilo	1280-1360	60	Military/ Ranching	4	0.05	4	0.05	2	0.03										1	1
Bonk (1985)	Yentes	1400-2650	300	Ranching	1	0.01	2	0.01													
Barrera and Kelly (1974), Kirch and Clark (1981)	Lalamilo, Waikoloa	2100-3600	610		28	0.03	80	0.11	14	0.02		14	2	0.00	1					66	8
Hammatt and Borthwick (1980)/ Hammatt et al. (1988)/ Hammatt and Shideler (1989)	Lalamilo	2175-2275	12.4	Ranching	7	0.56	34	2.74	2	0.16			31	2.50						1	
Cheng (1979), Clark (1981), Clark (1987)	Lalamilo	2280-2480	200	Ranching	284	0.98	422	1.43	228	0.08	74	63	18	0.12	27					26	123
Thompson and Rosendahl (1982)	Waikoloa, Puukapu and Lalamilo	2410-2440	91	Ranching	1	0.11	6	0.66													
Barrera (1983)	Lalamilo	2440-2500	80	Ranching	1	0.02	32	0.80					32	0.80							
Hamilton, Maly and Rosendahl (1984)	Waikoloa 2	2480-2640	14.8	Ranching	7	0.47	8	0.60	1	0.07			6	0.34	1					1	1
Rosendahl (1990)	Lalamilo	2500-2510	0.75	Ranching	0																
Barrera and Kelly (1974), Kirch and Clark (1981)	Waikoloa, Puukapu	2600-3500	1740		11	0.01	44	0.02	18	0.01			15	0.08			1			8	4
Enoteara (1982, 1990)	Waikoloa	2640-2740	20.8	Ranching	9	0.19	7	0.29							2					5	
TOTALS/AVERAGES			7917.7		726	3.09	3648	4.84	640	3.48	104	278	356	0.34	112	4	18	84	2027	360	153

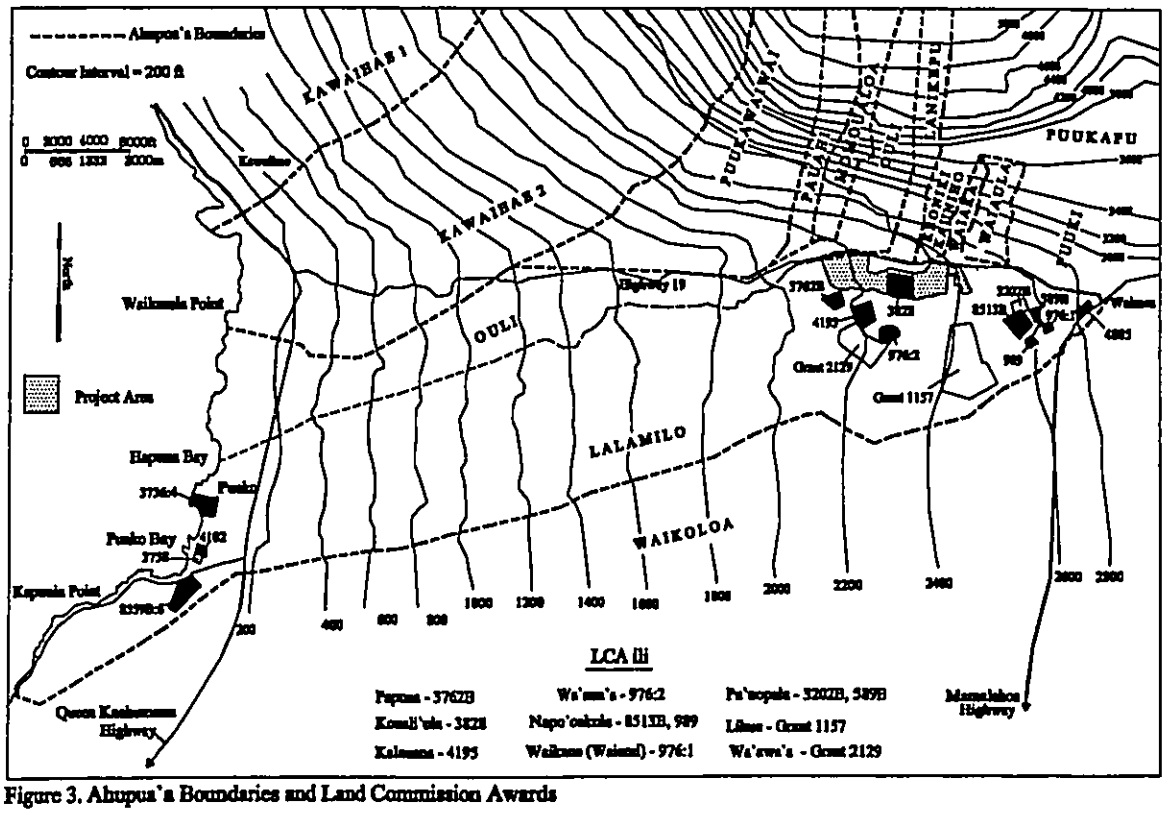

Figure 3. Ahupua'a Boundaries and Land Commission Awards

Palea received this land in 1847 from Hueu. This is an old place on which Palea has lived since 1829. He is living there at the present time.

2. The land lot is in the ili land of Koaliula in Waimea, Hawaii. It has not been enclosed and the farms are not known. One house is there for Palea.

Mauka is the land Pohakuloa for the konohiki, W. Pekele, and the same is for all sides.

This is an old land and Papai, the wife of Palea, has lived there during the lifetime of Keaumoku, before the coming of the missionaries here to the present time; no one has objected to this day.

3. Section III is the house-lot in Puako, Waimea, Hawaii, and Palea's interest is known. Two sides have been enclosed and one house in there which Waimea had trimmed is for Kuakini. Palea has no house there and the enclosure was built as if it were for the konohiki. I have not heard Palea has a lease at this time of the house and lot which belong to W. Bekele, the konohiki, at this time. This lot is directly with this konohiki; the entire boundary is for the konohiki only. Papai had requested of William Bakle to allow her to live under his protection and that he may have the house and lot interest.

Papai, sworn and stated, I have known these two sections all for us/two/and the third section at Puako is for William Bekele while he affords us both protection. No one has objected for the two sections. The third section has been opposed by William Backle; however, this is in order because of the konohiki status. (Native Testimony Vol. 4: 31-32)

Palea was awarded 48 acres at Koaliula, Waimea, South Kohala. The award description follows:

Land Commission Award 3828 to Palea

Helu 3828 Palea Koali`ula,Waimea, K. Hawai`i

`Āina ma Koali`uli [*sic*],Waimea, Hawai`i

E bo`omaka ana ma ke kihi `Ākau ma kahi kumu lā`au, e pili ana ma ka `auwai a e holo ana Hem. 26° Hik. 10.30 kaula [illegible word] Hem. 2 ½° Kom 9.63 kaul. ma Pōhakuloa a hiki ma kahawai o Waikoloa. A laila ma ia kahawai, Komohana 18.85 kaul. Alaila `Ākau 62° Kom 8.66 kaul. ma Amiikea. A laila Ak. 1¾° Kom. 16.50 kaula. ma Haleapuna a hiki ma kahawai o Waiaka. A laila ma ia kahawai Hem. 85 ½° Hik. 22.15 kaul. a hiki ma kahi i bo`omaka ai. Ma kēia `āina, 48 eka.

C. J. Lyons, Surveyor
Feb. 18, 1851

[Document signed/dated: May 12, 1851]
[Liber 5:46]

Translation:

No. 3828 Palea Koali`ula, Waimea, K[ohala], Hawai`i

Land at Koali`uli [*sic*], Waimea, Hawai`i

Commencing at the North corner at the tree, along the ditch:

South 26°	East 10.30 chains
South 2 ½°	West 9.63 chains along Pōhakuloa to the Waikoloa Stream. Then at the stream, west 18.85 chains. Then,
North 62°	West 8.66 chains along Ami`ikea. Then,
North 1 ¾°	West 16.50 chains along Haleapuna to Wai`aka Stream. Then, at this stream,
South 85 ½°	East 22.15 chaines to the point of commencement.

Within this land [is] 48 acres.

It seems apparent that Papai either died or she and Palea parted ways and Palea remarried. In July of 1880 Palea sold half of his land (24 acres) at Koali`ula to Antone Allen from Waimea, South Kohala for the sum of ten dollars. Kaluhia, identified as the spouse of Palea, (*`O Kaluhia (w) mare a Palea*) signed away her dower rights to the land. (Liber 64: 474-475)

On October 17, 1880, Palea and his wife Kaluhia (*ka`u wahine mare*) sold a little piece (*kauwahi*) of their land at Koali`ula to one Emalia. The land is described as a 'house lot, enclosed by a stone wall and a cultivated plot within the enclosure, as well as one acre outside of the aforementioned enclosure that Emalia desired, separate from the land conveyed to A. D. Kamaihui (*`Oia ke kahua hale i pā `ia i ka pā pōhaku a me kahi mahi i loko o ua pā lā a me ho`okahi `eka ma waho a`e o ia pā ma kahi a Emalia e makemake ai, `a`ole na`e mai loko mai o ka `āina i ho`olilo `ia iā A. D. Kamaihui.*) (Liber 65:491).

A. D. Kamaihui is the same person as Antone Allen, also known as "Bull" Allen, who lived at Wai`aka, just *ma uka* of the project area (Waimea Water Rights Case; Notley: 4)

On July 20, 1881, a deed was filed between Palea and J. W. Pa. The document was very revealing as to Palea's predicament at the time of the sale and the disposition of the 48-acre parcel at Koali`ula.

. . . Know all men by these presents that I. Palea (k) of Waimea, South Kohala, Hawaii, for and in consideration of the sum of one Dollar to me in hand paid this 20th day July, A. D. 1881 by J. W. Pa of Waimea aforesaid, the receipt whereof is hereby acknowledged, and for a further consideration, namely that the said J. W. Pa shall provide me the said Palea with proper food & lodging during my life and provide my remains with decent burial, when it pleases God to take me from this world. For the above considerations I do hereby sell and convey unto the said Pa, his heirs and assigns, all my interest in one half of a piece of land granted to me by Royal Patent, the same land being number 3828 in Book 5 page 46 and situated at Koaliali [Koaliula] Waimea aforesaid, containing forty-eight acres more or less. My son Kamuela retains the other half, my wife Kaluhia having deserted me without just cause to live with a Hawaiian named Kaleo at Puako, Hawaii aforesaid, from the year 1873 till this date and the said J. W. Pa relieving [*sic*] me when in a destitute condition and finding me in food, clothing and lodging till this day. For this and my love and affection towards said J. W. Pa and for the said sum of One Dollar and for the further consideration of said J. W. Pa his heirs or assigns to provide me with proper food, clothes and lodging do sell & convey with all the rights and appurtenances thereunto in the said forty-eight acres, twenty-four acres, to have and to hold unto the said J. W. Pa his heirs and assigns forever. And I the said Palea for myself my heirs and assigns do covenant with the said J. W. Pa his heirs and assigns that I will warrant and defend him in the said number of acres in said land forever against the lawful claims and demands of all persons and that the said piece of land is now free of all encumbrances. In witness whereof, I the said Palea do hereunto set

my hand and seal this 20th day of July, A. D. 1881. Signed: Palea (his "X" mark) (Liber 68:425-426.)

Apparently, Kaluhia and Palea had gone their separate ways seven years prior to the sales transactions to Antone Allen and Emalia.

The above deed to J. W. Pa is especially interesting because it states Pa was to give Palea a proper burial. Traditionally, the *maka'āinana* Hawaiians buried their dead where they lived. On the subject of burials, Bowen wrote that graves were ". . . either simply pits dug in the earth, or large enclosures . . . Occasionally they buried their dead in sequestered places at a short distance from their habitations, but frequently in their gardens and sometimes in their houses" (Bowen 1961:142). In one 1847 claim for a houselot, the claimant states, "It was from Kamehameha I to my *kupuna*, who have all died, and I have inherited it. I think my cousins are buried there" (LCA #3674 to Berenaba). The claim infers that this was the usual custom – to be buried where you lived. It is very likely that Palea was buried within the confines of his house lot on LCA 3828.

On July 14, 1898, J. W. Pa, along with Mahikulani Lindsay and James F. Lindsay sold their interest to the twenty-four acres (of the original 48-acres) in LCA 3828 to a Norah and Wilmot Vredenburg. The deed does not state the relationship between J. W. Pa and Mahikulani Lindsay, though an educated guess would be that they were father and daughter. James Lindsay was married to Mahikulani Lindsay and he agreed to renounce and quitclaim all of his dower rights as part of the sale (Liber 183: 254-255; Liber 189: 159). Thus, the lands of Palea passed out of Hawaiian ownership in the hands of foreigners.

Pulu As a Cash Crop

Pulu is the "soft glossy, yellow wool on the base of tree-fern stalks" (Elbert & Pukui 1986: 354). Beginning in the 1850s, *pulu* became another cash crop which was exported to California to stuff mattresses and pillows. Hawaiians flocked to the forests in huge numbers, many neglecting their homes and their fields in the hopes of making a quick cash profit. To many, it seemed more profitable than farming. As a result, many Hawaiians went into debt (by over extending themselves financially at the local stores) and the native tree-fern forest was depleted.

Of gathering *pulu*, Lyons writes of his church members in Hāmākua, "This is . . . trying labor. It is tedious work to pick it from the ferns, dry it, pack it and take it to the sea side to be shipped. Sometimes they have to descend precipitous rocks and bluffs to get their pulu" (Doyle 1945: 163). An 1862 Hawaiian newspaper article hailed *pulu* as "A remover of trouble, an elimination of poverty". The article goes on to say:

> Now here in Hamakua, men and women go to cut pulu and only a few remain at home. The doors are lonely with hardly any one passing. The lands that were bought and the kuleana are left to the mouths of horses, cattle, mules and donkeys to clear and patches of weeds. The hoofs of the same animals push the plants into the earth and the stalks enter the ground again. The saying has gone to the rounds, "Don't mind if your taro stalks are stepped on and crushed." So it is with other plants.
>
> Farming is useless because it takes so long to bring results, therefore strength is concentrated on the cutting of pulu and continued without rest "to the sea of Iloli" [painful weariness]. The pulu brings so much wealth that in the third week (the pickers) after spending two in the forest, drop in at Mr. Sweeney's store. There can be found articles of many colors to attract the mind, things one can buy with money and remove the need for them. Because want is not satisfied, desire goes on to obtain horses, cattle, and other things. Then back to work for pulu. (*Ka Nūpepa Kū'oko'a*, 7/12/1862; translated by Mary K. Pukui in Bishop Museum Archives; Hawaiian Ethnographic Notes)

In 1859, Lyons commented on the "remarkable events of the year" one of which was "the famine in Hamakua, in consequence of the people being all devoted to picking pulu" (Doyle 1945: 162). By 1860, Lyons observed, "The pulu business is becoming a failure" (*Ibid.*: 176). The height of the *pulu* trade was the 1850s to 1860s. In other parts of Hawai'i, especially in the area of Kilauea Volcano, the *pulu* trade lasted into the mid-1880s. The bottom fell out of the *pulu* business when a better substitute was found. *Pulu* absorbs moisture and over time becomes matted and disintegrates into dust. (Neal 1965:10).

Late 1800s

Sugar in Kohala

The sugar industry did not really gain momentum prior to 1850 for several reasons. Prior to the *Māhele*, all land was owned by the Kingdom. Leases were uncommon and growers depended on Hawaiian farmers to supply them with cane. The *Māhele* aided sugar growers by allowing them to purchase land in fee simple to grow their own cane. California became a viable market for sugar export when homesteaders settled there in the 1830s. This market was further expanded by the1849 Gold Rush. However, when California became a state in 1850, they imposed a strict sugar tariff which lowered profit margins and made it impossible for Hawai'i growers to compete with sugar imported to America from Manila or China. By 1857, there were only five sugar plantations in Hawai'i, none of them in South Kohala. During the Civil War (1861-1865), another market opened up for Hawaiian sugar planters (Dorrance & Morgan 2000: 11, 13). It was not until the Reciprocity Treaty of 1876 that the sugar industry made real strides. But the locus of the sugar industry became North Kohala rather than South Kohala.

In the early 1900s (1903-1913), Robert and John Hind started Puakō Plantation, which proved to be disastrous. The Hinds hoped to get water from a flume (*Figure 4*) that was built eight miles *ma uka* (upland). The water supply was irregular and any rainfall quickly evaporated due to frequent heavy windstorms. Production peaked in 1909 and the mill closed after the last harvest in 1913 (Dorrance & Morgan 2000: 90).

Though the era of sugar continued into the latter half of the 20th century, Waimea was not to figure prominently in this epic. The Lands at Lihu'e had long been converted to ranch lands by George Macy (Testimony of Samuel Macy: Waimea Water Rights Case, 1914-1915). By 1878, the Lihu'e lands were part of what was to become the Parker dynasty. A note in Lorenzo Lyons' diary reads, "Learned that Lihue ranch lands, cattle and all, have gone into the hands of John and Sam Parker (Doyle 1945: 218).

The Influence of Spanish Cowboys

Though the actual date when the Spanish *vaquero* (cowboy) first arrived in Waimea is not known, it is thought they were here by no later than 1830 (Kuykendall 1938:318). The *vaquero* or *paniolo* [from *paniola* after *espanol*], as they came to be called, brought their culture with them -- the art of saddle making, rawhide lariats, as well as their traditional garb of ponchos, leggings, spurs and wide-brimmed hats. By 1832, the Hawaiians were being taught to rope wild cattle in the mountains by three Mexican cowboys, Kossuth, Louzada and Ramon (Brundage 1971: 6).

The development of Waimea's ranching history in the second half of the 19th century was directly linked to the introduction of cattle and the outgrowth of economic pursuits (salted beef, tanning, tallow making, slaughterhouses) resulting from the overpopulation of cattle. The humble beginnings of Parker Ranch began when John Parker essentially started his first herd from taming wild cattle sometime during 1837-1838 (Brundage 1971: 7).

In the early 1850s, ranchers began to see that Hawai'i cattle were of inferior quality due to inbreeding. Organized ranching methods were spearheaded by the Royal Hawaiian Agricultural Society who recommended fencing to contain the wild cattle (1851) and that owners castrate their bulls or keep their bulls contained on their own land. The Society also recommended improving

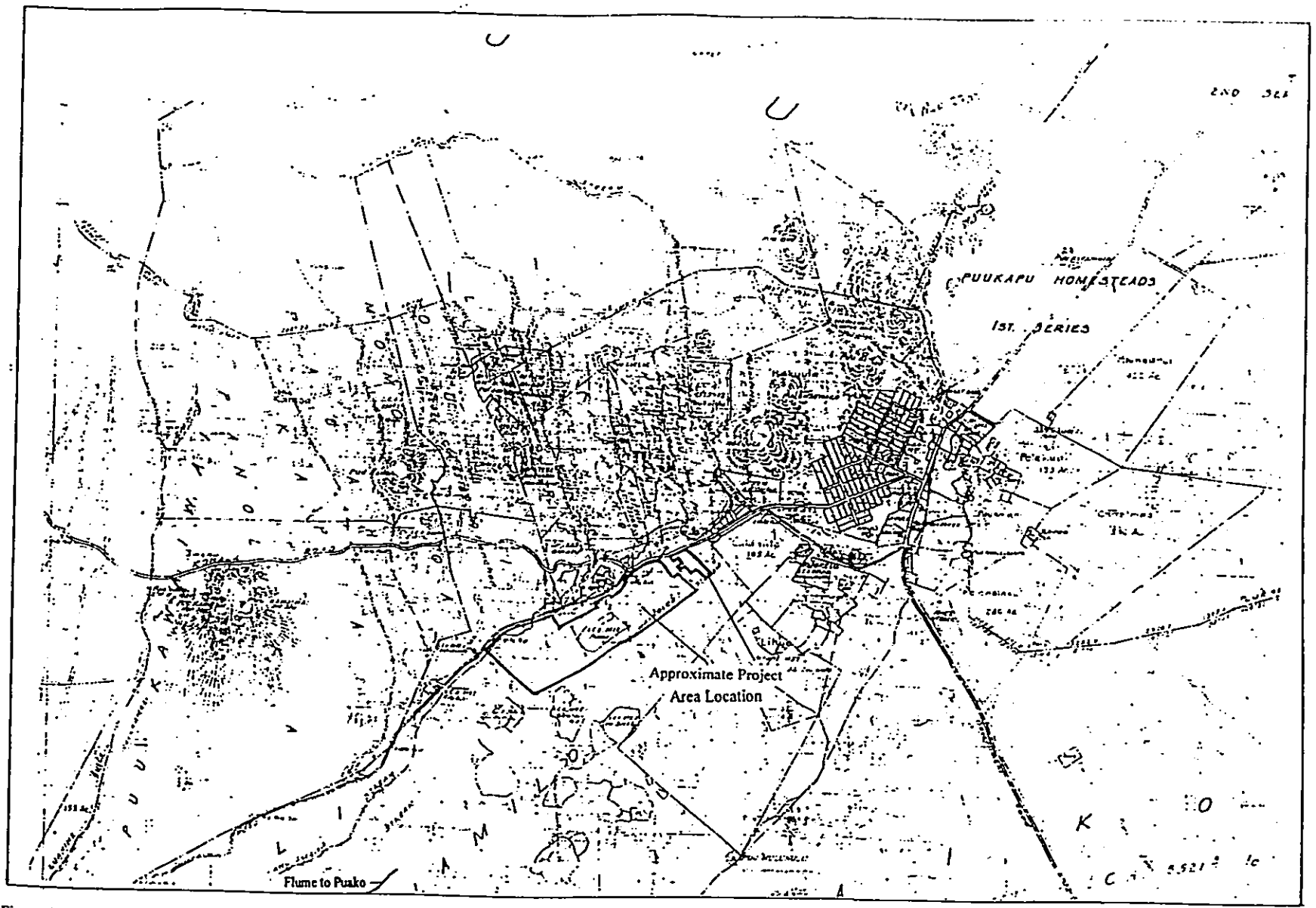

Figure 4. Portion of Registered Map 2785

the stock and to this effect, several new breeds were imported from Australia and later Scotland, the British Colonies and America. The Society also stressed against overstocking the land. Several other factors were important to the development of organized ranching. The Society realized there was a potential market to sell quality beef if it could be produced and they determined that Hawai'i had a higher percentage of grazing lands than arable lands. The Waimea Grazing Company (Janion & Green) began to acquire and lease acres of land in Waimea which they converted to pasture land. They also contracted with the Hawaiian Government to catch all unbranded wild cattle on public lands. Prior to this, the Government had claimed all wild cattle (Brundage 1971: 11-12). Waimea Grazing Company remained in business until 1878 (Wellmon 1970:136). Their closure was probably a direct result of the big drought of 1877 wherein hundreds of cattle died.

Also of note is the rise of the Parker dynasty in Waimea. In 1850, John Parker purchased 640 acres of land at Manā from the Hawaiian Government. The following year, Parker purchased an additional 1,000 acres. In 1852, Kamehameha III granted a lease to Parker for the lands of Waikoloa, giving Parker the competitive edge to control the developing ranching industry (Wellmon 1970: 75). In 1877, Rev. Lyons wrote to his son, Albert about the changes occurring in Waimea.

> Waimea has changed some since you left. It is mostly owned by J. P. Parker, Old Man Parker's son. He is a Noble in the Legislature, and one of the richest men on the Islands. But there are few people here. Very few foreigners, not more than ½ dozen. (Doyle 1945: 218)

In the early 20th century, the Parker family acquired Waikoloa and ʻŌuli in fee-simple, giving them 100,000 acres of grazing land (Wellmon 1970: 175). Today Parker Ranch is the State's second largest private landowner with lands comprising 139,000 acres (Juvik and Juvik 1998:22).

The Missionary Census

When Rev. Thurston visited Waimea in 1823, he estimated the population to be somewhere between eleven to twelve hundred, based on his count of 220 houses (Ellis 1963: 289).

Upon Lorenzo Lyons' arrival at the Waimea mission station in 1832, he estimated his whole district (including Kohala and Hāmākua) had a population of about 16,000 (Doyle 1945: 58). It is not clear how he came by this number. An 1833 diary entry noted that he had attended yet another funeral – the fourth in three weeks. Deaths were more numerous than births and the population was decreasing. Three years later in 1835, he wrote, "During the past year I have taken a census of the population of this district and find it to be as follows: Waimea, 1,396; Kohala 6,175; Hamakua 4,015; total 11,586 from which it appears there has been a diminution of the people 3,500 within three and a half years (*Ibid.* 82). In 1839, Lyons noted that the population census actually showed an increase because the census taken some years ago was incorrect (*Ibid.* 107).

In 1843, Lyons indicated the count for Waimea was 1,012; Hāmākua 3,820, Puakō and Kawaihae combined was 734; totaling 5,576. Of the total amount, 1,507 were children. He noted there was a "decrease in population of four hundred in two year (*Ibid.*: 124). By 1845, Lyons' diary indicated that the "Population of Waimea [was] rapidly diminishing by death and removal [displacement from the land] (*Ibid.*: 141).

By 1850, the native population had already been severely reduced due to introduced diseases (Bushnell 1993). The smallpox epidemic of 1853 had devastating effects on all the islands, including Hawai'i. Bushnell writes:

> No one ever knew how many people sickened, how many died. Official government figures released in 1854 declared "between 5,000 and 6,000 fatalities," in a total population of about 84,000. Comparison census counts taken in 1850 and 1855 indicate much greater losses. Estimates range from 10,000 to 15,000. "Nearly all the victims were Hawaiians" . . . (Bushnell 1993: 210)

In 1853, Lyons noted there was one case in of small pox in Waimea and "very many at Kawaihae" (Doyle 1945:157.)

Lyons noted noticeable change in population movement during 1859 due to displacement and changes in land tenure:

> Visited Puukapu. What changes in four months! All the people are leaving in consequence of the land being leased to Luzada and Co. A few remain. Cabbages, bananas, kalo are grown. The women make kapa, catch small fish, make mats, or sew. The land holders will allow no hogs, hence all are killed. Some of the men own horses and bullocks. (*Ibid.*: 161)

Another entry in 1860 noted that "there is much sickness . . . I notice a diminution of population since the census of 1854" (*Ibid.*: 175-176).

It seems that by 1865 the situation had worsened. Lyons commented that "Waimea is going downwards, population diminishing, those who remain sickly. How few well bodied are left! It will perhaps not be long before Waimea becomes a desolation. (*Ibid.*: 194)

Indeed, by 1867, Lyons wrote in his diary, "The whole population of Waimea is now about four hundred" (*Ibid.*: 195). Lyons made several entries, one in 1869 and one in 1872, that he was vaccinating people as a precaution due to smallpox outbreaks in Honolulu (*Ibid.*: 199, 201).

The picture of population diminution is one of a gradual decline, but also one that fluctuated depending on the activities of the general population (Clark 1983: 51). During the prehistoric and early historic period, shifts in population were due to demands imposed on the people by the chiefs such as building a major *heiau* like Puʻukoholā which involved massive amounts of labor and supplies; or seasonal movements -- going to the coast to gather salt and fish during cooler seasons in the uplands. Lyons made several comments about people being gone from their homes for extended periods of time and the hardship it imposed on them.

> Most of the people have gone to the mountains after canoes (Hollowed from forest trees), and will be gone 2 or 3 weeks. Hence we are rather lonely. The Governor must be obeyed whatever else must suffer. A thousand people will probably be employed in drawing five large and heavy canoes from Mauna Kea, to somewhere near the shore, a great work. The man who refuses to engage in it is to have his house burned down. (Doyle 1945: 73-74)

> Parents and children are taxed for articles not obtained in the neighborhood. They must go in search of them, at a distance from home. That means an absence of several weeks . . . Men and women are ordered by the chief to build a stone wall ten or twenty miles distant from their residence. Children must leave school to accompany their parents. (Doyle (1945: 88)

In the early historic period the sandalwood trade was a major impact on population shifts. People were forced to abandoned their fields and spend weeks in the mountains cutting sandalwood to meet the quotas of the chiefs. By the 1820s and 1830s bullock hunting and salted beef was another commerce controlled by the chiefs. The people were obliged to carry out their wishes. A notation from Lyons' diary follows:

> To carry beef, hides, and horns to the shore to ships sent by the king, requires much of the time of the natives . . . Besides, when they find they can procure beef for food by carrying certain quantities of it, they neglect to cultivate the ground. (Doyle 1945:64)

As cattle became an increasing problem, people moved their agricultural plots to places farther away where the cattle could not harm them.

> Passing through a wilderness where are many majestic *ohia* trees, one of the elders with me directed me to his plantation. It consisted of Irish potatoes, corn, onions, sugar cane, tomatoes, mulberries, *kapa* trees, figs, and *kalo*. He has his plantation in the remote wilderness that it may be protected from the ravages of cattle, for native gardens are generally without fences (*Ibid.*: 126).

Some threw up their hands in despair and gave up farming all together.

In the 1850s, the *pulu* trade sent people into the forest once more, many abandoning their homes and fields for weeks at a time.

Beginning in the 1830s and 1840s, Hawaiians began to be employed by the influx of foreigners cashing in on hunting cattle and related business pursuits such as tanneries, shoemaking, etc. However, Hawaiians often traded labor for food rather than getting paid with money. As cash crops failed, Hawaiians became even more dependent on foreigners for money. In 1849, there seems to have been a slight shift in the foreign population as quite a few left for California in hopes of striking it rich in the Gold Rush (*Ibid.*: 137). Changes in land tenure initiated by the *Māhele* also contributed to changing agricultural practices and population shifts. By the 1860s, the *pulu* business was failing. Many Hawaiians, having already abandoned their fields, were increasingly dependent on foreigners for cash. In 1860, Lyons lamented about the constantly fluctuating foreign population on whom the Hawaiians depend on for money (*Ibid.*: 176). By the 1860s there was also "very little demand for Irish potatoes" and Kawaihae Uka potatoes were "few, and poor and dear" (*Ibid.*:176, 194).

It seems by 1860 the Hawaiian population at Waimea had shifted to a near cash-based economy and taxes were being required in money rather than in goods. This was probably an outgrowth of selling a variety of cash crops to provisioning ships since the early 1800s -- vegetable produce, sweet potatoes, Irish potatoes and *pulu*. An 1860 notation from Rev. Lyons' diary is very revealing and shows the difficulty some people had in meeting the cash-based tax requirements put on them. As a result many sold their lands in order to pay taxes or, being unable to pay, their lands were auctioned off. Displacement from the land was the sad result.

> Here is the Government Tax Collector. He goes over the district and collects on the first tour -- say ten dollars of the $1600, whole sum. He has taken all the money there is. He notifies the people that he shall be around again in two weeks, and they must be ready. He makes a second and third, or fourth, or fifth, or sixth tour, collecting sometimes more, sometimes less. Meanwhile the people are working with all their might, selling their property, going off to other Islands to beg money of friends, or to sell property in time to pay the tax. Then for unpaid taxes property must be attached, and sold at auction at great sacrifice. (Doyle1945: 177)

The 1870s heralded several new businesses in Waimea which now had five stores and a hotel as well as the company of Spencer, Green & Macfarlane who raised sheep (*Ibid.*: 200, 204, 218). An 1870 diary entry by Lyons gives the passing away of traditional lifestyle in Waimea a sense of finality -- Papa, the last grass thatcher in Waimea, passed away (*Ibid.*: 206).

Early-Mid 1900s

Someone who was a guiding force in the ranching industry in the early 1900s was Alfred W. Carter, guardian of Thelma Parker and manager of Parker Ranch. Mr. Carter did much to aid ranching by improving cattle stock, conserve tree-less ranch lands by planting new and better grasses and organizing the Hawai'i Meat Company to provide ranchers an outlet to market their beef and beef products (Brundage 1971: 59, 28). Being a strong leader, Carter was able to facilitate networking among the different ranches so that everyone could learn from each other and help each other when problems arose. Mr. Carter managed Parker Ranch until 1937 when he was

forced to step down because of health problems. His son, Hartwell Carter took over the position of ranch manager and remained in that capacity for the next twenty-five years.

The Waimea Water Rights Case

In the year 1914, Alfred Carter, on behalf of his trustee, Thelma Parker, filed a petition against the Territory of Hawai'i and 62 individuals over appurtenant water rights to Waikoloa Stream for the purposes of irrigation. Carter alleged that in 1905 the Territory wrongfully diverted water from Waikoloa stream when it constructed a dam and ran connecting pipe-lines from the stream above the lands of the petitioner (Carter) to Waimea Village (Hawaiian Reports Vol. 24: 49). In essence, Carter was protecting the interests of Parker Ranch and their right to utilize water from Waikoloa Stream for purposes other than normal household use (e.g., irrigation for pasturelands). The majority of the respondents did not show up and the Territory of Hawai'i was the only one to contest Carter's claim. The "Hawaiian Report" summarized the case as follows:

> This is a proceeding . . . for the purpose of determining water rights in the Waikoloa stream, at Waimea, Island of Hawai'i . . . In the petition the petitioner's ownership of certain lands was alleged and the right to the quantities of water claimed as appurtenant thereto for irrigation purposes by immemorial custom was stated as follows: An area of 94.3 acres at Kaomaloo, within and a part of the ili of Waikoloa, through the ditch known as the "Lyons" ditch, not less than 940,000 gallons per day; three *kuleanas* in the government land of Waikoloaiki, comprising an area of about nine acres, through a ditch (called Lanakila), not less than 95,000 gallons per day; five *kuleanas* in the government land of Lalamilo (adjoining Waikoloa), and a grant (R. P. 1157) of a parcel of land containing an area of 250 acres at Lihue (stipulated to be a portion of the "land or so-called ahupuaa" of Waimea), not less than 2,000,000 gallons per day through the ditch known as the "Akona" ditch. Also water for domestic use upon a parcel of land described in a deed from Kamehameha IV to Waimea Grazing Co., adjoining Waikoloa stream; and the right to the surplus freshet water of the stream as it flows into and upon the *ahupuaa* of Ouli (adjoining Lalamilo) was claimed. (*Ibid.: 49-50*)

The record seems to suggest that this was the first modernization of a water system in the South Kohala district. Prior to the dam being built, Waimea residents received their water from the streams and from a series of ancient *'auwai* (ditches) which had been in use from "time immemorial" (Nakamura 1982:19; Carter vs. Territory of Hawai'i: 17-18). Handy, Handy and Pukui described the utilization of the ditch system by the Hawaiians.

> . . . With farms along the water system upon which all depended, a farmer took as much as he required and then closed the inlet so that the next farmer could get his share of water -- and so it went until all had the water they needed. This became a fixed thing, the taking of one's share and looking after his neighbor's rights as well, without greed or selfishness (1972: 58).

What is remarkable about this case is the native and foreign testimony, where there would otherwise be none, from informants with first-hand knowledge of the *'auwai* system and agricultural practices in the Lālāmilo/Waikoloa area. The testimonies describe the various land areas and provide glimpses into the lives of Hawaiians living during that time. Most of the informants were born around the mid-19th century, around the time of the *Māhele*. Many of the informants recalled seeing the water run through the ditches to various lands where people were living or seeing the remnant ditches no longer in use of settlements long gone. An important point made clear by the testimonies was that the water was used for domestic household use and not for large-scale irrigation. The point being made that in the "old days" there was no need to irrigate on a large scale because there was usually enough rainfall -- even on what local residents today consider the "dry" side of Waimea. However, if there was water to spare and plants needed watering, they were irrigated. Lucy Peabody, grand-daughter of Hū'eo and born in 1840 testified that, "There was very little, if any, irrigation at Waimea in the old days as it rained more or less nearly

every day and there was an abundance of water. The rainfall in the old days was much heavier than it is now and the forest came much farther down. The cattle have been causing the forest to recede". This was also recognized by the State Supreme Court when Carter appealed the 1915 decision.

> The evidence is to the effect that there were a very few *lois* of taro in the locality in question. It was shown that the Hawaiians habitually raised in their house-lots dry land taro, bananas and vegetables as well as sugar cane which they cultivated for human consumption as well as for food for their animals. And it is a fair inference from the evidence that the ditch system at Waimea was constructed for the purpose of supplying water to the inhabitants for household purposes and for the irrigation, when the natural rainfall was insufficient, of their crops (Hawaiian Reports Vol. 24: 59).

Barry Nakamura (1982) aptly discusses the ancient *'auwai* system in detail and it is briefly summarized here. The main sources of surface water for this *'auwai* system were the streams of Lanimaumau, Waikoloa (also known as Paliilii) and Kohākōhau. According to the testimony, Kohākōhau was known by several names: Wai'auia, Keanu'l'omanō and Wai'aka. Depending on which part of the stream being referred to, this still holds true for local residents today. At the time of the lawsuit, it was determined the main *'auwai* feeding off of Waikoloa Stream were the Lyons, Akona and Lanakila ditches. Off of these three ditches was a network of smaller ditches that watered the lands below (south) the project area. What was evident from the testimony was that these ditches were very old networks developed by the Hawaiians long ago and that portions of the *'auwai* were used up until the late 19th to very early 20th century.

Relative to Lālāmilo, the Akona *'auwai* watered the lands of Lihu'e below the project area (Grant 1157 to G. Macy and J. Louzada) and continued west toward Kolea where it turned south and was said to flow as far as Pu'uhuluhulu and Pu'upā. In addition to Grant 1157, the Akona *'auwai* watered the following five *kuleana* in Lālāmilo (see *Figure 3*):

LCA 4885 to William French
LCA 976, Apana 1 to William Beckely
LCA 3202-B to Jose Bowers
LCA 589-B to Naholowaa
LCA 8513-B to Kuamuu [Kuamoo] Ho'olulu
(Carter vs. Territory of Hawai'i: 774)

The testimonies indicate that in previous times there was a very large settlement on the *ma kai* lands of Lālāmilo, especially below Lihu'e and even spreading across toward Wa'awa'a, Papuaa and beyond toward Kona. By the mid-19th century when most of the informants were born, these settlements were gone. But, many informants reported hearing this from grandparents or older *kama'āina* and most recalled seeing outlines of remnant ditches on the landscape. Martin Campbell, born in 1864 and whose wife used to live at Papuaa said, "I was told there was a large settlement makai on Lalamilo and was told they got water from the stream going through Lihue. I was told that the people living there had a village of nearly 10,000" (Waimea Water Rights Case, 1914-1915; Campbell: 3).

Waimea's warrior tradition was recalled by Charles Notley who was born at Lanikeapu'u, Waimea in 1861.

> The land down in behind [below] Puopelu and LCA 8513-B [to Kuamoo Hoolulu] was thickly populated in the old days. Kamehameha got the flower of his army from these lands round about. In the old days the most populous portion of the land was below Puopelu and below Lihue. I knew this from the kamaainas. The signs of the old kuamas or patches were evident in the old days. I have seen them. The people makai of Puopelu would get their water from the Akona auwai and from Waikoloa Stream. There were pools in the

> solid rock in the Waikoloa Stream which would hold water for a long while, in dry season . . .
>
> I heard that they only stayed there one or two seasons, and then moved to Kohala
> . . . In the olden days there were auwais running through Lihue down to the settlement makai. I was told that in the old days the residents below Lihue would use the water from these auwais. In dry times they would go to Waikoloa and Waiauia streams. Times that I have gone beyond Lihue down makai looking for cattle, I have seen water running in the artificial auwais. When there would be an average flow in the stream I have seen the water down in the ditches makai of Lihue -- down into the settlement makai -- I don't know how far makai they go.

Of interest is Notley's comment about the lands *makai* being occupied for "one or two seasons" inferring that perhaps there was a specific intent for the occupation of these lands. This possibly gives substance to the theory that agricultural expansion in this marginal area was due to the construction of Pu'ukoholā *heiau* (ca. 1790) by Kamehameha I (Reeve 1983: 236).

The "pools in the solid rock" that Notley referred to were well known among the *kama'āina* who lived there. During drought and dry spells when the streams did not flow, the large rocks in the streams held remnant water where the people would draw water from for domestic use. This practice was also mentioned by Kamakau in reference to Lanimaomao [Lanimaumau] Stream in the battle between Loooikamakahiki and Kamalālāwalu (1992: 60).

Paul Jarrett, a non-native informant related that though he never saw people living there, he was told "that in the olden days there was quite a settlement below Lihue . . . The part in between Lihue and Waawaa and Papuaa and way towards Kona side, and all around there was cultivated. I was told this by the kamaainas. I was told that there was a large settlement there. (Nui kanaka oia wahi) . . The only places where I heard of the settlements makai of Lihue were on Lalamilo and mauka of Ouli. Jarrett was manager of Parker Ranch from 1888-1901.

By the early 1850s when Samuel Macy was growing up, there were not very many people living at Lihu'e itself. Still, there were about "50 of us altogether living at Lihue." At that time, there were still 25 or 30 thatched houses. Many of the cowboys lived there as well. Macy's recollection was that when he was a boy, "the forest used to go from Puukapu over to Waipio." Samuel Macy was the son of George W. Macy (Grant 1157) and he was born in 1848 (Waimea Water Rights Case; Macy: 2-3). Macy also recalled going to Waiemi (also know as Waikane) to catch plover in a pond there (*Ibid.*).

Another informant born in 1858, told about cultivation practices when he was a child.

> The Hawaiians in Lihue and in the remainder of the district of Waimea, when I was a little boy, cultivated their lands only in the old Hawaiian fashion, that is to say, they planted a few holes with sugar cane, sufficient for themselves and their friends who called, and a few mounds of sweet potatoes and sometimes, also, Irish potatoes, but all such planting depended in the main, upon rainfall; it was only in dry times that these plants were watered; sometimes they were so watered by running water from the auwais to them, but most of the time the water was carried in buckets by the old Hawaiians. There was no such watering on a large scale as is done nowadays by plantations. In a one-acre house lot there would be only a very small portion of the land so cultivated sometimes . . . Sometimes the Hawaiians planted small pieces of land at some distance from their house lots; the pieces so planted being chosen because, being in a depression, the land was richer or retained moisture longer . . . My grandfather cultivated such a piece distant from his home, containing, I should say, as much as four acres of land, but he was an exception; the average Hawaiian who planted at a distance from his home, planted ordinarily, not more than ¼ acre, and on those patches also, there was very little irrigation indeed . . . When I was young,

> the rainfall in Waimea district was very much heavier and more frequent than it is now. (Waimea Water Rights Case; W. C. Achi: 1-2)

Achi also testified that the main taro supply for Waimea came from Waipi`o, implying that not much taro cultivation was being done in Waimea by the 1860s. There were only a few cultivated plots of dry-land taro scattered here and there (*Ibid.*).

Pertaining to the project study area, a *ma uka* ditch named "Amiikea" fed from the Kohākōhau Stream, through Palea's LCA 3828 (within the project area), and flowed down to the Waikoloa Stream. Beyond the Waikoloa Stream was yet another network of intricate ditches. The Amiikea '*auwai* also watered LCA 3762 to Auwae at Papuaa, LCA 4185 to Kanehailua at Kaluaana, LCA 976:2 to William Beckley at Waawaa and Grant 2129 to G. K. Lindsey (Nakamura 1982: 49-51).

Nainoa was born in 1842 at the Rev. Lyons' homestead in Waimea. Seventy-two years of age, he was the District Magistrate at Hau'ula and living at Lā'ie at the time testimony was taken. Nainoa states his father's name is Auwae. It is not known if this is the same Auwae who was awarded LCA 3762 at Papuaa, just southwest of the project area, but it is a very likely possibility. Nainoa lived at Papuaa and his brother taught school there. When Nainoa was old enough, he took over the school. He says, "My parents lived above with Lyons, but we children, my brother and myself, lived down below, where my brother taught school" (Waimea Water Rights Case, 1914-1915; Nainoa Testimony: 3). Nainoa talks about the general Lālāmilo area and of the Papuaa settlement a little southwest of the project area. Though not mentioned by name, he also talks about the Amiikea ditch where they got water. But, of particular interest is his mention of a burial ground.

> In Lihue there were a lot of branch *auwais*. The hollow on the makai side in Lihue was not cultivated -- it was open pasture. Nothing but prickley pear on the Kohala makai side of the wall. I recollect the burial ground along towards Waawaa. Formerly the land between the burial ground and the makai part of Lihue was pretty well cultivated . . . That land was pretty thickly populated. I had many students in the school. The school was on a hill. Just below outside of the wall was quite a big settlement on the makai side of the road going to Puako. That is where Beckley was brought up. We lived at Papuaa and they lived below the schoolhouse. Formerly the land between the school house and Kaluaana was settled. They were there at the time I was teaching school. The people mauka of the school house got their water from the streams of Waiaula and Waikoloa. The Waikoloa stream flowed down further to a dam which furnished water to our homestead at Papuaa . . . The water for the school house came from the ditch that comes to our place. The ditch used to run just below the school house and that supplied the water. The ditch going to Papuaa often went dry because the people living at Kaluaana dammed up the water mauka. The ditch running to Kaluaana dries up during dry season. The people at Waawaa got their water from the branch ditch that went towards Kaluaana. (*Ibid.*)

According to Nainoa, the burial ground was located somewhere between Lihu'e and Waawaa.

Much more can be extrapolated from the testimonies, but which are beyond the scope of this work. They serve as a valuable source of ethnographic information representative of the mid-19th century. Most importantly, they describe the ancient `*auwai* or ditch system utilized by Hawaiians during up into the 19th century.

In 1917, Alfred Carter appealed the case to the Hawai'i State Supreme Court. The court maintained that the Territory owned all the waters of Waikoloa stream, that the petitioner (Carter) had rights to use the water from the stream for domestic use (according to "ancient custom"), the petitioner was entitled to surplus flow for artificial purposes only after all the domestic use requirements were satisfied and that freshet waters were "subject to reasonable use" by both the Territory and the petitioner (Hawaiian Reports Vol. 24: 70-71).

Two World Wars

As a major supplier of beef, Parker Ranch played a pivotal role in providing beef and mutton to the Armed Forces in Hawai'i during both WWI (1914) and WWII (1941). During WWII, the military (Army and Marines) basically took over Waimea town. Large areas of ranch lands were turned over to the U.S. Government for a campsite, and a firing range for training the U.S. Marines -- all for the sum of $1.00 (Brundage 1971: 109). When the war was over in 1945, Mr. Carter wrote the following:

> At the present time, there is a division, I think, consisting of something over 20,000 men, located in Waimea. They are moving out now. The licenses and leases which we gave the Armed Forces run for the duration and six months thereafter. Much, if not all, of the installations I expect will be removed within that time. The U.S.O. also has two leases upon which they have built. They have the right to remove their improvements unless we can agree to a price (*Ibid.*).

The daily operations of the ranch were disrupted and Carter commented on the difficulties faced:

> . . . the period of occupation by the Armed Forces has been difficult. It could not have been otherwise than difficult. Tenting as many as 30,000 men practically in the village of Waimea resulted in numerous infringements and headaches. Very often fires were started which we had to fight; the breaking down of gates, cutting down of fences, the breaking of pipes and the mixup of cattle, and a thousand and one other things made it difficult. We were shorthanded in our assistants and labor but it was handled well and I must say the officers cooperated in every way possible. (*Ibid.*)

A Pasture Lease map for Lālāmilo, Lihu'e, `Ōuli, Koali'ula and Wai'aka 1 was obtained from Woody Ramos. The map indicated an easement for a "tank trail" which was used by the military during WW II (Personal Communication, Woody Ramos) (*Figure 5*).

The firing range was one of the last properties to be released by the military. Mr. Carter wrote:

> The Army and Marines have released most of the property which we had turned over to them except what is known as the Firing Area. This is the land below the Kona Road and runs down to the sea, consisting of about 50,000 acres. On this land they used their artillery and many of the shells which came down did not explode and are called duds. They have about 200 men retained there in this area, detonating the duds as they find them. It is surprising how many were on the place. They are extremely dangerous because if a man going along on horseback should hit one, it would explode with fatal results so it is senseless to put our men into this area until we are well satisfied that all of the duds have been exploded. We have been promised they will keep this gang of men there as long as we wish them. It will be several months before it will be safe for us to use the land -- it is a big country to go over. (*Ibid.*: 110)

In an informal talk-story session with Radcliffe (Rally) Greenwell, former Ranch manager, he indicated there had been several accidents on the ranch due to unexploded ordinance. The actual project area was a small portion of the lands used by the Marines for training during WW II (Personal Communication from R. Greenwell, H. Kimura, Y. Kimura).

World War II reshaped the farming industry in Waimea and ironically the war was a boon to the farmers -- most of whom were Japanese. Prior to the war, there was only a relatively

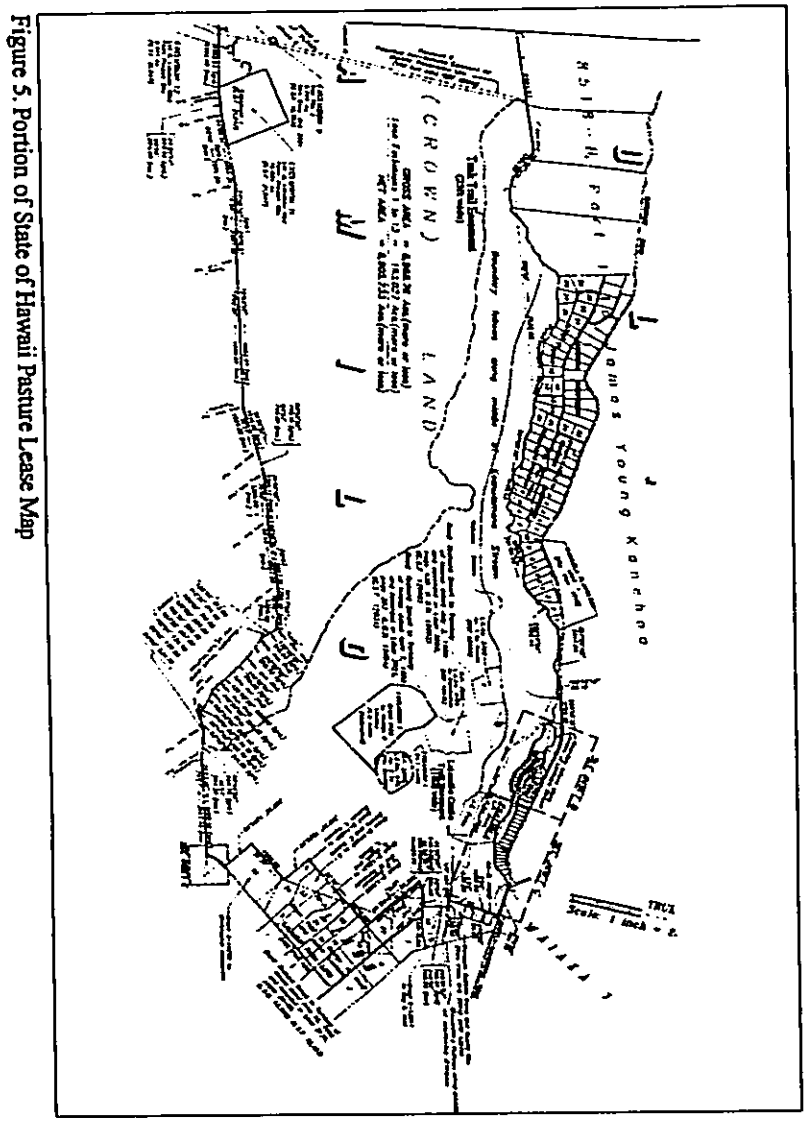

Figure 5. Portion of State of Hawaii Pasture Lease Map

small market for fresh produce. Once the war started, there was an immediate demand for vegetables to supply the Armed Forces stationed in Waimea and O'ahu. Parker Ranch played a role in this effort by leasing land to the farmers. Each farmer leased twenty acres of lands combined between the Ranch and Waimea homesteaders. The farmers learned to grow new kinds of vegetables they had never grown before – lettuce, asparagus, celery, and broccoli were especially requested by the servicemen (Nakano 1992: 101). The war helped the Waimea farmers make the shift from tenant farmers to commercial farmers.

Lālāmilo Farm Lots

After the war, the Japanese farmers found other venues to market their produce. Using their profits from the war, many of the farmers began to purchase land outright rather than lease farmlands. Besides mechanizing their farming equipment, they organized to form a cooperative (*Ibid.*: 113).

The birth of Lālāmilo farm lots stems from an amusing anecdote about how the lands were acquired. Several farmers wanted to purchase Government land around the area of Richard Smart's home at Pu'uopelu. Paniolo Yutaka Kimura foresaw that Mr. Smart's home would be a dustbin from the farmers plowing their fields so close to Mr. Smart's residence. Parker Ranch came up with a viable solution for the farmers by exchanging the Government owned land for Parker Ranch lands that would in turn be granted to the farmers. In 1963 a legislative bill was passed authorizing the sale of ranch lands at Lālāmilo to Parker Ranch in exchange for the Government lands at Pu'uopelu. The outcome actually benefited the farmers in the long run. Today, most of the privately owned farmland in Waimea belongs to Japanese farmers and they are the largest vegetable producers in the State (*Ibid.*: 113-115).

Late 1900s

Other than military use during the war, the project area has been used almost entirely for ranching purposes. A small portion of the subject parcel, near South Kohala Distribution Road was used as a dump after the war (late 1940s -1950s) and remnant pieces of disposed car parts and miscellaneous "junk" can be seen lying on the surface (Personal Communication, Woody Ramos).

At one time Lālāmilo, including the project area, was leased by Parker Ranch for pasturing their cattle. A Pasture Lease map for Lālāmilo and the surrounding area indicated a 100 ft.-wide easement for a "Lālāmilo Cattle Trail" which traverses through nearly the full length of the project area and LCA 3828 to Palea (see *Figure 5*). Yutaka Kimura recollected that in the "old days" the cowboys used to drive cattle through this area (Personal Communication). Having more productive pasture lands elsewhere, the Ranch opted not to renew their lease when it came up for review in the late 1950s or early 1960s. The pasture lands of Lālāmilo are marginal. They are considered "seasonal" pasture lands and are not used for pasturing year-round. They are most productive for grazing during the winter months and early spring (Personal Communication, Radcliffe Greenwell & Woody Ramos).

Parcel 77 and Parcel 12-17 is currently under lease to Jack Ramos who uses the land for cattle grazing and branding. The ranch was formerly known as the Palekoki Ranch (Petticoat Ranch) after two women owners who had the lease before Ramos (Personal Communication, Jack Ramos). People today refer to the it as the "Ramos Ranch". Parcel 10 is currently under a general lease to Roy Mattos and the parcel is used for pasturing horses.

COMMUNITY CONSULTATION

As part of the scope of work for this assessment, it was hoped that three to four formal, taped interviews with *kūpuna* could be conducted which would provide cultural information about the project study area relative to cultural practices, especially in relation to the cultural sites and burials present in the project area. It was especially hoped that descendents of the original families who were awarded *kuleana* lands during the *Māhele* could be located and could offer information that was more specific to the project study area and the sites there.

Consultation with agencies, community organizations, Hawaiian Civic Clubs, the Waimea Community Association and members of the community at large yielded a hopeful list of potential people to contact who might be knowledgeable about the project area. An effort was made to contact the older Hawaiian *paniolo* who worked for Parker Ranch. People were contacted either over the phone or in person. *Table 3* lists the individuals and agencies contacted.

Talk-story sessions were conducted with several potential interview informants: Yutaka Kimura (96 yrs.), Hisao Kimura (89 yrs.), Radcliffe Greenwell (80s), Allen Lindsey (70 yrs.), Helen Aveiro (86 yrs.) and Ethel Andrade (75 yrs.). This did not pan out as expected.

Yutaka Kimura began working for Parker Ranch in 1918 at the age of 13. He retired from the Ranch after 49 years of service. He is one of Waimea's oldest (if not the oldest) *kupuna* still living today. Though not of Hawaiian ancestry, with his *paniolo* background, it was hoped he would be able to relate stories or information he had heard from the older Hawaiian cowboys about the project area.

Hisao Kimura, Yutaka's brother, was also contacted. Hisao is married to Elizabeth Lindsey of the Lindsey clan in Waimea. Elizabeth's family is from Wai'aka, just across the highway from the project area. Like Yutaka, Hisao also worked for Parker Ranch and retired from the ranch. Hisao was in charge of the nursery and was responsible for planting/upkeeping the grasses in the paddocks and pastures.

An informal session was conducted with both Kimura brothers at the home of Hisao Kimura in Waimea. Hisao's wife, Elizabeth was also present. Both Kimuras have an extensive and intimate knowledge of Parker Ranch and ranch lands, as well as general knowledge about Waimea. However, they did not know any specific cultural information about cultural practices in the project area. Neither did Elizabeth Lindsey Kimura. However, they did confirm that Parker Ranch used the project area in the past for grazing and they also confirmed military use of the project area during WW II. They were all familiar with the house sites at Papuaa. Yutaka related that several peach trees used to grow in that area when he was young. Testimony from the Waimea Water Rights substantiated his memory. Part-way into the talk-story session, Mrs. Kimura called a friend whom she thought might be helpful. Her friend, Mrs. Nobriga (70s), came over to chat as well. As it turned out, she was a descendent of Auwae who was awarded LCA 3762 at Papuaa. She was familiar with the sites at Papuaa because she had visited them and walked over the land there. But she could not offer cultural information about the project study area, nor did she have any stories to relate through her family ties to the area.

A talk-story session was also arranged with Radcliffe (Rally) Greenwell at his home in Waimea. Mr. Greenwell was a prior ranch manager and retired from the ranch. Like the Kimura brothers, Mr. Greenwell only knew a few general details about the area such as military use, grazing use by the ranch, and the dump.

Talk-story with Helen Aveiro, gave some insight into traditional Hawaiian lifestyle in the early 20th century. Helen Aveiro (born in 1915) was raised at Mauna Hoeepa in Kawaihae Uka and moved to Waimea around the age of 14 or 15. She is familiar with the Hawaiian use of *'auwai* (ditch systems) because the traditional *'auwai* were utilized by her family in Kawaihae Uka as a young child. Mrs. Aveiro indicated that the Lalamilo use of *'auwai* was the same as in Kawaihae Uka -- using the stream for irrigation (mostly sweet potato) as well as for household use --

TABLE 3: Results of Community Consultations

Key:

Affiliation
HCC = Hawaiian Civic Club
HIBC Hawai'i Island Burial Council
HMINK = Hui Mālama I Nā Kūpuna o Hawai'i Nei
KSBE = Kamehameha Schools Bishop Estate
OHA = Office of Hawaiian Affairs
PR = Parker Ranch
SHPD = State Historic Preservation Division

Y = Yes
N = No
S = Some knowledge
D = Declined to comment
A = Attempted (at least 3 attempts were made to contact individual, with no response)
U = unable to contact, i.e., no known phone number or forwarding address

Name	Affiliation	Contacted (Y/N/A)	Personal Knowledge (Y/S/N)	Referral(s)
Akau, William	Retired Kawaihae harbor master	Y	N	Y
Akima, Lorna	works @ Pu'ukoho-la Heiau	Y	N	Y
Andrade, Ethel	Waimea Rancher	Y	N	Y
Aveiro, Helen	(Awa'a family)	Y	N	N
Ayau, Halealoha	HMINK	Y	N	N
Bell, Mary	(Lindsey family)	A	--	--
Bell, Teddy	PR, retired *paniolo*	Y	N	N
Bergin, Dr. William		Y	N	Y
Bradley, Michelle	SHPD	Y	N	N
Case, William		Y	N	Y
Chock, Gladys	owner, Chock-In Store, Waimea	Y	N	Y
Cook, Patty	Waimea Community Association	Y	N	Y
De Silva, Paula	Parker Ranch, Human Resources	Y	N	Y
Garmon, Ululani	HIBC	Y	N	Y
Gmirken, Rick	(Archaeologist)	Y	N	N

Name	Affiliation	Contacted (Y/N/A)	Personal Knowledge (Y/S/N)	Referral(s)
Greenwell, Rally (Radcliffe)	PR	Y	N	N
Hanohano, Val	Kanu o Ka 'Aina	Y	N	Y
Kahakalau, Nalei	HIBC	Y	S	Y
Kahakalau, Ku	Kanu o ka 'Aina	Y	S	Y
Kaniho Jr., Dan(iel)	former Pres. Waimea Hmstd. Assoc.	Y	N	Y
Kaniho, Sonny	Parker Ranch	Y	N	N
Kaniho, Thelma		Y	N	N
Kauka, Rev. Dean	Imiola Congregational Church	Y	N	N
Kimura Elizabeth (Lindsey)		Y	N	Y
Kimura, Hisao	PR	Y	S	N
Kimura, Larry	UHH	Y	Y	Y
Kimura, Yutaka	PR	Y	S	N
Langlas, Charles	Anthropologist, UH-Hilo	Y	N	Y
Lindsey, Allen	PR	Y	N	Y
Lindsey, Bobby (Robert)	KSBE, Kona Ofc.	Y	N	N
Lindsey, Bolo	PR	Y	N	N
Lindsey, Dedi	Kanu o Ka Aina	Y	N	Y
Lindsey, Mary H		Y	N	Y
Lindsey, Rene	Kanu o Ka Aina	Y	Y	N
Mahi, Abraham Rev.	Keola Mau Loa Church	Y	N	N
Mattos, Roy	Lessee	Y	N	N
Mc Donald, Ruby	OHA, Kona Ofc.	Y	N	N
Markell, Kai	SHPD Burial Staff	Y	N	N
Mc Eldowney, Holly	SHPD, Culture & History	Y	N	Y

Name	Affiliation	Contacted (Y/N/A)	Personal Knowledge (Y/S/N)	Referral(s)
Nahulu, Eli	KSBE; Keauhou Ofc	Y	N	N
Nobriga, Mrs.		Y	S	N
Purdy, Doris	Waimea Preservation Association	Y	N	N
Purdy, Martin	PR	Y	N	N
Ramos, Jack Ramos, Woody	Lessee	Y	S	N
Ray, John	Waimea Community Association president	Y	N	Y
Ramos, Violet		Y	N	Y
Sakamoto, Rosie		Y	N	Y
Sakuma, Angeline	Lindsey family	Y	N	N
Solmssen, Franz	HPA	Y	N	Y
Smith, Mark	SHPD-Hawai'I Island	Y	N	N
Spencer, Marjorie	Waimea resident	Y	N	N
Stevens, Jenny	Waimea resident	Y	N	Y
Tanimoto, Aloha	Lindsey Family	Y	N	Y
Tavares, Pua & Louis	Kawaihae Pua Ka'ilima Comm. Assoc.	Y	N	Y
Tolentino, Mabel	President Waimea Hawn Civic Club	Y	N	N
Waimea Gazette		Y	–	–
Whittle, Charlie		Y	S	Y
Yamaguchi, Jiro	Parker Ranch	Y	N	Y
* (name withheld)		Y	Y	D
* (name withheld)		Y	N	D/N

washing dishes, cooking, bathing and drinking. During dry times, water from pools in the stream was utilized -- certain pools were designated for bathing, certain pools for drinking and so forth. Drinking water was carried to the house in buckets and stored in a large barrel. The staple diet consisted of sweet potatoes -- the main agricultural crop. The main hot meal (involving a cooking fire) was eaten in the evening. Poi was usually eaten with this meal as well. Breakfast was a very

simple meal of sweet potatoes cooked overnight in the charcoals left over from preparing the evening meal. Lunch usually consisted of dried meat or dried *'ōpae*, crackers and maybe some *poi* if there was enough to go around. *Poi* had to be purchased and was not eaten at every meal so that the supply would last throughout the week.

Allen Lindsey (born in 1931), a descendent of the original Thomas Weston Lindsey who settled in Waimea in the early 1830s, worked as a *paniolo* for Parker Ranch for about 31 years. Mr. Lindsey grew up on family land in Wai'aka, across the highway from the project area and the present Kamuela Museum. He recalled that taro was grown on the family land at Wai'aka and traces of older agricultural terraces were seen in the general Wai'aka area. When the family decided to sell the Wai'aka land (approximately 7.6 acres), the Lindsey family burials, twenty-two in all, were reinterred at the county cemetery next to 'Imiola Church in Waimea Town. Even though Mr. Lindsey grew up across the highway from the project area, he could not offer more insight into the history or cultural practices of the project area.

An informal talk-story interview was also conducted with Ethel Andrade (born in 1926), a homesteader from Pu'ukapu, Waimea. Mrs. Andrade and her husband Albert have been ranching 300 acres of Hawaiian Homestead land since they were awarded their homestead in 1952. Mrs. Andrade also served as a past Waimea Homestead Association president. Mrs. Andrade grew up in Hāmākua and moved to Waimea in 1952. She offered glimpses into life in Waimea in the 1950s from a Hawaiian perspective. In the 1950s, it was almost impossible for Hawaiians to obtain credit from the local store. So Hawaiians bartered and traded for food, gas and other needed items. Though a long-time Waimea resident, Mrs. Andrade reiterated she is more familiar with the Pu'ukapu end of Waimea than the Lālāmilo end. She could not give any information specific to the project area. Mrs. Andrade did raise some social impact issue concerns that are unrelated to the scope of work for this cultural assessment.

None of these respected *kupuna* were surprised to hear about the sites in the project area. The general comment was, "That whole area is full of sites." Neither were they surprised to hear that the project area contained burials. It was to be expected that where you found house sites, you would probably find burials as well. Their feeling about the sites in the project area was the *kama'āina* of that place moved away so long ago that it would be difficult to find anyone who had intimate knowledge of them. Many of the old families that used to live in Waimea moved away or their *kupuna* have passed on.

A formal taped interview was conducted with Kū Kahakalau, founder of Kanu o Ka 'Āina, a charter school in Waimea. Though not native to Waimea, Kū is of Hawaiian ancestry and has lived in Kukuihaele for the last ten years. Her family roots take her back to Waipi'o Valley, Molokai and O'ahu.

Kū was interviewed because she is very interested in the project area itself and she has a definite vision of how the project plans could better serve the community of Waimea in the long-term – more specifically how the charter school can be an asset to the project, making it a win-win situation for all concerned, the charter school, the community at large and the project planners. Previously, when the project area was still designated State land, Kū had considered the project area as a site for the charter school because of the cultural sites there with the idea of preservation and *mālama* (to care for) in mind.

For Kū, key to the success of the project is communication and involvement with the community from the very beginning stages of project planning. As far as specific cultural information pertaining to the sites and past cultural practices, Kū was very up front about saying that she was not the right person to ask because even though she works in Waimea, she was not raised there. Kū did recommend several names of *kupuna* who might be able to offer more insight on cultural practices in Lālāmilo. She also had recommendations to make about the cultural sites (overall data recovery, especially for those sites not being preserved, i.e., house sites) and burials (preservation in place for all burials) within the project area. Excerpts from the interview follow:

KM: Do you have any specific recommendations on how best to preserve these sites? If the sites are scattered throughout, how do you pick and choose which sites should be preserved? Are you saying all the sites should be preserved?

KK: It's really hard. I would say that on a large scale basis data recovery should be done in terms of saying what was there? But I am really concerned if that is it because I certainly don't feel that that should be it. So data recovery is *maika'i* because we need to know more about this area. There also needs to be a way of preserving some of these things and figuring out what to do to integrate that into a community . . .

KK: So, I would say before we determine anything, it would be good to see the map, to see the extent of it and the concentrations of it in what areas and then probably do a walk-thru to look at the geographic locations of some of these things as well. Like in our case, things don't have to be contiguous. You can have it be noncontiguous . . .

KM: What do you think about the burials that are there?

KK: Well, we feel very strongly that (my husband, myself and certainly as a family and other people too), some things are sacred and we feel strongly that they should remain in place.

KM: So, that's your inclination rather than creating a burial preserve and moving them all to one place?

KK: Yes, definitely they should stay in one place.

Many of the other issues Kū raised were social impact issues and lie outside of the scope of work for this cultural assessment. Hopefully, these concerns will be addressed in the Social Impact Assessment being conducted under a separate contract.

Another talk-story session was conducted with a male in his late-50s (name withheld at his request) who indicated he had some cultural knowledge of the project area, especially in relation to burials. He also indicated he knew two other kupuna who had cultural information about the project area, but his feeling was that they would be very reluctant to talk openly about what they know. Though fairly young, by *kupuna* standards, this individual indicated information was passed on to him by *kupuna* who have since passed away. The individual stressed that the project area was "an important place in our [Hawaiian] culture". He also indicated that "a whole oral history of that area can be developed if people trust each other." The individual stressed that the Department of Hawaiian Homes and the planners "walk lightly" and "approach it [the project planning] in more sensitivity". For the time being, this individual declined to interviewed for this project.

It is possible that others might know more about the cultural use of the Lālāmilo area and the cultural sites there but, other than the anonymous individual mentioned above, no one else was identified during the course of the consultation for this project.

CONCLUSION

This assessment specifically dealt with Act 50 pertaining to identification of Hawaiian cultural practices and disclosing potential negative impacts to cultural practices includeing cultural sites and cultural properties.

This cultural impact assessment did not identify any present-day cultural practices nor did it identify anyone who currently uses the project area for cultural practices of any kind. Past cultural practices identified were related to agricultural practices and the utilization of an ancient *'auwai* or ditch system which traversed much of the Lālāmilo area. The project area is part of the larger Lālāmilo field system evidenced by remnant *'auwai* and dryland terraces. Hawaiian burial practices (pre-contact and historic) were conducted in the project area as evidenced by the presence of burials and grave sites.

Archival research indicated there was one *kuleana* awarded during the *Māhele* period. This Land Commission Award 3828 to Palea lies within the boundaries of the project area. Though not certain, the research also suggested the possibility that Palea might have been buried within this *kuleana*.

Testimony from the Waimea Water Rights Case (1914-1915) indicated the Lālāmilo area was heavily populated in earlier times and probably remained so up until the late 1700s - very early 1800s. This might have been due to agricultural expansion by the Waimea chiefs to serve a specific purpose such as supporting large armies and chiefly retinues and, in particular the construction of Pu'ukoholā *Heiau* by Kamehameha I which required a vast quantity of laborers. The negative impact of cattle, the sandalwood trade, and the influx of foreigners due to commerce and trade at Kawaihae contributed to dispersal of these communities before the mid-19th century. A few *hoa'āina* continued to maintain their kuleana on a very small scale -- mostly for domestic use. But, by the late 1800s, most of the *kuleana* were abandoned. Beginning in the 1840s, ranching activities became the primary land-use activity and has remained so up to the present day.

The Archaeological Inventory Survey identified a number of sites within the project area, including house sites, enclosure walls, agricultural terraces, remnant *'auwai* and burials. Networking with community members did not yield new cultural information specific to these sites or burials. No formal interviews were conducted for this study due to lack of identified knowledgeable informants. Through consultation, one informant (name withheld) was identified who intimated he had more specific knowledge of the project area, especially in relation to burials. This individual declined to be interviewed for the time being.

Several cultural practices of the surrounding area have been alluded to by several people however they chose to remain silent for the time being, honoring their oral tradition as it was passed on to them. Perhaps in time, people will feel comfortable to talk about these traditions so they can be documented for posterity.

There seems to be a feeling of mistrust between some members of the Hawaiian community and the Department of Hawaiian Home Lands. Dissatisfaction was expressed with the overall process -- of asking for community input as an after fact rather than before official plans for the proposed development was drawn up. Individuals are worried about the "fast-track" the DHHL seems to have planned for this development. They worry that decisions will be made based on the amount of time and money already invested in the project rather than on cultural sensitivity to the sites -- especially burials within the project area. Some Hawaiians feel "caught in the middle" -- not wanting to deter other Hawaiians from receiving awards versus speaking up for the cultural sites that are there. Most Hawaiians in the community feel the project is feasible on a smaller scale if DHHL is willing to work with the community -- especially by "listening and addressing" community concerns. There is a feeling by some Hawaiians (based on past DHHL projects on Hawai'i Island), that even if *kupuna* share their cultural knowledge of the project area, their *mana'o* (thoughts & concerns) will not be respected, but will be ignored, and the project will go on as planned regardless of what the Hawaiian community thinks. Other concerns raised were related to social impact issues which are not addressed by this assessment.

RECOMMENDATIONS

The following recommendations are suggested to mitigate cultural concerns identified by this assessment. It should be stressed that these are only recommendations and the final disposition should be decided through active communication with the Hawaiian community of Waimea and those concerned. Because the project area contains historic cultural sites (i.e., house sites, enclosure walls, agricultural terraces, *'auwai*, etc.) and burials, the final outcome or goals for the sites should be determined early on in the planning process, especially if preservation of all the archaeological sites is the goal. If preservation of all sites is not the goal, it must be determined which sites will or will not be preserved.

In the interest of the community and all concerned, the following recommendations are being made:

1. Follow-up with the one identified informant (name withheld) to see if a plan can be worked out to safely document his knowledge of the project area and related burials without jeopardizing these cultural properties. Decisions regarding the number and the size of preservation areas, and the overall development of the proposed parcel are dependent on this information to ensure efficient cultural planning for the project.

2. For sites not being preserved, archaeological data recovery is being recommended prior to any ground disturbance or ground altering activities. The data recovery could perhaps even contain an educational component, whereby Hawaiian students participate in the data recovery process, giving them first-hand experience in archaeological fieldwork in their own backyard so to speak.

3. Try to locate and map Palea's house site (LCA 3828).

4. Incorporate preserved sites into the overall plan utilizing cultural protocol, sensitivity and integrity.

5. Preserve all burials in place with a buffer zone, the specifics to be worked out with the Hawai'i Island Burial Council, any lineal/cultural descendants and/or the community.

6. In light of the sites and burials within the project area, cultural monitoring is recommended for all ground disturbing activities.

7. Lastly, as a safety precaution, clear the project area of any remaining unexploded ordinance.

The following recommendations deal with how to respond in the event that inadvertent burials are encountered during subsurface work in the project area. Regarding the discovery of burials, State law (Chapter 6E, Hawai'i Revised Statues) requires the following:

1. Stop all disturbing activity in the immediate area

2. Leave all remains in place

3. Immediately notify the State Department of Land and Natural Resources, Historic Preservation Division (DLNR/SHPD), at 692-8026 and the County Police Department.

The following recommendations speak to cultural concerns the Hawaiian community has regarding proper handling of *'iwi* (bones) should they be encountered within the project area and consultation with appropriate parties. It is stressed that utmost sensitivity, caring and understanding be employed when dealing with burial issues and the *'iwi*.

1. If for some reason the *'iwi* must be moved or touched, it is highly recommended this be done by a cultural monitor, a lineal/cultural descendant or someone of Hawaiian ancestry who will be cultural sensitive to the *'iwi*.

2. Consult with appropriate agencies and organizations: State Department of Land and Natural Resources, Historic Preservation Division (DLNR/SHPD), SHPD Burial staff, the Hawai`i Island Burial Council, the Office of Hawaiian Affairs (OHA), Hui Mālama I Nā Kūpuna o Hawai`i Nei and any other interested Hawaiian organizations.

3. Consult with all known lineal and/or cultural descendants

4. Prepare and implement a Burial Treatment Plan to be developed in consultation with the above agencies, the appropriate organizations and parties wishing to be consulted, including lineal and/or cultural descendants.

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Appendix G

Traffic Study

TRAFFIC IMPACT ANALYSIS REPORT UPDATE
FOR THE PROPOSED

DEPARTMENT OF HAWAIIAN HOME LANDS
LALAMILO PROJECT

TAX MAP KEYS (3) 6-6-01:54, 77 & (3) 6-6-04:12-17

PREPARED FOR

PBR HAWAII

NOVEMBER 6, 2002

PREPARED BY

THE TRAFFIC MANAGEMENT CONSULTANT

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Table of Contents

Table of Contents (cont'd.)

List of Figures

TRAFFIC IMPACT ANALYSIS REPORT UPDATE
FOR THE PROPOSED

DEPARTMENT OF HAWAIIAN HOME LANDS
LALAMILO PROJECT

TAX MAP KEYS (3) 6-6-01:54, 77 & (3) 6-6-04:12-17

I. Introduction

A. Traffic Impact Analysis Update

The traffic impact analysis update reflects the revision to the proposed development plan by the State of Hawaii Department of Hawaiian Home Lands (DHHL). In response to community concerns, DHHL was removed the commercial and industrial uses for the proposed development plan, totaling 16.0 acres. The 16.0-acre parcel will be designated as General Agricultural, and was excluded from this traffic impact analysis update. This traffic impact analysis updates the Traffic Impact Analysis Report for the Proposed Department of Hawaiian Home Lands Lalamilo Project, dated July 25, 2002.

B. Project Description

The State of Hawaii Department of Hawaiian Home Lands proposes to develop 248.8 acres in Waimea, South Kohala, Hawaii into residential use. The property is identified as Tax Map Keys (3) 6-6-01:54, 77 & (3) 6-6-04:12-17. The project site is located on the south side of Kawaihae Road, between Ohina Street and South Kohala Distribution Road. Figure 1 depicts the vicinity map.

The DHHL Lalamilo Project would be comprised of 442 single-family (SF) lots. For the purpose of this traffic impact analysis, it was assumed that only one dwelling unit (DU) would be constructed on each lot. The proposed project would include a community center, recreational park, passive parks, and open space. The proposed project would be developed in phases over a period of 10 years. Construction is planned to begin in 2003 and reach full build-out and occupancy by the Year 2012. The residential development would generally be constructed from east to west.

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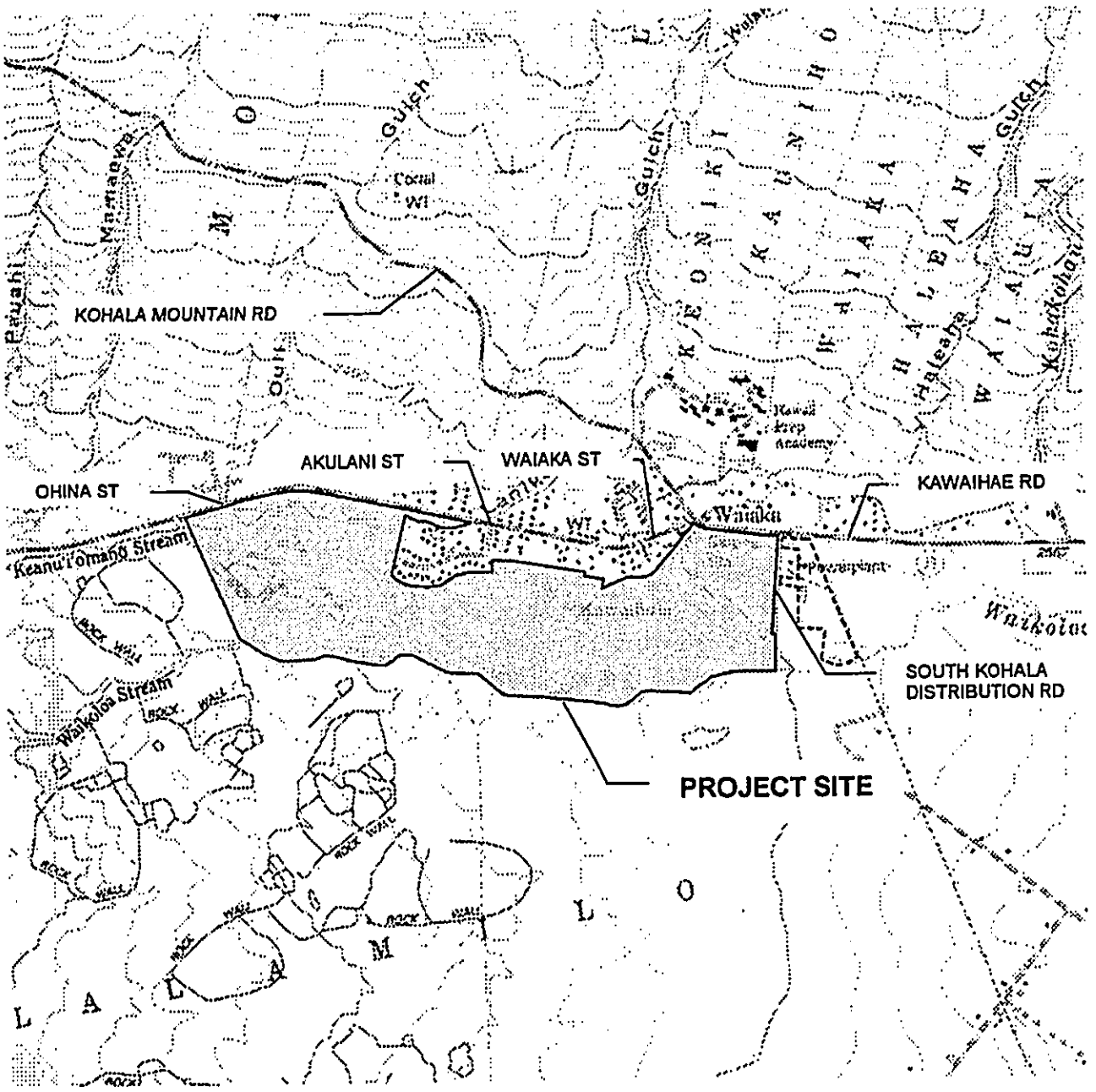

Figure 1. Vicinity Map

B. Purpose and Scope of the Study

The purpose of this study is to analyze the traffic impacts of the proposed Lalamilo project. The scope of this study includes:

1. Evaluation of existing roadways and traffic conditions.
2. Development of trip generation characteristics of the proposed project.
3. Analysis of the Year 2012 traffic conditions without the proposed project.
4. Identification and analysis of traffic impacts resulting from the full build-out of the proposed project.
5. Recommendations of improvements, as necessary, that would mitigate the traffic impacts identified in this study.

C. Access

Access to the residential area would be provided by a new loop access road, which would intersect Kawaihae Road at two stop-controlled Tee-intersections: the "West Access Road" would intersect Kawaihae Road between Ohina Street and Akulani Street; the "East Access Road" would intersect Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road. The west leg of Alaneo Street would be extended to connect to the West Access Road to provide a second access to the existing Ka La Loa Subdivision.

Fifteen (15) house lots are proposed to be developed on a remnant parcel, which is part of the existing Lalamilo House Lots Subdivision, located at the east end of Alaneo Street. Access to the remnant parcel would be provided by the extension of Alaneo Street to the east. The east extension of Alaneo Street would intersect Kawaihae Road between the Akulani Street and Waiaka Street intersections, providing a third access to the existing subdivision. The site plan for the proposed development is depicted on Figure 2.

D. Methodologies

1. Capacity Analysis Methodology

The highway capacity analysis performed for this study is based upon procedures presented in the Highway Capacity Manual (HCM), published by the Transportation Research Board, 2000. HCM defines Level of Service (LOS) as "a quality measure describing operational conditions within a traffic stream". Several factors may be included in determining LOS, such as: speed, travel time, freedom to maneuver, traffic interruptions, driver comfort, and convenience. LOS "A", "B", and "C" are considered satisfactory levels of service. LOS "D" is generally considered a "desirable minimum" operating level of service. LOS "E" is an undesirable condition, and LOS "F" is an unacceptable condition. Intersection LOS is primarily based upon delay.

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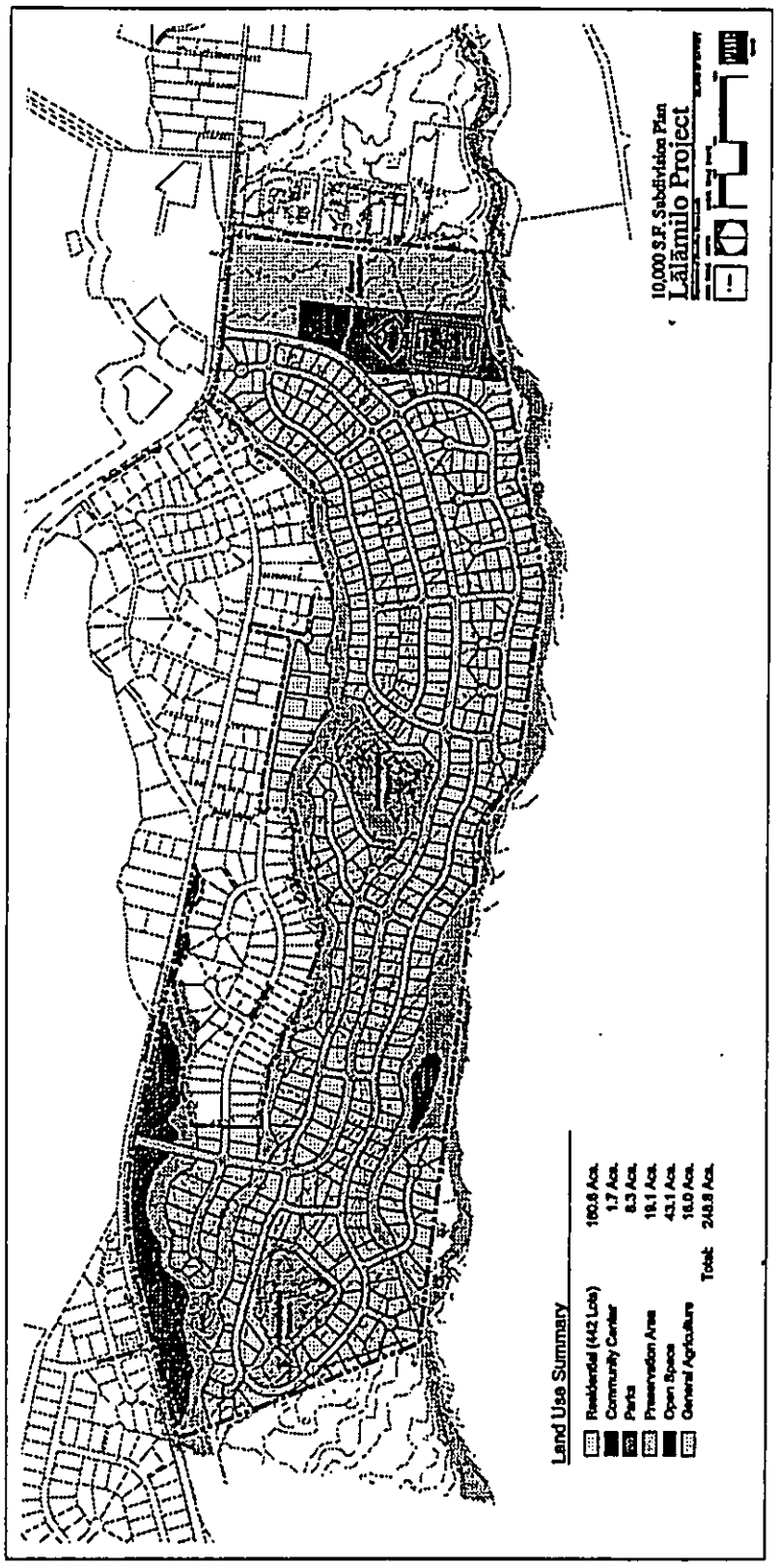

Figure 2. Site Plan

LOS at an unsignalized intersection is defined by HCM in terms of the average delay of a vehicle on the minor street attempting to turn onto or cross the major highway; or a vehicle turning left from the major street into the minor street. HCM defines LOS on a two-lane highway in terms of percent of time-spent-following a slower vehicle, resulting in platoon flow. Table 1 summarizes the LOS criteria.

Table 1. Level of Service Criteria (HCM)

LOS	Unsignalized Intersections	Two-Lane Highways
	Control Delay (sec/veh)	Time-Spent-Following (%)
A	≤ 10	≤ 35
B	> 10 – 15	> 35 – 50
C	> 15 – 25	> 50 – 65
D	> 25 – 35	> 65 – 80
E	> 35 – 50	> 80
F	> 50	v/c ≥ 1.0

"Volume-to-capacity" (v/c) ratio is a measure indicating the relative traffic demand to the roadway's capacity. HCM defines capacity as "the maximum number of vehicles that can pass a given point during a specified period under the prevailing roadway, traffic flow, and traffic control conditions." A v/c ratio of 0.50 indicates that the traffic demand is utilizing 50 percent of the roadway's capacity.

Worksheets for the capacity analysis, performed throughout this report, are compiled under a separate cover.

2. Trip Generation Methodology

The trip generation methodology is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in Trip Generation, 6th Edition. ITE trip rates are developed by correlating the total vehicle trip generation data with various activity/land use characteristics, such as the vehicle trips per hour (vph) per dwelling unit (DU). The trip generation characteristics for the proposed project are based upon ITE regression equations for single-family dwelling unit.

II. Existing Conditions

A. Roadways

Kawaihae Road is a two-way, two-lane arterial highway between Queen Kaahumanu Highway, near Kawaihae Harbor, and Mamalahoa Highway, in Waimea Town, South Kohala, Hawaii. Kawaihae Road is a curvilinear roadway with unrestricted access along most of the roadway. In the vicinity of the proposed project, the posted speed limit on Kawaihae Road is 35 miles per hour (mph), except on the approaches to the Waiaka Stream Bridge. The posted speed limits on the approaches to the bridge are reduced to 25 mph, because of the narrow bridge crossing and the curvilinear roadway alignment.

Kohala Mountain Road is a narrow, mountainous roadway between Hawi and Kawaihae Road. Kohala Mountain Road is stop-controlled at its junction with Kawaihae Road, which is comprised of three closely spaced intersections, separated by a triangular island.

Akulani Street is a local roadway, which provides access to the existing Lalamilo House Lots and Ka La Loa Subdivisions. Akulani Street is stop-controlled at its Tee-intersection with Kawaihae Road. An exclusive left-turn lane is not provided on Kawaihae Road at Akulani Street. Alaneo Street is a subdivision roadway, which runs roughly parallel to Kawaihae Road through the existing Lalamilo House Lots and Ka La Loa Subdivisions.

B. Existing Peak Hour Traffic Volumes and Operating Conditions

1. Field Investigation and Data Collection

Manual traffic count surveys were conducted along Kawaihae Road on October 2-3, 2001, December 10-11, 2001 and May 23-24, 2002, during the peak periods of traffic – from 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM. The following Kawaihae Road intersections were surveyed:

- Akulani Street
- Kohala Mountain Road

Additional traffic count data were obtained from the State Department of Transportation.

2. Existing AM Peak Hour Traffic

The AM peak hour of traffic on Kawaihae Road occurred between 7:15 AM and 8:15 AM. Kawaihae Road carried about 1,080 vehicles per hour (vph), east of Kohala Mountain Road, total for both directions. The AM peak direction of traffic was westbound – 52 percent westbound and 48 percent eastbound. East of Kohala Mountain Road, Kawaihae Road operated at LOS "E" and a v/c ratio of 0.46, during the existing AM peak hour of traffic.

The left-turn movement from Kohala Mountain Road to eastbound Kawaihae Road operated at LOS "E". The other intersections in the study area operated at satisfactory Levels of Service, i.e., LOS "C" or better, during the existing AM peak hour. Figure 3 depicts the existing AM peak hour traffic volumes, and the results of the capacity analysis.

3. Existing PM Peak Hour Traffic

The PM peak hour of traffic generally occurred between 4:00 PM and 5:00 PM. Kawaihae Road carried about 1,020 vph, during the PM peak hour of traffic. The PM peak hour directions of traffic were 60 percent eastbound and 40 percent westbound. During the existing PM peak hour of traffic, Kawaihae Road east of Kohala Mountain Road operated at LOS "E" and a v/c ratio of 0.35.

The intersections in the study area operated at satisfactory Levels of Service, during the existing PM peak hour. The existing PM peak hour traffic volumes, and the results of the capacity analysis are depicted on Figure 4.

III. Future Traffic Conditions

A. Future Roadway Improvements

1. Waiaka Stream Bridge Widening/Relocation and Kawaihae Road Realignment

DOT is planning to widen/realign Waiaka Stream Bridge and Kawaihae Road. According to DOT, construction is expected to begin in the Year 2005. The bridge project also would include realigning Kawaihae Road. DOT's bridge widening project also includes upgrading the intersection of Kawaihae Road and Kohala Mountain Road. At this writing, the specific bridge alignment and roadway improvements have not been determined. Therefore, the proposed traffic improvements at the intersection of Kawaihae Road and Kohala Mountain Road were based upon the existing intersection geometrics.

2. Kawaihae Bypass Highway

The Kawaihae Bypass Highway also is being planned by DOT. The two-lane highway would extend from Mamalahoa Highway, near the Waimea Airport, along a westerly alignment, to Queen Kaahumanu Highway. The proposed highway would bypass the study area to the south of the project site. The construction of the future Kawaihae Bypass Highway is considered to be beyond the time frame of the proposed project, and was not taken into consideration in this traffic impact analysis.

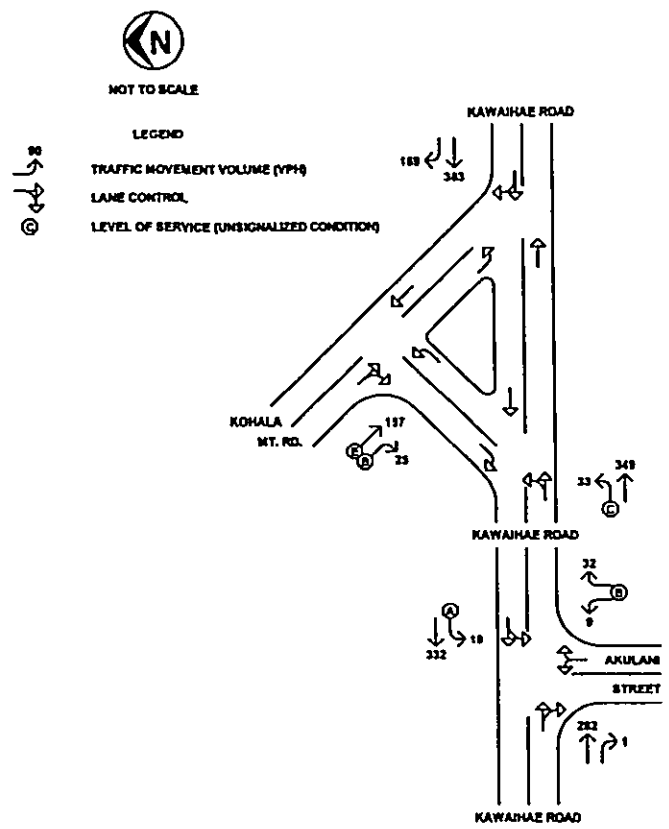

Figure 3. Existing AM Peak Hour Traffic

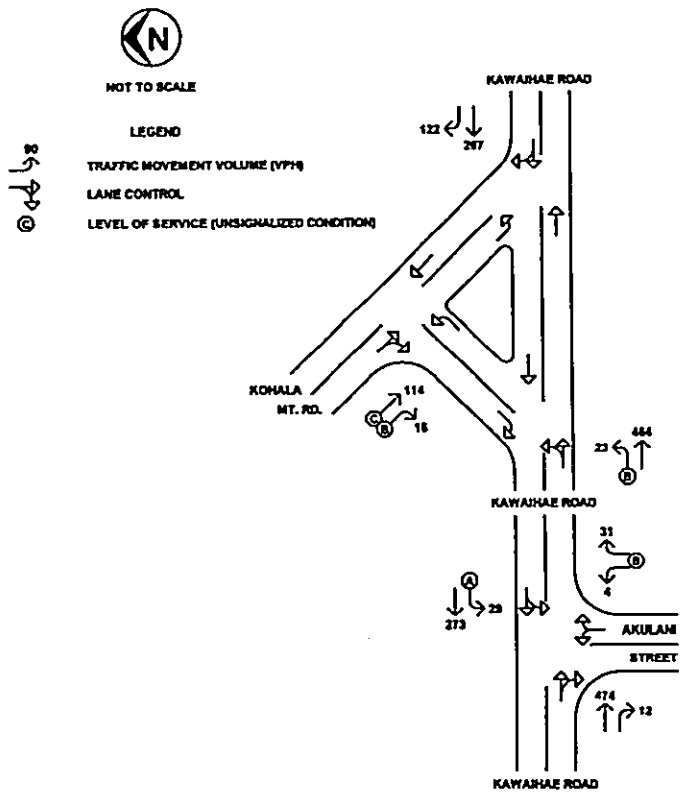

Figure 4. Existing PM Peak Hour Traffic

B. External Traffic

1. South Kohala Regional Traffic Forecasts

The travel forecasts for this traffic impact analysis were based upon the Draft South Kohala Regional Traffic Forecasts, prepared for the State of Hawaii Department of Transportation (DOT), by Julian Ng, Inc., dated April 19, 2002. The purpose of the Ng study was to develop traffic forecasts for three ongoing DOT highway projects in the South Kohala region: the Kawaihae Bypass Highway, the Waimea Bypass Highway, and the Saddle Road Extension.

In general, the Ng study projected an annual growth in traffic of 3.83 percent in the vicinity of the project. On Kawaihae Road, the Ng study projected an annual growth of 3.83 percent per year to the Year 2025 on Kawaihae Road. The future traffic without the proposed project was developed for the Year 2012 using the Ng annual growth rates in traffic.

2. Hawaii Preparatory Academy

Hawaii Preparatory Academy (HPA) is planning to relocate its lower and middle school campuses to the north side of Kawaihae Road, opposite South Kohala Distribution Road. At this writing, HPA does not have detailed plans for its proposal, therefore, the relocation of the HPA schools were not included in this traffic impact analysis.

C. Year 2012 Peak Hour Traffic Analysis Without Project

1. Year 2012 AM Peak Hour Traffic Analysis Without Project

Kawaihae Road, east of Kohala Mountain Road is expected to carry 1,420 vph, during the Year 2012 AM peak hour of traffic without the proposed project. Kawaihae Road is expected to operate at LOS "E" and a v/c ratio of 0.53.

Kohala Mountain Road is expected to operate at LOS "F" at Kawaihae Road under unsignalized conditions, during the AM peak hour of traffic without the proposed project. The traffic demands at the intersection of Kawaihae Road and Kohala Mountain Road are expected to meet the warrant for the installation of traffic signals, according to the Manual on Uniform Traffic Control Devices Millennium Edition (MUTCD), published by the U.S. Department of Transportation, Federal Highways Administration. The Year 2012 AM peak hour traffic demand on Kohala Mountain Road, without the proposed project, is expected to exceed the lower threshold volume for the minor street approach, as defined under the MUTCD Warrant 3 Peak Hour. Figure 5 depicts the Year 2012 AM peak hour traffic without the proposed project, and the results of the capacity analysis.

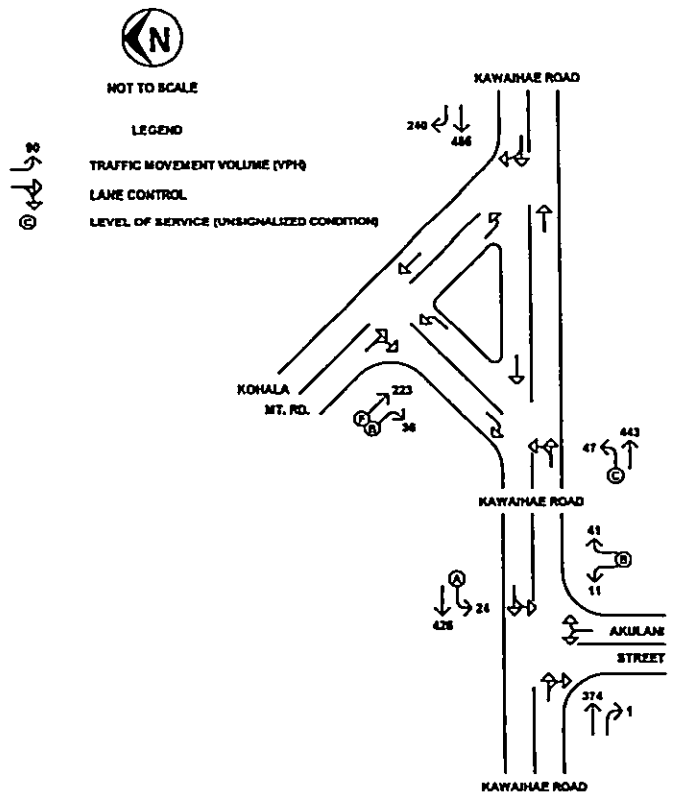

Figure 5. 2012 AM Peak Hour Traffic Without Project

2. Year 2012 PM Peak Hour Traffic Analysis Without Project

During the Year 2012 PM peak hour of traffic without the proposed project, Kawaihae Road, east of Kohala Mountain Road is expected to carry 1,330 vph. Kawaihae Road is expected to operate at LOS "E" and a v/c ratio of 0.46.

The left-turn movement from Kohala Mountain Road to eastbound Kawaihae Road is expected to operate at LOS "D". The Year 2012 AM peak hour traffic demand on Kohala Mountain Road, without the proposed project, is expected to meet the lower threshold volumes for the minor street approach for the installation of traffic signals on Kawaihae Road, as defined under the MUTCD Warrant 3 Peak Hour. The Year 2012 PM peak hour traffic without the proposed project, and the results of the capacity analysis are depicted on Figure 6.

D. Trip Generation

During the AM peak hour of traffic, the proposed project is expected to generate a total of 340 vph – 85 vph entering the site and 255 vph exiting the site. The proposed project is expected to generate a total of 450 vph – 288 vph entering the site and 162 vph exiting the site, during the PM peak hour of traffic. The trip generation characteristics for the proposed project are summarized in Table 2.

Table 2. Trip Generation Characteristics

Land Use (ITE Code)	Units	AM Peak Hour (vph)			PM Peak Hour (vph)		
		Enter	Exit	Total	Enter	Exit	Total
Single-Family Detached Housing (210)	442 DU	85	255	340	288	162	450

Figures 7 and 8 depict the AM and PM peak hour site-generated traffic assignments for the proposed project, respectively.

IV. Traffic Impact Analysis

A. Traffic Improvements

1. Traffic Improvements Without Project

The proposed widening of Waiaka Stream Bridge may include a complete redesign of the intersection of Kawaihae Road and Kawaihae Road. DOT has not finalized its improvements plans, at this writing. Therefore, the intersection improvements, recommended herein, were based upon the existing intersection configuration.

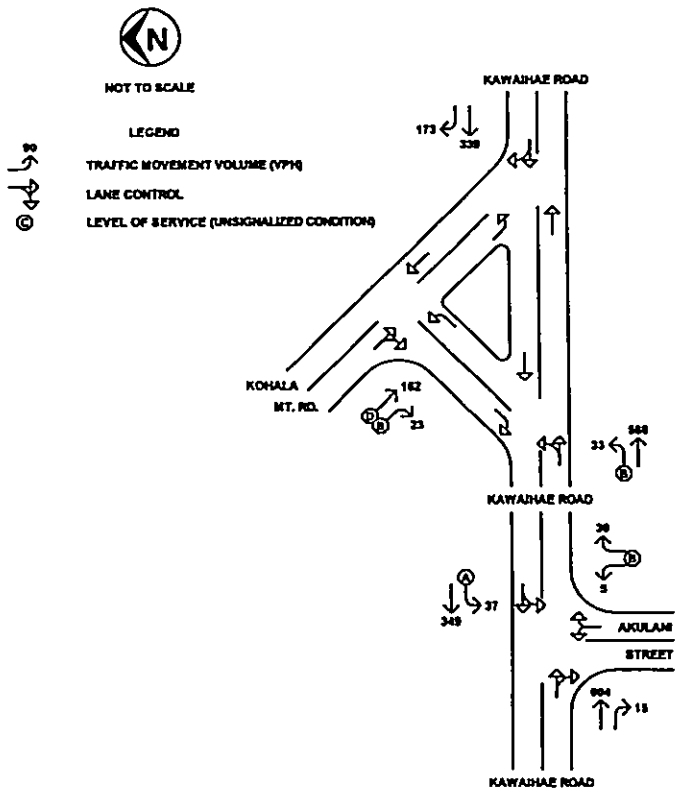

Figure 6. 2012 PM Peak Hour Traffic Without Project

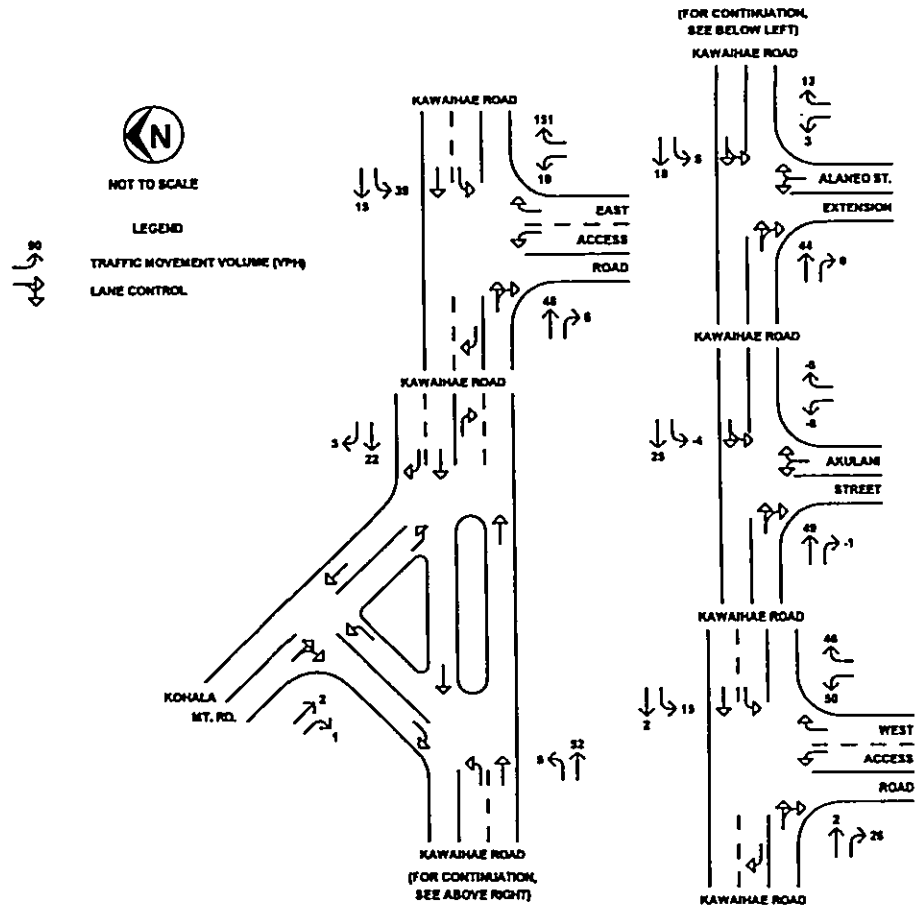

Figure 7. AM Peak Hour Site-Generated Traffic Assignment

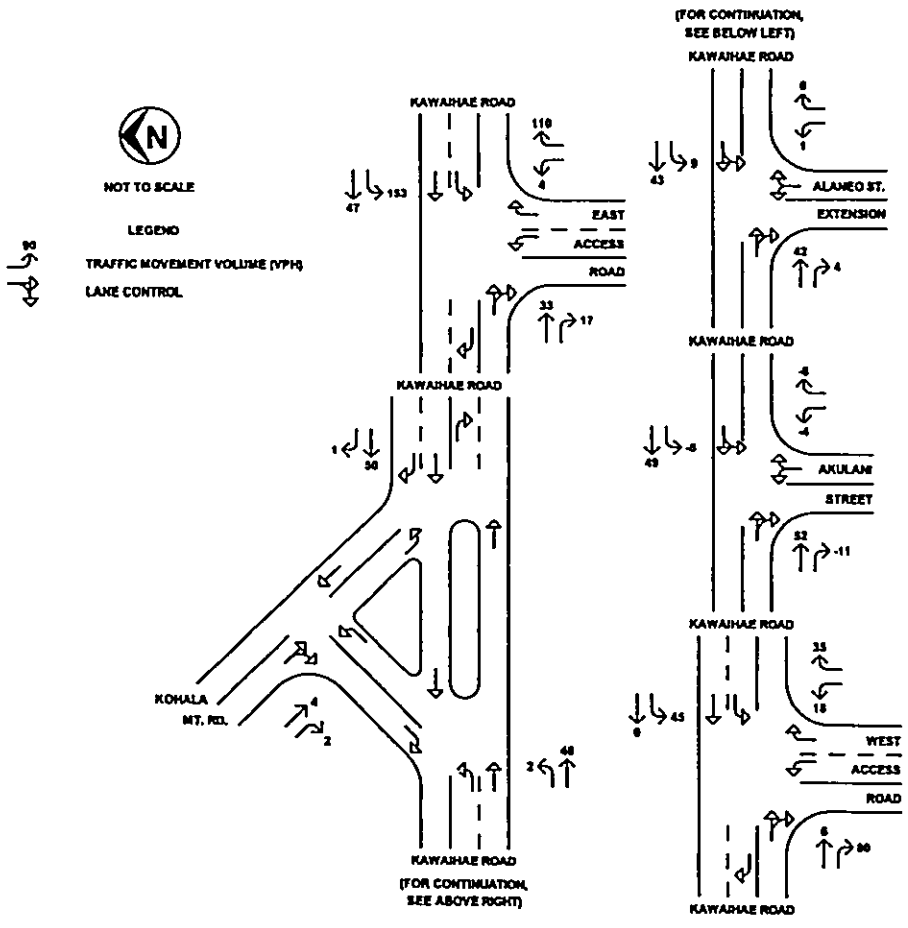

Figure 8. PM Peak Hour Site-Generated Traffic Assignment

For the purpose of this traffic impact analysis, the following improvements were assumed to be implemented to mitigate roadway deficiencies identified in this study without the proposed project:

a. Waiaka Stream Bridge and Kawaihae Road should be widened/realigned to accommodate the following improvements (ongoing DOT project).

b. An exclusive left-turn lane and a median shelter lane should be constructed on eastbound Kawaihae Road at Kohala Mountain Road.

c. A channelized right-turn lane should be constructed on westbound Kawaihae Road at Kohala Mountain Road.

2. Project Access Improvements

The following roadway improvements are recommended to provide and/or improve access to the proposed project.

a. Alaneo Street should be extended to the east to provide access to the proposed house lots on the remnant parcel in the existing Lalamilo House Lots Subdivision.

b. The east extension of Alaneo Street should intersect Kawaihae Road at a stop-controlled Tee-intersection.

c. A new east-west loop Access Road system should be constructed along the length of the residential project site.

d. The West Access Road should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Ohina Street and Akulani Street. An exclusive left-turn lane and a median shelter lane should be constructed on westbound Kawaihae Road at the West Access Road.

e. The west end of Alaneo Street should be extended to intersect the West Access Road at a stop-controlled, four-legged intersection.

f. The East Access Road should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road. An exclusive left-turn lane and a median shelter lane should be constructed on westbound Kawaihae Road at the East Access Road. The East Access Road intersection improvements should be coordinated with DOT's Waiaka Stream Bridge widening project.

3. Year 2012 AM Peak Hour Traffic Impact Analysis With Project

Kawaihae Road, east of Kohala Mountain Road, is expected to continue to operate at LOS "E", during the Year 2012 AM peak hour of traffic. The v/c ratio is expected to increase to 0.63.

The left-turn movement from Kohala Mountain Road to eastbound Kawaihae Road is expected to improve from LOS "F" to LOS "C", with the construction of the recommended median shelter lane and the channelized right turn lane on Kawaihae Road. The left turn movement from eastbound Kawaihae Road to northbound Kohala Mountain Road is expected to operate at LOS "C", during the AM peak hour with the proposed project. The other intersections within the study area are expected to operate at satisfactory Levels of Service, during the Year 2012 AM peak hour of traffic with the proposed project. Figure 9 depicts the Year 2012 AM peak hour traffic with the proposed project, and the results of the capacity analysis.

4. Year 2012 PM Peak Hour Traffic Impact Analysis With Project

During the Year 2012 PM peak hour of traffic with the proposed project, Kawaihae Road east of Kohala Mountain Road is expected to continue to operate at LOS "E". The v/c ratio is expected to increase to 0.58. The intersections within the study area are expected to operate at satisfactory Levels of Service. The Year 2012 PM peak hour traffic with the proposed project, and the results of the capacity analysis are depicted on Figure 10.

V. Recommendations and Conclusions

A. Recommendations

1. Year 2012 Traffic Improvements Without Project

a. Waiaka Stream Bridge and Kawaihae Road should be widened/realigned to mitigate existing road alignment and sight distance problems, and to accommodate the proposed improvements at the intersection of Kawaihae Road and Kohala Mountain Road.

b. An exclusive left-turn lane should be constructed on eastbound Kawaihae Road at Kohala Mountain Road to facilitate the left-turn movement from Kawaihae Road.

c. A median shelter lane should be constructed on eastbound Kawaihae Road at Kohala Mountain Road.

d. A channelized right turn lane should be constructed on westbound Kawaihae Road at Kohala Mountain Road.

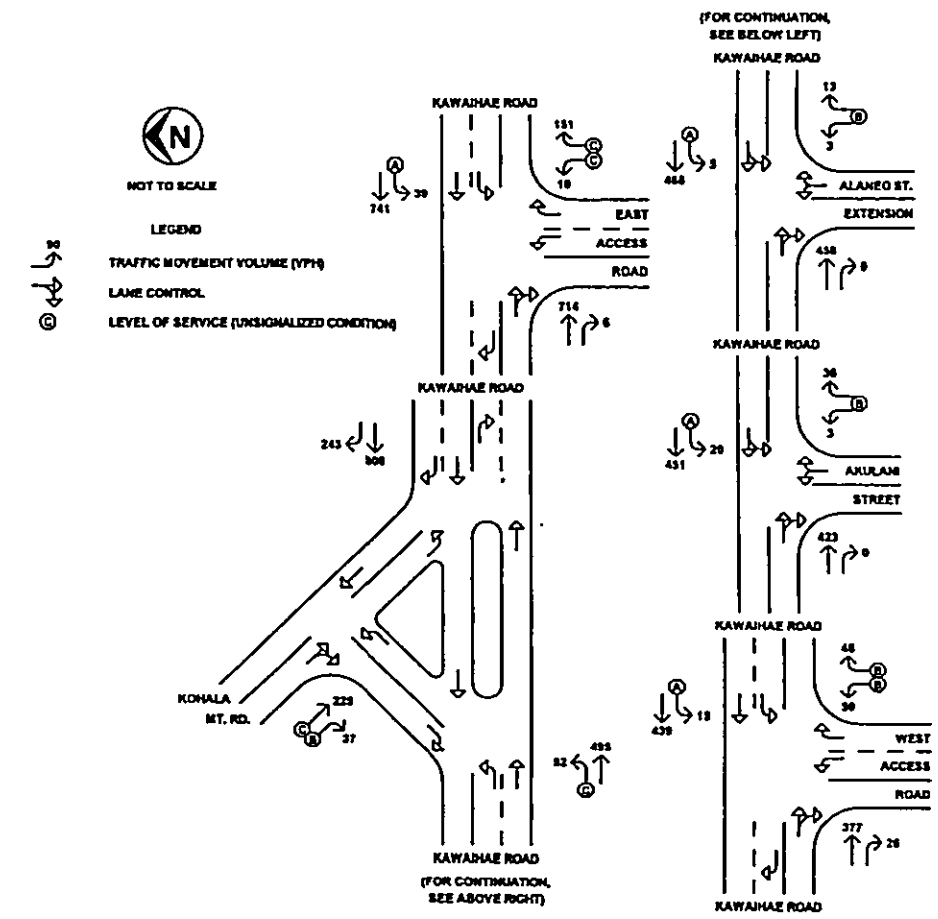

Figure 9. 2012 AM Peak Hour Traffic With Project

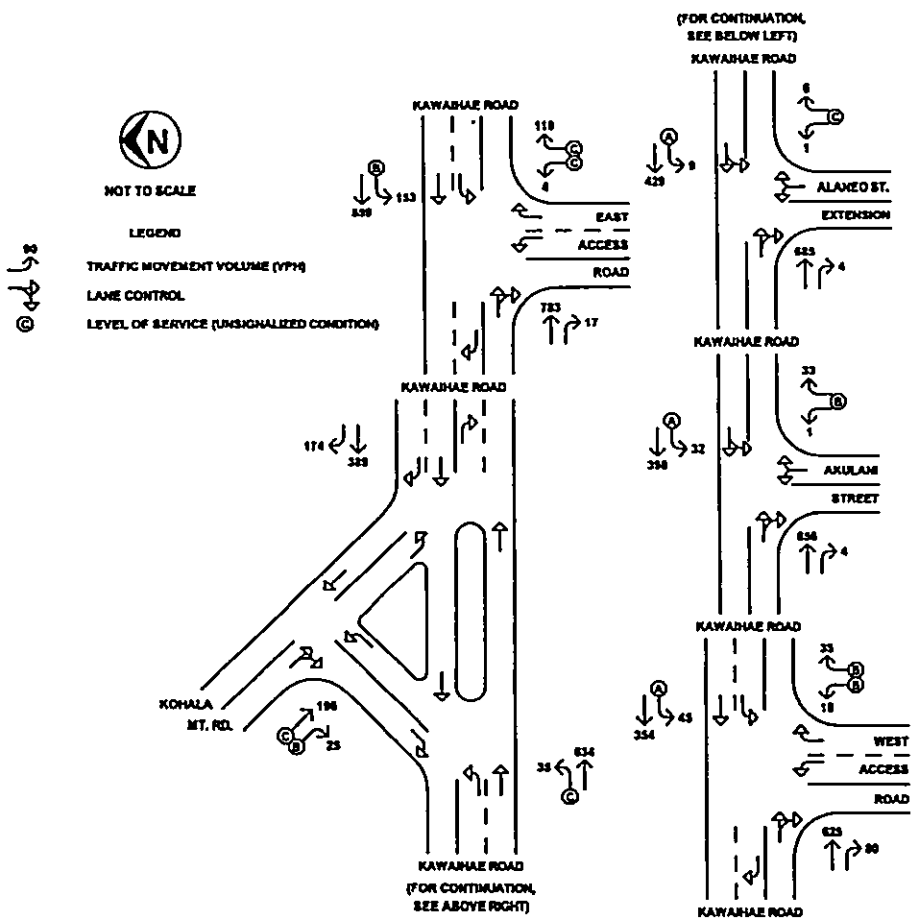

Figure 10. 2012 PM Peak Hour Traffic With Project

2. Proposed Project Access Improvements

The following improvements should be implemented in conjunction with their respective phase(s) of development:

a. Alaneo Street

- Alaneo Street should be extended to the east to provide access to the proposed house lots on the remnant parcel in the existing Lalamilo House Lots Subdivision.
- Alaneo Street East Extension should intersect Kawaihae Road at a stop-controlled Tee-intersection to provide access to the proposed house lots and a second access point for the existing Lalamilo House Lots and Ka La Loa Subdivisions.
- The west end of Alaneo Street should be extended to the West Access Road to provide a third access point for the existing Ka La Loa and Lalamilo House Lots Subdivisions.

b. East-West Access Road

An east-west loop access road should be constructed, with the West Access Road intersecting Kawaihae Road between the Ohina Street and Akulani Street intersections, and the East Access Road intersecting Kawaihae Road between the Kohala Mountain Road and South Kohala Distribution Road intersections.

c. Kawaihae Road and the West Access Road

- The West Access Road should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road.
- An exclusive left-turn lane should be constructed on westbound Kawaihae Road at the West Access Road to minimize the delay to westbound traffic on Kawaihae Road by separating the left-turn traffic from the through traffic.
- A median shelter lane should be constructed on westbound Kawaihae Road at the West Access Road to facilitate vehicles turning left from the side street by separating the left-turn movement into two stages: crossing the eastbound lane to the median shelter lane; then merging into westbound traffic.

d. Kawaihae Road and the East Access Road

The following intersection improvements should be coordinated with DOT's Waiaka Stream Bridge widening project. If DOT's Waiaka Stream Bridge widening project is delayed, a temporary connector road should be constructed between South Kohala Distribution Road and the east-west collector road.

Interim access would then be provided to Kawaihae Road, via South Kohala Distribution Road.

The following East Access Road and Kawaihae Road intersection improvements should be deferred until they can be coordinated with the Waiaka Stream Bridge widening project.

- The East Access Road should provide separate left-turn and right-turn lanes at the proposed stop-controlled Tee-intersection with Kawaihae Road between Kohala Mountain Road and South Kohala Distribution Road.
- An exclusive left-turn lane should be constructed on westbound Kawaihae Road at the East Access Road to separate the left-turn traffic from the through traffic and minimize the delay to the westbound traffic on Kawaihae Road.
- A median shelter lane should be constructed on westbound Kawaihae Road at the East Access Road to facilitate vehicles turning left from the side street.

B. Conclusions

The traffic in the vicinity of the proposed project is generally expected to increase by 3.83 percent per year to the Year 2012 without the proposed project. The peak hour v/c ratios are expected to increase as a result of the development of the proposed project. However, the Levels of Service during the peak hours of traffic on Kawaihae Road are not expected to be affected by traffic generated by the proposed Lalamilo project.

The proposed Kawaihae Bypass Road is a regional highway improvement, which is expected to divert through traffic, between Waimea and Kawaihae, around the vicinity of the proposed project. The Kawaihae Bypass Road is expected to provide the long-term solution to traffic congestion on Kawaihae Road. The construction of the Kawaihae Bypass Road by DOT was assumed to occur beyond the time frame of the development of the proposed Lalamilo project. Therefore, this traffic impact analysis did not take the proposed Kawaihae Bypass Road into account.

At this writing, the proposed Kawaihae Bypass Road is still in the planning stages, and its detailed design improvements have not been determined. DOT estimates that the bridge improvements would be implemented by the Year 2005, which coincides with the construction of the East Access Road.

The intersection of Kawaihae Road and Akulani Street is not expected to be impacted significantly by traffic generated by the proposed project. The proposed extensions of Alaneo Street in the east and west directions is actually expected to improve access to the existing Lalamilo House Lots and Ka La Loa Subdivisions by providing two additional access points. The traffic improvements, recommended in this study, are expected to mitigate the traffic impacts resulting from the development of the proposed Lalamilo Project by the State Department of Hawaiian Home Lands.

Appendix H

Air Quality Study

AIR QUALITY STUDY
FOR THE PROPOSED
DEPARTMENT OF HAWAIIAN HOME LANDS
LALAMILO PROJECT

SOUTH KOHALA, HAWAII

Prepared for:

PBR Hawaii, Inc.

July 2002

B.D. NEAL & ASSOCIATES

*Applied Meteorology * Air Quality * Computer Science*

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CONTENTS

FIGURES

TABLES

1.0 SUMMARY

The Department of Hawaiian Homelands (DHHL) is proposing to develop a 249-acre site located in the Waimea area on the island of Hawaii. The project site is situated along Kawaihae Road near the intersection with Kohala Mountain Road (Highway 19). The proposed development will consist of either 157 or 382 residential house lots (depending on the alternative selected); approximately 16 acres of lots for mixed-use retail, commercial and light industrial activities; and related areas and facilities for pubic use. Development is expected to occur in phases through the year 2012. This study examines the potential short- and long-term air quality impacts that could occur as a result of construction and use of the proposed facilities and suggests mitigative measures to reduce any potential air quality impacts where possible and appropriate. Potential impacts on the project from nearby air pollution sources were also examined.

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii air quality standards are more stringent than the comparable national standards except for those pertaining to sulfur dioxide and particulate matter, which are equivalent.

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is very much affected by the elevation of the site and by nearby mountains. There are no published wind data for the area, but the situation of the site in the gap between Mauna Kea and the Kohala Mountains makes it a fairly windy location. During tradewind conditions, winds are

often gusty during the daytime and the wind direction is predominantly from the east. During the nighttime, drainage winds from the east or southeast are likely due to the nearby high terrain. Temperatures in the project area are generally very consistent and cool with average daily temperatures ranging from about 55°F to 75°F. The extreme minimum temperature recorded at Waimea is 34°F, while the extreme maximum temperature is 90°F. Rainfall in the project area is highly variable but probably averages about 40 to 50 inches per year.

Except for periodic impacts from volcanic emissions (vog) and possibly occasional localized impacts from traffic congestion and local industrial sources, the present air quality of the project area is believed to be relatively good. There are no air quality monitoring data from the Department of Health for the Waimea area, but the limited air quality data that are available for other locations on Hawaii Island suggest that (despite the vog) concentrations are generally well within state and national air quality standards.

If the proposed project is given the necessary approvals to proceed, it is inevitable that some short- and long-term impacts on air quality will occur either directly or indirectly as a consequence of project construction and use. Short-term impacts from fugitive dust will likely occur during the project construction phase. To a lesser extent, exhaust emissions from stationary and mobile construction equipment, from the disruption of traffic, and from workers' vehicles may also affect air quality during the period of construction. State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, an effective dust control plan must be implemented to ensure compliance with state regulations. Fugitive dust emissions can be controlled to a large extent by watering of

active work areas, using wind screens, keeping adjacent paved roads clean, and by covering of open-bodied trucks. Other dust control measures could include limiting the area that can be disturbed at any given time and/or mulching or chemically stabilizing inactive areas that have been worked. Paving and landscaping of project areas early in the construction schedule will also reduce dust emissions. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program. Exhaust emissions can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours.

After construction, motor vehicles coming to and from the proposed development will result in a long-term increase in air pollution emissions in the project area. The impact of these emissions was not quantitatively evaluated, but given the size of the project, it is probable that any related impacts will be small.

At this time, the specific tenants of the proposed mixed-use commercial/industrial portion of the project have not been identified, but the types of facilities that will be permitted to locate there are not significant sources of air pollution. In any case, before any air pollution sources can be built anywhere in the state, an application must be submitted to the Department of Health for a permit to construct the facility, and detailed information concerning any air pollution emissions will need to be provided in the application. The Department of Health may at that time require the applicant to perform an air quality impact assessment and possibly air quality monitoring.

Depending on the demand levels, long-term impacts on air quality are also possible due to indirect emissions associated with a development's electrical power and solid waste disposal requirements. Quantitative estimates of these potential impacts were not made, but based on the estimated demand levels and emission rates involved, any significant impacts are unlikely. Nevertheless, incorporating energy conservation design features and promoting conservation and recycling programs within the proposed development could serve to further reduce any associated impacts and conserve the island's resources.

In addition to investigating the potential impacts of the project, potential impacts on the project from nearby industrial sources were examined. In this case, the major concerns are the Hawaii Electric Light Company Waimea Generating Station, the Waimea Solid Waste Transfer Station, and an old landfill. The Waimea Generating Station, which is located immediately to the east of the project, includes three diesel-fueled electric generating units. These units are in the prevailing upwind direction from the project, and the stacks that are used to exhaust the emissions are very short. Worst-case dispersion calculations indicate that exceedances of the air quality standards are likely to occur at times over the project area. Increasing the stack heights to meet good engineering practice would substantially alleviate this potential problem.

The Waimea Solid Waste Transfer Station is situated immediately to the east of the project area, making it upwind of the project site much of time and a potential source of odor nuisance. Waste is deposited at the transfer station into an enclosed container, and the container is removed from the site on a regular and frequent basis. Thus, it is not expected that any odors from the transfer station will significantly impact the proposed project.

An old landfill is also located immediately to the east of the project area. Although the landfill has been closed and covered with soil and grass for several years, underground fires from spontaneous combustion continue to occur. Fumes from the fires then tend to leak into the air from cracks and sinkholes that develop on the surface of the landfill. The fumes likely contain a variety of odorous and toxic substances. Given the landfill's location relative to the project site and the wind flow in the area, fumes from the landfill will likely impact the project area at times, particularly during the nighttime and early morning hours when dispersion conditions are worst and the wind flow is downslope. To mitigate the problem, it will likely be necessary for the County to perform regular and frequent maintenance of the landfill to keep cracks and sinkholes filled with soil. If this problem becomes too much of an issue, it may become necessary to undertake additional remedial action at the landfill, which would likely include the installation of a gas collection system to remove and burn landfill gas.

2.0 INTRODUCTION

The State of Hawaii Department of Hawaiian Home Lands (DHHL) is proposing to develop the Lalamilo Residential Lots and Commercial/Industrial Mixed Uses Project on approximately 249 acres of land in the South Kohala District on the island of Hawaii (see Figure 1 for project location map). Two alternatives are currently being considered. Alternative A includes 382 residential units on 10,000 square-foot lots, 16.5 acres of commercial and industrial uses, a community center, parks preservation areas and open space. Alternative B includes similar uses to Alternative A except that the residential uses include only 157 residential units on 1-acre lots. Project

development is expected to occur in three phases. Phase I in both alternatives is planned for completion in the year 2005 and will include 34 residential house lots. Phase II will be completed by the year 2010 for Alternative A or 2008 for Alternative B and will include the remaining residential house lots. Phase III is scheduled for completion by the year 2012 and will include the commercial/industrial components of the project.

The purpose of this study is to describe existing air quality in the project area and to assess the potential short-term and long-term direct and indirect air quality impacts that could result from construction and use of the proposed facilities. Potential impacts on the project from existing nearby industrial sources were also evaluated. Measures to mitigate impacts both by the project and on the project are suggested where possible and appropriate. As background information, the state and national ambient air quality standards are discussed and the regional and local climatology is described.

3.0 AMBIENT AIR QUALITY STANDARDS

Ambient concentrations of air pollution are regulated by both national and state ambient air quality standards (AAQS). National AAQS are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Table 1 summarizes both the national and the state AAQS that are specified in the cited documents. As indicated in the table, national and state AAQS have been established for particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. The state has also set a standard for hydrogen sulfide. National AAQS are stated in terms of both primary and secondary standards for most of the regulated air pollutants. National

primary standards are designed to protect the public health with an "adequate margin of safety". National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant". Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential injury to the natural or man-made environment, e.g., soiling of materials, damage to vegetation or other economic damage. In contrast to the national AAQS, Hawaii State AAQS are given in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality".

Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given air pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow a specified number of exceedances each year.

The Hawaii AAQS are in some cases considerably more stringent than the comparable national AAQS. In particular, the Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit, and the state 1-hour limit for ozone is more than two times as stringent as the national 1-hour standard. The national 1-hour ozone standard will be phased out (pending court appeal) the next few years in favor of the new (and more stringent) 8-hour standard.

The Hawaii AAQS for sulfur dioxide were relaxed in 1986 to make the state standards essentially the same as the national limits. In 1993, the state also revised its particulate standards to follow those set by the federal government. During 1997, the federal government again revised its standards for particulate, but the new standards have been challenged in federal court. To date, the Hawaii Department of Health has not updated the state particulate standards.

4.0 REGIONAL AND LOCAL CLIMATOLOGY

Regional and local climatology significantly affect the air quality of a given location. Wind, temperature, atmospheric turbulence, mixing height and rainfall all influence air quality. Although the climate of Hawaii is relatively moderate throughout most of the state and most of the year, significant differences in these parameters may occur from one location to another. Most differences in regional and local climates within the state are caused by the mountainous topography.

South Kohala, the site of the proposed project, is located on the northwestern side of the island of Hawaii. The topography of this island is dominated by the great volcanic masses of Mauna Loa (13,653 feet), Mauna Kea (13,796 feet), and of Hualalai, the Kohala Mountains and Kilauea. The island consists entirely of the slopes of these mountains and of the broad saddles between them. Mauna Loa and Kilauea, located on the southern half of the island, are still active volcanoes. The site of the proposed project occupies a portion of the lower slopes of Mauna Kea and the Kohala Mountains, at an elevation of about 2400 feet.

Hawaii lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high-pressure cell to the north and east. Much of the western coast of the island of Hawaii, however, is sheltered from the trade winds by high mountains, except when unusually strong trade winds sweep through the saddle between the Kohala Mountains and Mauna Kea and reach the areas to the lee. Although there are no published wind data for the specific project area, the approximate wind conditions can be reasonably ascertained. Because the project site is situated in the gap between Mauna Kea and the Kohala Mountains, it frequently experiences rather good ventilation due to the predominant trade winds, especially when the trade winds are more easterly. When the trade winds become more northerly, the Kohala Mountains tend to shelter the area from the wind. When the trade winds are weak or absent, local winds such as land/sea breezes and/or upslope/ downslope winds tend to dominate the wind pattern. At night and during the early morning hours, winds are often drainage winds which move downslope and out to sea.

Air pollution emissions from motor vehicles, the formation of photochemical smog and smoke plume rise all depend in part on air temperature. Colder temperatures tend to result in higher emissions of contaminants from automobiles but lower concentrations of photochemical smog and ground-level concentrations of air pollution from elevated plumes. In Hawaii, the annual and daily variation of temperature depends to a large degree on elevation above sea level, distance inland and exposure to the trade winds. Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the trade wind tend to have the least temperature variation, while inland and leeward areas often have the most. The project site's leeward location and mid-level elevation results in a relatively moderate temperature profile compared to

windward locations near sea level. At Kamuela, located a few miles to the east of the project and at an elevation of about 2700 feet, average daily minimum and maximum temperatures are 55°F and 73°F, respectively [1]. The extreme minimum temperature on record at this location is 34°F, and the extreme maximum is 90°F. Temperatures at the project site are probably similar but perhaps slightly warmer on the average than those at Kamuela due to the slightly lower elevation.

Small scale, random motions in the atmosphere (turbulence) cause air pollutants to be dispersed as a function of distance or time from the point of emission. Turbulence is caused by both mechanical and thermal forces in the atmosphere. It is oftentimes measured and described in terms of Pasquill-Gifford stability class. Stability class 1 is the most turbulent and class 6 the least. Thus, air pollution dissipates the best during stability class 1 conditions and the worst when stability class 6 prevails. In the South Kohala area, stability class 5 or 6 is generally the highest stability class that occurs, developing during clear, calm nighttime or early morning hours when temperature inversions form either due to radiational cooling or to downslope winds that push warmer air aloft. Stability classes 1 through 4 occur during the daytime, depending mainly on the amount of cloud cover and incoming solar radiation and the onset and extent of the sea breeze.

Mixing height is defined as the height above the surface through which relatively vigorous vertical mixing occurs. Low mixing heights can result in high ground-level air pollution concentrations because contaminants emitted from or near the surface can become trapped within the mixing layer. In Hawaii, minimum mixing heights tend to be high because of mechanical mixing caused by the trade winds and because of the temperature moderating effect of

the surrounding ocean. Low mixing heights may sometimes occur, however, at inland locations and even at times along coastal areas early in the morning following a clear, cool, windless night. Coastal areas may also experience low mixing levels during sea breeze conditions when cooler ocean air rushes in over warmer land. Although there is no mixing height data for the South Kohala area, mixing heights elsewhere in the state typically are above 3000 feet (1000 meters).

Rainfall can have a beneficial effect on the air quality of an area in that it helps to suppress fugitive dust emissions, and it may also "washout" gaseous contaminants that are water soluble. Rainfall in Hawaii is highly variable depending on elevation and on location with respect to the trade wind. The lower elevations of South Kohala are some of the driest areas in the state. The project site is in an area where the rainfall varies significantly over just a short distance, transitioning from relatively wet to the east to very dry to the west. The probable annual rainfall at the project site is about 40 to 50 inches.

5.0 PRESENT AIR QUALITY

Present air quality in the project area is mostly affected by air pollutants from vehicular, industrial, natural and/or agricultural sources. Table 2 presents an air pollutant emission summary for the island of Hawaii for calendar year 1993. The emission rates shown in the table pertain to manmade emissions only, i.e., emissions from natural sources are not included. As suggested in the table, much of the manmade particulate emissions on Hawaii originate from area sources, such as the mineral products industry and agriculture. Manmade sulfur oxides are emitted almost exclusively by point sources, such as power plants and other fuel-burning industries. Nitrogen oxides emissions emanate

predominantly from area sources (mostly motor vehicle traffic), although industrial point sources contribute a significant share. The majority of carbon monoxide emissions occur from area sources (motor vehicle traffic), while hydrocarbons are emitted mainly from point sources.

Hawaii Island is unique from the other islands in the state in terms of the natural volcanic air pollution emissions that occur. Volcanic emissions periodically plague the project area. This is especially so since the latest eruption phase of the Kilauea Volcano began in 1983. Air pollution emissions from the Hawaiian volcanoes consist primarily of sulfur dioxide. After entering the atmosphere, these sulfur dioxide emissions are carried away by the wind and either washed out as acid rain or gradually transformed into particulate sulfates or acid aerosols. Although emissions from Kilauea are vented on the other side of a mountain barrier more than 60 miles southeast of the project site, the prevailing wind patterns eventually carry some of the emissions into the Kona and Kohala areas. These emissions can be seen in the form of the volcanic haze (vog) which persistently hangs over the area.

Industrial sources of air pollution in the project vicinity include generating units at Hawaii Electric Light Company's Waimea Generating Station, which is located immediately to the east, and the Waimea Solid Waste Transfer Station, also located adjacent to the project on the east. Air pollution emissions from the Hawaii Electric Light Company (HELCO) generating units consist mostly of sulfur dioxide and oxides of nitrogen, while emissions from the transfer station consist mainly of potential odor nuisance. Also located adjacent to the project site on the east is an old landfill that continues to emit odorous emissions. Potential impacts on the project from these sources are discussed in more detail in subsequent sections of this report.

Kawaihae Road (Highway 19), which borders the project site on the north, is a regional arterial roadway. Motor vehicle emissions consist primarily of carbon monoxide and nitrogen oxides. The prevailing winds should tend to carry emissions from motor vehicles traversing this roadway away from the project area most of the time.

Agricultural activity consists primarily of pasturing of cattle and horses. Any air pollution from this source is limited mainly to fugitive dust.

The State Department of Health operates a network of air quality monitoring stations at various locations around the state. Unfortunately, very limited data are available for Hawaii Island, and virtually none is available for the South Kohala area specifically. The closest monitoring site is at Kealakekua, some 40 miles south of the project site, where particulate matter and sulfur dioxide are measured, but these data may not be representative of the project area, particularly due to the nearby HELCO power plant. In general, DOH monitoring stations in the state indicate compliance with state and federal air quality standards. This is so even in areas affected by vog. Thus, except perhaps for locations with localized impacts, ambient air quality in the state is well within the standards.

6.0 SHORT-TERM IMPACTS OF PROJECT

Short-term direct and indirect impacts on air quality could potentially occur due to project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality

impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts related to slow-moving construction equipment traveling to and from the project site and from a temporary increase in local traffic caused by commuting construction workers.

Fugitive dust emissions may arise from the grading and dirt-moving activities associated with site clearing and preparation work. The emission rate for fugitive dust emissions from construction activities is difficult to estimate accurately. This is because of its elusive nature of emission and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [2] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium" activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions in the project area would likely be somewhere near that level. In any case, State of Hawaii Air Pollution Control Regulations [3] prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phases is essential.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare-dirt surfaces in construction areas from becoming significant sources of dust. In dust-prone or dust-sensitive areas, other control measures such as limiting the area that can be disturbed at any

given time, applying chemical soil stabilizers, mulching and/or using wind screens may be necessary. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials that could be blown away. Haul trucks tracking dirt onto paved streets from unpaved areas is often a significant source of dust in construction areas. Some means to alleviate this problem, such as road cleaning or tire washing, may be appropriate. Paving of parking areas and/or establishment of landscaping as early in the construction schedule as possible can also lower the potential for fugitive dust emissions. Monitoring dust at the project property line could be considered to quantify and document the effectiveness of dust control measures.

On-site mobile and stationary construction equipment also will emit air pollutants from engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are low and should be relatively insignificant compared to vehicular emissions on nearby roadways.

Slow-moving construction vehicles traveling on roadways leading to and from the project site could obstruct the normal flow of traffic to such an extent that overall vehicular emissions are increased, but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume. Likewise, the schedules of commuting construction workers can be adjusted to avoid peak hours in the project vicinity. Thus, most

potential short-term air quality impacts from project construction can be mitigated.

7.0 LONG-TERM IMPACTS OF PROJECT

7.1 Roadway Traffic

After construction is completed, use of the proposed facilities will result in increased motor vehicle traffic on nearby roadways, potentially causing long-term impacts on ambient air quality in the project vicinity. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide. They also emit nitrogen oxides and other contaminates.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the Clean Air Act Amendments became law. This legislation requires further emission reductions which have been phased in since 1994. During the Clinton Administration, additional restrictions were signed into law which will begin to take effect during the next decade. The added restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. Carbon monoxide emissions, for example, will go down by an average of about 10 percent per vehicle during the next 10 years due to the replacement of older vehicles with newer models.

To evaluate the potential long-term indirect ambient air quality impact of the roadway traffic associated with a project such as this, computerized emission and atmospheric dispersion models can be used to estimate ambient carbon monoxide concentrations along

roadways leading to and from the project. Carbon monoxide is generally selected for modeling because it is both the most stable and the most abundant of the pollutants generated by motor vehicles. Furthermore, carbon monoxide air pollution is generally considered to be a microscale problem that can be addressed locally to some extent, whereas nitrogen oxides air pollution most often is a regional issue that cannot be addressed by a single new development.

Because the proposed project is not expected to generate large volumes of traffic during peak traffic hours, a detailed modeling analysis of the associated air quality impacts was not performed. However, it is probable that any impacts on air quality due to project-related motor vehicle traffic will be minimal.

7.2 Commercial/Industrial Facilities

Air pollution emissions from commercial/industrial facilities locating at the proposed project during Phase III could potentially result in direct impacts on air quality. While the specific residents of the mixed-use commercial/light industrial portion of the proposed project have not yet been identified, it is expected these will not have the potential to emit significant amounts of air pollution. The project's commercial/industrial areas will be zoned as Village Commercial (CV). The types of businesses that are allowed by the Hawaii County Code to locate within areas zoned as CV include the following:

Examples of permitted uses within the commercial/light industrial areas zoned as CV	
• Adult day care homes • Amusement and recreation facilities (indoor) • Art galleries, museums	• Hotels • Laboratories • Lodges

• Automobile sales and rentals • Automobile service stations • Bars • Bed and breakfast establishments • Boarding facilities • Business services • Cemeteries and mausoleums • Churches • Commercial parking lots • Community buildings • Convenience stores • Crop production • Day care centers • Dwellings, multi-family and single-family • Family child care homes • Farmers markets • Financial institutions • Group living facilities • Home occupations • Hospitals	• Manufacturing, processing and packaging (light) • Medical clinics • Meeting facilities • Model homes • Mortuaries • Neighborhood parks • Offices • Personal services • Photography studios • Public uses and structures • Publishing plants • Repair establishments • Restaurants • Retail establishments • Schools • Telecommunications antennas • Temporary real estate offices • Theaters • Utility substations

It should be noted that since DHHL can exercise an exemption option from state and local zoning, the zoning district uses will serve as a guideline for the types of uses it envisions for this project. In addition to CV uses, other non-polluting limited industrial uses such as warehousing, wholesaling and distribution, baseyards, would be considered.

Although the specific businesses that will be located within the commercial/light industrial area of the project have not yet been identified, none of the uses will have the potential to emit significant amounts of air pollution.

Without specific information concerning the locations and stack heights, stack gas temperatures, exit velocities and emission

rates, air quality impacts from the light industrial facilities locating within the proposed commercial/light industrial area of the project cannot be quantitatively estimated. At the present time, such detailed information is not available. However, Hawaii air pollution control rules [3] require that any activity that causes air pollution must obtain written approval from the director of the Hawaii Department of Health. This written approval generally involves applying for a permit to construct and operate a facility that emits air pollution. At the time of application, detailed information must be provided by the applicant concerning the type and nature of any air pollution emissions and the emission control technology that would be utilized. Depending on the magnitudes of the project emissions and other factors, air quality impact analyses and/or air quality monitoring may be required before the application to construct/operate is approved. Thus, even though an assessment of potential direct air quality impacts from project industrial components cannot be done at this time, state rules may require that such analyses be performed at a later date when specific businesses apply to locate and operate at the proposed project.

7.3 Electrical Demand

The proposed project also will cause indirect air pollution emissions from power generating facilities as a consequence of electrical power usage. Electrical power for the project will most probably be provided mainly by oil-fired generating facilities, but some of the project power may also be derived from geothermal energy, wind power or other sources. In order to meet the electrical power needs of the proposed project, power generating facilities will likely be required to burn more fuel and hence more air pollution will be emitted at these facilities.

The potential indirect air quality impacts from the project's electrical demand were not assessed, but it is doubtful if these impacts will be significant since emissions from this aspect of the project will be very small in comparison with the island-wide emission estimates given in Table 2. Any associated impacts would likely be distributed at various locations around the island since power-generating facilities are connected to a grid that feeds all areas.

7.4 Solid Waste Disposal

Currently, all solid waste on the island is buried at solid waste landfills. Thus, assuming this continues to be the method for solid waste disposal, the only associated air pollution emissions that will occur will be from trucking the waste to the landfill and from heavy equipment used to bury it. These emissions should be relatively minor.

8.0 LONG-TERM IMPACTS ON PROJECT

As indicated in Section 5 of this report, the present air quality of the project area may be affected by existing industrial sources located nearby. This section includes a more detailed discussion of the potential air quality impacts on the project from these air pollution sources.

8.1 HELCO Waimea Generating Station

Three electric generating units of 2.5 MW each are located at the HELCO Waimea Generating Station, which is situated along South Kohala Distribution Road. The generating units are fueled by diesel with a maximum sulfur content of 0.5 percent by weight.

The diesel-fueled generating units emit sulfur dioxide, nitrogen oxides, particulate, hydrocarbons and other air contaminants. The generating units located at the HELCO Waimea Generating Station are operated on an as-required basis. Although the three generating units generally do not operate simultaneously or continuously, the recently acquired operating permit obtained from the Department of Health has no restrictions on the hours of operation. Thus, if deemed necessary by HELCO, all three units can be operated simultaneously and continuously.

The HELCO Waimea Generating Station is located immediately to the east of the project site. Since the probable prevailing wind direction is from the east, the project site is in the prevailing downwind direction from the power plant, and exhaust emissions from the generating units will likely move toward the project site a high percentage of the time.

Figure 2 is a photograph of the HELCO Waimea Generating Station looking toward the north from the South Kohala Distribution Road. This figure shows the three generating units located next to the HELCO building. As shown in the figure, the generating unit stacks consist basically of a muffler on each unit that the exhaust gases move through horizontally and an elbow that directs the exhaust gases upward upon exiting the muffler. The exit point is below the height of the adjacent building.

Even with only one unit operating, the odor of exhaust fumes from the facility is often readily noticeable along the public roadway in front of the plant. The primary reason for this is the absence of vertical extensions on the generating unit stacks. Good Engineering Practice (GEP) as defined by the U.S. Environmental Protection Agency requires that stack heights generally be 2.5

times the height of any nearby structures to avoid aerodynamic downwash effects. Emissions from stacks of shorter heights can be caught in the aerodynamic wakes of adjacent structures and rapidly mixed to the ground, causing high ground-level concentrations near the source.

The generating units located at HELCO's Waimea Generating Station do not meet GEP guidelines. The stacks for the generating units are actually shorter than the adjacent building, which likely results in building downwash when moderate or higher wind speeds occur. The configuration of the stacks at this facility may exacerbate the problem. Exhaust gases are moved horizontally through a muffler and then abruptly directed upward and immediately exhausted, possibly before all of the horizontal momentum can be converted to vertical momentum. High terrain to the north may also cause terrain downwash at times.

Emission rates and stack data for the HELCO Waimea Generating Station are given in Tables 3 and 4, respectively. These data were submitted to the Department of Health by HELCO in their air permit application dated February 2002. As noted in Table 4, the information on file with the Department of Health indicates that the stack heights are 6.1 m (20 ft). Casual observation suggests that the stack heights are actually about 4 m (13 ft).

To assess the maximum potential impact of these emissions, a screening analysis was performed using the U.S. EPA atmospheric dispersion model SCREEN3 [4]. SCREEN3 is a single-source Gaussian plume model which provides maximum ground-level concentration estimates for point, area, flare, and volume sources, as well as concentrations in the cavity zone due to building downwash. SCREEN3 provides estimates of maximum 1-hour

average concentrations. To estimate maximum concentrations for longer averaging times, conversion factors recommended by the Department of Health were used. These conversion factors are as follows:

Averaging Time	Conversion Factor
3-hours	0.9
8-hours	0.7
24-hours	0.4
Annual	0.2

In performing this screening analysis, an ambient air temperature of 293°K (68°F) was assumed, and it was estimated that the height, width and length of the building adjacent to the stacks were 7 m, 6 m and 12 m, respectively. It was further assumed that all receptors were at the same elevation as the base of the power plant stacks.

Results from the SCREEN3 model are given in Tables 5 through 8. As shown in the tables, with only one unit operating, the estimated maximum sulfur dioxide concentrations exceed the air quality standards for distances from the power plant of about 50 m for a 3-hour averaging period, 70 m for a 24-hour averaging period and 100 m for an annual average. With only one unit operating, the estimated maximum particulate concentrations exceed the 24-hour and annual standards for a distance of about 30 to 40 m, and the estimated maximum annual nitrogen dioxide concentration exceeds the state standard out to a distance of nearly 500 m.

With all three generating units operating, estimated maximum sulfur dioxide concentrations exceed the air quality standards for

distances of about 100 to 200 m for the various averaging times, while maximum carbon monoxide concentrations exceed the state air quality standards for distances of about 50 to 60 m. Estimated maximum particulate concentrations exceed the 24-hour standard for a distance of about 70 m and the annual standard for a distance of nearly 100 m. The estimated maximum annual nitrogen dioxide concentration exceeds the state standard for a distance of at least 1,000 m.

8.2 Waimea Solid Waste Transfer Station

The Waimea Solid Waste Transfer Station is situated immediately to the east of the project area, making it upwind of the project site much of time and a potential source of odor nuisance. Waste is deposited at the transfer station into an enclosed container, and the container is removed from the site on a daily basis. Several visits to the transfer station revealed no evidence of any odor problems. The enclosed storage of refuse at the site and the frequent removal of the storage containers appear to effectively control odor. Thus, it is not expected that odor from the transfer station will significantly impact the proposed project.

8.3 Old Landfill

An old landfill is also located immediately to the east of the project area. The landfill was closed in the early to mid 1980's. After closure, it was covered with approximately 2 ft of soil and grassed. Over time, material buried in the landfill decomposes and sometimes spontaneous combustion occurs, causing underground fires. Also, cracks and sinkholes occasionally develop in the landfill surface, which allow fumes from the underground fires to leak into the atmosphere and be carried away by the wind.

Fumes from underground fires at landfills have been a problem at several locations in the state and many locations across the country. The fumes are particularly odorous and may contain toxic compounds as well. Some of the chemicals that have been found to exist in the fumes at other landfills include: methane, hydrogen sulfide, toluene, xylenes, benzene, vinyl chloride, mercury and phosgene.

Given the landfill's location relative to the project site and the wind flow in the area, odorous fumes from the landfill will likely impact the project area at times, particularly during the nighttime and early morning hours when dispersion conditions are worst and the wind flow tends to be downslope. The County already performs remedial work at the landfill from time-to-time to cover cracks and sinkholes with soil in an effort to reduce the leakage of fumes into the air. With residences and businesses locating closer to the landfill, it may become necessary to perform this maintenance activity on a more regular basis. An additional but much more expensive solution would be to install a gas collection system to remove and burn landfill gas.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The major potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction. Uncontrolled fugitive dust emissions from construction activities are estimated to amount to about 1.2 tons per acre per month, depending on rainfall. To control dust, active work areas and any temporary unpaved work roads should be watered at least twice daily on days without rainfall. Use of windscreens and/or limiting the area that is disturbed at any given time will also help to contain fugitive dust emissions. Wind erosion of inactive

areas of the site that have been disturbed could be controlled by mulching or by the use of chemical soil stabilizers. Dirt-hauling trucks should be covered when traveling on roadways to prevent windage. A routine road cleaning and/or tire washing program will also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area. Paving of parking areas and establishment of landscaping early in the construction schedule will also help to control dust. Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program and to adjust the program if necessary.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours.

After the proposed project is completed, emissions from project-related traffic will cause an increase in carbon monoxide concentrations near some roadway intersections in the project area. Although the impact of these emissions was not quantitatively investigated, given the size of the project, it is unlikely that significant impacts on ambient air quality will occur.

At this time, sufficient detail is not available describing the businesses that may be located within the commercial/industrial

areas of the project to perform any quantitative impact assessments. However, the types of businesses that would be permitted do not emit significant amounts of air pollution. In any case, before any new air pollution sources can be built anywhere in the state, an application must be submitted to the Department of Health for a permit to construct the facility, and detailed information concerning any air pollution emissions will need to be provided at that time. Depending on the magnitude of the proposed emissions, the Department of Health may require that an impact assessment and possibly air quality monitoring be performed.

Any long-term impacts on air quality due to indirect emissions from supplying the project with electricity and from the disposal of waste materials generated by the project will likely be relatively small based on the size of the project. To moderate any impacts, indirect emissions from project electrical demand could likely be reduced somewhat by incorporating energy-saving features into project design requirements. This might include the use of solar water heaters, water heater timers or possibly hot water on demand systems; designing building space so that window positions maximize indoor light without unduly increasing indoor heat; using landscaping where feasible to provide afternoon shade to cut down on the use of air conditioning; installation of insulation and double-glazed doors to reduce the effects of the sun and heat; movable, controlled openings for ventilation at opportune times; and possibly automated room occupancy sensors. Solid waste related air pollution could likely be reduced somewhat by the promotion of conservation and recycling programs within the proposed development.

Potential impacts <u>on</u> the project may occur due to emissions from the nearby HELCO Waimea Generating Station. Screening analyses of

emissions from the stacks at this facility indicate that state and federal air quality standards could be exceeded for a distance of several hundred feet, or even farther at times. In general, screening analyses can be expected to yield conservatively high estimates of maximum ground-level concentrations. Nevertheless, even with only one of the three units operating, the odor of exhaust fumes is often noticeable at the project boundary adjacent to the power plant, indicating that a problem may exist. The primary issue is that the stacks for the generating units do conform to good engineering practice with virtually no vertical ducts to help direct the exhaust emissions upward and out of the aerodynamic wake of the nearby building. The height of this building is estimated to be approximately 5 m (16 ft). Following good engineering practice, the stack heights should be approximately 2.5 times the nearby building height or about 12.5 m (41 ft). Given that the stack heights are currently only about 4 m (13 ft), stack extensions of at least 8 m (26 ft) would be suggested. With good engineering practice stacks, atmospheric dispersion calculations indicate that any air quality impacts from the plant at the project site would be reduced substantially and would comply with air quality standards. Federal and state laws require industrial sources of air pollution such as HELCO to meet air quality standards at their fenceline. If the standards are not met, then the Department of Health may require HELCO to take corrective action.

Several visits to the nearby refuse transfer station operated by the County revealed no noticeable odor problems. Refuse is stored at this facility within enclosed containers and transferred offsite on a daily basis. Thus, any impacts on the project site from the transfer station should not be significant.

Occasional impacts on the project from the nearby old landfill may be unavoidable. These impacts will likely be limited to odor nuisance from time-to-time. Probably the most practical approach to mitigating the problem will be for the County to establish a regular maintenance program at the landfill to keep cracks and sinkholes covered with soil. This will help to inhibit the escape of fumes and to smother the underground fires. If the problem becomes too much of an issue, it may become necessary to install a gas collection system at the landfill to collect and burn landfill gas.

REFERENCES

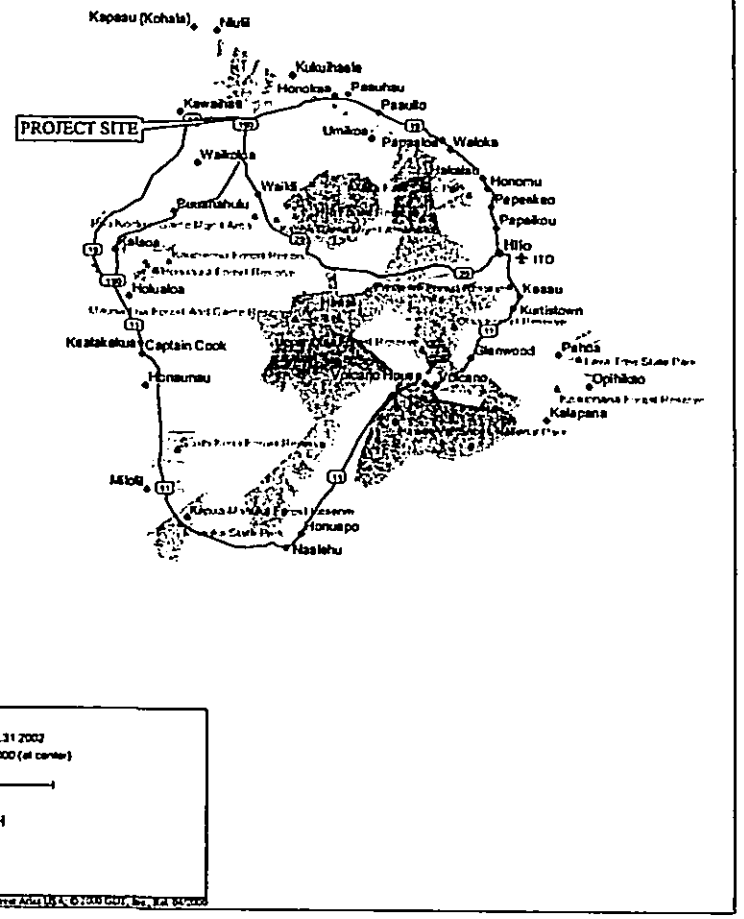
1. U.S. Department of Commerce, Weather Bureau, "Climatography of the United States No. 86-44, Decennial Census of the United States Climate, Climatic Summary of the United States, Supplement for 1951 through 1960, Hawaii and Pacific", Washington, D.C., 1965.

2. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition, AP-42, U.S. Environmental Protection Agency, Research Triangle Park, NC, January 1995.

3. State of Hawaii. Hawaii Administrative Rules, Chapter 11-60, Air Pollution Control.

4. SCREEN3 Model User's Guide, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Emissions, Monitoring, and Analysis Division, Research Triangle Park, North Carolina 27711, EPA-454/B-95-004, September 1995,.

Figure 1 - Project Location Map



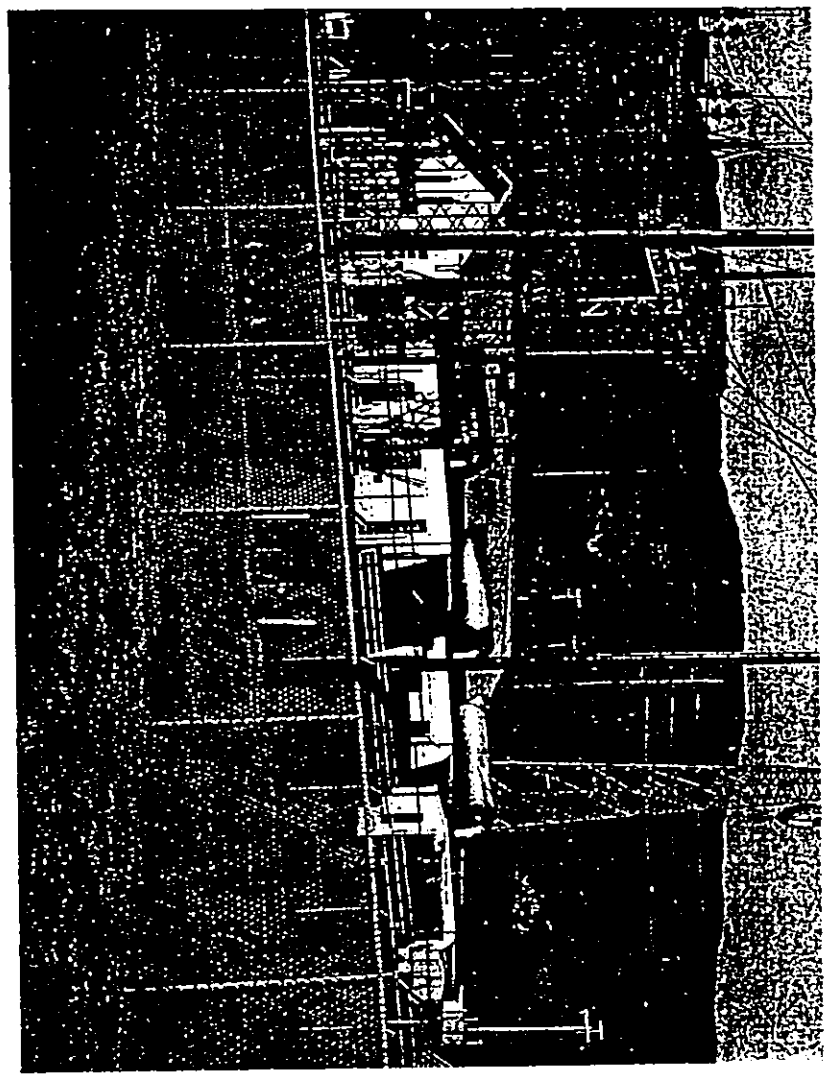


Figure 2 PHOTOGRAPH OF HELCO WAIEMA GENERATING STATION

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Units	Averaging Time	Maximum Allowable Concentration		
			National Primary	National Secondary	State of Hawaii
Particulate Matter (<10 microns)	µg/m³	Annual 24 Hours	50[a] 150[b]	50[a] 150[b]	50 150[c]
Particulate Matter (<2.5 microns)	µg/m³	Annual 24 Hours	15[a] 65[d]	15[a] 65[d]	- -
Sulfur Dioxide	µg/m³	Annual 24 Hours 3 Hours	80 365[c] -	- - 1300[c]	80 365[c] 1300[c]
Nitrogen Dioxide	µg/m³	Annual	100	100	70
Carbon Monoxide	mg/m³	8 Hours 1 Hour	10[c] 40[c]	- -	5[c] 10[c]
Ozone	µg/m³	8 Hours 1 Hour	157[e] 235[f]	157[e] 235[f]	- 100[c]
Lead	µg/m³	Calendar Quarter	1.5	1.5	1.5
Hydrogen Sulfide	µg/m³	1 Hour	-	-	35[c]

[a] Three-year average of annual arithmetic mean.

[b] 99th percentile value averaged over three years.

[c] Not to be exceeded more than once per year.

[d] 98th percentile value averaged over three years.

[e] Three-year average of fourth-highest daily 8-hour maximum.

[f] Standard is attained when the expected number of exceedances is less than or equal to 1.

Note: Standards for particulate matter (<2.5 microns) and for 8-hour ozone are subject to court appeal.

Table 2

AIR POLLUTION EMISSIONS INVENTORY FOR
ISLAND OF HAWAII, 1993

Air Pollutant	Point Sources (tons/year)	Area Sources (tons/year)	Total (tons/year)
Particulate	30,311	9,157	39,468
Sulfur Oxides	9,345	nil	9,345
Nitrogen Oxides	4,054	8,858	12,912
Carbon Monoxide	3,357	23,934	27,291
Hydrocarbons	1,477	203	1,680

Source: Final Report, "Review, Revise and Update of the Hawaii Emissions Inventory Systems for the State of Hawaii", prepared for Hawaii Department of Health by J.L. Shoemaker & Associates, Inc., 1996

Table 3

WAIMEA GENERATING STATION EMISSION RATES

Parameter	Unit 12		Unit 13		Unit 14	
	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s
Sulfur Dioxide	15.0	1.89	15.0	1.89	15.0	1.89
Particulate	2.21	0.28	2.21	0.28	2.21	0.28
Nitrogen Oxides	93.1	11.7	93.1	11.7	93.1	11.7
Hydrocarbons	5.82	0.73	5.82	0.73	5.82	0.73
Carbon Monoxide	35.4	4.46	35.4	4.46	35.4	4.46

Source: Department of Health, Initial Covered Source Permit Application for Waimea Generating Station dated February 2002

Table 4

WAIMEA GENERATING STATION STACK PARAMETERS

Stack Parameter	Unit 12	Unit 13	Unit 14
Height (m)	6.1	6.1	6.1
Diameter (m)	0.81	0.81	0.81
Exhaust Temperature (°K)	677.6	677.6	677.6
Exhaust Velocity (m/s)	23.35	23.35	23.35

Note: Although information on file with the Department of Health indicates the stack heights are 6.1 m (20 ft), casual observation suggests that the stack heights are actually about 4 m (13 ft).

Source: Department of Health, Initial Covered Source Permit Application for Waimea Generating Station dated February 2002

Table 5

ESTIMATED MAXIMUM SULFUR DIOXIDE CONCENTRATIONS
NEAR WAIMEA GENERATING STATION

Distance (m)	Maximum Concentration (µg/m³)							
	1-Hour		3-Hour		24-Hour		Annual	
	1 Unit	3 Units	1 Unit	3 Units	1 Unit	3 Units	1 Unit	3 Units
30	2,881	8,643	2,593	7,779	1,152	3,456	576	1,728
40	2,089	6,267	1,880	5,640	836	2,508	418	1,254
50	1,585	4,755	1,426	4,278	634	1,902	317	951
60	1,230	3,690	1,107	3,321	492	1,476	246	738
70	981	2,943	883	2,649	392	1,176	196	588
80	800	2,400	720	2,160	320	960	160	480
90	664	1,992	598	1,794	266	798	133	399
100	560	1,680	504	1,512	224	672	112	336
200	175	525	158	474	70	210	35	105
300	91	273	82	246	36	108	18	54

Notes:

1. One-hour concentration estimates obtained from SCREEN3 model.
2. Concentration estimates assume 4-m stack height.
3. Concentrations for averaging times greater than 1 hour estimated based on DOH recommended conversion factors.
4. Concentrations for three units assumed to be a factor of three higher than concentrations for one unit.
5. Background concentration assumed to be nil.
6. Shaded areas of table indicate concentrations that exceed air quality standards.

Table 6

ESTIMATED MAXIMUM CARBON MONOXIDE CONCENTRATIONS
NEAR WAIMEA GENERATING STATION

Distance (m)	Maximum Concentration (mg/m^3)			
	1-Hour		8-Hour	
	1 Unit	3 Units	1 Unit	3 Units
30	6.8	20.4	4.8	14.4
40	4.9	14.7	3.4	10.2
50	3.7	11.1	2.6	7.2
60	2.9	8.7	2.0	6.0
70	2.3	6.9	1.6	4.8
80	1.9	5.7	1.3	3.9
90	1.6	4.8	1.1	3.3
100	1.3	3.9	0.9	2.7
200	0.4	1.2	0.3	0.9
300	0.2	0.6	0.1	0.3

Notes:

1. One-hour concentration estimates obtained from SCREEN3 model.
2. Concentration estimates assume 4-m stack height.
3. Concentrations for averaging times greater than 1 hour estimated based on DOH recommended conversion factors.
4. Concentrations for three units assumed to be a factor of three higher than concentrations for one unit.
5. Background concentration assumed to be nil.
6. Shaded areas of table indicate concentrations that exceed air quality standards.

Table 7

ESTIMATED MAXIMUM PARTICULATE CONCENTRATIONS
NEAR WAIMEA GENERATING STATION

Distance (m)	Maximum Concentration ($\mu g/m^3$)					
	1-Hour		24-Hour		Annual	
	1 Unit	3 Units	1 Unit	3 Units	1 Unit	3 Units
30	424	1,272	170	510	85	255
40	307	921	123	369	61	183
50	233	699	93	279	47	141
60	181	543	72	216	36	108
70	144	432	58	174	29	87
80	118	354	47	141	24	72
90	98	294	39	117	20	60
100	82	246	33	99	16	48
200	26	78	10	30	5	15
300	13	39	5	15	3	9

Notes:

1. One-hour concentration estimates obtained from SCREEN3 model.
2. Concentration estimates assume 4-m stack height.
3. Concentrations for averaging times greater than 1 hour estimated based on DOH recommended conversion factors.
4. Concentrations for three units assumed to be a factor of three higher than concentrations for one unit.
5. Background concentration assumed to be nil.
6. Shaded areas of table indicate concentrations that exceed air quality standards.

Table 8

ESTIMATED MAXIMUM NITROGEN DIOXIDE CONCENTRATIONS
NEAR WAIMEA GENERATING STATION

Distance (m)	Maximum Concentration ($\mu g/m^3$)			
	1-Hour		Annual	
	1 Unit	3 Units	1 Unit	3 Units
30	17,862	53,586	3,572	10,716
40	12,952	38,856	2,590	7,770
50	9,827	29,481	1,965	5,895
60	7,626	22,878	1,525	4,575
70	6,082	18,246	1,216	3,648
80	4,960	14,880	992	2,976
90	4,117	12,351	823	2,469
100	3,472	10,416	694	2,082
200	1,085	3,255	217	651
500	332	996	66	198
1,000	159	477	32	96

Notes:

1. One-hour concentration estimates obtained from SCREEN3 model.
2. Concentration estimates assume 4-m stack height.
3. Concentration estimates assume 100% of nitrogen oxide emissions convert to nitrogen dioxide.
4. Concentrations for averaging times greater than 1 hour estimated based on DOH recommended conversion factors.
5. Concentrations for three units assumed to be a factor of three higher than concentrations for one unit.
6. Background concentration assumed to be nil.
7. Shaded areas of table indicate concentrations that exceed air quality standards.

Appendix I

Social Impact Assessment

DHHL Lalamilo Project
Social Impact Assessment

Prepared by Earthplan

July 2002

Contents

TABLES AND FIGURES

1 Background and Introduction

1.1 Report Description

The State Department of Hawaiian Home Lands, hereafter referred to as DHHL, proposes to develop residential lots and commercial and industrial uses at Lalamilo, Waimea in Hawaii County. An Environmental Impact Statement, or EIS, is being prepared due to the use of public funds and lands.

This report contains the social impact assessment conducted as part of the EIS and will be summarized in and appended to the EIS.

This social impact assessment was prepared by Earthplan, Inc., whose offices are located at 81 South Hotel Street, Suite 211, Honolulu, Hawaii. Berna Cabacungan, principal of Earthplan, was project manager, and principal analyst and writer. Rosevelt Dela Cruz assisted in research related to social integration. Marco Senelly assisted in research related to population trends, demographics and public facilities and services.

The remaining portions of this section describe the proposed actions and discuss the role and purpose of social impact assessments.

Section 2 describes the existing social environment in terms of population trends and demographics. Section 3 extends the baseline information by exploring public plans and policies.

Community issues are identified in Section 4 and Section 5 presents potential social impacts in terms of population changes, the project's relationship to public policies, community integration, and public facilities and services.

1.2 Description of the Proposed Project

DHHL proposes to develop approximately 249 acres in Waimea, South Kohala, Hawaii Island, identified as Tax Map Keys 6-6-01, parcels 77 and 54, and 6-6-04, parcels 12–17. DHHL owns Parcel 77, which is the largest parcel at 232 acres. The State Department of Land and Natural Resources owns the rest of the project site.

The linear property is approximately 7,000 feet long in an east-west direction, and is approximately 1,500 feet wide. It abuts the South Kohala Distribution Road along the eastern boundary. Other adjacent uses to the east include the Hawaiian Electric Company Waimea Baseyard / Generation Plant, the Hawaii County Solid Waste Division Waimea Baseyard, and Hawaii County Solid Waste Transfer Station. A former County landfill, currently covered, also is in this area.

Uses northeast and east of the project area include the Ka La Loa and Lalamilo House Lots Subdivision, and the Kamuela Museum. Adjacent to portions of the northern boundary is Kawaihae Road.

Three streams help to define the project site. Keanuiomano and Lanikepu Streams form portions of the north boundary. The Waikoloa Stream forms the entire south boundary.

The project site contains no structures, and the only onsite accesses are dirt roads. In terms of existing uses, 232 acres are under a general lease whose withdrawal is scheduled for January 1, 2003, seven acres are leased for a horse stable, and 9.8 acres are vacant.

Two alternatives are under consideration for development. Alternative A calls for 442 residential lots at approximately 10,000 square feet per lot, as follows:

Table 1: Alternative A Proposal

Land Use	Units	Area
Phase 1 residential lots	34	16.8
Phase 2 residential lots	408	143.9
Commercial		3.7
Industrial		12.6
Community Center		1.7
Parks		8.8
Preservation areas		19.1
Open space buffers		42.2
Total	442	248.8

Implementation of Phase 1 is scheduled for 2003 to 2005. The proposed 34 lots on 16.8 acres would conform to the existing R-10 zoning by Hawaii County. Phase 1 would include independent wastewater septic systems and would be served by extensions of existing roadways and the existing Hawaii County water system infrastructure.

Phase 2 implementation is scheduled for 2006 to 2010. The residential lot component would be phased in four increments and home occupation would coincide with the development of roadway, water and wastewater systems. The non residential components would also be implemented during this time.

Both Phase 1 and 2 residential lots would include developer-built turn-key homes and vacant lots for owner-builder and self-help construction.

Alternative B would generate a total of 155 residential lots, as follows:

Table 2: Alternative B Proposal

Land Use	Units	Area
Phase 1 residential lots	34	16.8
Phase 2 residential lots	121	133.5
Commercial		3.7
Industrial		12.6
Community Center		1.8
Parks		7.3
Preservation areas		19.7
Open space buffers		53.4
Total	155	248.8

The basis difference between Alternatives 1 and 2 is that the latter includes 114 one-acre lots, and more land planned for open space buffers.

For the purposes of this social impact assessment, Alternative A is the basis for our analysis in that it includes a higher number of residential units and is the "worst case" scenario" relative to social impacts.

1.3 The Role and Purpose of Social Impact Assessments

The social aspects of an area relate to people living and interacting with other people. Social impact analysis explores how the physical environment of a community or neighborhood may be changed by a proposed land development, and how these changes may affect the neighborhood as a social environment. [1]

Social impact assessment, hereafter referred to as SIA, became a recognized subfield of research and policy application, with the passage of the U.S. National Environmental Policy Act (NEPA) legislation in 1969. [2] It is an interdisciplinary, inter-professional field of social science knowledge and application. SIA draws sometimes from social science, but other times from organizational development, political analysis, or journalism. Its primary function has to do with the development and disclosure of social information relevant to informing the decision-making process and/or designing management actions to deal with problematic social outcomes of a proposed project.

The goal of SIA is to predict the social effects of a policy, program or project while still in the planning stage, before those effects have occurred. The overall framework for SIA is anticipatory research, which seeks to place the expectation and attainment of desired outcomes on a rational and reliable basis.

Commonly identified uses of SIA include:

Understanding the ability of a community or group to adapt to changing conditions - In identifying social consequences of a proposed action, cause- and-effect relationships are complex. Different people and different communities react differently to similar events. An important function of SIAs is therefore to obtain and analyze the necessary information about community organization and likely responses to changing conditions. As such, the non-project social scenario is as important as the with-project scenario because it provides the analyst with a realistic social context for the proposed action.

[1] *Kathleen Christiansen, Social Impacts of Land Development: An Initial Approach to Estimating Impacts on Neighborhood Usages and Perceptions (1976).*
[2] *Rabel Burdge and Frank Vanclay, "Social Impact Assessment," Environmental and Social Impact Assessment, ed. Frank Vanclay and Daniel A. Bronstein (1996), page 34.*

Defining the problems or clarifying the issues involved in a proposed change - Frequently, opposition to or support for a proposed project can only be understood and addressed when the proponent is aware of cultural tendencies, underlying issues, vested interests, and misperceptions. The SIA is the basis for defining and clarifying project or program issues in a systematic approach within the EIS framework.

Illuminating the meaning and importance of anticipated change - An important objective of SIA is to determine what meaning a probable impact would have for a community and its residents. Whereas a certain impact may have relatively low social significance in some communities, it may be given more import or significance in other settings or communities.

Identifying mitigation opportunities or requirements - Another function of SIA is to explore how a proposed action can cause the least adverse and most beneficial impacts, and to identify responses from the community and affected persons. SIA information can be crucial in determining what mitigation is necessary, what mitigation alternatives exist, and which mitigation strategies are most likely to work.

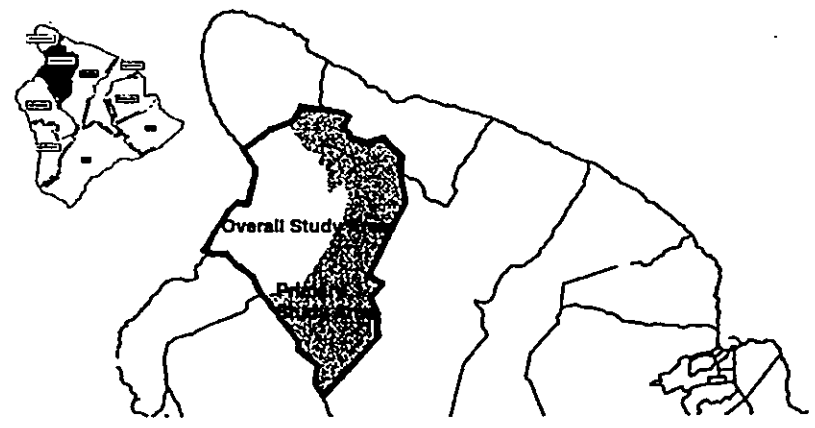
2 PROFILE OF THE EXISTING COMMUNITY

2.1 Study Area Definition

The Total Study Area for this report is the South Kohala District designated by the County of Hawaii. This district is generally coterminous with Census Tracts 217 in the 1990 census and 217.01 and 217.02 in 2002. Figure A illustrates the Total Study Area.

The project is in the vicinity of Waimea Town and, from a social perspective, Lalamilo residents are likely to interact with that community. The area encompassing Waimea to Puu Anahulu, which is included in Census Tract 217.02, is therefore the Primary Study Area for this report.

Figure A: Study Area for this Social Impact Assessment

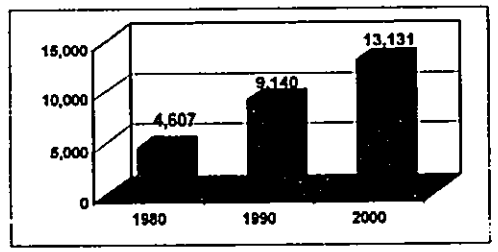


2.2 Population Trends and Projections

The Hawaii County population increased from 92,053 to 120,317 persons between 1980 and 1990. It increased to 148,677 persons in 2000. The 31 percent increase between 1980 and 1990 translates into an average annual growth rate of 2.7 percent. The County's average annual growth rate between 1990 to 2000 decreased to 2.1 percent.

The Total Study Area population grew at a higher pace than that of Hawaii County. Figure B illustrates the population changes for South Kohala from 1980 to 2000.

Figure B: Population Change in South Kohala, 1980, 1990 and 2000



Source: Table 1.5 of the County of Hawaii Data Book (October 25, 2001).

South Kohala's population nearly doubled from 4,607 to 9,140 persons from 1980 to 1990. This 98 percent increase suggests an average annual growth rate of 7.1 percent. By 2000, the population grew to 13,131 persons. This 44 percent increase breaks down into an average annual growth rate of 3.7 percent.

2.3 Selected Demographic Characteristics of Study Area Residents

In 1990, the South Kohala District comprised eight percent of the total Hawaii County population. This proportion increased slightly, to nine percent, in 2000. Table 3 contains demographic information for Hawaii County, the South Kohala District and the Primary Study Area.

Table 3: Demographic Characteristics, 1990 and 2000

	Hawaii County		Total Study Area: South Kohala		Primary Study Area: Waimea to Puu Anahulu
	1990	2000	1990	2000	2000
Population	120,317	148,677	9,140	13,131	6,015
			Age		
Less than 5	7.9%	6.1%	8.2%	6.8%	6.3%
5 to 17	20.8%	20.0%	21.5%	22.3%	23.3%
18 to 64	58.8%	60.3%	62.9%	61.8%	60.3%
65 and older	12.5%	13.5%	7.4%	9.0%	10.1%
Median age	34.3	38.6	32.1	36.2	36.6
			Ethnicity (1)		
Caucasian	39.7%	31.5%	52.3%	38.8%	31.0%
Asian	37.0%	26.7%	20.4%	18.1%	20.1%
Native Hawaiian and other Pacific Islander	20.1%	11.2%	24.8%	12.8%	15.5%
All Other Ethinicities including Mixed	3.2%	30.5%	2.6%	30.4%	33.3%
			Households		
Total Households	41,461	52,985	3,095	4,648	2,407
Family households	72.9%	69.6%	71.4%	72.1%	75.3%
Average household size	2.90	2.75	2.95	2.81	2.94
Average family size	3.33	3.24	3.31	3.23	3.35
			Housing Units		
Number	48,253	62,674	4,235	5,268	2,634
Owner Occupied	52.5%	54.5%	38.5%	47.2%	58.7%
Renter Occupied	33.4%	30.0%	34.5%	33.0%	32.6%
Vacant Units	14.1%	15.5%	26.9%	19.8%	8.6%

Source: The 1990 information is from U.S Census Bureau. Data Set: 2000 Summary Tape File 1 (STF 1) – 100 percent data. The 2000 information is from U.S. Census Bureau. Data Set: 1990 Summary Tape File 1 (STF 1) – 100 percent data. Both are available online at http://factfinder.census.gov

2.3.1 Age

Hawaii County population generally aged between 1990 and 2000. The County experienced a decrease in youngsters 17 years and younger, and increases in the working age (18 to 64) and the elderly. The median increased from 34.3 to 38.6 years. South Kohala experienced a similar aging of the population, and its median age increased from 32.1 and 36.2 years from 1990 to 2000.

As suggested by the median ages, when compared to the Hawaii County population, South Kohala is proportionally younger. The Total Study Area had a higher proportion of those 17 and younger (29 percent versus 26 percent for Hawaii County), and a lower proportion of elderly (nine versus 13 percent). The Primary Study Area was proportionally slightly older than the Total Study Area, with a 2000 median age of 36.6 years and a higher proportion of the elderly.

2.3.2 Ethnicity

A detailed analysis of ethnic trends is not possible due to the methodology differences in gathering information between the 1990 and 2000 census taking. In 1990, census respondents were required to pick a single ethnic category. In 2000, multi-ethnic respondents were allowed to select the appropriate number of categories.

Nevertheless, ethnic information for 2000 is valuable for comparisons between the various populations. When compared to the Hawaii County ethnic profile, the Total Study Area tended to have higher proportions of Caucasians and lower representation of those of Asian ancestry. The proportion of Native Hawaiians and other Pacific Islanders was higher in the Total Study Area, at 13 percent, compared to eleven percent Islandwide.

The 2000 ethnic makeup of the Primary Study Area was different from both Hawaii County and Total Study Area populations. The Primary Study Area proportion of Caucasians was lower than that of the Total Study Area (31 versus 39 percent in the Total Study Area), and the proportion of Native Hawaiians and other Pacific Islanders was higher (16 versus 13 percent.

2.3.3 Households

Hawaii County households increased 20 percent between 1990 and 2000, from 41,461 to 52,985. The Total Study Area households increased by a significant 50 percent, from 3,095 in 1990 to 4,648 in 2000.

In 2000, the Total Study Area households comprised nine percent of the Hawaii County households. At the same time, the Primary Study Area accounted for 59 percent of the Total Study Area households.

While the proportion of family households decreased in Hawaii County between 1990 and 2000 (from 73 to 70 percent), it increased in the Total Study Area by one percent.

Further, the proportion of family households tended to be higher in the Total and Primary Study Areas, as compared to Hawaii County households. In 2000, 70 percent of Hawaii County households were families. In the Total Study Area, 72 percent of the households were families; in the Primary Study Area, 75 percent.

The average household and family sizes decreased throughout the County between 1990 and 2000, but both remained higher in the Total and Primary Study Areas. In 2000, the Hawaii County average household and family sizes were 2.75 and 3.24 persons, respectively. The Total Study Area household and family sizes were 2.81 and 3.23 persons, respectively. In the Primary Study Area, both households and families tended to be larger, at 2.94 and 3.35 persons, respectively.

2.3.4 Housing Units

Housing units throughout Hawaii County generally increased proportional to the increase in households between 1990 and 2000. In 2000, the Total Study Area 5,268 households comprised eight percent of the total islandwide housing unit supply. The Primary Study Area accounted for about half of the Total Study Area housing units, with 2,634 units.

The proportion of owner-occupied units increased in Hawaii County between 1990 and 2000 (from 52 to 54 percent), and increased significantly in the Total Study Area (from 38 to 47 percent).

Nevertheless, the Total Study Area tended to have proportionally less owner-occupied units when compared to Hawaii County and the Primary Study Area in 2000. In the most recent census, 55 percent of the islandwide housing supply were owner-occupied. Fifty-nine percent of the Primary Study Area housing units were owner-occupied. Only 47 percent of the Total Study Area housing units were owner-occupied.

There was a significant difference in housing vacancy rates at the time of the 2000 census. In Hawaii County, 16 percent of the housing units were reportedly vacant. A significantly high 20 percent of the Total Study Area housing units was vacant. In contrast, nine percent of the Primary Study Area housing units were vacant in 2000.

3 Public Plans and Policies

Public plans and policies help define the social context for the proposed changes. With the proposed Lalamilo project, two areas of public policy influence its social context. County plans and policies provide direction for land use and growth management of the island and subject region. Federal and State laws provide the legal impetus for developing the proposed project.

Section 3.1 provides an overview of legislation that governs DHHL. Section 3.2 discusses the County of Hawaii draft General Plan, its role in the planning system, and specific directives for South Kohala.

3.1 Hawaiian Homes Commission Act

The legal foundation for the existence and mandate of DHHL is the Hawaiian Homes Commission Act, 1920, as amended. This Congressional Act, hereafter referred to HHCA, mandates the Hawaiian Homes Commission to manage a Hawaiian Home Lands trust that currently encompasses 203,500 acres on Hawaii, Maui, Molokai, Oahu and Kauai. DHHL is charged with managing and protecting this trust so that land distribution to beneficiaries is carried out in a timely and efficient manner.

DHHL beneficiaries are those with at least 50 percent Hawaiian blood. The intent is to promote economic self-sufficiency by providing land. Direct benefits to beneficiaries include 99-year homestead leases at an annual rent of $1 for residential, agricultural and pastoral uses.

In addition, HHCA provides the following services to beneficiaries:

- financial assistance through direct loans or loan guarantees for home construction, home replacement or repair, and for the development of farms and ranches
- technical assistance to farmers and ranchers
- operation of water systems

To generate revenues for the homesteading program, DHHL is authorized to dispense lease lands and issue revocable permits, licenses and rights-of-entry for lands not in homestead use.

During the 1990s, several key events advanced the goal of strengthening the Hawaiian Home Lands trust. One was the resolution of trust claims with the State of Hawaii. On June 19, 1995, the Governor signed Act 14 of the Special Session of 1995 into law. The Act resolves land claims involving compensation for the past use of and title to Hawaiian Home Lands.[3]

Act 14 established a Hawaiian Home Lands trust fund, and required the State to make 20 annual deposits of $30 million into the trust fund for a total of $600 million. As of December 2001, DHHL received approximately $60 million. All of this money has been used to open new homestead areas for beneficiaries of the program. Other provisions of Act 14 include:

- Transfer lands and resolve specific claims in Waimanalo, Anahola, Kamalomaloo, and Molokaa
- Compensate all remaining confirmed uncompensated public uses of Hawaiian Home Lands
- Initiate land exchanges to remedy uncompensated use of Hawaiian Home Lands for State roads and highways claims
- Authorize DHHL first priority to select up to 200 acres of surplus ceded land at Bellows Air Force Station, Waimanalo, upon its return to the State of Hawaii, and
- Authorize the transfer of 16,518 acres of public lands to DHHL to be designated as Hawaiian Home Lands.

This final action increases the total DHHL land inventory to 203,500 acres.

Another key event is the resolution of trust claims with the Federal Government. The Hawaiian Home Lands Recovery Act was passed by Congress in June 1994, and signed into law in November 1995. This law established a mechanism for valuing Hawaiian Home Lands under the control of Federal government and authorizing exchanges of excess Federal land based on a value determination. In August 1998, a Memorandum of Agreement was signed to allow for the transfer of 960 acres of excess land on Oahu to DHHL.

[3] *State Department of Hawaiian Home Lands, Annual Report for Fiscal Year 1999 - 2000.*

In terms of land resources, Hawaii Island has 116, 703 acres if land resources. The breakdown of acreage by use is as follows:

- 27,268 acres are in homestead use
- 46,157 acres are held in general leases
- 15,935 acres are licensed
- 27,193 acres are in other uses

3.2 Hawaii County General Plan

Planning in Hawaii County is conducted in a three-tier system. The first tier is the General Plan, which is a long-range plan containing goals, policies, standards and courses of action for the island. The General Plan forms the legal foundation of other elements in the County's planning system.

The second tier of the County planning system includes short and mid-range plans related to specific geographic regions, functions and special areas within a region.

The third tier includes zoning and subdivision codes and other specific mechanisms intended to implement the first and second tier.

The first General Plan was adopted by County ordinance on December 15, 1971. The plan is currently being revised and a draft was issued in December 2001. The information in this section is based on this draft.

As the most fundamental and directed document in Hawaii County's planning system, the General Plan includes a comprehensive review program that investigates and analyzes all aspects of the County under a standard methodology. General Plan elements include:

- Economics
- Energy
- Environmental quality
- Flooding and other natural hazards
- Historic sites
- Natural beauty

- Natural resources and shoreline
- Housing
- Public facilities and utilities
- Recreation
- Transportation
- Land uses in terms of agriculture, commercial, industrial, multiple residential, open space, public lands, resort and single family residential

Three sets of projections were developed based on the assumptions that:

- The new agriculture industry is characterized by a few large operations such as agroforestry and ranching. It is expected that agricultural employment will increase as former sugarcane lands are brought into prodcution with import replacement, export and value added crops and products, as well as agrotourism enterprises.
- A multi-market base for the visitor industry will be pursued, and it is expected that visitor and related industries employment will increase
- There is expansion potential in other industries such as aquaculture, astronomy, renewable energy, research and development, and special events.

The three sets of projections based on these assumptions are as follows:

- Series A is the most conservative set of projections. It assumes a one percent growth rate in the visitor industry, and that construction activities and employment growth will be limited.
- Series B is the mid-series, and assumes a two to 2.2 percent per year increase in visitor arrivals per year.
- Series C is the most optimistic set of projections. It assumes a visitor industry annual growth rate of three percent per year.

Table 4 shows the Series A, B and C population projections for Hawaii County in 2005.

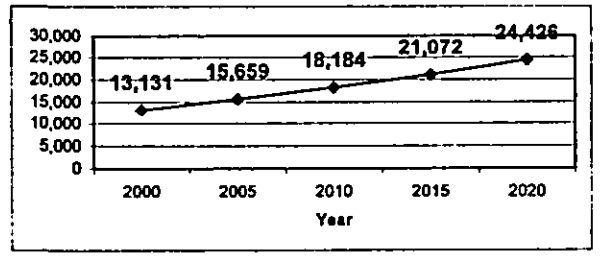
Table 4: Projected Population Distribution for Hawaii County, 2020

District	2000	2005	2010	2015	2020
Puna	31,335	36,351	42,591	49,801	58,246
South Hilo	47,386	46,273	47,477	48,614	49,791
North Hilo	1,720	1,643	1,720	1,798	1,879
Hamakua	6,108	6,196	6,561	6,933	7,328
North Kohala	6,038	6,622	7,917	9,446	11,273
South Kohala	13,131	15,659	18,184	21,072	24,426
North Kona	28,543	30,467	34,024	37,922	42,275
South Kona	8,589	10,253	11,414	12,681	14,092
Ka'u	5,827	6,443	7,050	7,698	8,408
Total	148,677	159,907	176,938	195,965	217,718

Source: County of Hawaii Planning Department, County of Hawaii General Plan Revisions (December 21, 2001), page 27.

In the Series B, or moderate set of projections, South Kohala is projected to grow from 13,100 to 24,400 persons. Relative to the projected county-wide projections, South Kohala would increase its proportion of the total Hawaii County population from nine percent in 2000 to eleven percent in 2020.

Figure C: Series B Population Projections for South Kohala, 2000 to 2020

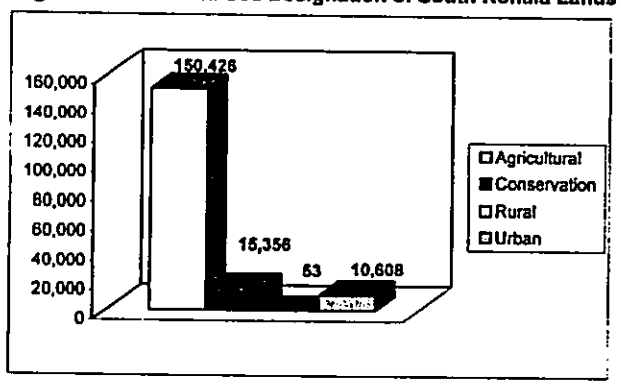


Source: County of Hawaii Planning Department, County of Hawaii General Plan Revisions (December 21, 2001).

These population projections suggest an average growth rate of 1.8 percent in the first five years, and stabilizing to 1.5 percent through 2020.

South Kohala comprises 176,443 acres, and Figure D shows the State Land Use designations for these lands.

Figure D: State Land Use Designation of South Kohala Lands



Source: : County of Hawaii Planning Department, County of Hawaii General Plan Revisions (December 21, 2001), page 340.

In terms of residential land, the General Plan estimates that there are 1,507 acres of multiple family-residential land, and most of this is in the resort areas. Approximately 3,382 acres of South Kohala land is in single family residential zoned lands, and most of this land is in Waimea and Waikoloa Village. Almost 2,700 of these acres are lands permitting 10,000 square foot residential lots.

4 Preliminary Community Issues

For the purposes of this social impact assessment, community issues are reactions and opinions about a proposed change or public policy. Community issues change over time, based on changes in community makeup and values, and project and policy changes.

This study presents an analysis of community issues as of July 2002. Section 4.1 discusses the approach for conducting this analysis, and Sections 4.2 through 4.4 present findings. Section 4.5 presents an analysis of findings.

4.1 Approach for Conducting Issues Analysis

The issues analysis was based on three sources of information. The first source included written documentation, such as correspondence and other material that reflected community viewpoints of project issues and impacts. This material was generated by several individuals, as well as the following organizations and agencies:

- South Kohala Traffic Safety Committee
- Waimea Community Association Planning and Design Committee
- County of Hawaii Department of Parks and Recreation
- County of Hawaii Planning Department
- Waimea Trails and Greenways
- Waimea Outdoor Circle
- Sandalwood Homeowners Association
- "Aaah, the views" Bed and Breakfast
- Waiaka Hui
- A school group including the Waikoloa Elementary School principal, the Waimea Middle School principal, the president of the Waimea School Parent-Teacher-Student Association, a Waimea School parent and a member of the Paauilo Community

The second source included interviews with selected community members. These interviews were intended to follow-up on issues raised in written sources. Table 5 identifies those interviewed and their affiliations. Note that affiliations are provided to indicate the perspectives and background of interviewees. They were not asked to represent the views of their respective organizations.

Table 5: List of People Interviewed for This Study

Name	Affiliations
Leningrad Elarionoff	Member of the Hawaii County Council and Chair of its Public Works Committee Member of the Waimea Community Association
Ku Kahakalau	Executive Director of Kanu O Ka'Aina Charter School
Joe Kealoha	Resident of Puu Kapu Homestead Association President of Ho'aloha Golf Club Board of Directors of West Hawaii Law Enforcement Club Police Officer
Kanani Kupuniai	President of Waimea Hawaiian Homesteaders Association
Kaipo Kincaid	Executive Director of Hui Kakoo Former President of Hui Kakoo Currently on the Hawaiian Home Lands waitlist
John Ray	President of Hawaii Leeward Planning Conference President of Waimea Community Association Chair of the South Kohala Traffic Safety Committee President of the Board of Directors of Family Support Service in West Hawaii

Name	Affiliations
Patricia Rice	Waimea Middle School Standards Implementation Design/ Title 1 Coordinator and Middle School Coordinator Teachers Representative on the School Community-Based Management Council Vice President of Kanehoa Community Association (community near the project site)
Cindy Shiraki	Member of School Community Based Management Council for Waimea Elementary And Middle School Member of the Board of Directors of the Parent Teacher Student Association of the Waimea Elementary School Member of the Waimea Planning and Design Committee Member of the Board of Directors of the YMCA

The third source included our observations at a meeting of the Waimea Community Association on 6 June 2002 in which the proposed Lalamilo project was discussed.

4.2 Issues Raised in Project Correspondence

We reviewed correspondence related to the proposed project and in response to the EIS Preparation Notice. Except for a letter from Waimea Community Association dated 2 July 2002, the correspondence was sent in January 2002. The following summarizes concerns raised:

- Archaeological impacts, in light of the existence of a large agricultural field system and burial sites
- Social integration and appropriateness, as related to the influx of many people to the area, the need for an effective social acclamation program, the need to include homesteaders in the planning process, and possible increase in drug use

- Transportation and circulation, which was a major concern in most of the correspondence, particularly in terms of existing conditions and the lack of major regional transportation improvements
- Impact of fumes from adjacent power generation plant, old landfill and solid waste transfer station on project residents
- Addition of non-residential uses to this vicinity, particularly in light of community desire to retain the rural character of this area
- Proposed industrial use on lands intended for a trail head park
- Infrastructure impacts on streams, particularly those related to septic systems
- The source of nearby employment opportunities for project residents, given the magnitude of the increase in population and the limited availability of jobs in Waimea and Honokaa
- Impacts on already-strained public educational facilities and services
- The impact of a major population increase on currently-limited community recreational gathering places
- The need for underground utilities to reduce visual impacts
- The need to enforce and maintain design guidelines to avoid the situation of inconsistent housing quality in the Kawaihae homestead community

Most of these issues are similar to those raised by interviewees and are discussed in Section 4.3.

4.3 Interview Findings

To understand the social context in which the project is being proposed, interviewees were asked to first discuss their feelings about the community's strengths and problems, as well as their hopes for the future of the community. Interviewees were then asked to discuss the project's relationship to the existing community's characteristics. They were also asked for suggestions on how to successfully implement the project.

4.3.1 Findings Related to the Existing Community

Community Strengths

Those interviewed felt that Waimea's greatest strengths are its natural beauty, climate, and its qualities as small, tight-knit community. They felt that Waimea's beauty lies in its green hills and its open plains, and appreciated the proximity to the dramatic Mauna Kea and Mauna Loa, and the verdant environment of North Kohala. The region is reportedly cool and moist, differing from the extremes of Hilo's downpour and Kona's dryness.

Interviewees appreciated the rural lifestyle and characterized it as slow-paced and easy-going. They contrasted the region's lifestyle to the visitor and business-like atmospheres present along the Kohala coast and Kona.

Those interviewed strongly felt that the people are a major component of the community's strength. They noted that the people are willing to work together on important issues. While the community comprises several distinct groups, including ranchers, homesteaders, farmers, environmentalists, and business people, they felt that there is an underlying trust and caring that unite people in dealing with youth and school-related matters.

It was also felt that Waimea has a strong Hawaiian presence. The ranch and paniolo legacy helped to shape the existing community identity, and much of the rural character is based on Hawaiian values such as ohana and aloha.

Community Problems

While the interviewees appreciated its cohesive qualities, they also noted socioeconomic divisions as problems. There is a reported division between affluent and those with low income. Interviewees felt that more affluent residents have choices that allow them to separate themselves from others. The school situation was cited as an example. Waimea has two private schools that provide educational alternatives to the public school system. It was felt that those who can afford private school tuition have little incentive to advocate improvement of the Waimea Elementary and Middle Schools, and are not interested in helping to establish a high school in Waimea.

It was noted that relative newcomers and long-time residents do not typically interact in community matters, and that long-time residents often do not join large community organizations. Long-time residents noted that newer residents have increasingly dominated community organizations. Newcomers tend to be more affluent, more articulate and bring different values to the community. As a result, long-time residents have shied away from organizational meetings unless there are clear benefits to their participation.

Interviewees were very concerned that crime and drug use are increasing in Waimea. It was felt that the use of drugs, particularly crack, is escalating for several reasons. Interviewees believed that drugs appeal to young people because the shortage of youth facilities and activities. Financial pressures require that parents commute and work extensive hours, thereby leaving children on their own for long periods of time. The drug problem is not isolated to the youth. Reportedly, many adults also use drugs to escape from daily stress often related to making financial ends meet.

It was further believed that the high presence of affluent people, including boarding students at private schools, makes it easier for drugs to enter the community.

School-related issues were a major concern. It was felt that there is disparity between the private and public educational facilities, which, in turn, contributes to social divisions.

More importantly, there were numerous problems cited regarding the public education system and facilities. Interviewees noted that the facilities at the Waimea Elementary and Middle Schools are old and over-crowded. These conditions result in program deficiencies. One example cited is the recent transition of a middle school shop facility to a regular classroom. This has eliminated the shop classes that were popular among the students.

Related to the school conditions is the lack of a public gathering places especially for young people. The only gym available to the general community is the Thelma Parker Gym at the Waimea Elementary and Middle Schools. It is old and overused, according to those interviewed. In addition, use is restricted through rules administered by the State Department of Education. Organizations must pay a fee to use the facility, even though many of the programs benefit the schools' students.

Although the community may also use Kuhio Hale, a DHHL facility, the demand is so high that it is generally reserved a year in advance.

Traffic is a major concern. Interviewees noted that there is only one main roadway artery that must be shared by the town's residents and people just passing through. While there have been discussions over the past 30 years about a new route designed to direct traffic away from the town, the bypass route is not scheduled for implementation in the near future.

A related community problem is the rapid pace of growth and the changes associated with growth. Long-time residents remembered that traffic lights are relatively recent, and that shopping malls and commercial strips have begun to dominate the town. They pointed out that "we don't know everybody anymore," and that they are losing that small town feeling.

Desired Future for the Community

Interviewees want the area to remain a rural community. They felt that there has already experienced major changes, and hoped that future development will be limited and designed to maintain the rural character. They advocated strong planning measures to limit commercial and industrial uses, and the level of residential development.

Those interviewed also want an answer to the growing problem of traffic. While a bypass has been discussed, there seems to be no solution in sight. They felt that any new development should address cumulative traffic impacts.

Education was also high on the list of a desired future. Interviewees expressed a hope for better educational system and facilities. They wanted the Waimea Elementary School expanded and improved, and the new facilities for the Waimea Middle School. They also hoped that Waimea would eventually have its own high school.

Further, given the high proportion of Hawaiians in Waimea, it was hoped that the existing Hawaiian language immersion charter school, Kanu o Ka Aina, has a permanent facilities.

Interviewees were also hopeful for new community gathering places. They strongly felt that new residential development projects should provide publicly-accessible community facilities since the new residents will be impacting existing facilities.

4.3.2 Reactions to the Proposed Project

Planning Process for Lalamilo

All of those interviewed were familiar with the proposed project. They had either attended the two community presentations made by DHHL, or had direct communication with project team members, or had read newspaper accounts. While there was appreciation for these attempts to inform the public, there was also frustration that, at the time of the interviews, the project density has remained the same, despite community concerns.

It was also noted that, while presentations have been made to general community organizations, no outreach efforts were made specifically to homestead groups and beneficiaries.

Interviewees cited the Parker Ranch 2020 process as an example of how they believed that planning should have occurred. The process extended for several years, and was inclusive of the various interest groups.

Relationship of the Project to Community Strengths, Problems and Desired Future

Those interviewed felt that Lalamilo would help strengthen the Native Hawaiian presence in Waimea. This would contribute to the continuing community identity that is shaped, in part, by Hawaiian values of past and current residents.

For the most part, however, those interviewed felt that the project will lessen the community strengths and add to current problems. In general, they believed that the project's timing and density would exacerbate community problems on several levels.

They were concerned that the open space quality of the area will be diminished. The addition of 400 new homes in this vicinity would detract from the current rolling hills and views of the area's streams.

Further, they feared that there might be no bylaws to govern the quality and long-term appearance of the new community, thereby further negatively impacting views. Interviewees felt that, without strict design guidelines, the new community may have a range of structural design and quality, and the existing situation at the Kawaihae Hawaiian Homestead community was cited as an example of inconsistent housing quality.

Interviewees were very concerned that the infrastructure system would be further strained and worsen an already intolerable situation. Traffic was a common concern. It was noted that, if each of the 400 new families owned at least two cars, which is common, there would be at least 800 new cars on the road.

Another infrastructure concern was related to the streams that run through and near the project site. Interviewees were concerned that runoff and emissions from the industrial and commercial area would negatively impact the ecosystem. It was also felt that any additional septic systems in the residential area could potentially impact stream water quality.

The impact of 400 new families on the public educational system was a major concern. Interviewees felt that the schools already are at a breaking point, and that any addition has significant negative impact.

A likely increase in crime was a big issue, and it was stressed that this concern is not specific to DHHL and its beneficiaries. Rather, their concern was related to the fast timing and density proposed for Lalamilo. Interviewees felt that any increase in families with children would increase the need for stronger drug control measures, more youth activities and facilities and more effective social and educational programs.

4.3.3 Suggestions for the Successful Implementation of Project

Most believed that the DHHL should take its time when adding significantly more people into an already dense area. They suggested a reduction in density, as well as delayed timing. It was felt that the two-year implementation schedule was unrealistic and would be a burden to the existing community.

It was also suggested that DHHL enforce strict rules to keep houses and lots attractive and well maintained and within the context of the existing rural character.

Further, interviewees strongly suggested that educational needs are addressed and met prior to any substantial increase in population.

4.4 Issues Raised at a Recent Waimea Community Association Meeting

The Lalamilo project was discussed at a regular meeting of the Waimea Community Association held on 6 June 2002. DHHL officials and project consultants provided a presentation, and noted that project changes have been made to accommodate community issues heard to date. Significant changes included eliminating industrial uses in the area proposed for a trailhead park, an extension of the implementation time frame from two to seven years, and an alternative scenario comprising one-acre lots in addition to the 10,000-square foot lot alternative.

Most of the comments were related to accommodating traditional Hawaiian lifestyle in the project, and reactions to comments by the general community regarding the development.

Regarding accommodating traditional Hawaiian lifestyle, some participants reacted negatively to DHHL comments that the project would not include ohana housing, and would have rules regarding housing design and maintenance. Meeting participants felt that the proposed 10,000 square foot lots were too small to accommodate the traditional Hawaiian lifestyle. This lifestyle was characterized as living with extended family, particularly so that multi-generational families could live on one property. It was felt that Lalamilo should have at least one to two-acre lots that would allow multiple units, or ohana zoning. They stressed the need to take care of their kupuna in contiguous or adjacent housing. This concern was raised by both Hawaiian and non-Hawaiian participants.

Others felt that 10,000 square foot lots optimized the opportunity for beneficiaries to live on homestead land. There was also an expressed desire for rentals for those who cannot afford homeownership.

Regarding reactions to general community concerns about the Lalamilo project, some Hawaiian participants expressed resentment people were critical of project impacts and density. They noted that Hawaiians have historically been very accommodating to newcomers, and that this is particularly true in Waimea. They felt that, by opposing or criticizing the Lalamilo project, the general community is not returning that same welcome to the host culture.

A related issue is the need for more housing for DHHL beneficiaries in Waimea, especially in light of private residential development under the Parker 2020 plan. Participants felt that Hawaiians need affordable homes, and may not be able to afford the market housing currently under construction.

Other comments were related to school-related issues previously discussed in this section. DHHL officials noted that the department is working with the State Department of Education and the Kanu O Ka'Aina Charter School to see how DHHL can participate in improving educational conditions in Waimea.

4.5 Issues Analysis

1. **The Lalamilo Project is viewed as a significant contributor to Waimea's current physical and social infrastructure problems.**

   As of this writing, the Waimea community, as represented by those who have expressed opinion on Lalamilo, is not ready to accept the proposed project. The project is not viewed as a contributor to community strengths, but rather is seen as part of growing problems. Although school capacity and traffic are major issues independent of the Lalamilo project, the project's addition of new residents has an integral relationship to how and when these problems are solved. Until these problems have definite solutions in sight, the Lalamilo project will likely elicit negative connotations with the general Waimea community.

2. **Some project changes have addressed concerns raised by the community.**

   The changes related to the project implementation schedule and the elimination of one of the industrial areas were announced in June 2002. Prior to this, community issues were often related to the magnitude of change proposed over a two-year period. The extension of the implementation time frame to seven years mitigates some concern by providing more time for assimilation and mitigating impacts.

3. **Rural character issues will likely continue.**

   The proposed project will permanently transform a natural undeveloped area into a residential subdivision and commercial and industrial areas. The community is likely to continue to be concerned about this change, since rural character is a commonly identified community strength. The concern is likely to heighten if the commercial and industrial areas attract large numbers of people and are visually urban in character.

4. **The conflict between traditional Hawaiian lifestyle and conventional residential subdivisions is not unique to this project.**

   DHHL is aware of the desire of some beneficiaries to have large acreage lots that accommodate multi-generational families and subsistence agriculture. The department's homesteading program therefore includes a wide diversity of housing types, including kupuna housing, rentals and large acreage lots.

5 Potential Social Impacts

5.1 Population Impacts

The proposed Lalamilo project will increase the area's residential population due to the development of residential lots. Table 6 provides estimates of resident population at full build-out. Projections are included for both the original lot count of 400 units, and a subsequent lot count of 442 due to project redesign.

Table 6: Projected Resident Population of Lalamilo Project at Full Build-Out

	Low Estimate Based on Primary Study Area Average Household Size of 2.94 Persons	High Estimate Based on Primary Study Area Average Family Size of 3.35 Persons
400 residential lots	1,176	1,340
442 residential lots	1,299	1,481

For both lot counts, low and high estimates are provided to indicate a possible range. The low estimate is based on the 2000 average household size for the Primary Study Area, which extends from Waimea to Puu Anahulu. The high estimate is based on the 2000 average family size for the same area. Typically, family households, which include only related individuals, are larger than the general households, which may include individuals who are not related to each other.

It is likely that the project will generate a resident population at the high estimate level, in that the new residents are expected to be mostly in family households.

Table 7 shows the proportion of the project population relative to projected population estimates for the South Kohala District. At full build-out, the Lalamilo project will comprise eight percent of the projected South Kohala population in 2010.

Table 7: Proportion of Lalamilo Resident Population to Projected South Kohala District Population: 2010, 2015, 2020

	Year		
	2010	2015	2020
Population Projection for South Kohala District	18,184	21,072	24,426
Percentage of Lalamilo Project Residents	8%	7%	6%

Compared to the 2000 population for Total Study Area, or the South Kohala District, the proposed Lalamilo project would represent a ten percent increase over the 2000 resident population. Further, the Lalamilo project represents a 20 percent increase over the Primary Study Area 2000 population.

5.2 Project Relationship to Public Policies

5.2.1 Hawaiian Homes Commission Act

As discussed in Section 3, DHHL is charged with managing and distributing trust lands for the use of its beneficiaries. As of June 30, there were 31,318 applications for homestead awards held by 19,302 applicants. Applicants are allowed to hold two applications, including one for a residential lot and one for an agricultural or pastoral lot. [4]

In 2000 and 2001, DHHL conducted a study to determine land area preferences among Hawaii Island applicants and to identify applicant needs and preferences related to land use and lot size. Hawaii Island lessees were also surveyed to quantify opinions on issues related to land use and distribution.

[4] *State Department of Hawaiian Home Lands, Department of Hawaiian Home Lands Annual Report: FY 1999 – 00, page 6.*

At the time of the survey, there were 7,883 Hawaii applicants who made 11,755 applications. Of these, 5,114 applications were for residential lots.[5]

Among residential applicants, North Hawaii, which includes the Lalamilo project site, ranked second in terms of area preferences; East Hawaii ranked first. [6] Geographic preferences were very important to applicants. Forty percent of the residential applicants were willing to accept a smaller lot size to get on the land sooner rather than change area preferences. [7]

In terms of how their house would be built, 38 percent indicated they would build a house with a contractor, 29 percent would use a self-help housing program, and 33 percent expected DHHL to build a unit.

Survey findings suggest that many applicants may not have the level of financial resources required to qualify for standard financing. The survey developed a classification system to analyze financial qualification information. The system included Level 1, which included those who already have real estate equity and/or savings of $10,000; this group would likely qualify for standard financing. At the other extreme, Level 4 included those not likely to qualify for standard financing. For the residential applicants, 29 percent were classified as Level 1 and 28 percent were classified as Level 2.

For those who selected North Hawaii as their preferred area, and expect to reside on the property, the majority said that they would reside on the land two to three years after receiving the award. [8]

The proposed Lalamilo project would have significant positive impact on DHHL's homesteading program. The project is consistent with applicant preferences to reside in North Hawaii. The project will include turnkey development, self help and/or owner-builder options to accommodate applicant needs. More importantly, it will provide 442 qualified beneficiary families houselot opportunities that would be available only through the DHHL homesteading program.

[5] *SMS, Beneficiary Surveys for DHHL Hawaii Island Plan (February 2001), page 2.*
[6] *Ibid., page 8*
[7] *Ibid., page 11.*
[8] *Ibid., page 16.*

5.2.2 County of Hawaii General Plan

The proposed Lalamilo project is generally consistent with policies set forth in the County of Hawaii General Plan. On the General Plan Land Use Pattern Allocation Guide Map, the project site lies in areas designated as Urban Expansion, Low Density Urban and Flood Plain. The project is consistent with policies and expectations that the project site would be developed for urban and low-density urban uses.

In terms of policies related to single-family residential, the General Plan encourages the development of appropriately located and serviced State-owned Hawaiian Home Lands and privately held lands for houselots. The Lalamilo project is being implemented to serve this purpose.

The General Plan calls for the establishment of Waimea as the regional commercial center for northern Hawaii. The General Plan restricts strip and spot commercial development on highways outside Waimea. In that the proposed commercial area is in the Waimea region but not within the Waimea Town proper, the proposed commercial area is inconsistent with these policies.

In terms of industrial uses, the General Plan encourages the development of a regional industrial park at Kawaihae and the centralization of limited industrial activities in Waimea. The proposed industrial area is adjacent to an existing industrial area that includes government-operated industrial uses and utility installations. The project is therefore consistent with industrial-related policies in that it is contiguous with an existing industrial complex.

5.3 Community Integration

The proposed Lalamilo project would increase the number of resident beneficiaries of the DHHL homesteading program in the South Kohala District, and, specifically, in the Waimea region. This would add another residential community whose residents share distinct ethnic and cultural characteristics.

Waimea already has several homestead communities. Nevertheless, the magnitude of the Lalamilo project relative to the existing community warrants a discussion of how the new residents can be successfully integrated into the existing community. This integration is crucial to maintaining and enhancing the small-town environment that currently exists in the area.

In interviews and correspondence related to this project, it was noted that there already exists divisions in the Waimea community. These divisions were reportedly based on economic status, ethnicity and length of residence. It was also felt that these divisions contribute to inequity, such as the difference in quality and conditions between the region's public and private schools.

While it is beyond the scope of this project to provide a thorough analysis of social conditions and integration, it is nevertheless important to address these issues to some extent because of the magnitude of the project and its potential to influence these existing social conditions.

5.3.1 Social Equity and Community Development

Social equity within a community refers to the fairness and inclusiveness with which resources are distributed, opportunities afforded, and decisions made. The principal objectives of social equity include:

- Redress poverty and to reverse trends toward greater disparity between rich and poor.
- Strengthen local democratic processes and encourage regional, ecologically sustainable initiatives.
- Enhance and support management capabilities within local communities.
- Mount programs to address the failure to provide adequate basic services.
- Target services for disadvantaged groups.
- Access to justice must be available equally to all people, no matter what their level of income.

From a community development perspective, social equity is essential to promoting "smart growth" principles. Smart growth is a planning movement that recognizes that current development patterns are typically dominated by development "sprawl" which has negatively affected cities, existing suburbs, small towns, rural communities, or wilderness areas. Communities are questioning the economic costs of abandoning infrastructure in the city, only to rebuild it further out. Spurring the smart growth movement are demographic shifts, a strong environmental ethic, increased fiscal concerns, and other views of growth. Hence, there has been both a new demand and a new opportunity for smart growth. [9]

Social equity and smart growth are intricately related because the latter requires equity to plan for the future of communities. To achieve smart growth, the various parts of a community need to have an equal voice in determining policies and directions, and the following are requirements for promoting smart growth:

- *Universal Access to Resource and Opportunities throughout the Region.* Inaccessibility to resources and socioeconomic opportunities create imbalances that foster poverty and hardship within urban communities and affluence and growth on the urban fringe.
- *Preventing Negative Impacts of Development: Gentrification and Disinvestments.* Measures should be in place to mitigate the effects of urban sprawl – where businesses and housing development move beyond inner cities toward the suburbs – exacerbating unequal distribution of resources and socioeconomic opportunities.
- *Creating and Maintaining Healthy, Diverse, Inclusive Communities throughout the Region.* Government policies, i.e., housing, employment, transportation and education, should be equally beneficial to everyone. Policies should curb socioeconomic and racial inequities such as residential segregations and disintegrated community developments should be discouraged.

[9] *"About Smart Growth," available online at http://www.smartgrowth.org/about/default.asp.*

5.3.2 Achieving Social Equity and Integration with the Proposed Lalamilo Project

The proposed Lalamilo project is being proposed in a community which 1) reportedly has some degree of divisions along economic and ethnic lines, and 2) is apparently trying to move toward more integration and equity. The integration of the project residents therefore depends, to a large degree, on the ability of the existing and new residents to work towards greater social equity in determining the future of the overall region.

The following are equity-oriented measures in regional planning to move the community towards full integration:

- *Ensuring Voice and Agency for Traditionally Underrepresented Constituencies.* Programs and policies addressing the impacts of sprawl should involve community participation by the diverse stakeholders. Low-income and minority groups leaders should be given voices in addressing the various challenges and opportunities within the community and region.
- *Giving Weight to the Third E – "Equity" – in Design, Implementation, and Impact Assessment.* The three "E's" in sustainable development are environment, economy and equity. Each component cannot stand-alone and more recognition should be given to equity in community development. Without equity, proponents of the environment and economy will be competing against each other resulting in a zero-sum game.
- *Linking Place-based and People-based Strategies.* Community building aims to strengthen through a mix of people and placed-based strategies. The features of community building should incorporate broad-based resident involvement; be asset based driven identifying and strengthening community assets; and provide linkages between outside institutions to neighborhood residents as well as address racial barriers to neighborhood development. [10]

Table 8 illustrates how people-oriented programs combined with place-based strategies can result in positive consequences related to regional equity, sustainable communities and environmental justice.

[10] *Angela Glover Blackwell, "Equity Priorities in Regional Planning," as presented in the New Orleans Chapter of the American Planning Association Symposium on Fair Growth: Connecting Sprawl, Smart Growth, and Social Equity held in March 2001; available online at http://www.asu.edu/caed/proceedings01/FAIRGRTH/*

Table 8: Linking People-Based and Place-Based Strategies to Achieve Positive Social Consequences

People-Based Strategies	Place-Based Strategies	Social Consequences
Workforce Development Producing job opportunities in both urban and rural areas. Providing incentives for businesses to redevelop urban areas.	**Transportation** Providing adequate alternative transit systems between communities and economic areas.	**Regional Equity** Equal distribution of resources, services and economic opportunities to both inner-city, suburban and rural residents.
Safety Net Programs Providing equal distribution and access of resources and services throughout a community or region.	**Housing policies** Creating effective linkages between communities (such as adequate housing with access to public transportation) and economic opportunities.	**Sustainable Communities** Citizen involvement in the processes/programs that implement restoration of economic, social and environmental vitality to its entire community.
Social Justice/Civil Rights Investing in building community building and focusing on regional planning efforts around human and environmental development.	**Environment** Focusing on physical development issues and recognizing the socioeconomic impacts as well.	**Environmental Justice** Meshing environmental, economic and equity components in sustainable development.

Source: Angela Glover Blackwell, "Equity Leads to Smart Growth," as presented in the New Orleans Chapter of the American Planning Association Symposium on Fair Growth: Connecting Sprawl, Smart Growth, and Social Equity held in March 2001; available online at http://www.asu.edu/caed/proceedings01/FAIRGRTH/

Achieving social equity and smart growth are efforts that extend well beyond the addition of 442 new homes. It requires strong will on the part of existing residents, and conscientious efforts of developers to integrate their proposals within the existing social context. It is recommended that DHHL encourage its Lalamilo, as well as other South Kohala homestead neighborhood, residents to fully partake in community activities related to achieving equity through planning and community development.

5.4 Public Services and Facilities

5.4.1 Police Protection Services

Police protection in the South Kohala District is provided by officers located at the Waimea Police Station, a police substation at the Mauna Lani Resort, and a mini police station at Waikoloa Village.

South Kohala has four beats in operation. The mauka beats are in and around Waimea. The makai beats include Waikoloa and Mauna Lani. The minimum watch is four police officers, which is one officer per beat, and five officers are generally available. [11]

The Lalamilo project will impact police protection services by increasing the service population, thereby increasing the number of calls and incidences.

It is recommended that the Lalamilo project mitigate impacts on police protection services through security measures such as on-site security, design measures such as well-lit public areas and walkways, and the establishment of neighborhood watch programs.

5.4.2 Fire Protection Services and Medical Emergencies

The project site is served by the Waimea Fire Station No. 9 located in Waimea Town. This fire station is an engine company, with one engine, a tanker, and a medic unit. Equipment includes a 1,200 gallons per minute pumper with a 1,000-gallon capacity and a 750 gallon tanker.

The back up company is Engine Company No. 14 located in South Kohala. Four to five firefighters are on duty at all times at both fire stations. The anticipated response time to the project site is about ten minutes.

Emergency services are served by the North Hawaii Community Hospital, located behind the Waimea Fire Station. Thus, the emergency response time to the project site would also be ten minutes. [12]

[11] *Personal communication with Captain Robert Kaaua of the Waimea Police Station on 11 July and 23 July 2002.*

[12] *Personal communication with Dennis Iyo, Temporary Captain at the Waimea Fire Station on 29 July 2002*

The Lalamilo project will impact fire protection services by increasing the service population and structures, thereby increasing the number of potential fires and emergencies.

The project will meet fireflow requirements. Further, the individual units will need to meet Hawaii County building code requirements to ensure public safety.

5.4.3 Public Schools

Residents of the Lalamilo project would be served by the Waimea Elementary and Middle Schools for grades kindergarten through eight, and the Honokaa High and Intermediate Schools for grades nine through twelfth grade.

The actual enrollment and a seven-year projection for these schools are presented in Table 9.

Table 9: Design, Actual and Projected Enrollment for Schools Affected by the Lalamilo Project

	Design Enrollment	Actual Enrollment in 2001	Projected Enrollment					
			2002	2003	2004	2005	2006	2007
Waimea Elementary School	1035	590	556	549	548	548	540	538
Waimea Middle School		501	505	510	501	490	483	476
Honokaa High and Intermediate School	850	784	764	763	758	756	751	746

Source: The design enrollment is contained in "Total Annual Enrollment: Hamakua Complex 1993 – 2003," as contained in the draft Complex Development Plan for the Hamakua Complex: 1997 – 2017. The actual and projected enrollment figures are contained in "2001 – 2007 Actual and Projected Enrollment: Hawaii District," provided by Keith Kameoka, Statistical Research Branch of the State Department of Education

In all instances, enrollment is projected to decrease over the seven-year period.

In terms of the design enrollment or capacity of these facilities, the Waimea Elementary and Middle Schools were over capacity by 56 students in School Year 2001 and projections suggest that, unless there is an increase in capacity, there will be continued over-capacity until 2006.

The State Department of Education, or DOE, and the Waimea community are working towards finding solutions to these existing problems. On a short-term time frame, the DOE is planning to build a new classroom building at either the elementary or middle school. A funding request may be made in the next biennium, which means that the new facility will be available no sooner than three or four years from now.

Previously, DOE had plans for a new elementary school near the existing facility. The current elementary school would then be improved to house the middle school. A land exchange with Parker Ranch would have provided for additional space for the new elementary school.

The Waimea community preferred a new middle school and has been working with DOE to explore alternatives. Plans for a new school are therefore currently on hold, as is the land exchange. [13]

The proposed project will negatively impact public educational facilities and services by increasing the service population. Table 10 contains estimated student projections related to the proposed Lalamilo project. Note that the estimates are based on the original lot count of 400.

Table 10: Estimated Student Population of the Proposed Lalamilo Project

	Low end (based on fair share standards used to calculate developer contributions)	High end (based on averages in comparable areas)
Elementary	100	180
Middle	40	52
High	40	56

Source: The low end estimates were provided by Sanford Beppu, Facilities Branch of the State Department of Education. The high end estimates were provided by Keith Kameoka, Statistical Research Branch of the State Department of Education. Both were based on personal communication on 3 May 2002.
Note: The estimates are based on the original lot count of 400.

[13] *Personal communication with Sanford Beppu, Facilities Branch of the State Department of Education on 6 June 2002.*

In that the public school system in this region is already at capacity, project impacts become even more critical. Mitigation related to any new residential development must be considered in the cumulative context. As of this writing, DHHL officials have publicly announced that the department is working with the State Department of Education and the Kanu O Ka`Aina Charter School to see how DHHL can participate in improving educational conditions in Waimea. The extent and nature of this participation are under consideration.

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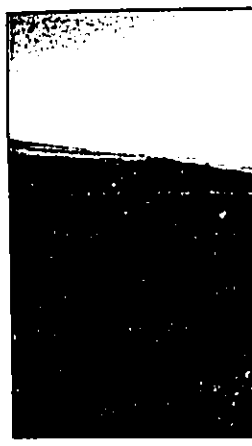
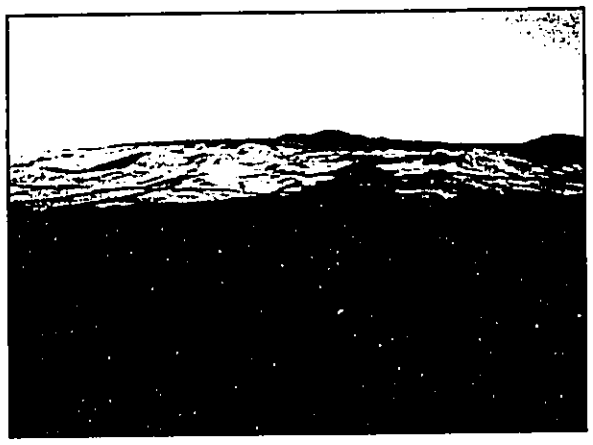
1. View of the western area of the DHHL property looking north towards Kawaihae Road and the homes in the Kamuela View Estates residential subdivision.

2. Keanuiomano Stream near the western end of the property (looking east). The area to the left of the stream would remain as an open space buffer along Kawaihae Road (lined with utility poles).



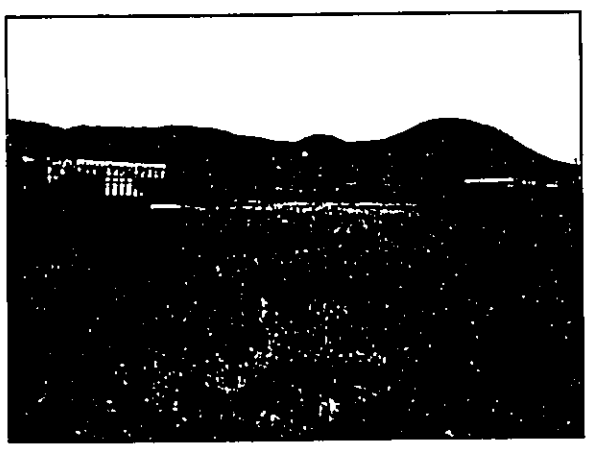
3. View of the western a towards the ocean in di

5. Historically, the property has been used for grazing, most recently by Palekoki Ranch. Prior to heavy rainfall in November and December 2001, the pastureland was heavily grazed and arid.



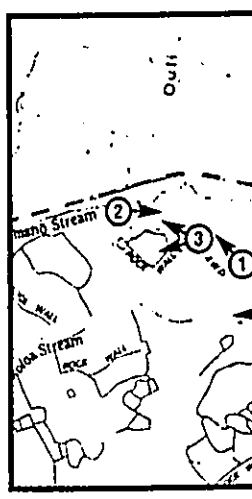
6. Following the rainfall in November - December 2001 and the cessation of grazing, herbaceous grasses quickly sprouted throughout the property. (Photo taken in January 2002.)

7. Dirt road through the

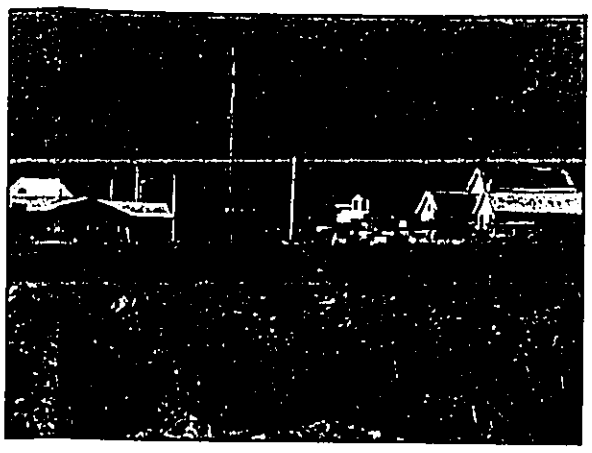


9. Eastern area of the property looking east northeast.

10. South Kohala Distribution Road forms the eastern boundary of the DHHL property. The HELCO and County Solid Waste Baseyard facilities are shown to the right.



3. View of the western area of the property looking makai towards the ocean in distance.



4. Homes in the adjacent subdivision.

7. Dirt road through the property heading west.

8. Waikola Stream – defined by the tree line and lush growth along the top bank.

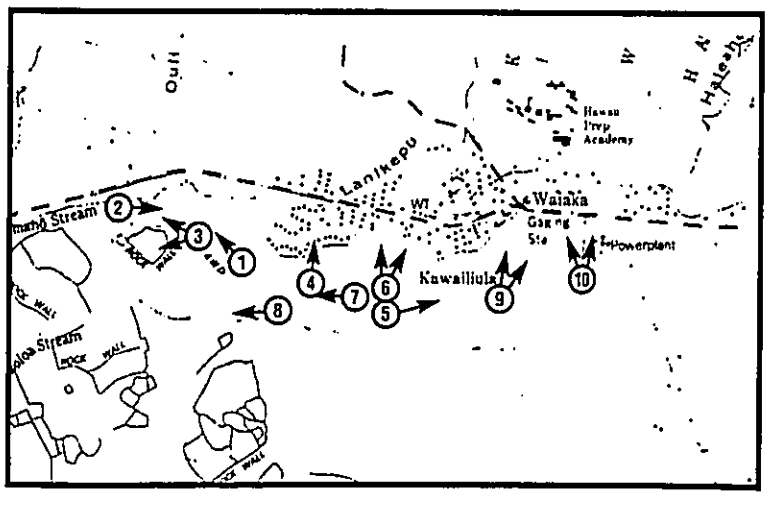


FIGURE 20
Photographic Analysis
Lalamilo PROJECT

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PBR HAWAII