

NEIL ABERCROMBIE
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

June 06, 2012

GLENN M. OKIMOTO
DIRECTOR

Deputy Directors
JADE T. BUTAY
FORD N. FUCHIGAMI
RANDY GRUNE
JADINE URASAKI

JUN 23 2012

IN REPLY REFER TO:



DEPT. OF ENVIRONMENTAL
QUALITY CONTROL

12 JUN 13 PM 2:42

RECEIVED

Mr. Gary Hooser, Director
Office of Environmental Quality Control (OEQC)
235 South Beretania Street, Suite 702
Honolulu, Hawai'i 96813

Dear Mr. Hooser:

**Draft Environmental Assessment (DEA) for
Saddle Road Maintenance Baseyard
Tax Map Key (3) 4-4-016: Portion of 003
Hāmākua District, Island of Hawai'i**

The Department of Transportation, Highways Division, has reviewed the Draft Environmental Assessment (DEA) prepared for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish the notice of availability of the DEA for this project in the next OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form, one (1) CD copy of the DEA, and one (1) copy of the DEA. The project summary is included on the CD. Should you or your staff have any questions, please contact Mr. Roy Shioji at 808-933-2755, or our consultant, Chester Koga, at R. M. Towill Corporation at 808-842-1133.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn M. Okimoto".

GLENN M. OKIMOTO, Ph.D.
Director of Transportation

Enclosures

Agency Action EA
Chapter 343, HRS
Publication Form

Project Name: Draft EA, Maunakea Baseyard

Island: Hawai'i

District: Hamakua

TMK: (3) 4-4-016: Portion of 03

Permits: Conservation District Use Permit, National Pollutant Discharge Elimination System, Construction Plan Review

Proposing/Determination: Finding of No Significant Impact

Agency: Department of Transportation

Responsible Official: Glenn Okimoto, PhD, Director of Transportation

Contact: Roy Shoji, Hawai'i Island District Office, 808-933-8866

50 Makaala Street

Hilo, Hawai'i 96720

JUN 23 2012

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

JUN 13 12:42

RECEIVED

FILE COPY

Consultant: R.M. Towill Corporation

Contact: Chester Koga, AICP, email: chesterk@rmtowill.com

2024 N. King Street, Suite 200

Honolulu, Hawai'i 96819

Telephone: 808-842-1133

Status: (30-day comment period or FONSI)

Summary (Provide proposed action and purpose/need in less than 200 words. Please keep the summary brief and on this one page):

The State Department of Transportation (HDOT) plans to construct a highways maintenance baseyard for the primary purpose of maintaining and repairing the Saddle Road. The proposed baseyard site occupies 4 acres of vacant land within a 20.5 acre area designated for the Mauna Kea State Recreation Area. The baseyard site would occupy space formerly utilized as a Nēnē breeding facility. The baseyard site and the Mauna Kea State Recreation Area are part of a larger approximately 6,900 acre parcel owned by the State of Hawai'i and identified by Tax Map Key (TMK) parcel (3) 4-4-016: 003. The highways maintenance baseyard is needed to address maintenance and repair of the Saddle Road which is an approximately 47 mile long roadway which is the most direct route between East and West Hawai'i. The proposed site is centrally located between the east and west ends of the road in order to provide broader reach and convenience for repair work.

Saddle Road links the historical main population centers of the island in East Hawai'i with the growing west side, where the economy is anchored by tourism. It extends from Kaumana, above Hilo, to an intersection with Mamalahoa Highway 7 miles south of Waimea. It is the only road serving the Pohakuloa Training Area (PTA), the Mauna Kea Astronomical Observatory Complex, the Mauna Loa atmospheric observatory complex, the ranching and residential areas of Waiki'i Ranch and Kaumana City, Mauna Kea State Recreation Area and other recreational areas.

Improvements on the site will include: a) shop building with work areas, an office, and vehicle parking, b) a fuel area, c) flammable storage area, d) parking area, d) open material storage, and e) utilities. Access to the site will continue via an existing unpaved road. The site will have a perimeter fence. Estimated construction costs are \$5.83 million. Construction start is schedule for Fall 2012.

Revised February 2012

Draft Environmental Assessment

Saddle Road Maintenance Baseyard

Department of Transportation

District of Hāmākua, Island of Hawai‘i, Hawai‘i

Tax Map Key: (3) (3) 4-4-016: portion of 3

June 13, 2012

Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawai‘i 96813

Draft Environmental Assessment

Saddle Road Maintenance Baseyard

Department of Transportation

District of Hāmākua, Island of Hawai‘i, Hawai‘i

Tax Map Key: (3) 4-4-016: portion of 3

June 13, 2012

Prepared For:

Department of Transportation

State of Hawaii

869 Punchbowl Street

Honolulu, Hawai‘i 96813

Prepared by:

R.M. Towill Corporation

2024 North King Street, Suite 200

Honolulu, Hawai‘i 96819

21896-0P

TABLE OF CONTENTS

Table of Contents.....	I
List of Figures.....	III
Acronyms.....	IV
PROJECT SUMMARY.....	1
SECTION 1 INTRODUCTION.....	2
1.1 PROJECT OVERVIEW.....	2
1.2 PROJECT PURPOSE AND NEED.....	2
1.3 BASIS FOR THE ENVIRONMENTAL ASSESSMENT.....	3
1.4 PROPOSING AGENCY AND ACCEPTING AUTHORITY.....	3
SECTION 2 PROJECT DESCRIPTION AND ALTERNATIVES CONSIDERED.....	6
2.1 BACKGROUND INFORMATION.....	6
2.1.1 PROJECT LOCATION.....	6
2.1.2 OWNER INFORMATION.....	6
2.2 PROJECT DESCRIPTION.....	6
2.3 PROJECT SCHEDULE AND COST.....	6
2.3.1 SCHEDULE.....	6
2.3.2 COST.....	6
2.4 ALTERNATIVES CONSIDERED.....	12
2.4.1 NO ACTION.....	12
2.4.2 DELAYED ACTION.....	12
2.4.3 PROPOSED ACTION.....	12
SECTION 3 DESCRIPTION OF AFFECTED ENVIRONMENT.....	13
3.1 PHYSICAL ENVIRONMENT.....	13
3.1.1 CLIMATE.....	13
3.1.2 TOPOGRAPHY, GEOLOGY, AND SOILS.....	13
3.1.3 SURFACE WATERS AND HYDROLOGY.....	16
3.1.4 AIR QUALITY.....	16
3.1.5 NOISE.....	18
3.1.6 NATURAL HAZARDS.....	19
3.1.7 FLORA AND FAUNA.....	19
3.2 SOCIO-ECONOMIC ENVIRONMENT.....	20
3.2.1 LAND USE.....	20
3.2.2 HISTORIC AND ARCHAEOLOGICAL RESOURCES.....	21
3.2.3 CULTURAL RESOURCES AND PRACTICES.....	22
3.2.4 SCENIC AND VISUAL RESOURCES.....	23
3.2.5 RECREATIONAL FACILITIES.....	23
3.2.6 FIRE, POLICE AND MEDICAL SERVICES.....	24
3.2.7 SOCIO-ECONOMIC CONDITIONS.....	24
3.3 INFRASTRUCTURE AND UTILITIES.....	26
3.3.1 TRAFFIC AND TRANSPORTATION SYSTEMS.....	26
3.3.2 DRAINAGE SYSTEM.....	26
3.3.3 WATER SYSTEM.....	27
3.3.4 WASTEWATER SYSTEM.....	27
3.3.5 ELECTRICAL SYSTEMS.....	27

3.3.6 SOLID WASTE DISPOSAL.....	27
SECTION 4 RELATIONSHIP TO LAND USE PLANS AND POLICIES	29
4.1 THE HAWAI'I STATE PLAN.....	29
4.2 HAWAI'I STATE FUNCTIONAL PLANS.....	30
4.3 STATE LAND USE LAW.....	30
4.4 CONSERVATION DISTRICT SUBZONES	32
4.5 ISLAND OF HAWAI'I LONG RANGE LAND TRANSPORTATION PLAN	34
4.6 COUNTY OF HAWAII GENERAL PLAN.....	34
4.7 ZONING.....	35
4.8 SPECIAL MANAGEMENT AREA (SMA) RULES AND REGULATIONS	35
SECTION 5 NECESSARY PERMITS AND APPROVALS	36
5.1 STATE OF HAWAI'I.....	36
5.2	
SECTION 6 ORGANIZATIONS AND AGENCIES CONSULTED AND TO BE CONSULTED DURING THE PREPARATION OF THE DEA.....	37
6.1 State of Hawai'i	37
6.2 Federal.....	37
6.3 County of Hawai'i.....	37
6.4 Utility Companies	37
SECTION 7 DETERMINATION.....	38
SECTION 8 REFERENCES.....	41
APPENDIX.....	42
Appendix A Flora and Fauna Study	
Appendix B Archaeological Inventory Survey	
Appendix C Cultural Resources Impact Assessment	

LIST OF FIGURES

Figure 1-1 Regional Context.....	5
Figure 1-2 Project Location	6
Figure 2-1 Aerial View of Project Site	8
Figure 2-2 Site Plan	9
Figure 2-3 Elevations.....	10
Figure 2-4 Elevation	11
Figure 2-5 Elevations.....	12
Figure 3-1 Soils.....	16
Figure 3-2 Topography	18
Figure 4-1 State Land Use	32
Figure 4-2 Conservation District Subzones	34

ACRONYMS

ADA	Americans with Disabilities Act
BMPs	Best Management Practices
CWA	Clean Water Act of 1972, as amended
CWRM	Commission on Water Resource Management, State of Hawai‘i, Department of Land and Natural Resources
CWB	Clean Water Branch, State Department of Health
CZM	Coastal Zone Management
DLNR	State Department of Land and Natural Resources
DOH	State Department of Health
FONSI	Finding of No Significant Impact
GP	General Plan
HAR	Hawai‘i Administrative Rules
HRS	Hawai‘i Revised Statutes
HDOT	State Department of Transportation
NPDES	National Pollutant Discharge Elimination System
RMTC	R. M. Towill Corporation
ROW	Right-of-Way
SMA	Special Management Area

PROJECT SUMMARY

Project:	Saddle Road Maintenance Baseyard
Proposing Agency:	Department of Transportation State of Hawai‘i 869 Punchbowl Street Honolulu, Hawai‘i 96813
Owner:	Department of Transportation, State of Hawai‘i
Accepting Authority:	Department of Transportation State of Hawai‘i
Agent:	R. M. Towill Corporation (RMTC) 2024 North King Street, Suite 200 Honolulu, Hawai‘i 96819 Tel. 808-842-1133, email: chesterk@rmtowill.com
Location:	District of Hāmākua, Island of Hawai‘i, Hawai‘i
Tax Map Key:	(3) 4-4-016: portion of 3
Proposed Action:	Development of a new highways baseyard for the purposes of maintaining and repairing the Saddle Road consisting of a) shop building, b) fueling area, c) flammable storage area, d) open storage yard and parking, e) access road improvements, and f) site landscaping. Project costs are estimated at \$5.8 million.
Land Area Affected:	Approximately 4 acres for the baseyard plus the access road from the Saddle Road.
Present Use:	The property is vacant. It was formerly utilized as a Nēnē breeding facility by the Department of Land and Natural Resources.
State Land Use District:	Conservation District
Zoning:	The baseyard site is in the Resource subzone of the State Conservation District. DLNR regulates land use of property.
Special Management Area:	Site is not in SMA.
Permits Required:	Department of Health <ul style="list-style-type: none"> • National Pollutant Discharge Elimination System Permit (Construction Stormwater, Hydrotesting) Construction Plan Review and Approval Department of Land and Natural Resources <ul style="list-style-type: none"> • Conservation District Use Permit
Anticipated Determination:	Finding of No Significant Impact (FONSI)

SECTION 1 INTRODUCTION

1.1 PROJECT OVERVIEW

The State Department of Transportation (HDOT) plans to construct a highways maintenance baseyard for the primary purpose of maintaining and repairing the Saddle Road. The proposed baseyard site occupies 4 acres of vacant land within a 20.5 acre area designated for the Mauna Kea State Recreation Area. The baseyard site would occupy space formerly utilized as a Nēnē breeding facility. The baseyard site and the Mauna Kea State Recreation Area are part of a larger approximately 6,900 acre parcel owned by the State of Hawai‘i and identified by Tax Map Key (TMK) parcel (3) 4-4-016: 003. See **Figure 1-1, Regional Context** and **Figure 1-2, Project Location**.

1.2 PROJECT PURPOSE AND NEED

A highways maintenance baseyard is needed to address maintenance and repair of the Saddle Road which is an approximately 47 mile long roadway which is the most direct route between East and West Hawai‘i. The proposed site is centrally located between the east and west ends of the road in order to provide broader reach and convenience for repair work.

Saddle Road links the historical main population centers of the island in East Hawai‘i with the growing west side, where the economy is anchored by tourism. It extends from Kaumana, above Hilo, to an intersection with Mamalahoa Highway 7 miles south of Waimea. It is the only road serving the Pohakuloa Training Area (PTA), the Mauna Kea Astronomical Observatory Complex, the Mauna Loa atmospheric observatory complex, the ranching and residential areas of Waiki‘i Ranch and Kaumana City, Mauna Kea State Recreation Area and other recreational areas.

Built by the military to access PTA during World War II, Saddle Road was not originally designed to State highway standards. In 1992, when the planning stage for the project began, the entire Saddle Road was a narrow, winding, two-lane road with steep grades, sharp curves, poor pavement conditions, substandard drainage, and high accident rates. Despite its poor conditions, Saddle Road was becoming increasingly important for access to PTA, Mauna Kea, and outdoor recreation areas. Furthermore, its role was increasing as a cross-island transportation route linking East and West Hawai‘i for business travel, the transport of goods and services, tourism/recreation, shopping, and for daily commuting. In response to these problems, the Saddle Road Improvement Project was initiated.

Presently, the middle portion of Saddle Road between Mile Post 19 to 42 has been reconstructed. This has been upgraded to current standards.

The west section between Mile Post 42 and the Mamalahoa Highway is being realigned. A 1999 Saddle Road Environmental Impact Statement (EIS) for the project selected an alignment (W-3) for the western end of Saddle Road. In 2006, however, the Department of the Army (DOA) purchased lands in the area for non-live fire military training. Since the proposed Saddle Road alignment essentially split the DOA’s land in two thereby reducing the area for available training, a new more southerly alignment (W-7) was proposed. A Supplemental EIS for the

revised alignment was completed. The record of decision was issued in 2010. Construction is on-going.

The eastern portion of Saddle Road between Mile Post 11 to Mile Post 19 has been completed. The project involves grading, drainage and asphalt paving. The remaining eastern portion of Saddle Road from Mile Post 5.3 to 11 is currently in the design phase. The road is planned to be upgraded to two 12 foot lanes with 8 foot shoulders. A climbing lane for most of the length of the project is planned.

1.3 BASIS FOR THE ENVIRONMENTAL ASSESSMENT

In accordance with Chapter 343, Section 5, Hawai‘i Revised Statutes (HRS), this project involves the following action that requires the preparation of an environmental assessment (EA):

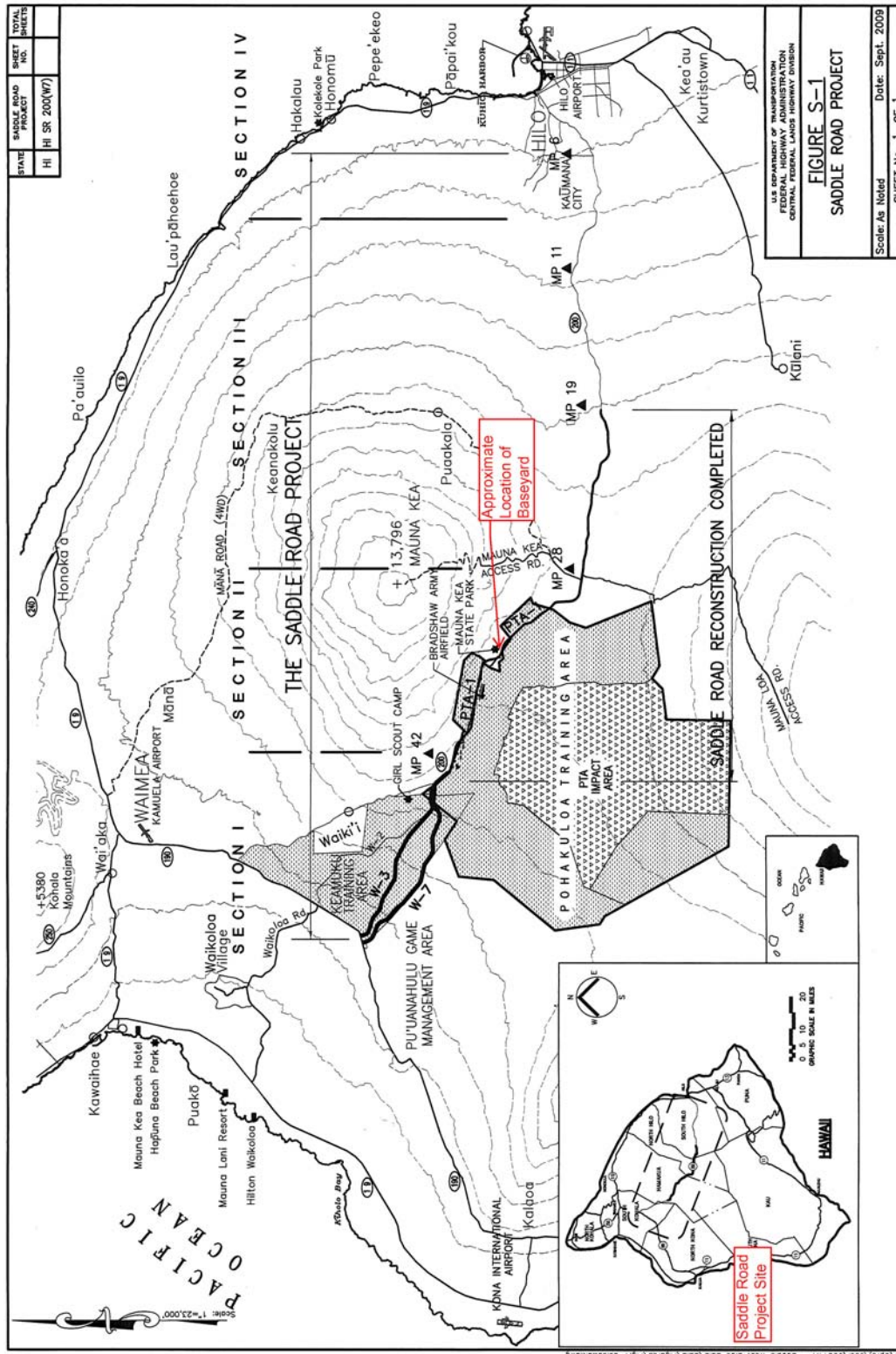
(1) Propose the use of state or county lands or the use of state or county funds;

Pursuant to the requirements of Chapter 343 HRS, and Chapter 11-200, Hawai‘i Administrative Rules (HAR), the proposing agency, the HDOT, has determined that the proposed project is not expected to have significant environmental effects. Based on analysis and review of environmental conditions, project effects, and proposed mitigation measures, it is anticipated that a Finding of No Significant Impact (FONSI) will be issued for this project.

1.4 PROPOSING AGENCY AND ACCEPTING AUTHORITY

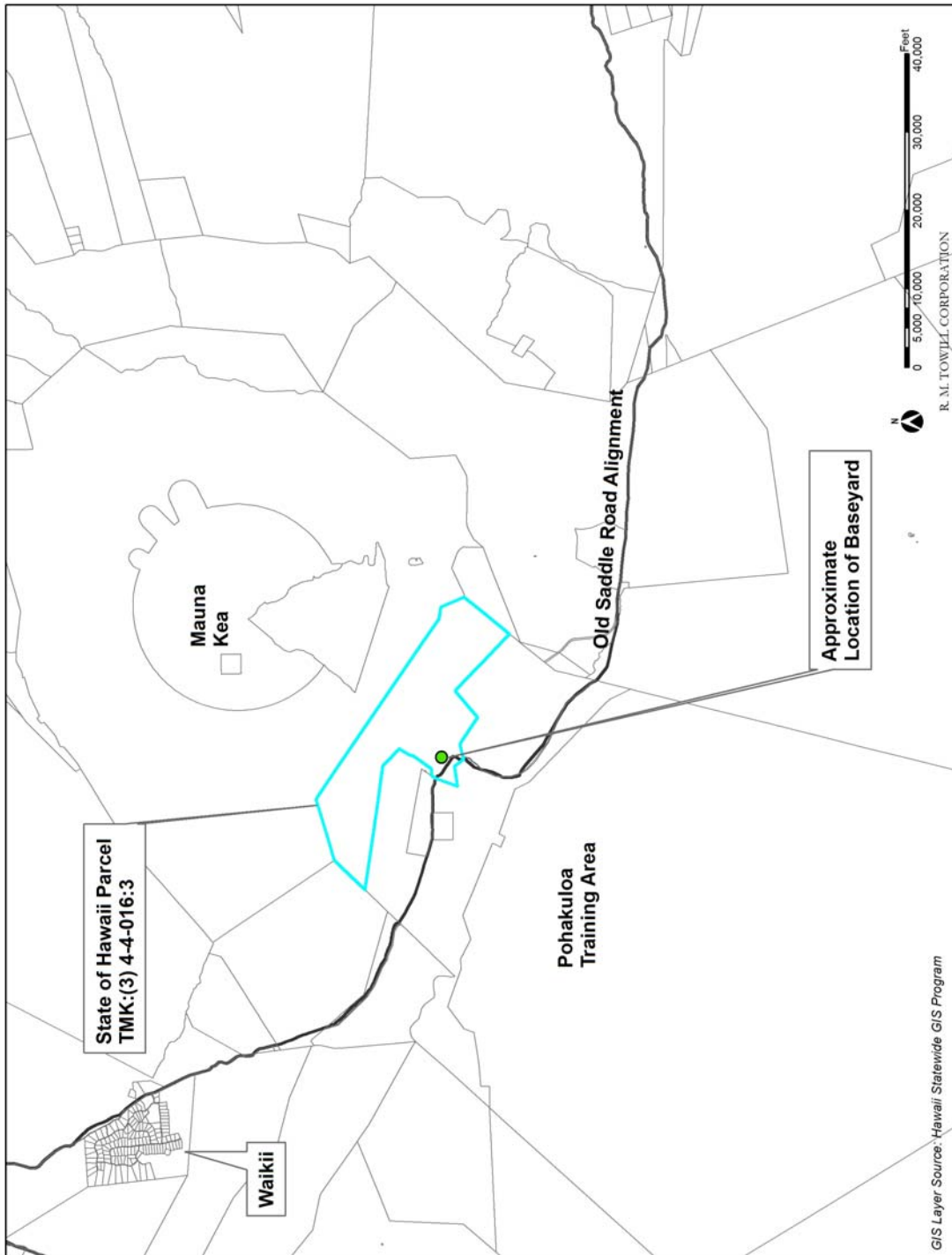
In accordance with HRS Chapter 343, Section 5, the proposing agency and accepting authority for this EA is the HDOT.

Figure 1-1. Regional Context Map



Source: DOT, 2009

Figure 1-2. Project Location



SECTION 2

PROJECT DESCRIPTION AND ALTERNATIVES CONSIDERED

2.1 BACKGROUND INFORMATION

2.1.1 PROJECT LOCATION

The project site is located on approximately 4 acres within the 20.5 acre Mauna Kea State Recreation Area. Developed portions of the 20.5 acre area are located adjacent to Saddle Road. These include a visitor center, cabins, and a picnic area. The remainder of the 20.5 acre area is largely dryland shrub vegetation. The project site was formerly occupied by a Nēnē breeding facility which was discontinued by the Department of Land and Natural Resources (DLNR). DLNR also operates a plant nursery within the Mauna Kea State Recreation Area boundary. See **Figure 2-1, Aerial View of Project Site**.

2.1.2 OWNER INFORMATION

The proposed baseyard project site is located on land owned by the State of Hawai‘i and managed by the Department of Land and Natural Resources.

2.2 PROJECT DESCRIPTION

Planned project improvements are described below. A site plan and section drawings are included as **Figure 2-2, Site Plan**. Improvements on the site will include: a) shop building with work areas, an office, and vehicle parking, b) a fuel area, c) flammable storage area, d) parking area, d) open material storage, and e) utilities. Access to the site will continue via an existing unpaved road. The site will have a perimeter fence.

Figure 2-3 show the floor plan the shop building. Figure 2-4 show the east elevation of the shop building and Figure 2-5 show the Fueling Station Plan and Elevation.

2.3 PROJECT SCHEDULE AND COST

2.3.1 SCHEDULE

Completion of Permitting and Entitlements	June 2012
Bid and Award	September 2012
Start of Construction	October 2012
Completion of Construction	June 2013

2.3.2 COST

The estimated construction cost for the baseyard improvements is \$5.83 million.



FIGURE 2-1. AERIAL VIEW OF PROJECT SITE
Saddle Road Maintenance Baseyard
State of Hawai'i Dept. of Transportation
District of Hāmākua, Island of Hawai'i
Not To Scale

Figure 2-2, Site Plan



Figure 2-3 Shop Building Floor Plan

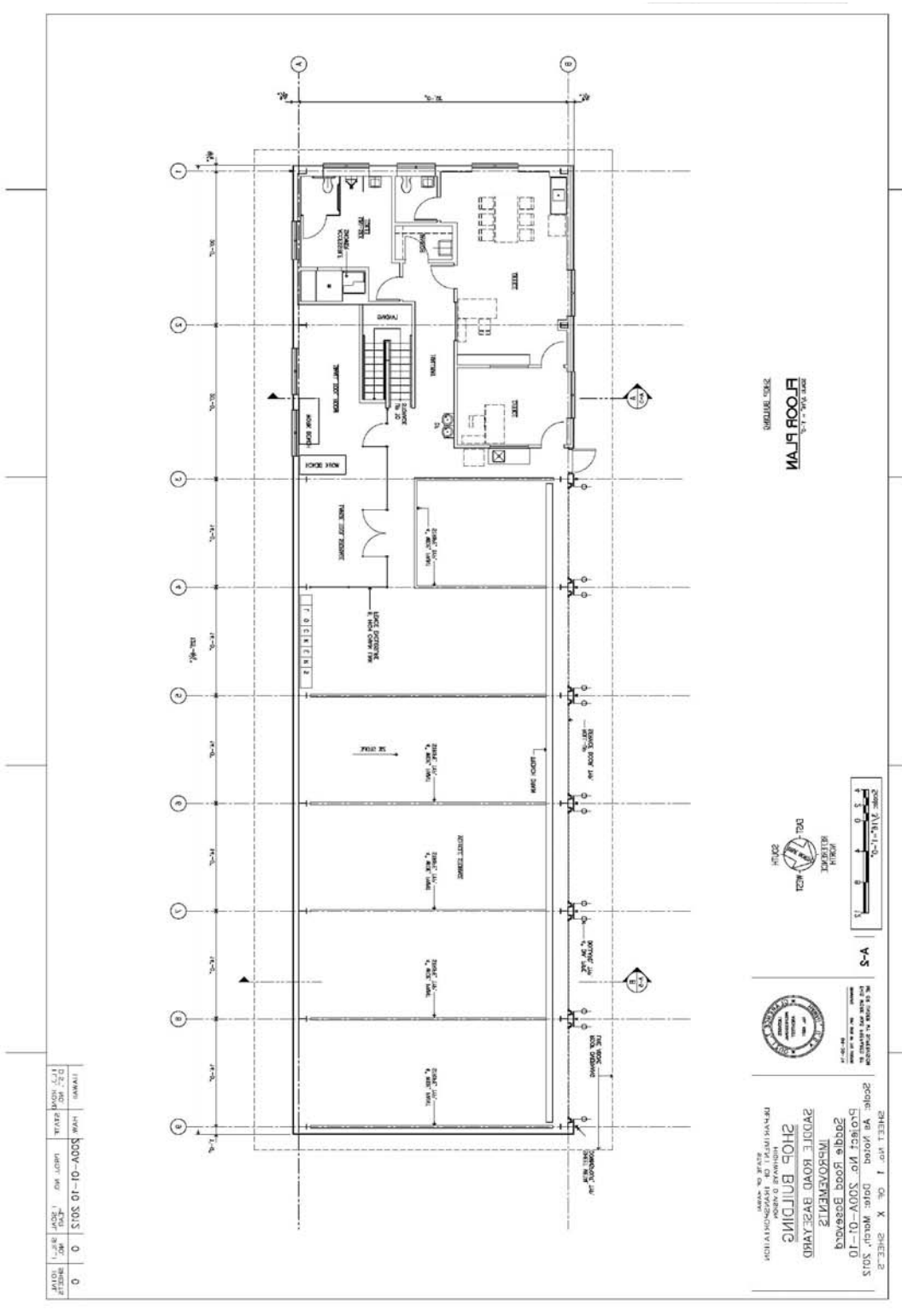


Figure 2-4. East Elevation of the Shop Building and Cross-Section

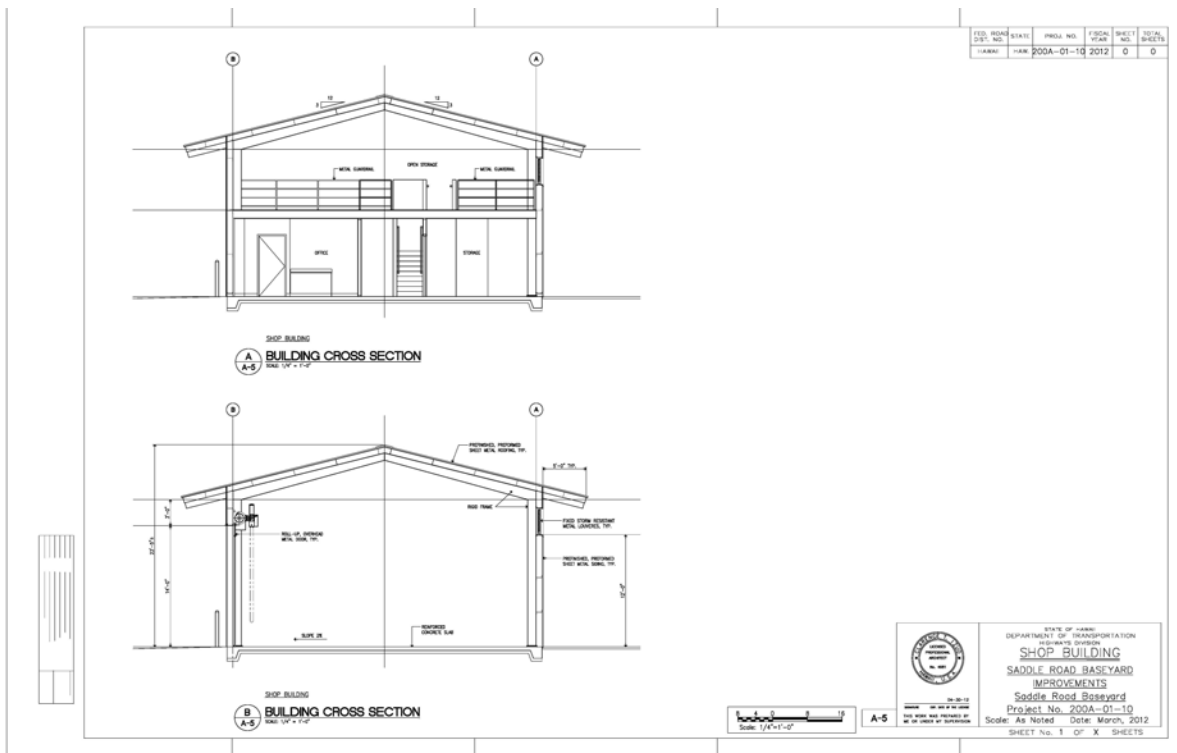
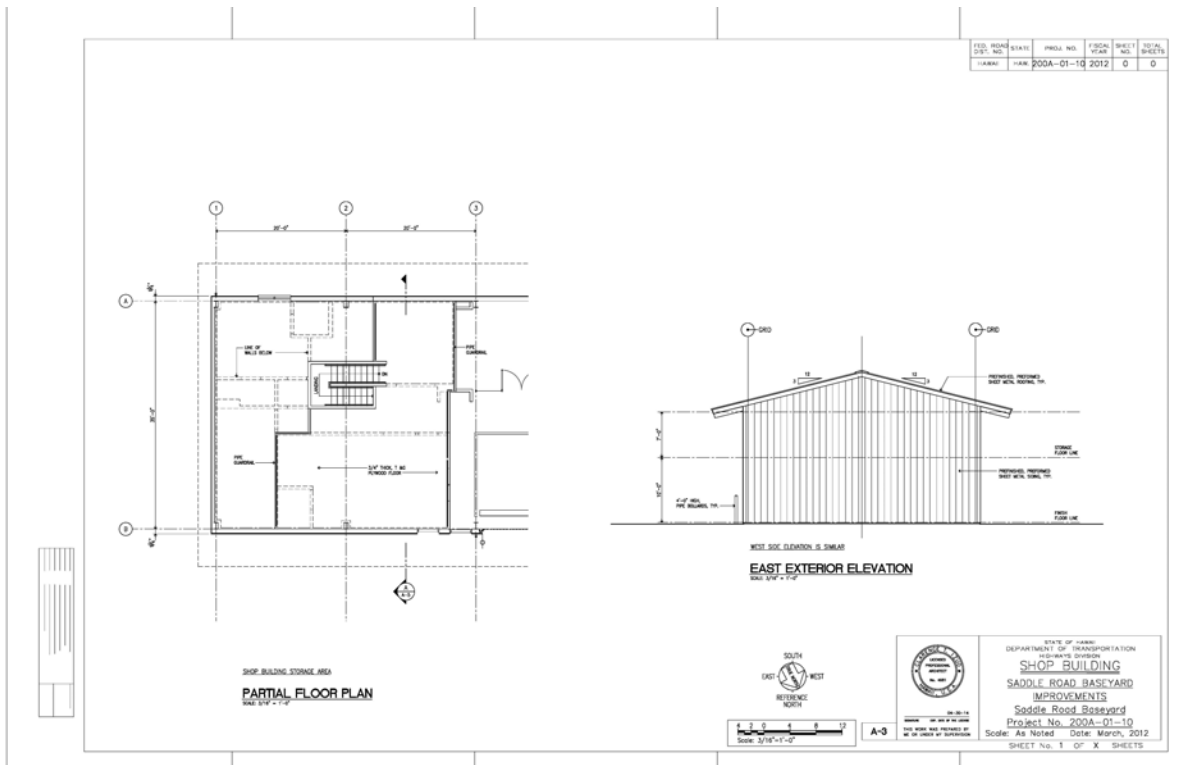
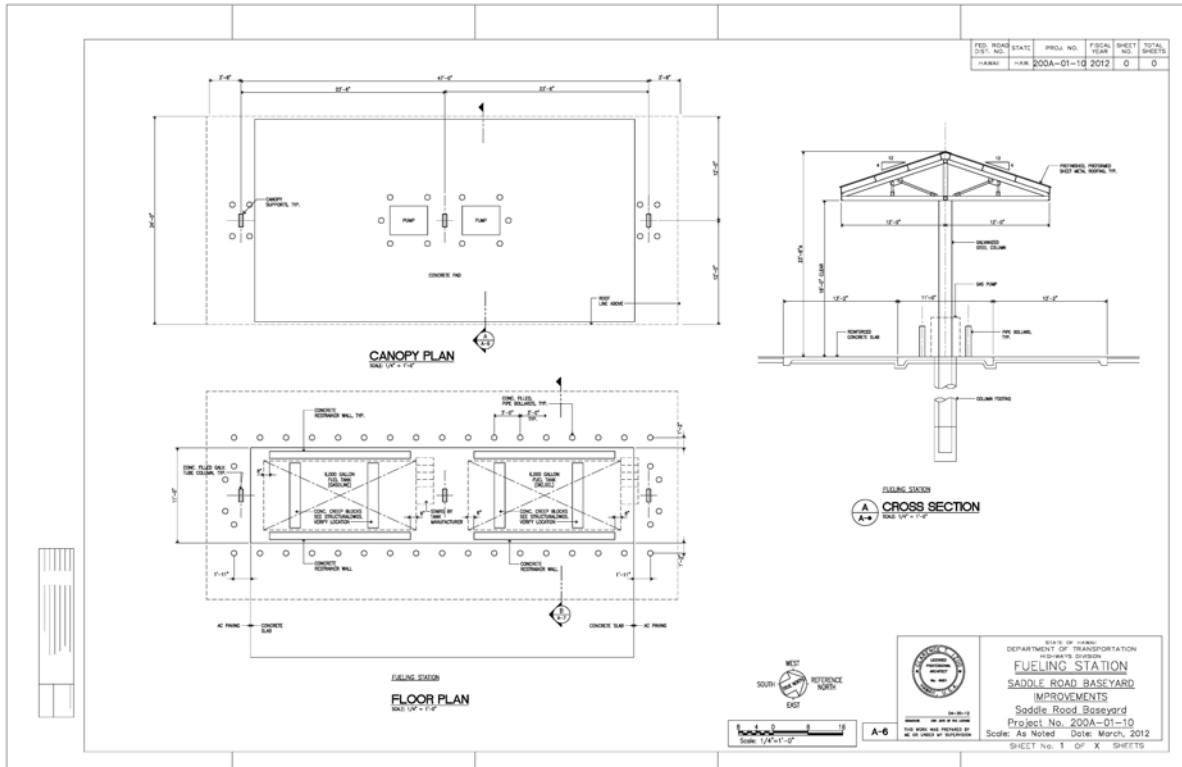


Figure 2-5 Fuel Station Plan and Elevation



2.4 ALTERNATIVES CONSIDERED

2.4.1 NO ACTION

State legislation requires that a “no-action” alternative be considered to serve as a baseline against which potential actions can be measured. The no-action alternative would involve no effort to construct a new Saddle Road baseyard. Under this option, environmental impacts resulting from work activities would be averted and project costs would be spared. However, the “no-action” alternative would result in an increase in maintenance cost over the long term. The closest State baseyards are in West Hawai‘i and in East Hawai‘i. Since the Saddle Road extends approximately 47 miles, travel time to transport staff and equipment over significant distances is significant. Because of significant mobilization time, this lessens the actual time and resources spent on repair and maintenance. Thus, because of the travel time, either minimal maintenance is accomplished and/or additional overtime will need to be paid. Moreover, for highway repair and maintenance work which may take an extended period of time, equipment may need to be left at the work site until the next work day. This increases the risk of vandalism because of the isolation of the area and significant distances to the baseyard. Increased vandalism leads to increased costs to repair equipment and additional down time for work which could otherwise have been done. For the foregoing reasons, this alternative was rejected from further consideration.

2.4.2 DELAYED ACTION

The delayed action alternative would postpone construction of the proposed baseyard to an unspecified future date. Under this alternative, environmental impacts resulting from work activities would be delayed, but are anticipated to be generally the same as with the proposed project. Project costs would also be postponed to a later date. It is reasonable to assume that future costs for labor and materials will be greater than present day costs due to inflation. However, it is noted that delays in performing preventive maintenance will result in premature roadway deterioration and additional significant costs in the long term. So, although some upfront costs may be averted under this alternative, it will likely cost more to build a baseyard at a later date. Existing Saddle Road improvements will continue to deteriorate at an accelerated rate until a new baseyard is built. For these reasons, this alternative was rejected.

2.4.3 PROPOSED ACTION

The proposed baseyard offers a convenient location to store equipment and provisions to perform maintenance and repair along the 47 mile stretch of the Saddle Road. Saddle Road is needed for access to the Pohakuloa Training Area, Mauna Kea, Mauna Loa, Mauna Kea State Recreation Area, outdoor recreation areas along the road including areas used for hunting and gathering, ranch lands, and the communities of Waiki‘i Ranch and Kaumana. It is becoming increasingly important as a cross-island transportation link. Thus, adequate maintenance and repair of the road also takes on increased significance.

Since significant public monies are being spent to upgrade the Saddle Road, the proposed action to build a conveniently located baseyard to perform preventive maintenance would maximize public funds and can keep Saddle Road in satisfactory operating condition for a longer period of time. Thus, the proposed action is the selected alternative.

SECTION 3 DESCRIPTION OF AFFECTED ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 CLIMATE

The project is located in the Humuula Saddle area between Mauna Kea and Mauna Loa at approximately 6,500 feet above mean sea level (msl). Air temperature in Hawai‘i has a muted annual cycle because of small season to season changes in solar radiation and the ocean’s moderating influence. Differences in temperature from place to place are mainly due to elevation. The rate of temperature decrease, with elevation, called the lapse rate, is fairly constant at about 3.6 degrees Fahrenheit per 1,000 feet below about 4,100 feet and 2.2 degrees Fahrenheit per 1,000 feet at higher elevations. At Mauna Kea, temperatures can range from highs in the mid 50’s to lows near 20 degrees Fahrenheit. This differs from Hilo Airport which ranges from the high 80’s to the low 60’s during a typical year. (Department of Geography, 1983). Using the lapse rate as a guide, temperatures at the subject site would range from the high 60’s to the low 40’s.

Winds are primarily northeasterly tradewinds. Occasionally, during the winter months, storms are accompanied by winds from the south. The Island of Hawai‘i also exhibits a distinct diurnal weather pattern. This is attributed to a combination of a large island, intense daytime sunshine and steady winds. During the day, breezes blow from the sea and up valley bottoms. At night, breezes blow from the land, down the mountain slopes.

Rainfall in the general project area averages about 20 inches annually. (Juvik and Juvik, 1998). However, higher elevations along the Saddle Road are subject to frequent fog. Fog is essentially absent at sea level because of the radiative properties of the ocean and the abundant wind mixing, which combine to prevent surface temperature inversions. The natural cooling that takes place as air is forced to higher elevations promotes fog development, and many locations over 800 feet in elevation in Hawai‘i experience some fog.

Impacts and Mitigation Measures

The proposed project will have no impacts on the existing climate of the region. However, the existing foggy conditions can make driving on the Saddle Road hazardous. The proposed baseyard does provide a more convenient means to adequately maintain and repair the road. Mitigation measures relating to climate for the proposed baseyard will not be required.

3.1.2 TOPOGRAPHY, GEOLOGY, AND SOILS

The proposed project will be constructed within an approximately 4-acre area of a larger approximately 6,900 acre parcel owned by the State of Hawai‘i. The proposed baseyard would be located on the former site of a Nēnē breeding facility under the jurisdiction of the Department of Land and Natural Resources. The general project vicinity has an average slope of approximately 5 percent. However, north of the project site, slopes become more severe in the range of approximately 30 percent as it extends up to the summit of Mauna Kea.

The island of Hawai‘i was formed by the activity of five shield volcanoes: Kohala (long extinct); Mauna Kea (active during recent geologic times); Hualālai (last erupted in 1801); and Mauna Loa and Kīlauea (both still active).

The project site is located along the saddle between Mauna Kea and Mauna Loa. Mauna Kea is a dormant volcano in its postshield stage. It last erupted about 4,500 years ago. Alkalic lavas have buried the final summit caldera. A few flows funneled down streambeds and reached the coast, but most recent lavas are short flows and large cinder cones. The oldest exposed lavas are about 250,000 years old. Mauna Loa is nearing the end of the shield stage, so the volcano’s frequency and rate of eruption are declining, although it still discharges lavas of tholeiitic basalt. Only three eruptions have occurred over the past 50 years. (Juvik and Juvik, 1998).

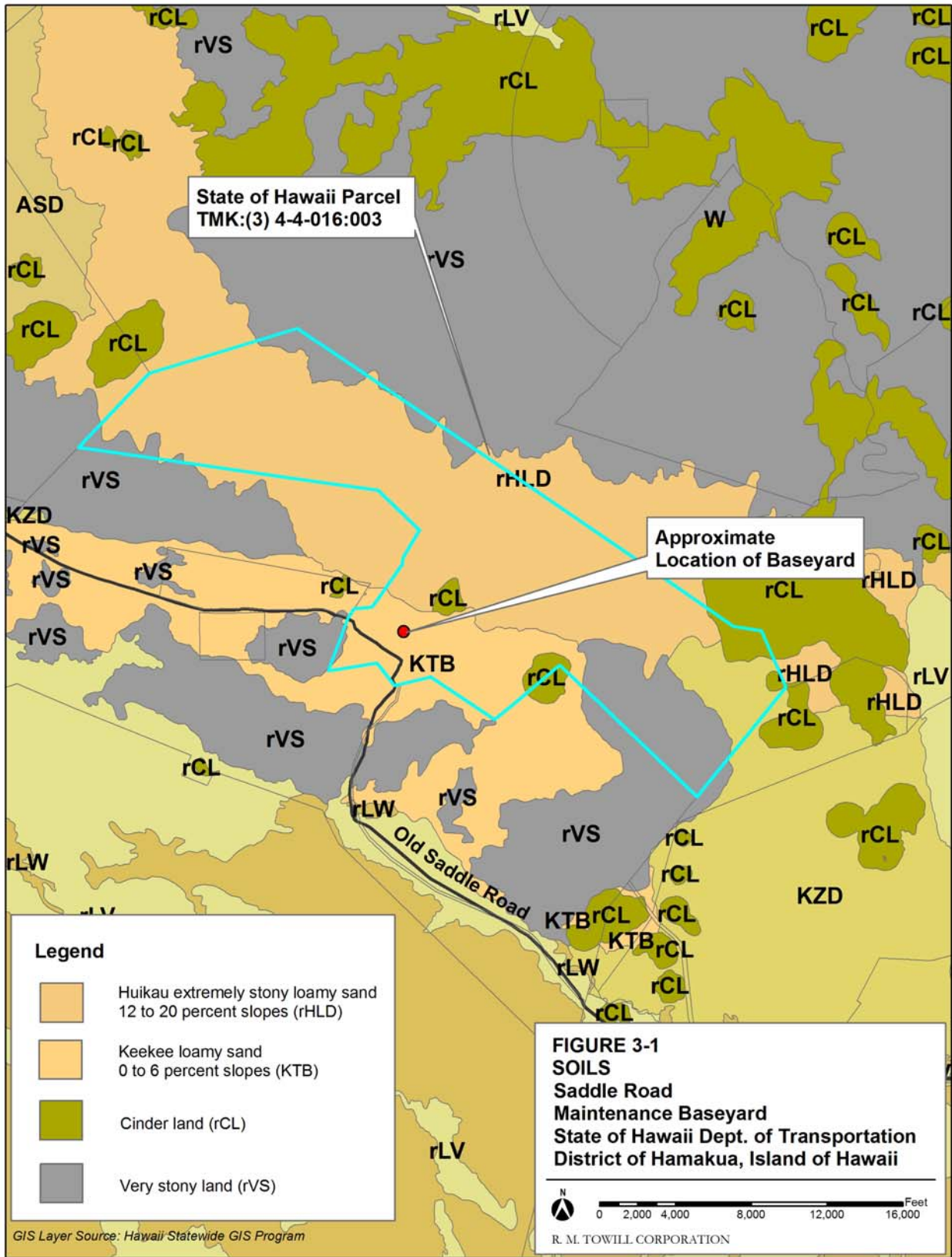
Volcanic hazard zones for the Island of Hawai‘i were prepared by the U.S. Geological Survey. The map divides the island into zones that are ranked from 1 through 9 based on the probability of coverage by lava flows. Zone 1 is the area of the greatest hazard with Zone 9 the least. The subject site is classified as Lava Flow Hazard Zone 8. Only a few percent of Lava Hazard Zone 8 has been covered in the past 10,000 years. (USGS, 1997).

Soils underlying the project site are identified as Ke‘eke‘e loamy sand, 0 to 6 percent slopes (KTB). The Ke‘eke‘e series consists of somewhat excessively drained loamy sands that formed in alluvium from volcanic ash and cinders. These soils are nearly level to gently sloping. They are located on the uplands in the saddle between Mauna Kea and Mauna Loa. A representative profile has a surface layer about 9 inches thick consisting of loamy sand, silt loam, and fine sand. This layer is very dark gray and very dark grayish brown. The subsoil is about 7 inches thick and consists of dark-brown silty clay loam. The substratum is stratified sand and loam. The surface layer is mildly alkaline to moderately alkaline, the subsoil is strongly alkaline, and the substratum is strongly alkaline to very strongly alkaline. Permeability is rapid and runoff is slow, and the hazard of soil blowing is moderate to severe. This soil is now used for wildlife habitat (Soil Conservation Service, 1973). See **Figure 3-1, Soils**.

Other soil types in the project vicinity are Huikau extremely stony loamy sand, 12 to 20 percent slopes (rHLD); Cinder land (rCL); and Very stony land (rVS).

Impacts and Mitigation Measures

The proposed project will not have a significant effect on the topography, geology or soils of the area. The site will be graded to accommodate the proposed improvements.



3.1.3 SURFACE WATERS AND HYDROLOGY

According to the National Wetlands Inventory, there are no wetlands in the project vicinity. (USFWS, 2011). However, the United States Geological Survey has mapped several “blue-line” streams within the general area of the project site. Puu Pohakuloa, Pohakuloa Gulch, Puukoohi, and Waikahalulu Gulch are located along the more severe slopes of Mauna Kea’s southern flank. As the streams approach the more moderate slopes in the Humuula saddle area, the “blue lines” are no longer shown. Pohakuloa Gulch, in particular, extends close to the project site. See **Figure 3-2 Topography**. Thus, a jurisdictional determination was submitted to the Corps of Engineers. The Corps determined that Pohakuloa Gulch “at this location is not a water of the U.S., subject to regulatory jurisdiction of the Corps,” and “accordingly, we have determined that a DA permit will not be required.”

Impacts and Mitigation Measures

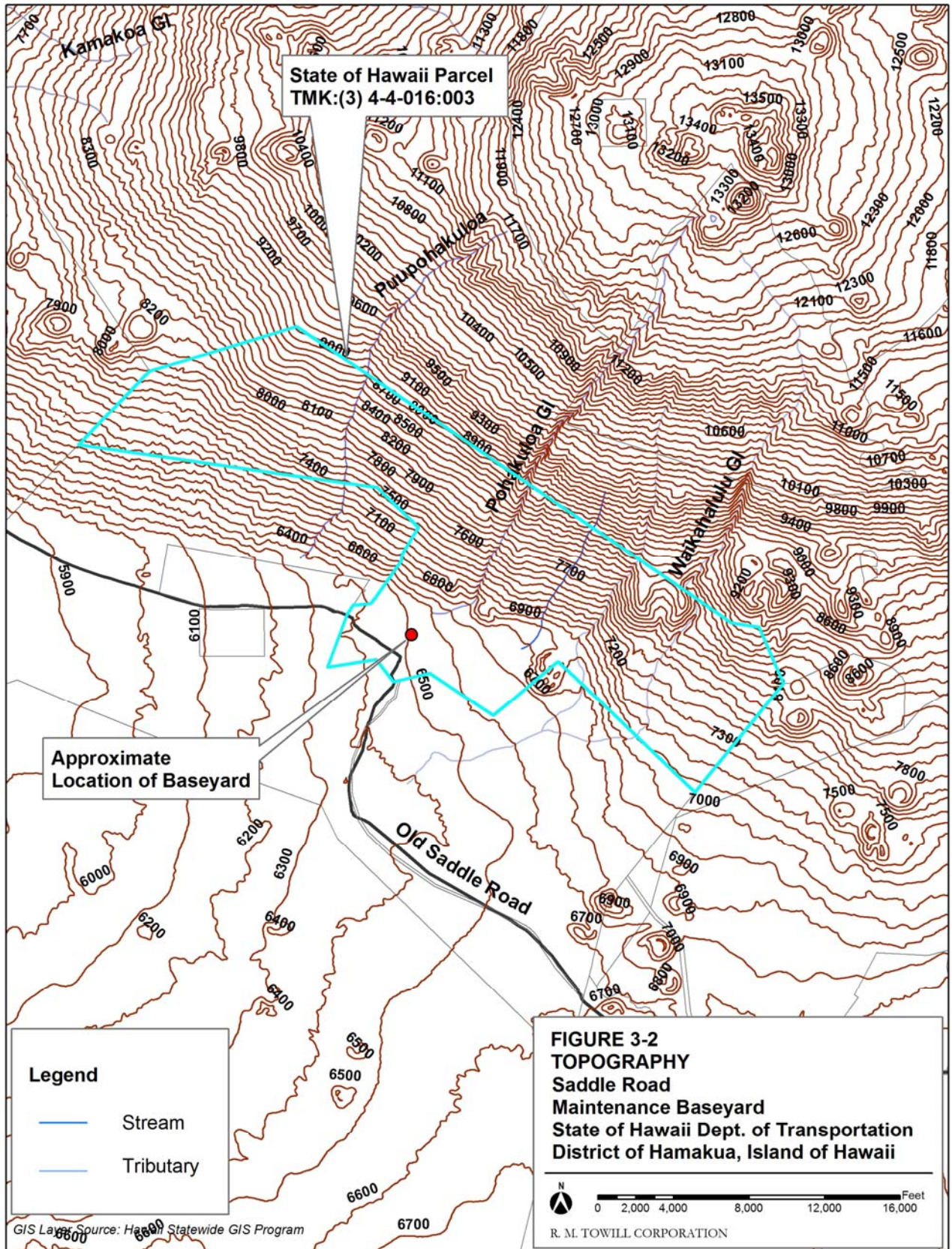
The project is not expected to have adverse effects on surface waters or ground waters. Best Management Practices (BMPs) will be installed and maintained during all phases of construction activities to ensure that sediment and other contaminants are not discharged in runoff water from the site.

3.1.4 AIR QUALITY

Hawai‘i lies within the Northern Hemisphere Hadley Cell, which is responsible for persistent northeast trade winds. Consequently, air quality is relatively good with the exception of occasional Kona or leeward storms that produce a low pressure system that brings southerly winds and precipitation. In the project area, volcanic emissions of sulfur dioxide convert into particulate sulfate, which causes a volcanic haze (vog) to blanket the area, primarily during occasional episodes when trade winds are not present. The major industrial source for air pollution is oil-fired power plants, which emit SO₂, nitrogen oxides, and particulate matter. Motor vehicles emit CO, nitrogen oxides and hydrocarbons, and smaller amounts of other pollutants. Except for periodic vog and possibly occasional localized impacts from traffic congestion, local industrial sources, and dust from farms and ranches during very windy periods, the present air quality of the project area is believed to be relatively good. There are no air quality monitoring data from DOH for the Saddle area, but there are 6 other air quality monitoring stations located on the Island of Hawai‘i. Air quality is rated as “Good” at 5 of the 6 monitoring stations. There are stations at Kona, Hilo, Mountain View, Puna E, and Ocean View. The remaining monitoring station is located at Kīlauea which is rated as “Moderate”. (DOH, 2011).

Impacts and Mitigation Measures

Dust and exhaust emissions will be generated from construction vehicles and equipment including backhoes, trucks, pile driving equipment, generators, fuel tanks, etc., during construction. Mitigation of fugitive dust generated during construction will be handled through the use of periodic site watering and applicable on-site BMPs. Additional measures as provided in Hawai‘i Administrative Rules (HAR) Chapter 11-60.1 - Air Pollution Control will also be followed and will include, but not be limited to, the following:



- The planning of project construction operations will focus on: minimizing the amount of dust-generating materials and activities; centralizing material transfer points and onsite vehicular traffic routes; and, locating potentially dusty equipment in areas of least impact;
- An adequate water source at the site will be provided prior to start-up of construction activities for dust control wet-down application;
- Disturbed soils will be stabilized as soon as possible by means of grassing, hydromulch, geo-fabric, or other methods of cover;
- Dust will be controlled by stabilizing ground conditions at project entrances to prevent dirt tracking onto adjacent access roads, and by covering or wetting down construction vehicles carrying dust-generating materials; and,
- Adequate dust control measures will be provided on weekends, after hours, and prior to daily start-up of construction activities.

Vehicle and construction equipment exhausts are a source of air pollution. Mitigation of potential adverse effects associated with use of construction equipment, fuel tanks, and vehicle exhausts will be handled through adherence to applicable Federal, State and County regulations. As required, all machinery and vehicles will be required to be in proper working order with appropriate use of mufflers.

3.1.5 NOISE

Ambient noise levels in the general area are usually low, reflecting the light traffic volumes on Saddle Road and the undeveloped and unpopulated nature of much of the region. The Mauna Kea State Park offers shrub land picnicking and lodging opportunities. Pig, sheep and bird hunting is allowed nearby which may involve intermittent noise impacts. Noise levels can also be relatively high on an occasional basis in the vicinity of the Pohakuloa Training Area in association with military training activities.

Impacts and Mitigation Measures

Construction activity will result in short-term noise impacts associated with the proposed project. Construction related noise will be generated by use of construction equipment and machinery such as bulldozers, backhoes, compressors, and vehicles. Management of short term noise impacts will involve use of mufflers and related noise reduction technologies. As required, construction equipment with mufflers in poor working condition shall be replaced or repaired. Adverse effects from construction noise are not expected to pose a hazard to public health and welfare due to the temporary nature of the work, the absence of sensitive land uses in the surrounding area, and the application of mitigation measures that will be employed to minimize noise effects.

Construction noise will cease at project completion. Long-term noise effects should be minimal. Vehicles and equipment from the baseyard are expected to leave the baseyard at the start of the work shift and return at the end of the work day. There may be repairs and preventive maintenance which occur within a normal work day. The baseyard is expected to close during weekday nights, holidays and weekends.

3.1.6 NATURAL HAZARDS

Flood

The project site is located within Flood Zone X which is an area outside the 500-year flood, which means it has a less than 0.2% chance to flood annually.

Tsunami

A tsunami involves the generation of a series of destructive ocean waves that can affect all shorelines. These waves can occur at any time with limited or no warning. Persons in low lying shoreline or beach areas are advised to immediately go to higher ground.

The project site is located at approximately 6,500 feet above mean sea level, approximately 28 miles from the closest East Hawai'i shoreline and approximately 26 miles from the closest West Hawai'i shoreline.

Seismic Hazard

The Islands of Hawai'i experience thousands of earthquakes each year but most are so small that they can only be detected by instruments. Some are strong enough to be felt and a few cause minor to moderate damage. Most of Hawai'i's earthquakes are directly related to volcanic activity and are caused by magma moving beneath the earth's surface.

Hurricane and Wind

The Hawaiian Islands are seasonally affected by Pacific hurricanes from the late summer to early winter months. The State has been affected twice since 1982 by significant hurricanes, 'Iwa in 1982 and 'Iniki in 1992. During hurricanes and storm conditions, high winds cause strong uplift forces on structures, particularly on roofs. Wind-driven materials and debris can attain high velocity and cause devastating property damage and harm to life and limb. It is difficult to predict these natural occurrences, but it is reasonable to assume that future events will occur. The project area is, however, no more or less vulnerable than the rest of the island to the destructive winds and torrential rains associated with hurricanes.

Impacts and Mitigation Measures

Construction work activities will occur on FEMA Zone X and are at very low risk for flood inundation. No adverse effects to human health or safety associated with flooding are anticipated.

Tsunami and tsunami related flooding in the project area are negligible due to the high elevation of the project site and significant distance to the ocean.

In terms of any seismic or hurricane issues, the design and construction of the proposed baseyard will be in accordance with all applicable County of Hawai'i building standards.

3.1.7 FLORA AND FAUNA

Rana Productions conducted field work on March 15, 2012 of the project site. Vegetation findings indicated "The vegetation on the site is dominated by fountain grass (*Pennisetum setaceum*), with scattered low stature māmane (*Sophora chrysophylla*), and naio (*Myoporum sandwicense*) trees. There are numerous ruderal species along the road and along some of the unimproved roads including 'uhaloa (*waltheria indica*), 'aweoweo (*Chenopodium oahuense*), Garden spurge (*Euphorbia hirta*) and other alien weedy species and grasses. Vegetation on the site has been

heavily grazed and the māmane trees have significant ungulate browse lines on their lower trunks. There are a number of ornamental Plum trees around several Structures on the site, these appear to have been taken care of and one suspects that those who are aware that the trees are on the site harvest the fruit in season.” See Appendix A.

“A total of 86 individual birds of 11 species, representing 11 separate families, were recorded during the station counts. One species detected, Hawai’i Amakihi (*Hemignathus virens*) is a Hawai’i Island endemic species. The remaining 10 species recorded during the course of this survey are alien to the Hawaiian Islands (Table 1). No avian species currently protected or proposed For protection under either the federal or State of Hawai’i endangered species programs were detected during the course of this survey (DLNR, 1998; USFWS, 2005a, 2005b, 2012).”

Impacts and Mitigation Measures

No impacts are anticipated.

1. It is recommended that woody vegetation taller than 4.6 meters (15 feet), not be cleared between June and September 15th, the period in which bats are potentially at risk from vegetation clearing
2. If night time construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood /work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed at the ground.
3. Following build-out it is recommended that any streetlights, security or facility lighting be shielded (Reed et al.1985, Telferetal.1987). This minimization measure would serve the dual purpose of minimizing the threat of disorientation and downing of Hawaiian Petrel and Newell’s Shearwaters, while at the same time complying with the Hawai’i County Code Section 14-50 *et seq.* which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to astronomical observatories located on Mauna Kea.

3.2 SOCIO-ECONOMIC ENVIRONMENT

3.2.1 LAND USE

The proposed project would occupy approximately 4 acres of land. The project site is located within the 20.5 acre area designated as the Mauna Kea State Recreation Area which offers a visitor center, cabin lodging, a full kitchen, picnic opportunities, rest rooms, and public telephone facilities.

The 4-acre project site was formerly utilized as a Nēnē breeding facility by the Department of Land and Natural Resources. The abandoned Nēnē breeding facility was established in 1949. By 1976, when the State acquired responsibility for the ‘Alala breeding program from the Federal government, two additional endangered species were being propagated at the Pohakuloa site, the Hawaiian duck (*Anas wyvilliana*) and the Laysan duck (*Anas laysanensis*). Although there was considerable success, the breeding of the ‘Alala provide to be much more difficult. In 1985, as a result of poor ‘Alala reproduction and the recognition that propagation efforts would probably be expanded to include other endangered Hawaiian forest birds, a new facility at a more suitable location was sought. The move from Pohakuloa was due to substandard facilities, personnel and predator problems, prevailing climatic conditions, and the periodic disturbance from military training. After reviewing several alternative sites, the former Olinda Honor Prison Camp on Maui was selected as a new propagation facility which would have the advantages of pre-existing buildings, suitable climate, and relative isolation. (National Academy of Sciences, 2000).

The Pohakuloa Training Area is located to the west of the project site. It extends up the lower slopes of Mauna Kea to approximately 6,800 feet in elevation and to about 9,000 feet on Mauna Loa. The Pohakuloa Training Area consists of 108,863 acres, of which 24,048 are leased by the Army from the State of Hawai‘i. Pohakuloa is utilized to accomplish varying types of training for military forces.

Much of the region surrounding the project site is designated within the State Conservation District. Other than the Mauna Kea State Recreation Area and the Pohakuloa Training Area, lands in the region are generally vacant. However, there are substantial areas on which hunting is permitted. Hunting areas include the Mauna Kea Forest Reserve, Pu‘uanahulu Game Management Area, Kaohe, and Pohakuloa Training Area Units.

Impacts and Mitigation Measures

The proposed new baseyard comprises a minor addition in terms of the land use in the area. The baseyard will help the HDOT to provide more responsive and efficient maintenance and repair services to the Saddle Road. The baseyard would be centrally located between both ends of the Saddle Road. The proposed use would be compatible from a land use standpoint and will not detract from or induce changes to the existing land uses on the surrounding properties. No mitigation measures are proposed.

3.2.2 HISTORIC AND ARCHAEOLOGICAL RESOURCES

The fieldwork component of the archaeological inventory survey was carried out by Cultural Surveys Hawai‘i (see Appendix B) under archaeological permit #11-17 for 2011 and #12-04 for 2012. These permits were issued by the Hawai‘i State Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai‘i Administrative Rules (HAR) Chapter 13-282. Five sites were identified on the subject property:

SIHP # 50-10-22-29222, a historic cabin;

SIHP # 50-10-22-29223 *nēnē* propagation aviaries;

SIHP # 50-10-22-29224, a historic stone enclosure; and

SIHP # 50-10-22-29226, ranching features including a feed trough and fence lines with gates.

SIHP # 50-10-22-29225, a possible terrace remnant and alignments. After testing, further evaluation concluded that this feature is nothing more than a bulldozer push pile.

CSH’s project specific effect recommendation is “effect, with agreed upon mitigation measures.”

The construction of the HDOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of the historic properties identified within the project area. The recommended mitigation measures will reduce the project’s potential adverse effect on these significant historic properties.

Impacts and Mitigation Measures

No recommendations to undergo further research are made at any of the five sites identified within the project area, because it has been determined that these historic properties lack cultural or scientific significance beyond that documented during this archaeological inventory survey. Therefore, no further work is recommended at any of the five historic properties within the project area. These historic properties are classified under Criterion B and/or D significance only and are characterized as consisting of remnants of twentieth century historic features that were utilized for ranching operations

or *nēnē* propagation. SIHP #50-10-22-29223 is associated with a historic figure, Ah Fat Lee, who was also known as “Father Goose”. Ah Fat Lee was instrumental in the success of the propagation of the Hawaiian *nēnē* goose at SIHP #50-10-22-29223, and the subsequent reintroduction of the geese back into the wilds of Hawai‘i and Maui Islands.

It is unlikely that the removal of these features would disturb any undiscovered subsurface features because they would have likely been impacted during the construction of the existing buildings and facilities. Therefore, archaeological monitoring is not recommended for construction-related ground disturbance.

However, if at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that the SHPD be contacted immediately.

3.2.3 CULTURAL RESOURCES AND PRACTICES

Hawaiian organizations, agencies and community members were contacted by Cultural Surveys Hawai‘i (see Appendix C) in order to identify individuals with cultural expertise and/or knowledge of the Project area and the vicinity. The consulted organizations included the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), the Hawai‘i Island Burial Council (HIBC), the Nature Conservancy of Hawai‘i (TNC), DLNR, Division of State Parks, and community and cultural organization in the Kailua-Kona and Hāmākua areas. Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the proposed project area and the vicinity.

CSH attempted to contact twenty-two community members (government agencies or community organization representatives or individuals such as cultural and lineal descendants including cultural practitioners) for the purpose of this CIA. Eight community members responded and two *kūpuna* (elders) and/or *kama ‘āina* (native born) were interviewed for more in-depth contributions.

Community consultation yielded the following results:

1. Participants expressed their concern with the destruction to the *‘āina* (land) and the native plants that grow nowhere else in the world.
2. Participants discussed the association of Mauna Kea to its cultural and spiritual links in *mo ‘olelo* (myths, legends, oral histories), *wahi pana* (legendary or storied places), *mele* (chants and songs) and poetical sayings as well as proverbs (*ōlelo no ‘eau*).
3. *Kūpuna*, *‘anakala* (uncle) Reynolds recommends within the construction, assemble a place for Hawaiian cultural practitioners to practice and perpetuate their culture. For example, an outside *hale* (house) similar to a small pavilion, an open area where cultural practitioners are able to gather, practice and share. *‘Anakala* Reynolds states, “Knowing what this area is so that we can perpetuate the culture, this is the culture. This is the key, when they construct, they develop it up and they’re perpetuating the culture by giving us a place by providing us a site so we can do our culture so that we can teach the culture.”
4. All of the community members interviewed for this study stress that Mauna Kea is a sacred landscape and that any future development activities on/vicinity of the mountain proceed with greater awareness of, and the utmost respect for Hawaiian culture, Hawaiians’ spiritual connection to the mountain, and the sanctity of Mauna Kea.

Impacts and Mitigation Measures

The findings of this CIA indicate that there is a wealth of Native Hawaiian cultural resources, beliefs and on-going practices associated with Ka'ohē Ahupua'a and the proposed project area. The results of this CIA present a number of possible mitigation measures for the landowner/developer's consideration. The following recommendations are offered as a way to begin to address some of the concerns expressed:

1. Construction consideration to the natural resources within the proposed project area.
2. If at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that SHPD be contacted immediately.
3. CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The construction of the HDOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of the historic properties identified within the project area. The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.

3.2.4 SCENIC AND VISUAL RESOURCES

The area affords expansive views of Mauna Kea and Mauna Loa. The slope of the saddle area between the two peaks is more gently sloping. Rock outcrops and shrub and grassland dominate the landscape. There are few developed areas in the vicinity. Mauna Kea State Recreation Area has cabins and a visitor center. An overhead transmission line extends along the north boundary of the project site. Further west, the Pohakuloa Training Area does contain about 600 acres of logistic and administrative facilities plus quarters for approximately 2,000 troops. However, the remainder of the 108,863 acres under its jurisdiction is generally vacant and devoid of structures.

The proposed baseyard site is located approximately 1,200 feet from the closest point of Saddle Road. There are 3 proposed buildings not to exceed 17 feet in height.

Impacts and Mitigation Measures

The project is not expected to adversely affect scenic and visual resources in the project area. The scale and massing of the proposed baseyard is compatible with existing development in the area and does not visually compromise the vast open space of the region. It is noted that the baseyard will provide a vital maintenance function for the Saddle Road which is the most direct connection between East and West Hawai'i.

3.2.5 RECREATIONAL FACILITIES

The proposed project is proposed to be located within the 20.5 acre Mauna Kea State Recreation Area. Located at the 6,500 foot elevation, the Mauna Kea State Recreation Area began as a Civilian Conservation Corps camp house in the 1930's. The current facility provides picnicking opportunities, cabin lodging, rest rooms and telephone facilities. A visitor center as well as a fully equipped kitchen facility is located on the premises. The developed portions of the park are located along the southern portion of the 20.5 acre area. The central portion of the 20.5 acre area where the proposed baseyard would be located, contains the vacated site of a former Nēnē breeding facility. There is also a Department of Land and Natural Resources plant propagation facility near the proposed baseyard site. The remainder of the central and northern portion of the 20.5 acre area is vacant.

Within the larger region, there are the attractions of the astronomical observatories on Mauna Kea as well as several hunting and hiking trails. Licensed hunters on the Big Island hunt pigs, sheep, goats, turkey, pheasants, quails, chukars, francolins and a variety of other gamebirds, by rifle or archery. State hunting areas in the vicinity include the Mauna Kea Forest Reserve, Kaohe and Pohakuloa Training Area units. Pohakuloa allows hunting only when it does not conflict with training. Pohakuloa also allows only mammal archery and shotgun bird hunting (no rifle hunting). (DOT, 2009).

There are no other recreational resources in the vicinity of the project site.

Impacts and Mitigation Measures

The proposed project will not have an adverse effect on recreational resources. The project site within a portion of the Mauna Kea State Recreation Area will not substantially affect recreational opportunities for the facility. The central and northern portion of the 20.5 acres are vacant. The proposed project also is still in very close proximity to the developed portions of the Mauna Kea State Recreation Area so as to not adversely affect existing hunting activities which take place over a broad expanse of the saddle region. Other than normal hunting rules and precautions which are already in place, no mitigation measures are proposed or anticipated to be required.

3.2.6 FIRE, POLICE AND MEDICAL SERVICES

The Pohakuloa Training Area maintains 24-hour emergency services with 25 firefighters, two ambulances, and 14 Army Police. There is a Mutual and Automatic Aid Agreement with the County of Hawai'i. Thus, the Pohakuloa Training Area provides first response to 911 calls for all fires, traffic accidents and other emergencies in its vicinity, including at a minimum, the area from MP 17 to 46 and the summits of Mauna Kea and Mauna Loa.

Fire and emergency service for the County of Hawai'i is provided by the Hawai'i Fire Department. Full stations are present in Waimea and North Kona, as well as in Hilo. Each station operates round-the-clock with a crew of firefighters and Mobile Intensive Care Technicians.

The Hawai'i Police Department provides police services for the island, including round-the-clock police stations in Waimea and Hilo. Police have begun patrols and speed enforcement on Saddle Road as portions of the highway have been improved and traffic is increasing.

Emergency telephones are located at Mauna Kea State Park, Pohakuloa Training Area and in emergency callboxes at certain sections of the Saddle Road.

Impacts and Mitigation Measures

The proposed project is not expected to have an adverse effect on or result in an increase in calls for fire, police or medical services. No mitigation measures are required or recommended.

3.2.7 SOCIO-ECONOMIC CONDITIONS

The County of Hawai'i has experienced continuing population growth over the last half-century. From 1960 to 2006 the average annual growth rate for the County as a whole was 2.3 percent. Population growth, however, has not been evenly distributed. The districts of Puna (southeast of Hilo), North Kona and South Kohala have had far more population growth, and a much higher

rate of growth, than the South Hilo district. Outlying areas in East Hawai‘i – Hamakua and North Hilo – have seen little or no population growth. (DOT, 2009).

Hawai‘i County is expected to see continuing growth in resident and visitor populations. Prior to the late 2008 economic slowdown, the State Department of Business, Economic Development and Tourism released a new series of long-range projections. These projections recognize that Hawai‘i County is experiencing the fastest population growth in the state. They anticipate population and job growth continuing at higher rates than the visitor count. They accordingly suggest two economic trends: successful targeting of high-income visitors and diversification of the local economy. The former trend supports high employment in the visitor industry. As the local economy grows, it can support a larger share of its own commercial infrastructure, lessening dependence on O‘ahu. (DOT, 2009).

With the continued improvements to the Saddle Road, travel time between Hilo and coastal West Hawai‘i could shorten the travel time by approximately 30 minutes, or more during peak travel. The improved Saddle Road would be safer and easier to drive than the existing road, and less likely to be congested than the other circum-island routes. At peak drive times, the difference could be much greater. The impact on the social environment depends on the drivers and routes affected. However, traffic volumes are likely to increase and travel times would decrease for the following groups of people:

- Visitors traveling between West Hawai‘i and the Kilauea Volcano area;
- East Hawai‘i residents commuting to and from work in West Hawai‘i;
- Residents of either side of the island, making occasional cross-island trips;
- Residents of Waiki‘i, whose subdivision is adjacent to the existing Saddle Road;
- Visitors and residents traveling between West Hawai‘i and the Mauna Kea Access Road; and
- Workers at Pohakuloa Training Area and the Mauna Kea and Mauna Loa observatories.

Impacts and Mitigation Measures

The project will not have an adverse or significant effect on area demographics or economic conditions. The project consists of a maintenance baseyard for the Saddle Road. The project will not induce or cause socio-economic changes by itself, but is intended to support the proposed improvements to Saddle Road.

Construction of the new baseyard will result in temporary, positive economic activity in the form of construction jobs and material procurements.

Construction effects will be temporary and will cease upon project completion. Facility operations following construction should be compatible with the area. Normal operations involve equipment and staff arriving and leaving at the start of the work day. Then at the end of the workday, equipment and staff arrive back at the baseyard and leave for home. No work is planned for nights, holidays or weekends. No mitigation measures are recommended or required.

3.3 INFRASTRUCTURE AND UTILITIES

3.3.1 TRAFFIC AND TRANSPORTATION SYSTEMS

Existing Traffic Conditions

Saddle Road traffic has traditionally been relatively sparse because of its substandard conditions. Existing uses or destinations such as the Mauna Kea Recreation Area, visitors to Mauna Kea, and other recreational users do not generate a significant amount of traffic. When Pohakuloa Training Area is in use for military exercises, traffic takes a brief temporary increase.

As sections of Saddle Road and eventually the entire length is widened and improved, traffic volumes will increase and travel time between East and West Hawai'i will decrease. The maintenance baseyard is located approximately halfway between East and West Hawai'i. This provides a more convenient location of equipment so that repairs may be effectuated in a more expedited and efficient manner. Traffic generated by the baseyard is anticipated to be minimal, approximately 5-6 private vehicles during morning and afternoon periods, and 2-3 maintenance vehicles during the day-time periods.

Impacts and Mitigation Measures

No significant increase in traffic associated with the proposed baseyard project is expected. On a short-term basis, construction-related traffic may be temporarily noticeable. However due to the limited scope of the project, construction-related traffic will not significantly alter the total volume of traffic on Saddle Road. The contractor will be required to keep all construction vehicles in proper operating condition and ensure that material loads are properly secured to prevent dust, debris, leakage, or other adverse conditions from affecting public roadways. No other mitigation measures are required or recommended.

Traffic generated by the baseyard should not result in an adverse effect on the Saddle Road level of service. Minor addition of traffic volume can be attributed to the baseyard. However, it is noted that without the baseyard, maintenance would still have to be performed on Saddle Road. Thus, any net addition of traffic resulting from the project can be considered negligible.

3.3.2 DRAINAGE SYSTEM

Rainfall and stormwater runoff from the site will be allowed to sheet-flow from the project site. There are no perennial streams that traverse through or nearby the property. Drainage patterns which allow runoff to sheet flow off the site will not be altered. The drainage improvements will result in no net increase in peak runoff resulting from the project.

Impacts and Mitigation Measures

No adverse changes to existing drainage patterns are expected to result from the project. The project does not involve any modifications to the existing drainage patterns and will not result in an increase in peak runoff. The project contractor will employ construction stormwater BMPs to prevent sediment or other pollutants from discharging in stormwater runoff from the site. The construction site and staging area will exceed one acre, therefore a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater

Permit is required. Hydrotesting will also be required. Thus, an NPDES Hydrotesting permit would be required as well.

3.3.3 WATER SYSTEM

The site is currently served by a water system operated by the State and also serves the State Park. Water needed for construction will need to be trucked to the project site. A water tank may be constructed for potable use and for long term water needs.

Impacts and Mitigation Measures

Construction activities will require use of water for dust control, vehicle wash down, concrete mixing, general housekeeping activities, and for pipe pressure testing. These uses will be intermittent and of short duration and will cease upon project completion. Quantities of water required for these uses are relatively minor. The specific source of water to be used for construction would be the responsibility of the contractor, but contractors may opt to purchase and truck water from County Department of Water Supply standpipes in Kaumana, above Hilo. Since the West Hawai'i connection is on Mamalahoa Highway, Waimea may also provide an option.

3.3.4 WASTEWATER SYSTEM

The area is not served by municipal sewer service. Thus, a septic system with a leaching field is proposed. Used oil and other waste materials from the baseyard will be stored in leak proof on-site tanks. It is intended that vendors collect the oil and waste materials to reuse or dispose of the products in compliance with applicable regulations.

Impacts and Mitigation Measures

During the period of construction, portable toilets will be provided for construction personnel. In the long term, the septic system would serve wastewater needs of the baseyard. Collection of other oils and waste materials would ensure that no adverse environmental impacts would result from the project. No other mitigation measures are recommended or required.

3.3.5 ELECTRICAL SYSTEMS

Electrical power in the area is provided by Hawai'i Electric Light Company (HELCO) which services the Island of Hawai'i. Connection to the power grid will be from lines extending just north of the proposed baseyard site.

Impacts and Mitigation Measures

Construction of the baseyard will not adversely affect provision of electrical power in the area. The existing HELCO system has adequate capacity to meet the power requirements during construction activities. Following construction, electrical power will be required for the new baseyard although power demand will be relatively low and intermittent in nature. No mitigation measures are required or recommended.

3.3.6 SOLID WASTE DISPOSAL

The County of Hawai'i Department of Environmental Management administers two landfills, twenty-one transfer stations and island wide hauling operations in accordance with local, state

and federal guidelines and regulations. Municipal solid waste generated by the proposed baseyard will be disposed at transfer stations either at Hilo or Waimea. During the period of construction, the contractor will be responsible to truck construction waste to the Pu'uana'hulu Landfill which is authorized to receive construction waste.

Impacts and Mitigation Measures

Construction activities will result in the generation of small amounts of construction and demolition debris. The Pu'uana'hulu Landfill handles construction waste in accord with applicable State Department of Health regulations. No additional mitigation measures for solid waste are proposed.

SECTION 4 RELATIONSHIP TO LAND USE PLANS AND POLICIES

4.1 THE HAWAI'I STATE PLAN

The Hawai'i State Plan, adopted in 1978, and promulgated in HRS, Chapter 226, consists of three major parts:

Part I, describes the overall theme including Hawai'i's desired future and quality of life as expressed in goals, objectives, and policies.

Part II, Planning Coordination and Implementation, describing a statewide planning system designed to coordinate and guide all major state and county activities and to implement the goals, objectives, policies, and priority guidelines of the Hawai'i State Plan.

Part III, Priority Guidelines, which express the pursuit of desirable courses of action in major areas of statewide concern.

The proposed project is consistent with the objectives and policies of the Hawai'i State Plan. Specifically, the proposed action will provide a new maintenance baseyard which will provide repair and maintenance services along the Saddle Road thereby keeping the facility in a safe operating condition for an extended period of time without the need for major capital improvement repair. Described below are sections of the Hawai'i State Plan's goals, objectives, and policies that are relevant to the proposed action.

§226-14 Objectives and policies for facility systems—in general. (a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.

(b) To achieve the general facility systems objective, it shall be the policy of this State to:

(1) Accommodate the needs of Hawai'i's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.

(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.

(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.

(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems. [L 1978, c 100, pt of §2; am L 1986, c 276, §13]

The proposed project supports the State Plan objectives and policies related to facility systems in general. The proposed baseyard provides a convenient means to properly maintain Saddle Road infrastructure so that cost of maintenance, repair and upkeep are optimized over the long term.

4.2 HAWAII STATE FUNCTIONAL PLANS

The State Plan contains twelve separate Functional Plans addressing specific areas of concern. The 1991 revision of the Functional Plan for Transportation has several objectives, policies and implementing actions that are relevant to this project including the following:

Objective IA: Expansion of the Transportation System.

Policy I.A.2: Improve regional mobility in areas of the State experiencing rapid urban growth and road congestion.

Objective II.A: Development of a transportation infrastructure that supports economic development initiatives.

Policy II.A.1: Support State economic development initiatives.

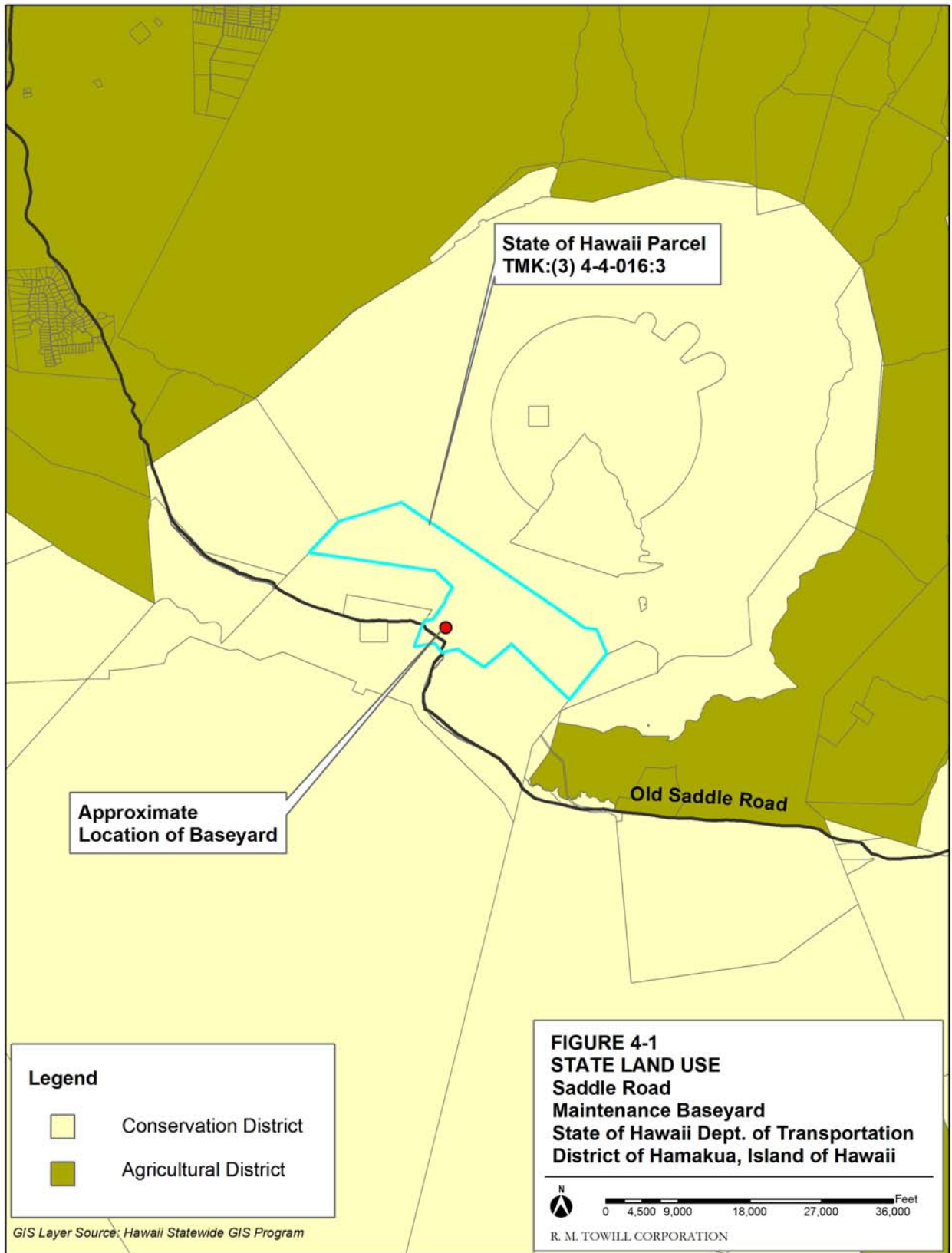
The proposed project supports the Objectives and Policies of the Transportation Functional Plan. The proposed baseyard provides a more convenient base of operations to maintain and repair Saddle Road in an efficient manner. This supports the roadway purpose of accommodating both existing and future cross-island traffic in a safe and efficient manner. The improved Saddle Road would link the existing residential, governmental and service centers in East Hawai‘i with the major job centers and economic development opportunities in West Hawai‘i.

4.3 STATE LAND USE LAW

The State Land Use Commission classifies all lands in the State of Hawai‘i into one of four land use designations: Urban, Rural, Agricultural and Conservation. The project site is located in the State Land Use Conservation District. See **Figure 4-1, State Land Use District**. Section 205-2, HRS, notes the following with regard to districting and classification of lands within the State Conservation District.

Conservation districts shall include areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered; preventing floods and soil erosion; forestry; open space areas whose existing openness, natural condition, or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources; areas of value for recreational purposes; other related activities; and other permitted uses not detrimental to a multiple use conservation concept.

Section 205-5, HRS, also notes that Conservation Districts shall be governed by the Department of Land and Natural Resources pursuant to Chapter 183C, HRS. The proposed baseyard is not contrary to the purposes of the State Conservation District. No action from the State Land Use Commission is required to implement the proposed project.



4.4 CONSERVATION DISTRICT SUBZONES

Chapter 183C, HRS and Title 13-5, HAR, regulate land use in the State Conservation District for the purpose of conserving, protecting, and preserving the important natural resources of the State through appropriate management and use to promote their long term sustainability and the public health, safety and welfare. The proposed baseyard is located within the Resource subzone of the State Conservation District. See **Figure 4-2, Conservation District Subzones**. Described below are the objectives of the Resource subzone as noted in Section 13-5-13, HAR.

The objective of the Resource subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas.

(b) The (R) subzone shall encompass:

(1) Lands necessary for providing future parkland and lands presently used for national, state, county, or private parks;

(2) Lands suitable for growing and harvesting of commercial timber or other forest products;

(3) Lands suitable for outdoor recreational uses such as hunting, fishing, hiking, camping, and picnicking;

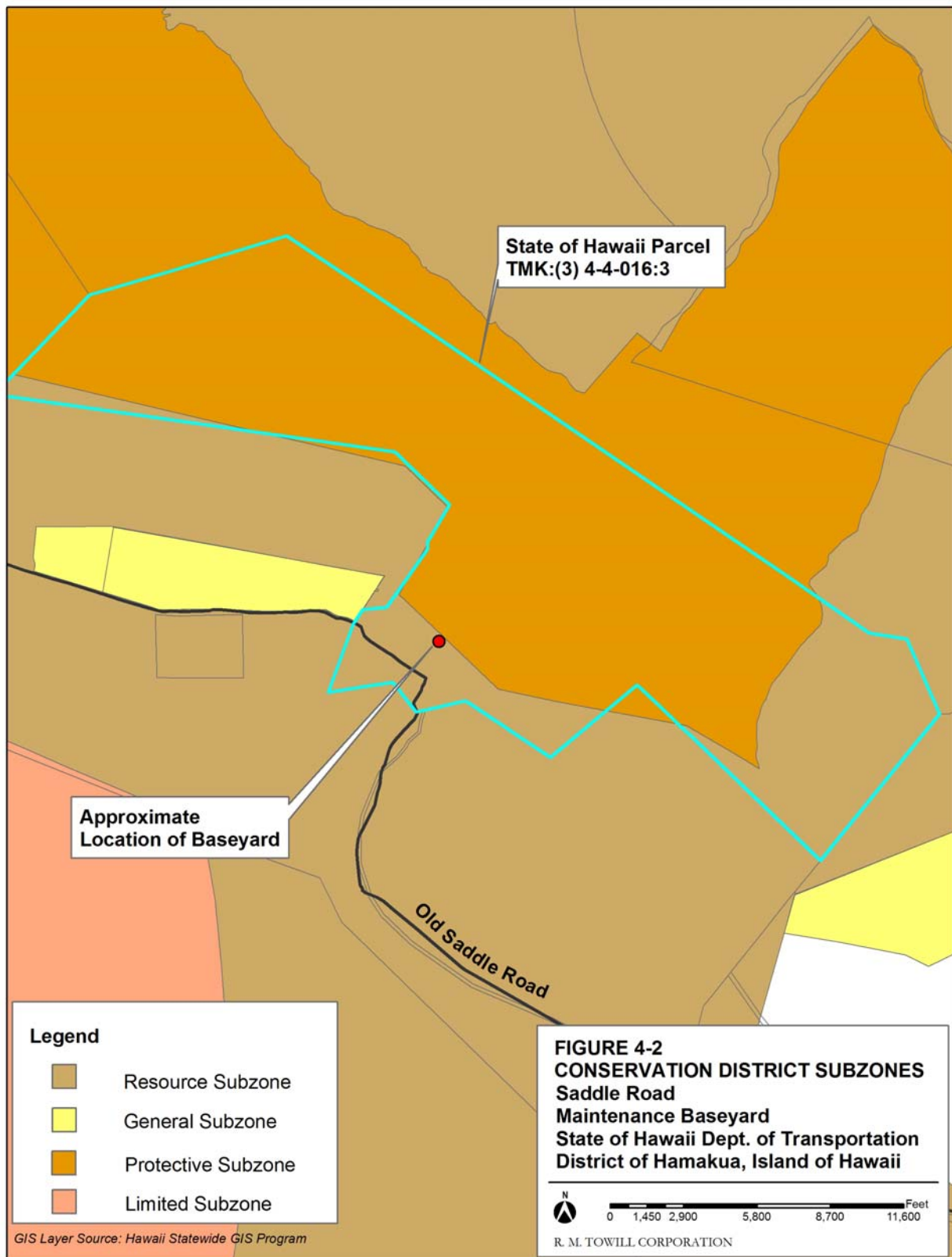
(4) Offshore islands of the State of Hawaii, unless placed in a (P) or (L) subzone;

(5) Lands and state marine waters seaward of the upper reaches of the wash of waves, usually evidenced by the edge of vegetation or by the debris left by the wash of waves on shore to the extent of the State's jurisdiction, unless placed in a (P) or (L) subzone.

The proposed baseyard is a permitted land use in the Resource subzone. Land uses which are permitted in the Protective and Limited subzones also apply in the Resource subzone. Section 13-5-22P-6 (D-1) of the Protective subzone allows the following:

Land uses undertaken by the State of Hawaii or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district. Such land uses may include transportation systems, water systems, communication systems, and recreational facilities.

It is noted that action by the Board of Land and Natural Resources is required for approval.



4.5 ISLAND OF HAWAI'I LONG RANGE LAND TRANSPORTATION PLAN

The Hawai'i Long Range Land Transportation Plan (HLRLTP) for the Island was adopted by HDOT in May 1998. This plan updated the Island of Hawai'i Long Range Highway Plan, which was originally developed in 1991. The HLRLTP is intended to identify needed land transportation improvements to accommodate traffic demand projections for the year 2020 and to prioritize those improvements for funding. This plan serves as the guide to State and County highway planning for the Island of Hawai'i. The HLRLTP identified the Saddle Road Improvement Project, extending from Kaumana to Mamalahoa Highway (SR 190), as a Tier 1 project. Tier 1 projects comprise those projects considered higher priority. This was based on the fact that the project: 1) linked Hilo with West Hawai'i; 2) addressed safety concerns along Saddle Road; 3) provided a more efficient route to West Hawai'i; 4) relieved congestion along other routes (Highway 19); 5) had Federal Funds through the Department of Defense available; and 6) connected Mamalahoa Highway (SR 190) with the Pohakuloa Training Area

The proposed highways baseyard supports the Saddle Road Project as contained in the HLRLTP. Projects will be added to the State Transportation Improvement Program in segments as they are programmed. It should be noted that the HLRLTP is currently in the early stages of an update.

4.6 COUNTY OF HAWAII GENERAL PLAN

The County of Hawai'i General Plan is a requirement of the County Charter and sets forth the policy for the long range comprehensive physical development of the county. The purposes of the General Plan are to:

- Guide the pattern of future development in the County based on long term goals.
- Identify the visions, values, and priorities important to the people of this County.
- Provide the framework for regulatory decisions, capital improvement priorities, acquisition strategies, and other pertinent government programs within the County organizations and coordinated with State and Federal programs.
- Improve the physical environment of the County as a setting for human activities; to make it more functional, beautiful, healthful, interesting and efficient.
- Promote and safeguard the public interest and the interest of the county as a whole.
- Facilitate the democratic determination of community policies concerning the utilization of its natural, man-made, and human resources.
- Effect political and technical coordination in community improvement and development.
- Inject long-range considerations into the determination of short-range actions and implementation.

The current plan was approved in 2005. (County of Hawai'i, 2005).

The proposed baseyard is intended to maintain the Saddle Road, a State facility. The project supports the following goal and policy of the Transportation section of the Plan.

Section 13.2.2 Goals

(a) Provide a system of roadways for the safe, efficient and comfortable movement of people and goods.

Section 13.2.3 Policies

(d) Support the development of programs to identify and improve hazardous and substandard sections of road way and drainage problems.

The General Plan also recognizes the overall community benefits that Saddle Road improvements will provide.

To alleviate the problem of distance between east and west Hawaii, a project planned by the Federal, State and County governments would improve the commute along the narrow and winding Saddle Road (Highway 200), the only paved road serving the astronomical observatories on Mauna Kea and Mauna Loa and the Pohakuloa Training Area. This project will upgrade and modernize the Saddle Road to Federal highway design standards and address conflicts in its shared use by the general public and the military. Once completed, the one-way commute time between East and West Hawai'i could be reduced by twenty to thirty minutes.

4.7 ZONING

The project site is located entirely in the State Conservation District. Pursuant to Section 183C-3(2), HRS, the Department of Land and Natural Resources is tasked with identifying and appropriately zoning lands classified within the Conservation District. County zoning maps recognize the subject property as Forest Reserve (Conservation District). (County of Hawai'i, 1999).

4.8 SPECIAL MANAGEMENT AREA (SMA) RULES AND REGULATIONS

The County of Hawaii has designated certain shoreline and inland areas of the Island of Hawai'i as being within the Special Management Area (SMA). SMA areas are designated sensitive environments that should be protected in accordance with the State's Coastal Zone Management policies, as set forth in Section 205A, Coastal Zone Management, HRS.

The project site is located in the saddle area of the Big Island and a significant distance from the shorelines of East and West Hawai'i. It is located outside of the SMA.

SECTION 5 NECESSARY PERMITS AND APPROVALS

5.1 STATE OF HAWAII

Department of Health

- National Pollutant Discharge Elimination System permit (Construction Stormwater, Hydrotesting)
- Construction Plan Review and Approval

Department of Land and Natural Resources

- Conservation District Use Permit

Department of Transportation

- Finding of No Significant Impact

5.2 COUNTY OF HAWAII

Department of Public Works

- Building Permit

SECTION 6
ORGANIZATIONS AND AGENCIES CONSULTED AND TO BE
CONSULTED DURING THE PREPARATION OF THE DEA

6.1 State of Hawai‘i

- Office of Environmental Quality Control
- DLNR, Land Division, Historic Preservation
- Department of Business, Economic Development and Tourism
- Department of Health
- Department of Transportation
- Office of Hawaiian Affairs
- Office of Planning
- University of Hawai‘i Environmental Center

6.2 Federal

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service

6.3 County of Hawai‘i

Department of Planning

6.4 Utility Companies

Hawaiian Electric Company, Inc.

Hawaiian Telcom

SECTION 7 DETERMINATION

In accordance with the content requirements of Chapter 343, Hawai‘i Revised Statutes, and the significance criteria in Section 11-200-12 of Title 11, Chapter 200, an applicant or agency must determine whether an action may have a significant impact on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short and long term effects. In making the determination, the Rules establish “Significance Criteria” to be applied as a basis for identifying whether significant environmental impact will occur. According to the Rules, an action shall be determined to have a significant impact on the environment if it meets any one of the following criteria.

The proposed project:

1. *Involves an irrevocable commitment to loss or destruction of natural or cultural resources;*

The proposed project is not expected to adversely impact natural or cultural resources.

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

The proposed project will not result in the curtailment of the range of beneficial uses of the environment. The project supports the function of Saddle Road as the only trans-island highway link between East and West Hawai‘i as well as connections to Mauna Kea and Mauna Loa. Proposed development is similar in scale to what is existing at the nearby Mauna Kea State Recreation Area. No adverse effects are anticipated open space and view planes. There should be no effect on hunting activities in the region.

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

The proposed project is consistent with the environmental policies, goals and guidelines expressed in Chapter 343, HRS. Potential sources of adverse impacts have been identified and appropriate measures have been developed to either mitigate or minimize potential impacts to negligible levels.

4. *Substantially affects the economic or social welfare of the community or state;*

The proposed project is expected to enhance the future long term stability of the State and County through the maintenance of basic public works infrastructure necessary to the health and welfare, of the community and region.

5. *Substantially affects public health;*

During construction, there will be minor impacts to air quality and noise levels. After completion of the construction work, there will be no long term negative consequences relating to air quality and noise. The project does not substantially affect public health.

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

Impacts on public facilities are negligible. The general region around the baseyard consists of vacant land and open space. Significant portions are controlled by the military through the Pohakuloa Training Area. The proposed baseyard will help keep the Saddle Road in good operating condition but will not cause significant population changes or effect exiting public facilities.

7. *Involves substantial degradation of environmental quality;*

The proposed project will be developed in accordance with the environmental polices of Chapter 343, HRS. No degradation of environmental quality is, therefore, anticipated or expected.

8. *Is individually limited but cumulatively has considerable effects on the environment, or involves a commitment for larger actions;*

The proposed project does not commit resources or energy for a larger action. There are no future phases of development. There is no further commitment to a larger action. There are no other effects on ecosystem resources and human communities from a cumulative effects perspective.

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

There are no endangered flora or fauna species within the project site.

10. *Detrimentially affects air or water quality or ambient noise levels;*

As required, any potential impacts to air, water quality, or noise levels will be addressed through the implementation of appropriate mitigation measures described in this document.

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

The proposed baseyard is located in an area designated as Zone X, an area outside the 500-year flood. The site is not located in or affects a tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters. The site contains no especially sensitive environmental characteristics which would detract from proposed use for this activity.

12. *Substantially affects scenic vistas and view planes identified in county or state plans or studies;*

The views to and from the project area will not be adversely affected. The project will not result in a significant change from the existing condition and does not substantially affect scenic vistas and view planes.

13. *Requires substantial energy consumption.*

The facilities identified in this project will not consume a substantial amount of energy.

Construction activities will result in a short-term increase in power demand, but the increase will be of short duration and will cease upon project completion. In the long term, the baseyard saves energy by providing a more convenient starting point for maintenance activities rather than using existing baseyards in the East or West Hawai'i areas.

Based on the above evaluation and the information contained in this Draft Environmental Assessment, it is anticipated that an Environmental Impact Statement (EIS) will not be required and that a recommended Finding of No Significant Impact (FONSI) will be published for this project.

SECTION 8 REFERENCES

(County of Hawai‘i, 1999), Hāmākua District Zone Map Section 25-8-15 (Formally Section 7.11), Prepared by Planning Commission, County of Hawai‘i, Ratified April 6, 1999.

(County of Hawai‘i, 2005), *County of Hawai‘i General Plan*, Prepared by County of Hawai‘i Department of Planning, February 2005.

(Department of Geography, 1983), *Atlas of Hawai‘i Second Edition*, Department of Geography, University of Hawai‘i, 1983.

(DOH, 2011), Hawai‘i Ambient Air Quality Data, Hawai‘i Department of Health Clean Air Branch,
http://hawaii.gov/health/environmental/air/cab/cab_onlinedata/cab_onlinedata_intro_2010.html.

(DOT, 2009), *Draft Supplemental Environmental Impact Statement, Saddle Road (State Route 200) Mamalahoa Highway (State Route 190) to Milepost 41, County of Hawai‘i, State of Hawai‘i FHWA Project No. 200(00)*, Hawai‘i Department of Transportation Highways Division and U.S. Department of Transportation Federal Highway Administration Central Federal Lands Highway Division, November 2009.

(Juvik and Juvik, 1998), *Atlas of Hawai‘i Third Edition*, Edited by Sonia P. Juvik and James O. Juvik, 1998.

(National Academy of Sciences, 2000), *The Scientific Bases for the Preservation of the Hawaiiina Crow*, <http://www.nap.edu/openbook/0309047757/html/51.html>, copyright 1992, 2000 The National Academy of Sciences, all rights reserved.

(Soil Conservation Service, 1973), *Soil Survey of the Island of Hawai‘i*, Prepared by United States Department of Agriculture Soil Conservation Service in cooperation with University of Hawai‘i Agricultural Experiment Station, Issued December 1973.

(USFWS, 2011), *National Wetlands Inventory*, U.S. Fish and Wildlife Service, last updated September 16, 2011.

(USGS., 1997), *Lava Flow Hazard Zone Maps*, Prepared by United States Geological Service, Last updated December 18, 1997, <http://pubs.usgs.gov/gip/hazards/maps.html>.

APPENDIX

Appendix A

Flora and Fauna Study

Rana Productions

March 2012

**Biological Surveys Conducted for the HDOT Saddle Road
Maintenance Baseyard, TMK: (4)-4-016:003, District of
Hāmākua, Island of Hawai'i**

Prepared by:

Reginald E. David
Rana Biological Consulting, Inc.
P.O. Box 1371
Kailua-Kona, Hawai'i 96745

Prepared for:

R. M. Towill Corporation
2024 North King Street Suite 200
Honolulu, Hawaii 96819

March 28, 2012

Table of Contents

INTRODUCTION AND BACKGROUND	3
SITE DESCRIPTION	3
METHODS.....	7
AVIAN SURVEY METHODS	7
MAMMALIAN SURVEY METHODS.....	7
RESULTS.....	7
AVIAN SURVEYS.....	7
MAMMALIAN SURVEY	9
DISCUSSION	10
BOTANICAL RESOURCES.....	10
AVIAN RESOURCES	10
MAMMALIAN RESOURCES.....	11
POTENTIAL IMPACTS TO PROTECTED SPECIES.....	11
HAWAIIAN HOARY BAT.....	11
SEABIRDS	11
RECOMMENDATIONS	12
CRITICAL HABITAT	12
LITERATURE CITED.....	14

Introduction and Background

The State of Hawai'i Department of Transportation, Highways Division (HDOT) is proposing to develop and operate a Saddle Road Maintenance Baseyard and associated infrastructure on an approximately 4-acre parcel of land, identified as Tax Map Key (4)-4-016:003, which is located adjacent to the Mauna Kea State Park, Hāmākua District, Island of Hawai'i (Figure 1). The purpose of the baseyard is to store equipment and material necessary to maintain the new Saddle Road.

This report describes the methods used and the results of, biological surveys conducted on the subject property as part of the environmental disclosure process associated with the proposed project. The primary purpose of the surveys was to determine if there are any botanical, avian or mammalian species currently listed, or proposed for listing under either federal or State of Hawai'i endangered species statutes within or adjacent to the study area. The federal and State of Hawai'i listed species status follows species identified in the following referenced documents, (Department of Land and Natural Resources (DLNR), 1998; U. S. Fish & Wildlife Service (USFWS), 2005a, 2005b, 2012). Fieldwork was conducted on March 15, 2012.

Site Description

The approximately 4-acre site is located to the northwest of the existing Mauna Kea State Park, north of the Saddle Road. The site is located at approximately 1985 meters feet above mean sea level. And includes the former DLNR endangered bird captive propagation facility. There are also a number of buildings in various states of disrepair on the property, and several abandoned vehicles (Figures 1, 2 and 3). There are several unimproved roads within the site and a 4 x 4 gravel road connecting the site to the Park proper (Figure 4). It is planned that this road will be upgraded and paved as part of this action. This improved road will serve as the access point to the baseyard off of the Saddle Road, which is located, adjacent to the southern boundary of the State Park (Figure 1).

The vegetation on the site is dominated by fountain grass (*Pennisetum setaceum*), with scattered low stature māmane (*Sophora chrysophylla*), and naio (*Myoporum sandwicense*) trees. There are numerous ruderal species along the road and along some of the unimproved roads including 'uhaloa (*waltheria indica*), 'aweoweo (*Chenopodium oahuense*), garden spurge (*Euphorbia hirta*) and other alien weedy species and grasses. Vegetation on the site has been heavily grazed and the māmane trees have significant ungulate browse lines on their lower trunks. There are a number of ornamental plum trees around several structures on the site, these appear to have been taken care of and one suspects that those who are aware that the trees are on the site harvest the fruit in season (Figure 5).



Figure 1 – Project location showing Mauna Kea State Park and proposed access road



Figure 2 – Baseyard site, looking north, Mauna Kea in the background



Figure 3 – Abandoned captive propagation pens within the site



Figure 4 – Current access road located on the eastern boundary of the site, looking north



Figure 5 – Plum tree and fruit located next to one of the buildings on the site

Methods

Plant names follow *Manual of the Flowering Plants of Hawai'i* (Wagner *et al.*, 1990, 1999) for native and naturalized flowering plants. The avian phylogenetic order and nomenclature used in this report follows the *AOU Check-List of North American Birds* (American Ornithologists' Union, 1998), and the 42nd through the 52nd supplements to the Check-List (American Ornithologists' Union, 2000; Banks *et al.*, 2002, 2003, 2004, 2005, 2006, 2007, 2008; Chesser *et al.*, 2009, 2010, 2011). Mammal scientific names follow (Tomich, 1986). Place names follow *Place Names of Hawaii* (Pukui *et al.*, 1974).

Avian Survey Methods

Four avian count stations were sited within the study site. A single 6-minute avian point count was made at each of the four count stations. Field observations were made with the aid of Leica 8 X 42 binoculars and by listening for vocalizations. The count and subsequent search of the site were conducted between 8:00 am and 11:00 am. Time not spent counting the point count stations was used to search the remainder of the site for species and habitats not detected during the point counts. Weather conditions were ideal, with no rain, unlimited visibility on the site, and winds of between 1 and 5 kilometers an hour.

Mammalian Survey Methods

With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or 'ōpe'ape'a as it is known locally, all terrestrial mammals currently found on the Island of Hawai'i are alien species, and most are ubiquitous. The survey of mammals was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all terrestrial vertebrate mammalian species detected within the study site.

Results

Avian Surveys

A total of 86 individual birds of 11 species, representing 11 separate families, were recorded during the station counts. One species detected, Hawaii Amakihi (*Hemignathus virens*) is a Hawai'i Island endemic species. The remaining 10 species recorded during the course of this survey are alien to the Hawaiian Islands (Table 1).

No avian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR, 1998; USFWS, 2005a, 2005b, 2012).

Avian diversity and densities were in keeping with the location and vegetation present on the site. Two species, House Finch (*Carpodacus mexicanus*), and House Sparrow (*Passer*

domesticus), accounted for almost 71 percent of the total number of birds recorded. House Finch was the most frequently recorded species, accounting for slightly more than 54.5 percent of the total number of birds recorded during the station count.

Table 1 – Avian Species Detected Within the DOT Mauna Kea Baseyard Site			
Common Name	Scientific Name	ST	RA
GALLIFORMES			
ODONTOPHORIDAE - New World Quail			
California Quail	<i>Callipepla californica</i>	A	1.00
COLUMBIFORMES			
Zebra Dove	<i>Geopelia striata</i>	A	0.25
PASSERIFORMES			
ALAUDIDAE - Larks			
Sky Lark	<i>Alauda arvensis</i>	A	0.50
ZOSTEROPIDAE - White-eyes			
Japanese White-eye	<i>Zosterops japonicus</i>	A	0.25
MIMIDAE - Mockingbirds & Thrashers			
Northern Mockingbird	<i>Mimus polyglottos</i>	A	0.50
STURNIDAE - Starlings			
Common Myna	<i>Acridotheres tristis</i>	A	0.75
CARDINALIDAE - Cardinals Saltators & Allies			
Northern Cardinal	<i>Cardinalis cardinalis</i>	A	0.50
FRINGILLIDAE - Fringilline and Carduline Finches & Allies			
Carduelinae - Carduline Finches			
House Finch	<i>Carpodacus mexicanus</i>	A	11.75
Drepanidinae - Hawaiian Honeycreepers			
Hawaii Amakihi	<i>Hemignathus virens</i>	ER	1.25
PASSERIDAE - Old World Sparrows			
House Sparrow	<i>Passer domesticus</i>	A	3.50
ESTRILDIDAE - Estrildid Finches			
African Silverbill	<i>Lonchura cantans</i>	A	1.25

Key to table 1

ST Status

A Alien – Introduced to the Hawaiian Islands by humans

ER Endemic Resident species – native and unique to the Island of Hawai'i

RA Relative Abundance - Number of individual birds detected, divided by the number of count stations (n~4)

Mammalian Survey

Six terrestrial mammalian species were detected during the course of this survey (Table 2). Several dogs (*Canis f. familiaris*) was heard barking from outside of the site within the Mauna Kea Park and dog scat and tracks were encountered at several locations within the site proper. One small Indian mongoose (*Herpestes a. auropunctatus*) was seen along the unpaved access road adjacent to the site. Two cats (*Felis catus*) were seen within the state park and along the access road. Scat, tracks and sign of pigs (*Sus s. scrofa*) were encountered within the site. Eleven sheep (*Ovis aries*) were seen within the site, as was one Mouflon x domestic sheep hybrid (*Ovis musimon x Ovis aries*). Beds, trails and scat of sheep were seen in many locations within the site.

No mammalian species currently protected or proposed for protection under either the federal or State of Hawai'i endangered species programs were detected during the course of this survey (DLNR, 1998; USFWS, 2005a, 2005b, 2012).

Table 2 – Mammalian Species Detected Within the DOT Mauna Kea Baseyard Site			
Common Name	Scientific Name	ST	DET
	CARNIVORA- Flesh Eaters		
	Canidae - Wolves, Jackals & Allies		
Domestic dog	<i>Canis f. familiaris</i>	A	V
	Viverridae - Civets & Allies		
Small Indian mongoose	<i>Herpestes a. auropunctatus</i>	A	V
	Felidae- Cats		
House cat	<i>Felis catus</i>	A	
	ATRIODACTYLA - Even-Toed Ungulates		Sc,Tr,Si
	Suicidae - Old World Swine		
Pig	<i>Sus s. scrofa</i>	A	Sc, Tr, Si
	Bovidae- Hollow-horned Ruminants		
Domestic sheep	<i>Ovis aries</i>	A	V, Sc, Tr, Si
Mouflon - domestic sheep hybrid	<i>Ovis musimon x Ovis aries</i>	A	V

Key to table 2

ST Status

A Alien – Introduced to the Hawaiian Islands by humans

DET Detection Type

V Visual – animals were seen

Sc Scat – scat of this species was encountered

TR Tracks – tracks of this species were encountered

Si Sign – trails, beds, tree girdling, odor, one or more of these signs were encountered on the site

Discussion

Botanical Resources

The vegetation on the site is dominated by alien species, the few remaining māmane trees and naio are in poor condition, the māmane mainly due to the impacts of ungulate browsing. The few native species other than the two aforementioned are commonly encountered native species, in habitat of this nature and at this elevation on the Big Island. The vegetation has been severely degraded by human and ungulate activity.

No plant species currently listed or proposed for listing under either federal or State of Hawai'i endangered species statutes was detected during the course of this survey (DLNR, 1998; USFWS, 2005a, 2005b, 2012).

Avian Resources

The findings of the avian survey are consistent with the location of the site. These findings are also comparable to the results of at least one other survey conducted along the dirt road located north, and adjacent to the site (David, 1996)

As previously discussed a total of 11 avian species were detected during the time spent within the study area. One of these, Hawaii Amakihi is an endemic species restricted to the Island of Hawaii. Hawaii Amakihi are arguably the second most common endemic forest bird, and as such it is not listed as a threatened or endangered species under either federal or State of Hawaii endangered species statutes (USFWS, 2012). The remaining 10 species recorded are alien to the Hawaiian Islands.

Although no seabirds were detected during this survey, it is probable that both the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened endemic subspecies of the Newell's Shearwater (*Puffinus auricularis newelli*), over-fly the project area in small numbers between April and the middle of December each year. Both species have been recorded flying within the Pōhakuloa Training Area (Cooper et al., 1995; David 2012). Both of these pelagic seabird species nest high in the mountains in burrows excavated under thick vegetation, especially 'uluhe (*Dicranopteris lineraris*) fern. There is no suitable nesting habitat for either of these listed seabird species within or close to the site.

The primary cause of mortality in the two aforementioned seabird species is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983; Simons and Hodges 1998; Ainley et al., 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai'i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Hadley 1961; Telfer 1979; Sincock 1981; Reed et

al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al. 1998; Ainley et al., 2001; Hue et al., 2001; Day et al 2003).

Mammalian Resources

The findings of the mammalian survey are consistent with the location of the site. These findings are also comparable to the results of at least one other survey conducted along the dirt road located north, and adjacent to the site (David, 1996)

Although no rodents were detected, it is likely that the several of the four established alien *muridae* found on Hawai'i, roof rat (*Rattus r. rattus*), Norway rat (*Rattus norvegicus*), European house mouse (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use resources found within the site on a seasonal basis. These human commensal species are all but ubiquitous around human activity.

No Hawaiian hoary bats were detected during the course of this survey. It is probable that Hawaiian hoary bats forage above the site in low numbers on a seasonal basis, as Hawaiian hoary bats have been documented very close to the site (Jacobs 1994; Cooper et al., 1995, David 2012)

The large numbers of sheep that have been utilizing resources on the site have seriously impacted the ground cover and the māmane (*Sophora chrysophylla*) trees remaining on the site.

Potential Impacts to Protected Species

Hawaiian hoary bat

The principal potential impact that the construction of this project poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace individual bats, which may use the vegetation as a roosting location. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. During the pupping season, females carrying their pups may be less able to rapidly vacate a roost site as the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage. Very small pups may be unable to flee a tree that is being felled. Potential adverse effects from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 4.6 meters (15-feet), between June 1 and September 15, the period in which bats are potentially at risk from vegetation clearing.

Seabirds

The principal potential impact that the development and operation of the proposed highway maintenance baseyard poses to protected seabirds is the increased threat that birds will be downed after becoming disoriented during the nesting season by lights associated with the project. The two main areas that outdoor lighting could pose a threat to

these nocturnally flying seabirds is if, 1) during construction if it is deemed expedient, or necessary to conduct nighttime construction activities, 2) following build-out, the potential operation of streetlights and security or facility lighting during the seabird nesting season.

Recommendations

1. It is recommended that woody vegetation taller than 4.6 meters (15-feet), not be cleared between June 1 and September 15, the period in which bats are potentially at risk from vegetation clearing.
2. If nighttime construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.
3. Following build-out it is recommended that any streetlights, security or facility lighting be shielded (Reed et al. 1985, Telfer et al. 1987). This minimization measure would serve the dual purpose of minimizing the threat of disorientation and downing of Hawaiian Petrels and Newell's Shearwaters, while at the same time complying with the Hawai'i County Code § 14 - 50 *et seq.* which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

Critical Habitat

There is no federally delineated Critical Habitat present on the project site. This particular parcel identified as TMK: (4)-4-016:003 was specifically excluded from the designated Critical Habitat for Palila (*Loxioides bailleui*), in a revision to the original Palila Critical Habitat designation (USFWS, 1977b - Page 47842). The northern edge of the site is very close to the southern boundary of Critical Habitat designated for this species (USFWS, 1997a, 1997b). There is no equivalent statute under State law.

Glossary

Alien – Introduced to Hawai‘i by humans

Endangered – Listed and protected under the Endangered Species Act of 1973, as amended (ESA) as an endangered species

Mauka – Upslope, towards the mountains

Muridae – Rodents, including rats, mice and voles, one of the most diverse family of mammals

Nocturnal – Night-time, after dark.

‘Ōpe‘ape‘a – Endemic endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*)

Pelagic – An animal that spends its life at sea – in this case seabirds that only return to land to nest and rear their young

Sign – Biological term referring tracks, scat, rubbing, odor, marks, nests, and other signs created by animals by which their presence may be detected

DOT – State of Hawai‘i Department Transportation, Highways Division

DLNR – State of Hawai‘i Division of Land and Natural Resources

ESA – Endangered Species Act of 1973, as amended

USFWS – United State Fish & Wildlife Service

Literature Cited

- Ainley, D. G, R. Podolsky, L. Deforest, G. Spencer, and N. Nur. 2001. The Status and Population Trends of the Newell's Shearwater on Kaua'i: Insights from Modeling, in: Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna*. Studies in Avian Biology No. 22: Cooper's Ornithological Society, Allen Press, Lawrence, Kansas. (Pg. 108-123).
- American Ornithologist's Union. 1998. *Check-list of North American Birds*. 7th edition. AOU. Washington D.C. 829pp.
- _____. 2000. Forty-second supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 117:847-858.
- Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2002. Forty-third supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 119:897-906.
- _____. 2003 Forty-fourth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 120:923-931.
- _____. 2004 Forty-fifth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 121:985-995.
- _____. 2005 Forty-sixth supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 122:1031-1031.
- _____. 2006 Forty-seventh supplement to the American Ornithologist's Union *Check-list of North American Birds*. Auk 123:926-936.
- Banks, R. C., C. R. Terry Chesser, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz. 2007 Forty-eighth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 124:1109-1115.
- Banks, R. C., C. R. Terry Chesser, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz, and K. Winker. 2008 Forty-ninth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 125:758-768.
- Bonaccorso, F. J., C. M. Todd and, A. C. Miles. 2005. Interim Report on Research to Hawaiian Bat Research Consortium for The Hawaiian Hoary Bat, Ope'ape'a, *Lasiurus cinereus semotus*. 1 September 2004 to 31 August 2005.
- _____. 2007. Interim Report on Research to Hawaiian Bat Research Consortium for The Hawaiian Hoary Bat, Ope'ape'a, *Lasiurus cinereus semotus*. April 1, 2007.

-
- Chesser, R. T., R. C. Banks, F. K. Barker, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, and D. F. Stotz, and K. Winker. 2009. Fiftieth supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 126:1-10.
- _____. 2010. Fifty-first supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 127:726-744.
- _____. 2011. Fifty-second supplement to the American Ornithologist Union *Check-list of North American Birds*. Auk 128:600-613.
- Cooper, B.A., David, R.E. and R.J. Blaha. 1995. Radar and Visual Surveys of Endangered Seabirds and Bats in the Pohakuloa Training Area, Hawai'i, During Summer 1995. Prepared for:R.M. Towill Corporation and the U.S. Army Corps of Engineers, Pacific Ocean Division.
- Cooper, B. A and R. H. Day. 1998. Summer Behavior and Mortality of Dark-rumped Petrels and Newells' Shearwaters at Power Lines on Kauai. Colonial Waterbirds, 21 (1): 11-19.
- David, R. E. 1996. Ornithological and Mammalian Surveys of the Proposed Improvement and Realignment Corridors of the Saddle Road (State of Hawaii Route 200), Island of Hawai'i, Hawaii. Prepared for: Rust E&I and the Federal Highways Administration, Central Federal Lands Highway Division.
- David, R. E. 2012. Unpublished field notes – Hawai'i 1980 - 2012.
- Day, R. H., B. Cooper, and R. J. Blaha. 2003. Movement Patterns of Hawaiian Petrels and Newell's Shearwaters on the Island of Hawai'i. Pacific Science, 57, 2:147-159.
- Day, R. H., B. Cooper, and T. C. Telfer. 2003. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. The Auk 120: 669-679.
- Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered And Threatened Wildlife And Plants, And Introduced Wild Birds. Department of Land and Natural Resources. State of Hawaii. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.
- Hadley, T. H. 1961. Shearwater calamity on Kauai. Elepaio 21:60.
- Hue, D., C. Glidden, J. Lippert, L. Schnell, J. MacIvor and J. Meisler. 2001. Habitat Use and Limiting Factors in a Population of Hawaiian Dark-rumped Petrels on Mauna Loa, Hawai'i. , in: : Scott, J. M, S. Conant, and C. Van Riper III (editors) *Evolution, Ecology, Conservation, and Management of Hawaiian Birds: A Vanishing Avifauna*. Studies in Avian Biology No. 22. Cooper's Ornithological Society, Allen Press, Lawrence, Kansas (Pg. 234-242).
- Jacobs, D.S. 1994. Distribution and Abundance of the Endangered Hawaiian Hoary Bat, *Lasiurus cinereus semotus*, on the Island of Hawai'i. Pacific Science, Vol. 48, no. 2: 193-200.

-
- Podolsky, R., D.G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. "Mortality of Newell's Shearwaters Caused by Collisions with Urban Structures on Kaua'i". *Colonial Waterbirds* 21:20-34.
- Pukui, M. K., S. H. Elbert, and E. T. Mookini 1976. *Place Names of Hawaii*. University of Hawaii Press. Honolulu, Hawai'i. 289 pp.
- Reed, J. R., J. L. Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariiform Birds: Reduction by Shielding Upward Radiation. *Auk* 102: 377-383.
- Simons, T. R., and C. N. Hodges. 1998. Dark-rumped Petrel (*Pterodroma phaeopygia*). In A. Poole and F. Gill (editors). *The Birds of North America*, No. 345. The Academy of Natural Sciences, Philadelphia, PA. and the American Ornithologists Union, Washington, D.C.
- Sincock, J. L. 1981. Saving the Newell's Shearwater. Pages 76-78 in *Proceedings of the Hawaii Forestry and Wildlife Conference, 2-4 October 1980*. Department of Land and Natural Resources, State of Hawaii, Honolulu.
- Telfer, T. C. 1979. Successful Newell's Shearwater Salvage on Kauai. *'Elepaio* 39:71
- Telfer, T. C., J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Society Bulletin* 15:406-413.
- Tomich, P.Q. 1986. *Mammals in Hawaii*. Bishop Museum Press. Honolulu, Hawaii. 37 pp.
- U.S. Fish & Wildlife Service (USFWS) 1977a. Determination of critical habitat for six endangered species. *Federal Register*, 42:40685-40690 (August 8, 1977)
- _____. 1977b. Final Correction and Augumentation of Critical Habitat Reorganization; 42 FR 47840 47845 (Thursday, September 22, 1977).
- _____. 1983. Hawaiian Dark-Rumped Petrel & Newell's Manx Shearwater Recovery Plan. USFWS, Portland, Oregon. February 1983.
- _____. 2005a. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 (Tuesday, November 1, 2005).
- _____. 2005b. 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. *Federal Register*, 70 No. 90 (Wednesday, May 11, 2005): 24870-24934.
- _____. 2012. USFWS Threatened and Endangered Species System (TESS), online at http://ecos.fws.gov/tess_public/StartTESS.do. Last Checked March 20, 2012

Wagner, W.L., D.R Herbst, and S.H. Sohmer. 1990. *Manual of the Flowering Plants of Hawai'i*. University of Hawaii Press, Honolulu, Hawaii 1854 pp.

Wagner, W.L. and D.R. Herbst. 1999. *Supplement to the Manual of the flowering plants of Hawai'i*, pp. 1855-1918. *In*: Wagner, W.L., D.R. Herbst, and S.H. Sohmer, *Manual of the flowering plants of Hawai'i*. Revised edition. 2 vols. University of Hawaii Press

Draft

Appendix B

Archaeological Inventory Survey
Cultural Surveys Hawaii
March 2012

**Archaeological Inventory Survey for the Baseyard at the
Mauna Kea State Recreation Area, Ka‘ohe Ahupua‘a,
Hāmākua District, Hawai‘i Island
TMK: [3] 4-4-016:003**

**Prepared for
R.M. Towill**

**Prepared by
Olivier Bautista, B.A.,
Sarah Wilkinson, B.A.,
Aulii Mitchell, B.A.
and
Hallett H. Hammatt, Ph.D.**

**Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: KAOHE 2)**

March 2012

**O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950**

www.culturalsurveys.com

**Maui Office
1860 Main St.
Wailuku, Hawai‘i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994**

Table of Contents

Management Summary	ii
Section 1 Introduction	1
1.1 Project Background	1
1.2 Scope of Work	1
1.3 Environmental Setting	7
1.3.1 Natural Environment.....	7
1.3.2 Cultural Context.....	7
1.3.3 Built Environment	9
Section 2 Methods	10
2.1 Field Methods	10
2.2 Laboratory Methods.....	11
2.3 Document Review	11
Section 3 Background Research	12
3.1 Traditional Background	12
3.1.1 <i>Mo'olelo</i>	12
3.1.2 <i>Mele</i>	14
3.1.3 Traditional Hawaiian Use of the Project Area Lands	14
3.2 Historic Background.....	18
3.2.1 Early Historic Period	18
3.2.2 Mid-to-Late 1800s	30
3.2.3 Late 1800s-1900s.....	33
3.2.4 Modern Land Use	34
3.3 Previous Archaeological Research	40
3.4 Background Summary and Predictive Model.....	43
3.4.1 Background Summary	43
3.4.2 Predictive Model.....	44
Section 4 Results of Fieldwork	45
4.1 Survey Findings	45
4.2 Site Descriptions.....	47
4.2.1 SIHP 50-10-22-29222.....	47
4.2.2 SIHP #50-10-22-29223.....	48
4.2.3 SIHP 50-10-22-29224.....	51
4.2.4 SIHP 50-10-22-29225.....	55
4.2.5 SIHP 50-10-22-29226.....	58
4.3 Test Excavations Findings.....	59
4.3.1 Test Unit 1	59
4.3.2 Test Unit 2	62
Results of Laboratory Analysis.....	64
4.4 Artifacts from Test Unit Excavations	64
4.5 Charcoal Sample Collected in TU-1	64
4.6 Discussion.....	64

Section 5 Summary and Interpretation..... 67
5.1 Summary..... 67
5.2 Interpretation..... 67

Section 6 Significance Assessments 68
6.1 Significance Assessments..... 68
6.1.1 SIHP # 50-10-22-29222..... 68
6.1.2 SIHP # 50-10-22-29223, features A, B, and C 68
6.1.3 SIHP # 50-10-22-29224..... 69
6.1.4 SIHP # 50-10-22-29225..... 69
6.1.5 SIHP # SIHP # 50-10-22-29226 69

Section 7 Project Effect and Mitigation Recommendations..... 70
7.1 Project Effect 70
7.2 Mitigation Recommendations..... 70
7.3 Disposition of Materials..... 70

Section 8 References Cited 71

List of Figures

Figure 1. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads, showing the location of the project area.....	2
Figure 2. Tax Map Key [3] 4-4-016:003, showing the location of the project area (see following Figure for detail)	3
Figure 3. Tax Map Key [3] 4-4-016:003, inset "B"	4
Figure 4. Aerial photo (Google Earth 2011) showing the location of the project	5
Figure 5. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads, overlain with USDA soil survey data (Sato et al. 1973), showing project area soils.....	8
Figure 6. Ah Fat Lee with gosling <i>nēnē</i> from Pōhakuoloa Propagation Project	39
Figure 7. Map of Previous archaeological studies in the vicinity of the current project area	41
Figure 8. Aerial photo (Google Earth 2011) showing the locations of the historic properties within the project area.....	46
Figure 9. Photo of SIHP # 50-10-22-29222 historic cabin; view to the northwest	47
Figure 10. Photo showing the SIHP # 50-10-22-29223 <i>nēnē</i> propagation aviary; view to the west.....	49
Figure 11. Photo showing the SIHP # 50-10-22-29223-B <i>nēnē</i> propagation aviary; note the power line on the left side of the photo; view to the south west.....	50
Figure 12. Photo of a cement water bowl located in SIHP # 50-10-22-29223-A; view to the west.....	50
Figure 13. Photo of a cement water bowl showing inscribed date "11-8-61" and letter "A" on cement water bowl; overview	51
Figure 14. SIHP # 50-10-22-29224 Plan View of Stone Enclosure with Location of TU-1	53
Figure 15. Photo showing interior of SIHP # 50-10-22-29224; view to the southeast.....	54
Figure 16. Photo showing SIHP # 50-10-22-29224 exterior eastern wall; view to the northwest	54
Figure 17. Plan view of SIHP # 50-10-22-29225, showing the location of TU-2	56
Figure 18. Photo of SIHP # 50-10-22-29225, possible corner of terrace; view to the northeast.....	57
Figure 19. Photo of SIHP # 50-10-22-29225; view to the northeast	57
Figure 20. Photo of SIHP # 50-10-22-29226, showing the animal feed trough (left) along a section of historic fence line; view to the northwest.....	58
Figure 21. Photo of the feed trough at SIHP # 50-10-22-29226; view to the southwest.....	59
Figure 22. Photo showing the area of Test Unit 1 prior to excavation; view to the southeast	60
Figure 23. Profile drawing of the south face of Test Unit 1	61
Figure 24. Photo showing TU-1 post excavation; and the profiled southern face of Test Unit 1; view to the southwest.....	61
Figure 25. Photo showing the area of Test Unit 2 prior to excavation; view to the northeast.....	62
Figure 26. Profile drawing of the northern face of Test Unit 2	63
Figure 27. Photo showing the profiled north face of Test Unit 2 post-excavation; view to the northeast.....	63
Figure 28. Photo of Accession #001, sheep rib bone.....	65
Figure 29. Photo of Accession #002, chain link fragment.....	66
Figure 30. Photo of Accession #003, chain link fragment.....	66

List of Tables

Table 1. LCA claims in Ka' ohe Ahupua'a	31
Table 2. Mauna Kea Telescopes	39
Table 3. Previous Archaeological Studies Conducted in the Vicinity of the Project Area	42
Table 4. Historic Properties Documented During the Inventory Survey Fieldwork	45
Table 5. Stratigraphy of Test Unit 1	60
Table 6. Stratigraphy of Test Unit 2	62
Table 7. Finds During Test Excavation at SIHP # 50-10-22-29224.....	65

Management Summary

Reference	Archaeological Inventory Survey for the Baseyard at the Mauna Kea State Recreation Area, Ka'ohē Ahupua'a, Hāmākua District, Hawai'i Island TMK: [3] 4-4-016:003 (Bautista et al. 2012)
Date	March 2012
Project Number (s)	Cultural Surveys Hawai'i, Inc. (CSH) Project Code: KAOHE 2
Investigation Permit Number	The fieldwork component of the archaeological inventory survey was carried out under archaeological permit #11-17 for 2011 and #12-04 for 2012. These permits were issued by the Hawai'i State Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai'i Administrative Rules (HAR) Chapter 13-282.
Project Location	The current project area is situated along the Saddle Road (Route 200) in the vicinity of the Mauna Kea State Recreation Area, near mile marker 34.0, in the <i>ahupua'a</i> (traditional land division) of Ka'ohē, District of Hāmākua, on the Island of Hawai'i. The Tax Map Key (TMK) is [3] 4-4-016:003. The project area is situated at 6,500 feet above sea level (amsl), and is just north of the Saddle Road.
Land Jurisdiction	State of Hawai'i
Agencies	Department of Land and Natural Resources / State Historic Preservation Division (DLNR / SHPD) / Department of Transportation (DOT)
Project Description	Construction of a new maintenance facility for crews maintaining the newly improved Saddle Road.
Project Acreage	Approximately 4 acres
Area of Potential Effect (APE)	For the purposes of the current archaeological inventory survey, the APE is defined as the entire, approximately 4-acre, project area. The extent of land disturbance expected by the current project is unknown at this time.
Historic Preservation Regulatory Context	This document was prepared to support the proposed project's historic preservation review under Hawai'i Revised Statutes (HRS) Chapter 6E-8/42 and Hawai'i Administrative Rules (HAR) Chapter 13-13-275/284. In consultation with the Hawai'i State Historic Preservation Division (SHPD), the archaeological inventory survey investigation was designed to fulfill the State requirements for an archaeological inventory survey per HAR Chapter 13-13-276.
Fieldwork Effort	The fieldwork component of this archaeological inventory survey was accomplished on November 22, 2011 and January 3, 2012 by CSH archaeologists Sarah Wilkinson, B.A. and Olivier M. Bautista, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. (principal investigator). The fieldwork required approximately 3 person-days to complete.

Number of Historic Properties Identified	Five
Historic Properties Recommended Eligible to the Hawai'i Register of Historic Places (Hawai'i Register)	Four : SIHP # 50-10-22-29222, a historic cabin; SIHP # 50-10-22-29223 <i>nēnē</i> propagation aviaries; SIHP # 50-10-22-29224, a historic stone enclosure; and SIHP # 50-10-22-29226, ranching features including a feed trough and fence lines with gates.
Historic Properties Recommended Ineligible to the Hawai'i Register	One: SIHP # 50-10-22-29225, a possible terrace remnant and alignments. After testing, further evaluation concluded that this feature is nothing more than a bulldozer push pile.
Effect Recommendation	CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The construction of the DOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of the historic properties identified within the project area. The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.
Mitigation Recommendation	<p>No recommendations to undergo further research are made at any of the five sites identified within the project area, because it has been determined that these historic properties lack cultural or scientific significance beyond that documented during this archaeological inventory survey. Therefore, no further work is recommended at any of the five historic properties within the project area. These historic properties are classified under Criterion B and/or D significance only and are characterized as consisting of remnants of twentieth century historic features that were utilized for ranching operations or <i>nēnē</i> propagation. SIHP #50-10-22-29223 is associated with a historic figure, Ah Fat Lee, who was also known as "Father Goose". Ah Fat Lee was instrumental in the success of the propagation of the Hawaiian <i>nēnē</i> goose at SIHP #50-10-22-29223, and the subsequent reintroduction of the geese back into the wilds of Hawai'i and Maui Islands.</p> <p>It is unlikely that the removal of these features would disturb any undiscovered subsurface features because they would have likely been impacted during the construction of the existing buildings and facilities. Therefore, archaeological monitoring is not recommended for construction-related ground disturbance.</p> <p>However, if at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that the SHPD be contacted immediately.</p>

Section 1 Introduction

1.1 Project Background

At the request of R.M Towill, Cultural Surveys Hawai'i (CSH) conducted an archaeological inventory survey for the proposed Department of Transportation Base yard, behind Mauna Kea State Recreation Area (commonly known as Mauna Kea State Park) in the *ahupua'a* (traditional land division) of Ka'ohe, Hāmākua District, on the Island of Hawai'i, TMK: [3] 4-4-016:003. The approximately 4-acre project area is depicted on a portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads, (Figure 1), tax map key [3] 4-4-016:003 (Figure 2 and Figure 3) and aerial photograph (Figure 4).

The Department of Transportation seeks to provide a new maintenance facility for crews maintaining the newly improved Saddle Road. Under Hawai'i state historic preservation legislation, archaeological inventory surveys are designed to identify, document, and provide significance and mitigation recommendations for historic properties. Under this legislation, historic properties are defined as any "building, structure, object, district, area, or site, including *heiau* [traditional place of worship] and underwater site, which is over fifty years old." A project's effect and potential mitigation measures are evaluated based on the project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established significance criteria, for inclusion in the Hawai'i Register of Historic Places [Hawai'i Register]). Determinations of eligibility to the Hawai'i Register result when a state agency official's historic property "significance assessment" is approved by the State Historic Preservation Division/Department of Land and Natural Resources (SHPD / DLNR), or when SHPD / DLNR itself makes an eligibility determination for an historic property (HAR Chapter 13-284).

In consultation with SHPD, this inventory survey investigation was designed to fulfill the state requirements for archaeological inventory surveys (HAR Chapter 13-276).

1.2 Scope of Work

The following archaeological inventory survey scope of work is designed to satisfy the Hawai'i state requirements for archaeological inventory surveys (Hawai'i Administrative Rules [HAR] Chapter 13-276 and Chapter 13-275/284):

1. Historic and archaeological background research, including a search of historic maps, written records, Land Commission Award documents, and the reports from prior archaeological investigations. This research will focus on the specific project area's past land use, with general background on the pre-contact and historic settlement patterns of the *ahupua'a* and district. This background information will be used to compile a predictive model for the types and locations of historic properties that could be expected within the project area.
2. A complete (100%) systematic pedestrian inspection of the project area to identify any potential surface historic properties. Surface historic properties will be recorded with an evaluation of age, function, interrelationships, and significance. Documentation

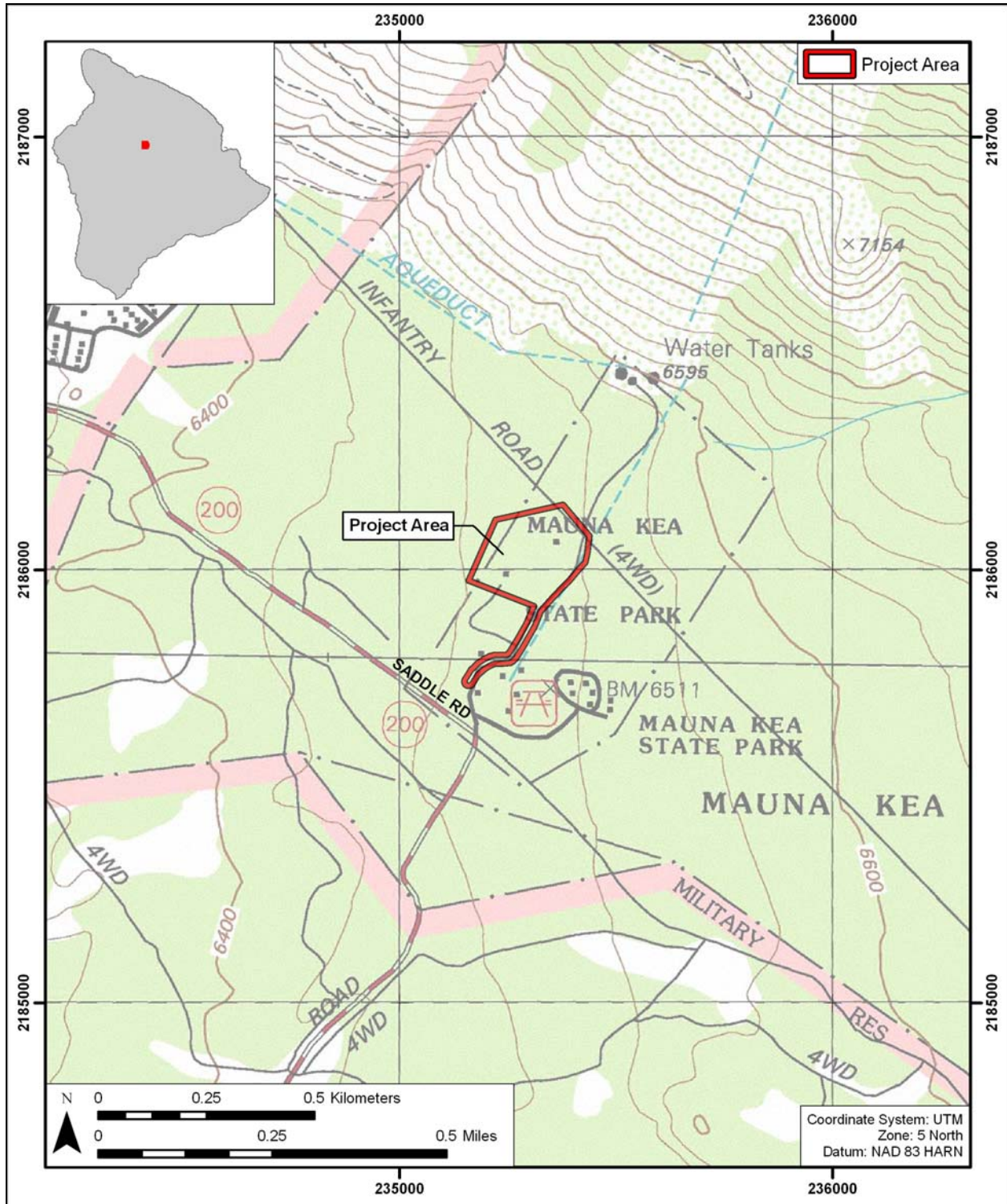


Figure 1. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads, showing the location of the project area.

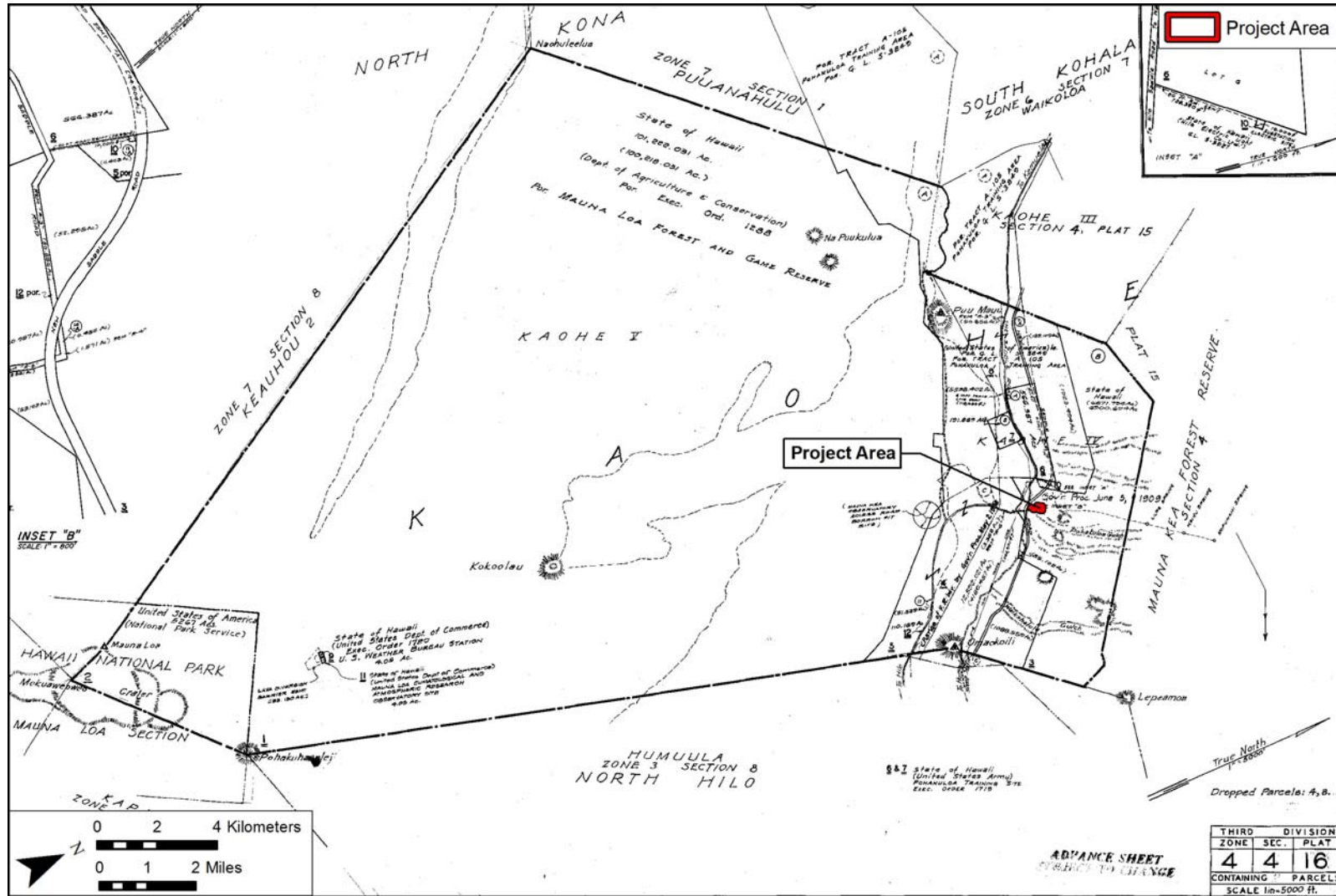


Figure 2. Tax Map Key [3] 4-4-016:003, showing the location of the project area (see following Figure for detail)

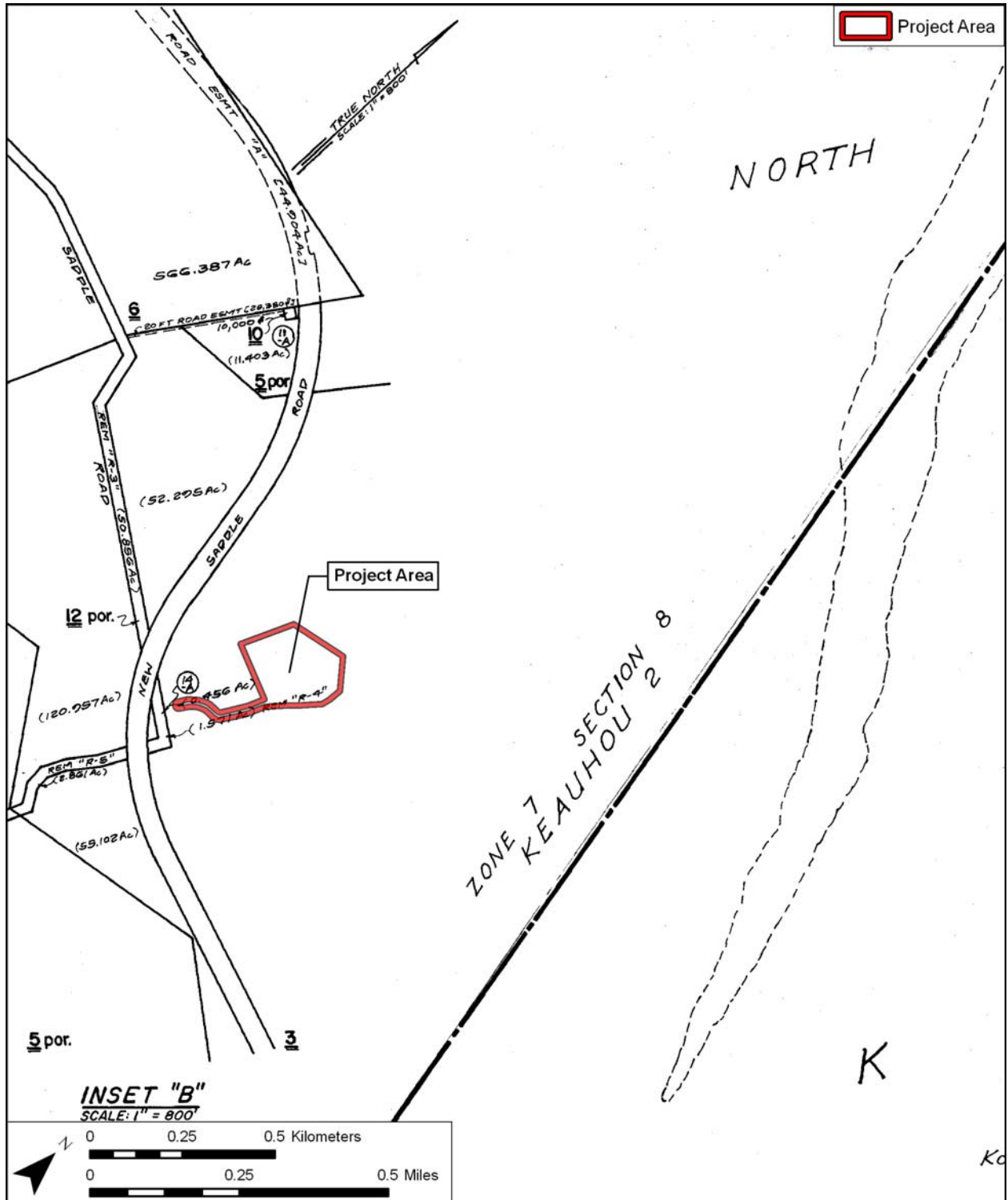


Figure 3. Tax Map Key [3] 4-4-016:003, inset "B"

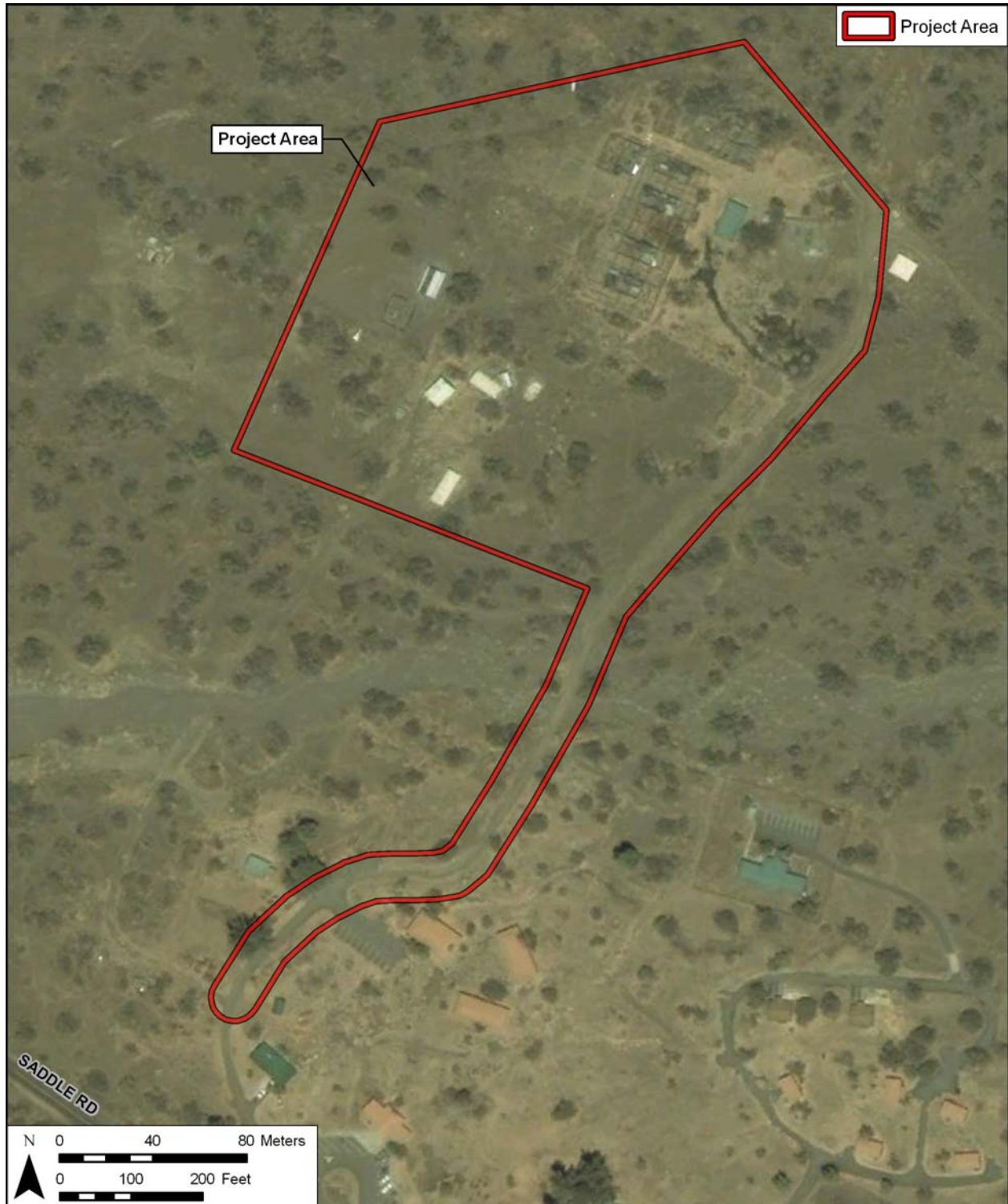


Figure 4. Aerial photo (Google Earth 2011) showing the location of the project

will include photographs, scale drawings, and, if warranted, limited controlled excavation of select sites and/or features.

3. Based on the project area's environment and the results of the background research, subsurface testing by hand excavation to identify and document subsurface historic properties that would not be located by surface pedestrian inspection may be appropriate. Appropriate samples from these excavations will be analyzed for cultural and chronological information. All subsurface historic properties identified will be documented to the extent possible, including geographic extent, content, function/derivation, age, interrelationships, and significance.
4. As appropriate, consultation with knowledgeable individuals regarding the project area's history, past land use, and the function and age of the historic properties documented within the project area.
5. As appropriate, laboratory work to process and gather relevant environmental and/or archaeological information from collected samples.
6. Preparation of an inventory survey report, which will include the following:
 - a) A project description;
 - b) A section of a U.S. Geological Survey topographic map showing the project area boundaries and the location of all recorded historic properties;
 - c) Historical and archaeological background sections summarizing prehistoric and historic land use of the project area and its vicinity;
 - d) Descriptions of all historic properties, including selected photographs, scale drawings, and discussions of age, function, laboratory results, and significance, per the requirements of HAR 13-276. Each historic property will be assigned a Hawai'i State Inventory of Historic Properties number;
 - e) If appropriate, a section concerning cultural consultations [per the requirements of HAR 13-276-5(g) and HAR 13-275/284-8(a) (2)];
 - f) A summary of historic property categories, integrity, and significance based upon the Hawai'i Register of Historic Places criteria;
 - g) A project effect recommendation;
 - h) Treatment recommendations to mitigate the project's adverse effect on any historic properties identified in the project area that are recommended eligible to the Hawai'i Register of Historic Places;

This scope of work includes full coordination with the SHPD/DLNR and county relating to archaeological matters. This coordination takes place after consent of the owner or representatives.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is located adjacent to Mauna Kea Recreation Area in the Saddle Region of the island of Hawai'i at the southern base of Mauna Kea, Ka'ohē Ahupua'a, Hāmākua District, Hawai'i Island, TMK (3) 4-4-016:003 (see Figure 1 through Figure 4). Elevation at the study area for this project is located at approximately 6500 feet above sea level (amsl). The climate at the project area is relatively cool and dry by Hawaiian standards; mean annual temperatures range from approximately 50–60°F and minimum temperatures in the winter months regularly plunge into the 30s. It receives between 20 and 30 inches of rain annually and experienced average annual soil temperatures between 50 and 53 degrees Fahrenheit (Sato et al. 1973:37). The surrounding area lacks permanent stream drainages but small amounts of fresh water may be available in the form of pools in lava tubes and other subterranean features.

The project area is underlain by Keekee soil series (Figure 5). According to Sato et al. (1973:37), the Keekee series consist of somewhat excessively drained loamy sands that formed in alluvium from volcanic ash and cinders. These soils are nearly level to gently sloping. They are located on uplands in the saddle between Mauna Kea and Mauna Loa. The natural vegetation consists of *māmane* (*Sophora chrysophylla*), mountain *pili* (*Heteropogon contortus*), golden crown beard, and lambsquarters. The entire project area is comprised of Keekee loamy sand, 0 to 16% slopes (KTB) (Sato et al. 1973). There are also small areas that have loose stones on the surface these areas tend to be at the mouths of drainages where coarse material accumulates. Permeability is rapid, runoff is slow, and the hazard of soil blowing is moderate to severe. Roots can penetrate up to a depth of three feet or more (Sato et al. 1973).

Currently these soils are used for wildlife habitat. It was formally used a sheep grazing (Sato et al. 1973).

1.3.2 Cultural Context

Situated at the base of Mauna Kea, the current study parcel is part of a vast area known in Hawaiian traditions as *'Āina Mauna*. This area is associated with many important historical figures in Hawai'i including the high chief 'Umi and Kamehameha I. Into the nineteenth century, the Saddle Region remained mostly Crown lands. Cattle, sheep and goats, originally introduced by Vancouver, were let loose to roam the Interior Plateau. Hunting of these feral ungulates was common (Bergin 2004:22-23).

From an archaeological perspective, the Saddle Region is particularly interesting as a place that was, until relatively recently, thought to contain few significant cultural resources. This view of the Saddle Region as a barren place that Hawaiians did not use or visit extensively in pre-Contact and early historic times—or mainly just traveled through on their way to other places—has been revised over the past 10 or 15 years. According to Bayman et al. (2004), more than 300 archaeological sites have now been documented at PTA including lava tube/blister shelters, trails, shrines, *ahu* (rock cairns or markers), petroglyphs, lithic quarries and thousands of pits excavated into *pāhoehoe*. Thus, while it is true Hawaiians did not live permanently in the Saddle Region and that large-scale cultivation in this high and dry landscape has always been impractical, it is clear that this area was an important source of a variety of resources important

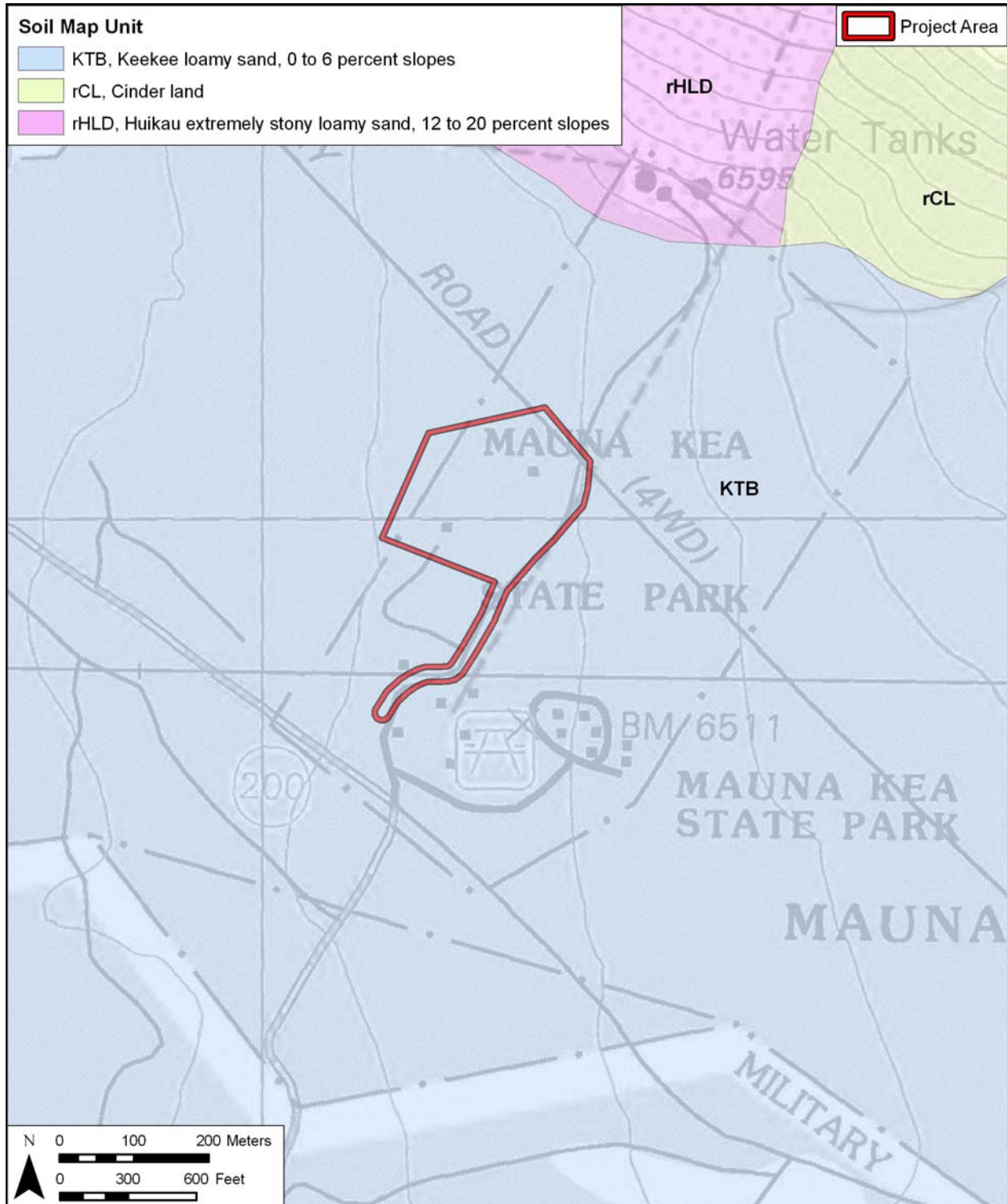


Figure 5. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads, overlain with USDA soil survey data (Sato et al. 1973), showing project area soils

to the maintenance of Hawaiian society including wood, forest plants, birds and bird feathers and lithic material, among others.

1.3.3 Built Environment

The project area has numerous modern and historic buildings, and is fenced in. The largest of these structures is the *nēnē* (*Branta sandvicensis*) rearing facility, which is comprised of three separate aviaries (SIHP #50-10-22-29223 Features A through C). There is also a cabin (SIHP #50-10-22-29222), two Quonset huts, a small cabin on wheels, a large modern cabin, a fenced in nursery with a green house, several small storage sheds, and a cattle feeding trough (SIHP #50-10-22-29226). Furthermore, there are several fence lines and gates that separate the *nēnē* rearing facility, greenhouse, and cabins. It appears that SIHP #50-10-22-29222 (the larger modern cabin), the nursery and green house are currently still in use. The remaining structures are dilapidated and appear abandoned, though they indicate modern-era usage. Existing dirt roadways provide access from the Park headquarters to and throughout the project area. The project area is strewn with abandoned military vehicles and materials.

Section 2 Methods

2.1 Field Methods

The fieldwork component of the archaeological inventory survey investigation was carried out under archaeological research permit number 11-17 for 2011 and 12-04 for 2012. These permits were issued by the Hawai'i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai'i Administrative Rules (HAR) Chapter 13-13-282. The fieldwork component of this archaeological inventory survey was accomplished on November 22, 2011 and January 3, 2012 by CSH archaeologists Sarah Wilkinson, B.A. and Olivier Bautista, B.A. under the general supervision of Hallett H. Hammatt, PhD (principal investigator). The fieldwork required approximately 3 person-days to complete.

A ground survey of the project area was undertaken for the purpose of historic property identification and documentation. The ground survey of the project area was accomplished through systematic sweeps. The interval between the archaeologists was generally between two and five meters, depending on the density of vegetation. All sites identified during the pedestrian survey were given a temporary CSH site number. The site locations were initially recorded with a Garmin GPSMAP 60CSx GPS unit. A photo log of all digital images associated with the project was maintained. The photo log included the date and the initials of the photographer, the approximate cardinal direction the photographer was facing, the subject matter of the image, and the CSH temporary field number. All photos included a clear, visible photo scale and north arrow. Scale photographs and written descriptions were prepared for each site, and plan view maps were drawn as applicable.

A program of subsurface testing was undertaken as part of this study. The number and locations of the test units were chosen based on the potential for excavation noted at each feature documented during the pedestrian survey. Excavation potential assessments were based on such criteria as feature function, extent or depth of sedimentary deposit, and/or feasibility of excavation (e.g., presence or lack of obstructive tree roots). Once determined, the locations of excavation units were photographed before and after digging, and marked on the scaled plan view field sketch. All relevant information about the archaeological excavations was recorded on standard excavation and level forms. Excavation levels and representative profiles were drawn to scale at each excavation unit according to standard operating procedures. Likewise, excavated sediments were described following standard procedures (e.g., Munsell color, sediment size, texture, consistency, inclusions).

The test units measured 1.0 by 1.0 m (1.0 m²). Soil-sedimentary deposits were removed either by trowel or by scooping by hand. An attempt was made to excavate and record each unit one level (or stratum) at a time to the underlying bedrock. All excavated deposits were passed through standard 1/8-inch screen. All soil-sediment passed through the screen was captured on a plastic tarpaulin, returned to its original provenience and tamped down to restore, as much as possible, the original appearance of the feature prior to excavation. All collected cultural materials were appropriately bagged, and then delivered to the CSH laboratory for analysis and curation.

2.2 Laboratory Methods

All collected materials were analyzed using current standard archaeological laboratory techniques. Historic artifacts were identified using standard reference materials and resources.

2.3 Document Review

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai'i at Mānoa, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona 'Āina database (<www.waihona.com>).

Section 3 Background Research

The following section presents information about the history and previous archaeological research of the lands surrounding the current project area and of the Saddle Region in general. This information provides a context in which the data gathered during the archaeological survey can be better understood and interpreted. The traditional and historical background sub-sections represent a synthesis of information and new information gathered during the archival data analysis.

The current project area lies in the Saddle Region between the volcanoes Mauna Kea, Mauna Loa, and Hualālai; at the southern base of Mauna Kea. The property is situated in the district of Hāmākua, in the Ka'ōhe Ahupua'a.

3.1 Traditional Background

3.1.1 *Mo'olelo*

Hawaiian *mo'olelo* (legends) provide insight into the traditional Hawaiian existence. In The Hawaiian culture, natural and cultural resources are regarded as one and the same. Hawaiian traditions describe the formation of the Hawaiian Islands and the presence of life on and around them, in the context of genealogical accounts. All forms of the natural environment are believed to be the embodiment of the Hawaiian gods and deities. One Hawaiian genealogical account records that Wākea (the expanse of the sky-father) and Papa-hānau-moku (Papa, who gave birth to the islands, also called Haumea-nui-hānau-wawa [meaning Great Haumea, born time and time again]) and various gods and creative forces of nature gave birth to the islands. Hawai'i, the largest of these islands, was the first born. As the Hawaiian genealogical account continues, we find these same god beings, or natural creative forces of who gave birth to these islands, were also parents of the first man (Hāloa), and from this ancestor all Hawaiian people are descended (David Malo 1951; Beckwith 1970; Pukui and Korn 1973). It was in this context of kinship, that the ancient Hawaiians addressed their environment, and is the basis of the Hawaiian system of land use. Most importantly, in these genealogical accounts, we find that Mauna Kea is referred to as “Ka Mauna a Kea” (Wākea's Mountain), and is likened to the first born of the island of Hawai'i (Pukui and Korn 1973).

While *mo'olelo* were traditionally passed down through the generations orally, in the 19th century Hawaiian language newspapers began publishing some of them. One *mo'olelo*, “*Na Kaa a Kekahi Elemakule Hawaii*,” printed in 1863 in the paper *Ke Au Okoa*, represents a collection of stories documented by the Frenchman Jules Remy during his time in Hawai'i. This account, excerpted below, describes the construction of the Ahu-a-Umi, which was translated by Maly:

Umi ruled in place of Hakau, and his friends Koi and Omaokamau dwelt with him. Piimaiwaa, Umi's war leader dwelt in Hilo. With Umi, there was also his trusted companion Pakaa, and his priest Lono. At this time, Umi ruled the eastern side of Hawaii, while on the western side, his relative Keliokaloa, ruled and dwelt at Kailua... In the time that he dwelt in Kailua, Keliokaloa was known as an evil chief, he cut down the coconut trees and desecrated the cultivated fields. It

was because of these evil deeds that Umi made preparations to go to war against him. Umi marched to battle, joined by his famous warrior, Piimaiwaa, and his companions Koi and Omaokamau. Also with him were his favorite, Pakaa, and his priest Lono.

Between Mauna Kea and Hualalai the chief and all his party traveled, with the thought of descending to Kailua. Keliokaloa did not wait though, but instead, traveled with his warriors to meet Umi in battle. The two armies met on a broad open plain, surrounded by the three mountains, at the place [now] called Ahu a Umi. There, Laepuni and them (people who were unattached to a chief) fought with Umi. Umi was almost killed, but Piimaiwaa leapt in and helped him, it was he who turned the battle in the favor of Umi's side. There is not much else that is said, but, it is known that the chief of Kailua died in the battle. Thus, with this battle, the entire kingdom was gained by Umi. He became the chief that controlled the entire island of Hawaii. So that the battle would be remembered from generation to generation, he (Umi) built the stone altar, that remains to this day, the altar (ahua) of Umi...

...He (Umi) also built a heiau (temple) below Pohaku Hanalei, it is called the ahua o Hanalei (altar of Hanalei); and on the side of Mauna Kea, by where one travels to Hilo, he built the third of his temples, at the place called Puukekee [also written Puu Keekee in historical texts]; and there at Mauna Halepohaku he built the fourth of his temples; there, it is said, Umi dwelt with his many people. It is said that Umi was a chief who dwelt upon the mountain, it was because of his love of his people, that he (Umi) returned and dwelt in the middle of the island [Ahu-a-Umi], that is where he dwelt with his beloved people. His commoners lived along the shores, and they brought food for them (in the uplands), from one side of the island to the other... [*Ke Au Okoa*; Mei 22, 1865; Maly, translator; from Maly 2004:16-18].

Another famous *mo'olelo* tells the story of two supernatural brothers, Ka-Miki and Maka'iole. These brothers travelled around the island in the 1300s, engaging with the various people they met along the way. This extensive and detailed narrative is known as "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki*," or "The Heart Stirring Tale of Ka-Miki," and was reproduced in the Hawaiian language newspaper *Ka Hōkū o Hawai'i* from 1914 to 1917 (Maly 2004:19). Excerpted below are sections of the account referencing Waiki'i and Pu'u Ke'eke'e, which both lie near the project area to the northeast in Waikōloa Ahupua'a, and to Pōhakuloa.

Ka-Miki then joined Maka'iole at Holoholokū on the plain of Waikōloa. As they traveled along the hill tops, the wind goddess Wai-kō-loa (Water carried far) caused the water to splash over the brim of Hōkū'ula. Some of the water was carried afar by the wind and fell, forming a new spring. When the spring appeared, Pōhaku-a-Kāne fetched some of the water. Because Pōhaku-a-Kāne fetched some of the water that had fallen, that place is called Wai-ki'i (water fetched) to this day. This happened near the hills of Pu'u Keke'e.

Pōhaku-a-Kāne took the water he retrieved to the base of the cliffs of Mauna Kea and dug into the earthen plain of Pōhakuloa and placed the water there. From

Pōhakuloa, the water flowed underground and appeared as springs at several other places, including Ana-o-Hiku at Hanakaumalu, Honua'ula, and Kīpahe'e-wai on the slopes of Hualālai... [*Ka Hōkū o Hawai'i*; March 12, 1914; from Maly 2004:24-25].

3.1.2 *Mele*

Hawaiian *mele*, or songs, explain history, carry genealogies, praise individuals, reveal lands, and worship *Akua* (Gods). One *mele*, related in the Ka-Miki narrative, is a chant meant to warm travelers headed to the summit of Mauna Kea (from Maly 2004:20):

<i>Ala hele mauka la</i>	The path goes to the uplands
<i>Ala hele makai la</i>	The path goes to the lowlands
<i>Ala hele mehameha i ke kualono</i>	It is a lonely path to the mountain
<i>Ala hele kuo-ū ko 'eko 'e</i>	A damp dreary path
<i>He ahi kou kapa e mehana ai</i>	A fire will be the wrap which warms you
<i>E lala ai i ke ala kapu la</i>	Warming you along the sacred trail
<i>A ko kūpuna wahine kino manamana</i>	[Fire] of your ancestress with many body forms
<i>Manamana ke ala nui ou e ku 'u kama</i>	Your path will have many branches my child
<i>E Nana-i-ka-ulu-o-Kamalama</i>	O Nana-i-ka-ulu-o-Kamalama (Ka-Miki)
<i>Ku ana ho 'olono i ka leo o 'u</i>	Stand and heed my voice
<i>O ko kūpuna wahine nei la</i>	It is I your ancestress
<i>Kū—e, kū la</i>	Stand, make ready
<i>Kū ho 'olono, lono e!</i>	Stand and hear, listen!

Through this *mele* one may develop a sense of the sacredness that Mauna Kea embodies for the Hawaiian people; it is not only physical property, but more importantly spiritual and cultural property that ties the Hawaiian people to their ancestors.

3.1.3 Traditional Hawaiian Use of the Project Area Lands

The *ahupua'a* of Ka'ohē is located near the center of the Island of Hawai'i. Elevation of this land division varies from sea level to 13,000 amsl, at the summit of Mauna Kea. The region is generally characterized by a harsh, cold, barren landscape comprised of numerous lava flows with sparse vegetation. Despite these extreme climactic and geological conditions,

archaeological evidence and literature sources suggest that this area was indeed being utilized possibly as early as A.D. 900. Dates obtained from archaeological sites in the saddle region follow this assessment (Streck 1986b). The place name “Ka’ohe” literally translates as “The bamboo”, though it is also a type of *kalo* (taro) that may have been common in the region (Pukui, et al. 1974).

Traditional Hawaiian activities in the Saddle Region as documented in the cultural record (Fornander 1996, Kamakau 1992, and Maly and Maly 2005) and in the archaeological record (see Section 3.3) included transportation, the establishment of ceremonial sites, bird hunting, collection of lithic resources (volcanic glass and dense fine-grained basalt) and other forest resources such as medicinal and other plants, and spiritual pursuits (e.g., burial of the dead and burial of *piko*, or umbilical cords of newborn children). At times, naturally-occurring lava tubes were utilized for some of the various reasons listed above, and for temporary shelter or habitation.

3.1.3.1 Transportation

Numerous pre-Contact trails, or *ala hele*, cross the Saddle Region; three major trail systems were documented by early historic travelers. Cordy (1994:194) proposed that these early post-Contact routes probably followed pre-Contact trails. The first trail connected Hilo to Waimea along a route generally following the modern Saddle Road. The second connected Waimea to Kona along the border between the Hāmākua and North Kona Districts. The third trail connected Ka‘ū to the Waimea-Kona trail at the celebrated Ahu-a-‘Umi Heiau temple site, passing just south of the Hāmākua District boundary (Williams 2002b). Robins et al. (2006:8) report that both the Waimea to Kona route and the route connecting Ka‘ū to the Waimea-Kona trail were often referred to as “‘Umi’s Roads.” SIHP 19528 is associated with ‘Umi’s Road to Waimea” (in reference to the famous ruling chief ‘Umi-a-Līloa) (Williams 2002b:9).

Kamakau’s *Ruling Chiefs of Hawaii* described Keawe-nui-a-‘Umi’s (son of ‘Umi-a-Līloa) use of the trail system to wage war against other districts:

When Keawe-nui-a-‘Umi learned of the unjust rule of Ke-li‘i-o-kaloa and the burdening of the common people, he was filled with compassion for the chiefs and commoners of Kona. Therefore he made himself ready with his chiefs, war lords, war leaders, and warriors from Hilo, Puna, and Ka-‘u to make war on Kona. The war party [met?] at the volcano (pit of Pele) before going on to battle along the southern side of Mauna Kea and the northern side of Mauna Loa. The mountain road lay stretched on the level. At the north flank of Hualalai, before the highway, was a very wide, rough bed of lava - barren, waterless, and a desert of rocks. It was a mountain place familiar to ‘Umi-a-Līloa when he battled against the chiefs of Hilo, Ka-‘u, and Kona. There on that extensive stretch of lava stood the mound (*ahu*), the road, the house, and the heiau of ‘Umi. It was through there that Keawe-nui-a-‘Umi’s army went to do battle against his older brother, Ke-li‘i-o-kaloa [Kamakau 1992:35].

In the early 1780s, Kamehameha used a trail across the mountains from Kawaihae to Kilauea to attack Ka‘ū and Hilo chiefs. This trail is believed to have been located along the Saddle Road corridor, but Williams (2002b:8) reported no remains of this trail have been found to date.

Dye discusses the problems with attempting to identify prehistoric trails in the region:

The widespread historic-era use of high elevation areas on Hawai'i Island, primarily for cattle ranching, has made it difficult for archaeologists to reconstruct the traditional Hawaiian trails there. The problem is being able to determine the age of a modern trail—is it new, or was it laid out over an existing trail? This problem is compounded somewhat by the lack of a detailed record of trails and by the nature of the trails themselves; over rough *'a'ā* lava a definite route is often marked, but over *pāhoehoe*, which is easily traversed, the “trail” might be poorly marked, if at all, and hikers could have walked anywhere within a wide corridor [Dye 2005:6]...

The difficulty of fixing precise locations in remote areas complicated archaeological efforts to record trails before the advent of the geographic positioning system. An example of this is trail site –19528 which might have been recorded and incorrectly located earlier as site –5006, the Nā'ōhule'elua curbstone trail [Reinman and Pantaleo 1998:101 as footnote in Dye 2005:6].

3.1.3.2 Ceremonial Sites

Fornander states that 'Umi constructed a *heiau* (place of worship) east of Hualālai along the Kona-Waimea road, called “Ahu-a-'Umi,” where his court resided (1996:101). However, a translation provided by Maly and Maly (2005:9-12; 2004:18; see section 4.1.1 above) indicates this *heiau* was instead built to commemorate the battle which consolidated 'Umi's rule. According to Hammatt and Shideler (1991:72-73), “the burst of activity in the west corner of the PTA circa 1500 may well be associated with the movement of numbers of people to live and work at the Ahu a 'Umi project which lies just 5 miles to the southwest.”

Maly and Maly (2005:12) also describe the report of another *heiau* of 'Umi, built atop Pu'u Ke'eke'e (approximately 12 km northeast of the project area).

3.1.3.3 Bird Hunting

According to Dye:

The testimony by elderly *kama'āina* clearly distinguishes the forested [upland zone] lands from those above the forest line. Within the forest are noted the homes or temporary camps of canoe makers and bird feather collectors. These are specifically noted at elevations as high as 5,500 ft... The available records do not identify any substantial construction that might have taken place at these temporary camps, however. Above the forest line, the primary traditional Hawaiian resources appear to have been *'ua'u* [or dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*)] and *nēnē* birds. These resources were actively managed... [Dye 2005:6].

Hammatt and Shideler also discuss the importance of avian resources in and around Pohakuloa Training Area (PTA):

While there are no specific references tying 'Umi to the PTA, it is nevertheless clear that his lifetime is much associated with the acquisition of avian resources in

the uplands, with high elevation trails, and with the plateau area. 'Umi and some of his friends are specifically referred to as hunting birds for feathers and food. Their primary area of operation appears to be ten miles or more to the northeast of the PTA but it seems reasonable to assume that some similar bird hunting was going on within the PTA in this time frame... [Hammatt and Shideler 1991:73].

Prominent surveyor Curtis J. Lyons penned "Hawaiian Land Matters," an 1875 paper describing "the rights of native tenants on the *ahupua'a* of Humu'ula and Ka'ohē," (Maly 2004:8). In this paper, he notes that "The whole main body of Mauna Kea belongs to one land from Hamakua...Kaohe, to whose owners belonged the sole privilege of capturing the *ua'u*, a mountain-inhabiting but sea-fishing bird," (Lyons 1875:111; from Maly 2004:8). Hammatt and Shideler remark that "[b]oundary disputes...were common in the interior with men of one district killing men of other districts 'for stealing food'" (1991:34).

The Saddle Region was once home to a variety of bird species including vast quantities of ground-nesting seabirds, the most common of which was the *'ua'u*. Lyons (1875:111) mentions that the *ahupua'a* of Ka'ohē was a well known location to catch seabirds to eat. Henshaw reported that the Hawaiians went to the lava fields of the Saddle Region to capture young birds in their nests. The immature birds were said to be a delicacy restricted to the *ali'i*, or chiefly class (Henshaw 1902:102; Beckwith 1932:88).

Bird hunters also sought other species for food, including: the *moho*, or Common Hawai'i Rail (*Porzana sandwichensis*); the *nēnē*; and the *'alalā*, or Hawaiian Crow (*Corvus hawaiiensis*). Like the *'ua'u*, the *moho* nested in holes and crevices, and were probably exploited in the same fashion. The *nēnē*, *mamo* (*Drepanis pacifica*), and *'alalā* were taken for their plumage as well as for food (Malo 1951:38).

Other bird species collected in the Saddle Region for their feathers included: the Hawai'i *'amakihi* (*Loxops virens virens*); *'apapane*, or Hawaiian honeycreeper (*Himatione sanguinea*); *'elepaio*, or Hawaiian flycatcher (*Chasiempis sandwichensis*); *'i'iwi*, a scarlet honeycreeper (*Vestiaria coccinea*); *kepa*, a honeycreeper (*Loxops coccinea*); *kōlea*, or Pacific Golden-Plover (*Pluvialis fulva*); *palila* (*Loxioides bailleui*); *pueo*, Hawaiian owl (*Asio flammeus*); *'akialoa* (*Hemignathus* spp.); *'ō'ō* (*Moho* spp.); and *'ō'ū* (*Psittirostra psittacea*) (Athens and Kaschko 1989:39). Their plumage was used for making symbols of chiefly rank such as feather cloaks, capes, helmets, and standards.

J.S. Emerson relates how the game birds, once captured and killed, were cooked using stones, or *pōhaku eho manu*:

The stone was heated red hot and inserted in the interior of the bird to be cooked. Bird and stone were then wrapped in suitable leaves and covered with earth to steam in its own juice. This saved the use of water which was often a scarce article on the southern and western slopes of the mountains of Hawaii [Emerson in Summers 1999:2].

3.1.3.4 Lithic Resources

The resource most noted by visitors to the summit plateau is the fine-grained basalt extracted and worked into stone adzes. All but one of the references gathered are the accounts of foreign

visitors who described in some detail, and with some knowledge, the function of this quarry and its products after 1870. If this knowledge was derived from Hawaiian informants, this source was not acknowledged.

One native Hawaiian mention of this resource, or its use on Mauna Kea, found thus far is the testimony in the 1873 boundary dispute between Humu'ula and Ka'ohē *ahupua'a*. In reciting noteworthy landmarks along the boundary, which he claimed crossed the summit, Haiki mentioned first “Kaluakaakoi a cave there they used to get stone adzes out” and later reiterated, “My parents told me Humuula went to Kaluakaakoi and Poliahu. We used to go there after adzes for Humuula people.” If these statements are valid, and if his knowledge of the boundaries came from his “father,” “grandfather,” and “father of my wife” as he claims, and considering that he was born “after the battle of Kekuakalani” (i.e., 1819)... then the knowledge and use of the quarry as implied from these statements potentially stretch from the 1770's to the 1840's (McEldowney and McCoy 1982; A-10).

3.2 Historic Background

3.2.1 Early Historic Period

3.2.1.1 *Bullock (Cattle) Hunting*

Captain George Vancouver introduced cattle to the islands in 1793 with the gift of a bull and a cow to Kamehameha I. L.A. Henke details this event:

On the 19th of February, 1793, he [Vancouver] landed a bull and cow from California for Kamehameha I in the canoe of Krimamahoo [Kalaimamahū, a half brother of Kamehameha I], off the coast of Hawaii. On the 22nd of February, 1793, he landed five cows, two ewes and a ram, in the bay of Kealakekua for Kamehameha I; on the 15th of January, 1794, he landed a bull, two cows, two bull calves, five rams, and five ewe sheep from California in Kealakekua Bay for Kamehameha I [Henke 1929:9].

Kuykendall notes that Vancouver saw that the introduction of cattle to Hawai'i “...would not only be of advantage to the native people but would also enhance the value of the islands as a commercial depot and rendezvous,” (Kuykendall 1968:40-41).

At this point in time, all of cattle and other introduced livestock—including horses, which were first brought to Hawai'i in 1803, and goats, introduced by Captain Cook in 1778—were considered property of the government, though a few foreigners had been granted the right to handle the cattle (Henke 1929:5-20). Henke estimated that of the 20,000 cattle on the island of Hawai'i in 1851, 12,000 were wild (Henke 1929:22).

Cattle herds spread quickly around Waimea and the upland slopes (including the Saddle Region). By 1818, the wild cattle had become such a nuisance that foreign “bullock hunters” (including John P. Parker, who later founded the Parker Ranch) were hired to shoot cattle and prepare the meat for sale to foreign ships (Williams 2002b:25).

3.2.1.2 Sandalwood Collection

In the first decades of the 19th century, *'iliahi* or sandalwood (*Santalum* spp.) was harvested throughout the Hawaiian Islands for export to China. Thousands of trees were taken from the uplands, devastating the forests; by the 1840s only saplings remained (Robins et al. 2006:11-13). Wilkes (1845:100 in Robins et al. 2006) observed caves along the Kona-Waimea Trail that were reported to have served to house sandalwood collectors. When Shapiro and Cleghorn (1998) documented a lava tube (SIHP 19491) on the western edge of PTA, near the border separating North Kona from Hāmākua, three bundles of sandalwood wrapped in nets were found in the lava tube (Shapiro and Cleghorn 1998:48).

3.2.1.3 Early Foreign Visitors

First-hand accounts of early foreign visitors to the Hawaiian Islands provide valuable insight into the natural landscape and the transition from the traditional lifestyle to one influenced by the introduction of western culture. Many of these travelers traversed the saddle region, often as a launching point for travels to the summit of Mauna Kea. In Maly's 2004 report on the lands of Humu'ula and Pi'ihonua, he discusses how the routes the early visitors would usually take through the saddle:

By the early 1800s, foreign visitors began making regular trips across the *'āina mauna* [mountain lands] and to the summit of Mauna Kea. Based on their accounts, travel in the region through the middle 1800s basically followed the old trails, or cut across new areas. By the 1850s, the Kingdom of Hawai'i entered into a program of improving ancient trails and identifying new routes, by which to improve travel between various locations and facilitate commerce [Maly 2004:5].

The journals of the British missionary William Ellis contain references to the Mauna Kea (Mouna-Kea), Mauna Loa (Mouna Roa), Hualālai (Mouna Huararai), and to the saddle, or "interior:"

On approaching the islands, I have more than once observed the mountains of the interior long before the coast was visible, or any of the usual indications of land had been seen. On these occasions, the elevated summit of Mouna Kea, or Mouna Roa, has appeared above the mass of clouds that usually skirt the horizon, like a stately pyramid, or the silvered dome of a magnificent temple, distinguished from the clouds beneath, only by its well-defined outline, unchanging position, and intensity of brilliancy occasioned by the reflection of the sun's rays from the surface of the snow.

The height of these mountains has been computed by some navigators who have visited the Sandwich Islands, at 12,000, and by others at 18,000 feet. The estimate of Captain King [1779], we think exceeds their actual elevations, and the peaks of Mouna Kea, in the opinion of those of our number who have ascended its summit, are not more than 1000 feet high. But admitting the snow to remain permanent on the mountains of the torrid zone at the height of 14,600 feet, the altitude of Mouna Kea and Mouna Roa is probably not less than 15,000 feet.

The base of these mountains, is, at the distance of a few miles from the seas shore, covered with trees; higher up, their sides are clothed with bushes, ferns, and alpine plants; but their summits are formed of lava, partly decomposed, yet destitute of every kind of verdure.

There are few inland settlements on the east and north-west parts of the island, but, in general the interior is an uninhabited wilderness. The heart of Hawaii, forming a vast central valley between Mouna Roa, Mouna Kea, and Mouna Huararai, is almost unknown, no road leads across it from the east to the western shore, but it is reported by the natives who have entered it, to be “Bristled with forests of *ohia*,” or to exhibit vast tracts of sterile and indurated lava... [Ellis 1963:3-4].

Ellis also recorded the observations of his travel companion, a Mr. Goodrich, during the latter's ascent of Mauna Kea. Mr. Goodrich described to Ellis his views of the saddle from the mountain, in particular, the herds of wild cattle seen there:

In his way down, he saw at a distance several herds of wild cattle, which are very numerous in the mountains and inland parts of the island, and are the produce of those taken there, and presented to the king, by Captain Vancouver. They were at his request, tabued for ten years, during which time they resorted to the mountains, and 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 them, 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 with great labour 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 into small barrels, which are brought on men's shoulders ten or fifteen miles to the sea-shore [Ellis 1963:290].

According to Maly, “[i]n 1830, Reverend Hiram Bingham and family visited Waimea, and in September they were joined by members of the royal household. It was during the September visit that Kauikeaouli (Kamehameha III) and party, in the company of Bingham, traveled to the summit of Mauna Kea, via the Waimea-Waiki'i-Kalai'eha route,” (Maly 2004:33). Bingham described the party's journey toward Mauna Kea over the saddle:

...The king set out with a party of more than a hundred, for an excursion further into the heart of the island, and an ascent to the summit of Mauna Kea. To watch over and instruct my young pupil, and to benefit my health, I accompanied him. The excursion occupied nearly five days, though it might have been accomplished much sooner. Crossing in a southerly direction the plain of Waimea, some on horseback and some on foot, the party ascended a small part of the elevation of the mountain, and being in the afternoon enveloped in dense fog, they halted and encamped for the night. The next day they passed over the western slope of the mountain to the southern side, thence eastward along a nearly level plain, some

seven thousand feet above the level of the sea, to a point south of the summit, and encamped out again, in the mild open air. In the course of this day's journey, the youthful king on horseback, pursued, ran down, and caught a yearling wild bullock, for amusement and for a luncheon for his attendants. A foreigner lassoed and killed a wild cow [Bingham 1969:375].

A decade later, Lieutenant Charles Wilkes of the U.S. Navy visited Hawai'i as part of his assignment to explore and survey routes in the Pacific. Wilkes' party traveled over the saddle, and the following written account documented much of what they saw there, including a description of the "Temple of Kaili, or the Ahu a 'Umi". Wilkes describes the saddle region as "...barren lava plains...between Mauna Kea and Mauna Loa, where desolation reigns," (Wilkes 1970:216).

Dr. David Douglas, an early visitor to Mauna Kea, commented on the remarkable stillness and ability of sound to carry as he descended the mountain, calling this phenomenon an "apparent non diminunon of sound," (Maly 2004:31). Charles De Varigny, Secretary of the French Consulate, also described the atmosphere during his 1857 visit to Mauna Kea:

Here the atmosphere of these upland plateaus has an exceptional power to carry the sound of the human voice, making ordinary tones audible a mile away; But there are no traces of inhabitants. Only some great wild cattle, recognizable by their curly hair, trouble the silence of these solitudes when during their wanderings a dead branch is broken... Halemakule [the native guide] was struck by the unfortunate idea of testing the effects of his Hawaiian chanting as it reverberated among the mountain echoes. Still one more point on which we failed to agree. We preferred the song of the native birds to his slow, monotonous *melopoeia*... [De Varigny in Korn, 1981:86; reprinted in Maly 2004:36-37].

In 1859, an individual writing under the pen name "Hualalai" published an account of his travels across the saddle region in the Pacific Commercial Advertiser, which coincided with the 1859 eruption of Mauna Loa:

July 28, 1859

The next day was a hard day's travel for our animals, over about fifteen miles of clinkers, until we came to the rolling hills above Puakou [Puako, the Waiki'i vicinity]. A worse piece of road it would be hard to imagine. Fancy that distance of country terribly cut up into ravines and gullies, and the only path or semblance of a road made of equal parts of broken bottles and slag from a blacksmith's forge, and you will get some idea of the plain between Mauna Loa and Mauna Kea. All these beds of clinkers—for we passed four or five—have come from the former mountain, while Mauna Kea appears to have discharged scarcely anything, latterly, but sand and ashes. On reaching the open ground we found our horses were much cut up and bleeding about the feet, while one bullock was so exhausted and worn down that we were obliged to take off his load and leave him to shift for himself. Pushing along, we arrived at sundown at our camping ground in "the big gulch" [Pōhakuloa] among the hills which form the base of Mauna Kea. This was a beautiful spot, the grass growing luxuriantly in the valleys, and

the ravines being lined with mamani trees. Wild hogs were plentiful; we disturbed a drove of forty or fifty as we entered the gulch, and they went scampering up the mountain. Cattle too, were seen in droves, but very shy. Unfortunately, however, there was no water in the gulch, and, after stopping one night, we started on Thursday morning for Kalaieha, an elevated point on the east side of Mauna Kea, where report said that water and game were to be found in plenty.

From the “big gulch [Pōhakuloa]” to Kalaieha, a distance of some fifteen or twenty miles, the road lays over a beautiful rolling country, made up of wash from the conical hills which so frequently occur along the base of Mauna Kea, with here and there patches of sand [the area between Pu‘u Ke‘eke‘e-Pōhakuloa and Pu‘u Huluhulu]. This would be a magnificent country for sheep farms, or for wheat growing, but for one drawback—the want of water. There is ample evidence, however, in the numerous water courses with which the face of the country is seamed, that at times there is “too much of water.” Huge boulders are seen scattered about, brought from the hills and carried far out on the plains by the streams; but at the time of our visit not a drop of water could be found in any of the gulches or ravines... [Pacific Commercial Advertiser; July 21 and 28, 1859; from Maly 2002:51-52].

Isabella Bird was an English woman who traveled the Hawaiian Islands extensively, with the guidance of the local people. In 1873 she stayed for a short time with rancher Francis Spencer, observing:

...Mr. S. [Spencer] is a Tasmanian, married to a young half-white lady... Sheep are the source of my host's wealth. He has 25,000 at three stations on Mauna Kea, and, at an altitude of 6000 feet they flourish, and are free from some of the maladies to which they are liable elsewhere. Though there are only three or four sheep owners on the islands, they exported 288,526 lbs. of wool in 1872. Mr. S— has also 1000 head of cattle and 50 horses... [Bird 1964:133].

Bird also traveled to Mauna Kea. An account of her trip there is given:

...A few days ago I was so fortunate as to make the acquaintance of Mr. W. L. Green (now Minister of Foreign Affairs), an English resident in Honolulu... He asked me to make the ascent of Mauna Kea with him, and we have satisfactorily accomplished it today.

The interior of the island, in which we have spent the last two days, is totally different, not only from the luxuriant windward slopes, but from the fiery leeward margin. The altitude of the central plateau is from 5000 to 6000 feet, there is not a single native dwelling on it, or even a trail across it, it is totally destitute of water, and sustains only a miserable scrub of *mamane*, stunted ohias, *pukeawe*, ohelos, a few compositae, and some of the hardiest ferns. The transient residents of this sheep station [Kalai‘eha], and those of another [Kealapū‘ali] on Hualalai, thirty miles off, are the only human inhabitants of a region as large as Kent. Wild goats, wild geese (*Bernicla sandvicensis*), and the *Melithreptes Pacifica*, constitute its

chief population. These geese are web-footed, though water does not exist. They build their nests in the grass, and lay two or three white eggs.

Our track from Waimea lay for the first few miles over light soil, destitute of any vegetation, across dry, glaring, rocky beds of streams, and round the bases of numerous tufa cones, from 200 to 1500 feet in height, with steep, smooth sides, composed of a very red ash. We crossed a flank of Mauna Kea at a height of 6000 feet [around Pu'u Lā'au], and a short descent brought us out upon this vast tableland [the Pu'u Ke'eke'e-Pōhakuloa region], which lies between the bulbous domes of Mauna Kea, Mauna Loa, and Hualalai, the loneliest, saddest, dreariest expanse I ever saw.

The air was clear and the sun bright, yet nothing softened into beauty this formless desert of volcanic sand, stones, and lava, on which tufts of grass and a harsh scrub war with wind and drought for a loveless existence. Yet, such is the effect of atmosphere, that Mauna Loa, utterly destitute of vegetation, and with his sides scored and stained by the black lava-flows of ages, looked like a sapphire streaked with lapis lazuli. Nearly blinded by scuds of sand, we rode for hours through the volcanic wilderness; always the same rigid *mamane* (*Sophora Chrysophylla* ?) the same withered grass, and the same thornless thistles, through which the strong wind swept with a desolate screech.

The trail, which dips 1000 feet, again ascends, the country becomes very wild, there are ancient craters of great height densely wooded, wooded ravines, the great bulk of Mauna Kea with his ragged crest towers above tumbled rocky regions, which look as if nature, disgusted with her work, had broke it to pieces in a passion; there are living and dead trees, a steep elevation, and below, a broad river of most jagged and uneven aa. The afternoon fog, which serves instead of rain, rolled up in dense masses, through which we heard the plaintive bleating of sheep, and among blasted trees and distorted rocks we came upon Kalaieha.

I have described the "foreign residences" elsewhere. Here is one of another type, in which a wealthy sheep owner's son, married to a very pretty native woman, leads for some months in the year, from choice, a life so rough, that most people would think it a hardship to lead it from necessity. There are two apartments, a loft and a "lean-to." The hospitable owners gave me their sleeping-room, which was divided from the "living-room" by a canvas partition. This last has a rude stone chimney split by an earthquake, holding fire enough to roast an ox. Round it the floor is paved with great rough stones. A fire of logs, fully three feet high, was burning, but there was a faulty draught, and it emitted a stinging smoke. I looked for something to sit upon, but there was nothing but a high bench, or chopping-block, and a fixed seat in the corner of the wall. The rest of the furniture consisted of a small table, some pots, a frying-pan, a tin dish and plates, a dipper, and some tin pannikins. Four or five rifles and "shot-guns," and a piece of raw meat, were hanging against the wall. A tin bowl was brought to me for washing, which served the same purpose for everyone. The oil was exhausted, so recourse was had to the native expedient of a jar of beef fat with a wick in it.

We were most hospitably received, but the native wife, as is usually the case, was too shy to eat with us, or even to appear at all. Our host is a superb young man, very frank and pre-possessing looking, a thorough mountaineer, most expert with the lasso and in hunting wild cattle. The "station" consists of a wool shed, a low grass hut, a hut with one side gone, a bell-tent, and the more substantial cabin in which we are lodged. Several saddled horses were tethered outside, and some natives were shearing sheep, but the fog shut out whatever else there might be of an outer world. Every now and then a native came in and sat on the floor to warm himself, but there were no mats as in native houses. It was intolerably cold. I singed my clothes by sitting in the chimney, but could not warm myself. A fowl was stewed native fashion, and some rice was boiled, and we had sheep's milk and some ice cold water, the drip, I think, from a neighbouring cave, as running and standing water are unknown.

There are 9000 sheep here, but they require hardly any attendance except at shearing time, and dogs are not used in herding them. Indeed, labour is much dispensed with, as the sheep are shorn unwashed, a great contrast to the elaborate washings of the flocks of the Australian Riverina. They come down at night of their own sagacity, in close converging columns, sleep on the gravel about the station, and in the early morning betake themselves to their feeding grounds on the mountain.

Mauna Kea, and the forests which skirt his base, are the resort of thousands of wild cattle, and there are many men nearly as wild, who live half savage lives in the woods, gaining their living by lassoing and shooting these animals for their skins. Wild black swine also abound.

The mist as usual disappeared at night, leaving a sky wonderful with stars, which burned blue and pale against the furnace glare on the top of Mauna Loa, to which we are comparatively near. I woke at three from the hopeless cold, and before five went out with Mr. Green to explore the adjacent lava. The atmosphere was perfectly pure, and suffused with rose-colour, not a cloud-fleece hung round the mountain tops, hoar-frost whitened the ground, the pure, white smoke of the volcano rose into the reddening sky, and the air was elixir. It has been said and written that there are no steam-cracks or similar traces of volcanic action on Mauna Kea, but in several fissures I noticed ferns growing belonging to an altitude 4000 feet lower, and on putting my arm down, found a heat which compelled me to withdraw it, and as the sun rose these cracks steamed in all directions. There are caves full of ferns, lava bubbles in reality, crust over crust, each from twelve to eighteen inches thick, rolls of lava cooled in coils, and hideous a-a streams on which it is impossible to walk two yards without the risk of breaking one's limbs or cutting one's boots to pieces.

I will not weary you with the details of our mountain ascent. Our host provided ourselves and the native servant with three strong bullock-horses, and accompanied us himself. The first climb is through deep volcanic sand slashed by deep clefts, showing bands of red and black ash. We saw no birds, but twice

started a rout of wild black hogs, and once came upon a wild bull of large size with some cows and a calf, all so tired with tramping over the lava that they only managed to keep just out of our way. They usually keep near the mountain top in the daytime for fear of the hunters, and come down at night to feed. About 11,000 were shot and lassoed last year. Mr. S— says that they don't need any water but that of the dew-drenched grass, and that horses reared on the mountains refuse to drink, and are scared by the sight of pools or running streams...

The actual forest, which is principally *koa*, ceases at a height of about 6000 feet, but deplorable vegetation beginning with *mamane* scrub, and ending with withered wormwood and tufts of coarse grass, straggles up 3000 feet higher, and a scaly orange lichen is found in rare patches at a height of 11,000 feet... [Bird 1964:207-210].

Kalai'eha lies along the eastern edge of the saddle, and was the location of the Humu'ula Sheep Station. Surveyor Captain Clarence E. Dutton extensively described Kalai'eha and the saddle region during an 1882 trip to the region:

...From Hilo I decided to make an advance at once upon Mauna Kea and to visit the intervalle between that mountain and Mauna Loa. Mauna Kea may be approached from many directions, the easiest lines of access being from the northwest and north. The approach from Hilo is the most difficult of all, because it involves the necessity of traversing the belt of forest which lies between the middle slopes of the mountain and the sea. No one can imagine the density and exuberance of tropical vegetation until he has seen it. In truth, the forest can be penetrated only by hewing a way through it or by traversing a route which has already been cut by main force...

...There are two routes leading from Hilo to Mauna Kea. One extends along the coast northwestward for about 30 miles, then turns abruptly upwards, striking the northeastern flank of the mountain. The other leads directly inland, and passing through the forest belt reaches the southern base of the mountain and the intervalle between it and Mauna Loa. Each route has difficulties peculiar to itself...

In going from Hilo to Mauna Kea I declined the coast route across the gorges, and chose the much more direct line of approach passing through the forest...

...Three miles of travel through tall Hilo grass growing in a muddy soil brings us to the verge of the forest. Years ago a trail leading from Hilo up into the central wilderness of the island was cut through the forest and corduroyed. The trees used for the corduroy were trunks of the great tree ferns which form a large part of the undergrowth of the forest. These are soft, spongy, and perishable, and lasted but a very few years. They quickly became rotten, and wherever they were laid the trail has become worse than it would be if they had never been put there. The effects of the incessant rain are now abundantly visible, and that to our great discomfiture. The trail is a mixture of rocks, mire, and fragments of rotten fern-trees. Progress is difficult and extremely harassing. Every few rods some poor animal sinks his fore legs or hind legs into tough, pasty mud, and must be

unloaded and pried out. Four miles of this kind of travel was accomplished in the space of about six hours. Suddenly and without warning a sharp turn of the trail brought us upon a wide expanse of naked pahoehoe. The relief was indescribable. Nobody would pretend that pahoehoe is pleasant traveling. It is good only in comparison with clinker fields and forests. The exchange is that of misery which is intolerable for misery which can be borne readily by the exercise of patience. The animals being exhausted by the desperate struggle, we at once made camp upon the lava rock, finding a pool of swampy water hard by.

We had landed upon the termination of the great flow of 1855, the grandest of all the historic eruptions of Mauna Loa. The next day we had an opportunity to observe and appreciate its immensity. Our route lay upon the upward course of this flow, which soon widened out on either hand until the forest was miles away from us in both directions. Already a few straggling ferns and other humble plants have begun to take root upon its surface, but without a vestige of soil. Except for these stragglers all is now bare rock, rolling in heaps and mounds, twisted ropes and huge wrinkles, with now and then a network of cracks rifting the mass into fragments, and large holes where the arch over some great lava pipe has fallen in. One characteristic of this great flow is the exceptional unevenness of it and the large size of the mounds and hills formed by the pahoehoe. It seems to lie very much thicker than in most other eruptions. In many places it has formed high hills or ridges, and everywhere there are abundant indications that sheet after sheet of lava was piled up to form its final mass. The width of it a few miles above its extremity could only be estimated roughly by the eye, and seemed in many places to exceed six miles. In the course of an hour the forest was dim in the distance on either hand, the tall ohia trees appearing like mere shrubs...

...A little more than 20 miles from the end of the flow we found ourselves confronted by a high barrier of clinkers stretching far out towards the base of Mauna Loa on the left and plunging into the forest on the right. Turning sharply to the right the trail crosses several spurs of this ridge of clinkers and at length leaves the lava field and enters the forest. The character of the forest is now greatly changed. It is no longer a swamp and jungle. We have gained an altitude of about 5,500 feet, and although we are not wholly above the wet region we are in one which is considerably dryer than that which is occupied by the main forest belt. The soil in the summertime is generally dry, and the undergrowth is so moderate that it offers little obstruction to progress. Winding through the forest we come frequently upon open parks densely clothed with mountain grass. The trail ascends slowly but steadily, and as we progress the trees become fewer and the parks larger and more numerous. Numberless trails of wild or half wild cattle traverse the country in every direction. The soil is abundant, but so too are the ledges of lava and fragments of clinker which project through it. Ascending a rocky shelf, Mauna Kea discloses its magnificent mass in close proximity on the one hand, while Mauna Loa, more distant and yet more grand, rises sublimely upon the other... Turning around with Mauna Loa at our backs, the majestic pile of Mauna Kea rises immediately before us. The contrast is very great. The eye is

instantly caught by the large number of cinder cones which everywhere stud its surface, from the summit where they cluster thickly, down its flanks to the plain below. All of them are symmetrical and normal in their outline, and in an admirable state of preservation. They are truncated at their tops, showing the existence of regular craters within the truncated portions. Some of these cones, by a careful eye estimate and comparison with known magnitudes, appear to be more than 1,000 feet in height and more than three-fourths of a mile in diameter. The number is too great to be easily counted. They are most numerous upon the summit platform, but they are very abundant, not only upon the immediate base of the mountain, but at all intermediate zones, and they ramble away far beyond the base like a crowd dispersing from a common center...

...The volcano has been extinct for many centuries, and although the degradation on this side of the mountain has made comparatively little progress, we shall soon find reason for believing that the epoch of final cessation, historically speaking, is quite ancient. The impression produced is that the period which has elapsed since the last sign of activity should be reckoned by thousands of years rather than by hundreds. Soil is everywhere abundant, and no fresh looking rocks are known. The dense forest comes up only to the level where the steeper part of the mountain begins its ascent; that is, to altitudes varying from 5,000 to 6,000 feet. Above that are many scattering groves with a gradually increasing proportion of open spaces. Up to an altitude of nearly 10,000 feet the mountain is clothed with long mountain-grass, which has a pale yellowish color. The cinder cones have that faint reddish cast often assumed by basaltic lapilli which has long been exposed to weathering.

Winding onward by a rough stony trail, where old rotten clinkers and slabs of weathered basalt project up out of the soil, we at length reach a pool of stagnant water, where we make camp. Just before reaching camp the way was somewhat obstructed by a thicket of thorny bushes which at once aroused the keenest interest. They were apparently raspberries, but such raspberries! The bushes were gigantic and the fruit equally so, the berries being over two inches in length and an inch in diameter. Conceive our ordinary pale red garden raspberries magnified two and half to three times in linear dimensions whether in stalk, leaf, or fruit, and we shall have a very good idea of its appearance. Its flavor, however, was somewhat inferior, though by no means unacceptable. The taste of the fruit is almost exactly the same as our common Lawton blackberry. The abundance of fruit was remarkable. For two or three miles the banks and hillsides were covered with them and they could have been gathered by thousands of bushels. They were growing at an altitude of about 6,000 feet, where snow frequently falls in winter and where the climate probably does not differ greatly from that of the coast range of California; though I presume this climate is rather the more equable of the two, being cooler in summer and perhaps a trifle milder in winter.

The journey from Hilo had been a very long and arduous one. Unpleasant as was the struggle with the forest, the journey of twenty miles over pahoehoe, so coarse and rough as that of the flow of 1855, proved in the end to be almost as harassing

to the animals. The foothold upon the rocks is all that could be desired, but the constant ascent and descent of the smooth rounded hummocks produced an incessant lurching and strain upon the animals the effects of which were now manifest in the shape of sore and scalded backs. Two days' rest was deemed absolutely necessary to recuperate the sore, weary, and half-starved brutes. I occupied the time in tramping over the rolling hills and half-concealed lava beds around the base of Mauna Kea, and in exploring three or four long caverns or ancient lava pipes, which are quite as common here as they are upon Mauna Loa. No results of any importance attended the investigation...

...After two days' rest and recuperation the ascent of Mauna Kea was determined upon. The summit is easily reached from the southern side, so easily in fact that no great precaution is necessary in the choice of routes. Still, some routes are much easier than others, and it was thought best, in view of the long and tedious character of the ascent, to take a guide familiar with the mountain. I found a native who had been to the summit many times and who had hunted sheep, cattle, and goats all over its southern flanks. At daylight the party was in motion with three pack animals carrying photographic apparatus, provisions, and also blankets, in case it should be found necessary to spend the night upon the mountain top. The guide went afoot from preference, a most unusual thing for a kanaka, while the rest of the party were well mounted.

Our camp was situated at an altitude of about 5,670 feet, and the top of the mountain was more than 8,000 feet above us. Two hours were spent winding deviously among the foothills and cinder cones around the base of the mountain before the principal slope of the mass was reached...

...In the afternoon of the day following the ascent of Mauna Kea, I moved camp about five miles further westward, to a locality called Kalaieha. This point is now used as a sheep station. The pasturage upon the slopes of Mauna Kea is very abundant and rich, but there is no water. At first it was a mystery to me how these animals could flourish with nothing to drink. It appears, however, that the fog is so abundant that a night rarely passes without more or less rain or a condensation of vapor sufficient to thoroughly saturate the grass, and the animals thus obtain sufficient moisture from the grasses they feed upon. They seem to thrive very well, and I have never heard of any serious loss arising from want of moisture.

Kalaieha is situated near the summit of the pass between Mauna Kea and Mauna Loa, at an altitude of about 6,900 feet. Both to the eastward and to the westward there is a very gentle slope towards the ocean, so gentle in fact that from here it appears to the eye like a broad level plain. The lavas from Mauna Loa have flooded it again and again, and are now outspread over a vast expanse in fields of black, ominous, naked aa. These lava floods stretch all the way up to the very base of Mauna Kea and find a sharp line of demarkation upon its lowest slopes. The base of Mauna Kea is well covered with soil and volcanic sand, giving life to an abundant herbage and no inconsiderable number of trees, thus offering a strong contrast to the desolation and blackness of the lava fields beyond. Around us are

very many cinder cones, some of noble proportions, and from the summit of any one [page 165] of them we may obtain an overlook of these Phlegrean fields. The sense of desolation which they awaken is exceedingly impressive... Several days were spent at Kalaieha searching for varieties among the lavas and for such other facts of interest as might present themselves. Very little, however, was discovered. The lavas of Mauna Kea, especially around the base of the mountain, show but little variety, and those of Mauna Loa are even more homogeneous.

Leaving Kalaieha, my next objective point was the valley of Waimea, on the northern side of Mauna Kea. To reach it, it was necessary to go over the mountain. This was not a serious undertaking, for it presents no difficulty except the length of the journey, and this is readily overcome by dividing up the march between two days... [Dutton 1884:150-166; reprinted in Maly 2004:42].

Maly writes of a group of prominent men, also known as the "Pendulum Party," that set out to ascend Mauna Kea:

In June 1892, W.D. Alexander, Surveyor General of the Kingdom; E.D. Preston, astronomer with the U.S. Coast and Geodetic Survey; W.W. Chamberlain, L. Koch, and W.E. Wall, traveled to the Island of Hawai'i to ascend Mauna Kea—the journey undertaken between June to July 1892. At Kalei'eha, the party was met by A. Haneberg, station manager, and also joined by surveyor, E.D. Baldwin, and J.J. Muir. Alexander penned an article documenting the trip, published in the Pacific Commercial Advertiser, titled "*The Ascent of Mauna Kea, Hawaii*" (September 14, 1892) [Maly 2004:50].

An excerpt from this article follows:

Although the ascent of Mauna Kea presents no great difficulty and has often been described, yet a brief account of a late scientific expedition to its summit may be of interest to your readers...

...The party left Honolulu for Kawaihae June 25th, consisting of Mr. E.D. Preston, astronomer, Mr. W.E. Wall, his assistant, Prof. W.D. Alexander, surveyor and quartermaster for the party, and Messrs. W.W. Chamberlain and Louis Koch.

The first station occupied was in the village of Kawaihae, near the sea, in a lot belonging to His Ex. S. Parker, to whom as well as to his agent, Mr. Jarrett the party are indebted for many repeated kind and generous acts... Our next move was to the grassy and windswept plain of Waimea, 2600 feet above the sea, where we enjoyed a complete change of climate, and had glorious views of the three great mountains of Hawaii... Here we engaged our guide, hired our horses and part of our pack mules, and had our freight, ("impedimenta," as Caesar appropriately called it,) carted thirty-five miles farther, half-way around the mountain to the Kalaieha Sheep Station. We made this our base of operations in attacking the mountain, in order to dispense as much as possible with the use of pack mules, on account of the heavy and costly instruments which we were obliged to carry. A wagon road made by the owners of the Humuula Sheep Ranch

leads from Waimea around the western and southern sides of Mauna Kea. On the western side of the mountain it passes through a region which only needs more rainfall to make it a superb grazing country. The ancient forests here, as at Waimea, have been nearly exterminated, but a fine grove of mamane trees still survives at the Auwaiakeakua Ranch.

The *manienie* grass is gradually spreading and will in time add immensely to the value of the land. At the half-way station, called Waikii, water tanks and a rest house have been provided for teamsters. After turning the corner we skirted the desolate plain studded with volcanic cones that lies between the giant mountains of Hawaii, riding through loose volcanic sand amid clouds of dust. Occasional flocks of quails or pigeons were the only living creatures to be seen.

At length the vegetation began to be more dense, the patches of *piipii* grass and the groves of the beautiful and useful *mamane* or *sophora* tree more frequent, as we approached the Hilo district. Barbed wire fences showed that we were approaching civilization, and at last we came in sight of the Kalaieha Sheep Station with its neat buildings, its water tanks and telephone lines, and general air of thrift, all testifying to the energy and foresight of its manager, A. Haneberg, Esq.

Nearly every afternoon this region is enveloped in dense fog which pours in from the east, driven by the trade wind. At night, during our stay, the thermometer generally fell below 40° Fahr., and frost is not uncommon. The elevation, according to the barometer, is about 6700 feet.

Quails abound, and the mountain geese and wild ducks are found in the "Middle Ground." The mongoose has not yet arrived there. Wild cattle and boars are still numerous on the slopes of Mauna Kea, and the former supplied the best beef we have tasted in these islands. The present manager has been at much labor and expense in extirpating two pests, which are said to have been accidentally introduced from New Zealand, viz., the Scotch thistle and the gorse [Pacific Commercial Advertiser; September 14, 1892; from Maly 2004:50-52].

3.2.2 Mid-to-Late 1800s

3.2.2.1 *The Māhele and Resulting Changes*

In 1848, Kamehameha III decreed a division of lands called the *Māhele 'Āina*. Lands were divided into three portions: crown lands, government lands, and lands set aside for the chiefs (*konohiki*). Giffen describes how native peoples could obtain land within these lands:

From these three classes of lands, native tenants were allowed to file claims for kuleana (approximately 1848-1855); then for grant lands (by Royal Patent); and then by the 1880's, lands for homesteading purposes. When the monarchy was overthrown in 1893, both Crown and Government lands were ceded to the United States and later the State of Hawai'i. These two land inventories make up the land base of the State at the present time [Giffen 2009:3].

This new system of land ownership was in stark contrast to the traditional system, in which all land and natural resources were held in trust by the hierarchy of chiefs. According to Maly, “[t]his change in land tenure was ardently sought after by the growing Western population and business interests in the island kingdom...” (Maly 1999:58-59). Researching the claims and testimonies that were given in the mid-1800s can sometimes assist in forming a settlement pattern for the region at that time and possibly earlier.

3.2.2.2 Land Commission Awards

Ka‘ohe Ahupua‘a was “[r]elinquished by Victoria Kamamalu to Kamehameha III on January 27, 1848...[and] [g]iven by Kamehameha III to Government Land Inventory on March 8, 1848 (*Buke Māhele*, 1848:5-6, 191; from Maly 2004:59). A search of the Waihona ‘Āina Corporation’s Māhele Data Base (www.waihona.com) revealed one Land Commission Award, two Land Grants, and one Royal Patent along coastal Ka‘ohe, in the Hāmākua District. These awards are not included in this report as their locations are not adjacent to the project area lands.

Table 1. LCA claims in Ka‘ohe Ahupua‘a

LCA	Claimant	District	Ahupua‘a	‘Ili	Award
08297	Kookooku	Hāmākua	Koholalele, Ka‘ohe	Lipelau	Awarded 1 ‘āpana (land parcel) in Koholalele
10180	Malao, Tatina	Hāmākua	Kemau 2, Ka‘ohe	Kahaumake, Manele, Haleolono	Awarded 2 ‘āpana in Kemau 2
03705B	Ko‘olau	Hāmākua	Ka‘ohe		Awarded 1 ‘āpana in Ka‘ohe
03722B	Keopohaku	Hāmākua	Ka‘ohe		None

The following testimony was provided as Native Testimony in support of Ko‘olau’s claim on October 30th, 1848:

Keopohaku, sworn, He has seen in Kaohu ahupuaa of Hamakua, Hawaii, 10 sections.

Section 1: House site: All konohiki boundaries, 2 houses for Koolau, no fence.

Section 2: All konohiki boundaries, 1 cultivated taro kihapai.

Section 3: Mauka [*mauka*; upland], Kohala, Makai [*makai*; seaward] also by konohikiHilo by Nuumalolo's land. 1 cultivated taro kihapai.

Section 4: All konohiki boundaries, 1 cultivated potato kihapai.

Section 5: Mauka & Kohala by konohiki. Makai by Moano's land. Hilo by konohiki. 1 cultivated banana and coffee kihapai.

Section 6: Koholalele ahupuaa: All konohiki boundaries, 2 cultivated banana kihapai.

Section 7: All konohiki boundaries, 1 cultivated coffee kihapai.

Section 8: All konohiki boundaries, 1 cultivated arrowroot kihapai.

Section 9: All konohiki boundaries, 1 cultivated arrowroot kihapai.

Section 10: All konohiki boundaries, 1 cultivated taro kihapai.

Land from Keopohaku in 1836; no one has objected to him.

(Native Testimony; 389v4)

Of the ten *āpana* that Koolau claimed, he was awarded only one 7-acre *āpana*. This was the sole *kuleana* award in Ka'ōhe Ahupua'a. This single awarded *kuleana* claim indicates coffee, arrowroot, banana, and taro were all cultivated in the lands of Ka'ōhe.

3.2.2.3 *The Boundary Commission*

Maly discusses the creation and function of the Boundary Commission:

In 1862, a Commission of Boundaries (the Boundary Commission) was established in the Kingdom of Hawai'i to legally set the boundaries of *ahupua'a* that had been awarded to *Ali'i*, *Konohiki*, and foreigners during the *Māhele*. By the middle 1860s, land owners and their lessees were petitioning to have the boundaries of their respective lands—which were the foundation of ranching interests on Hawai'i—settled. The mountain lands on the Island of Hawai'i, including those completely surrounding Mauna Kea, made up the heart land of the largest ranch in the Hawaiian Kingdom. As a result, Commissioner G.M. Robertson began taking testimonies from native residents early in the Commission's history. Following Robertson's death, brothers, Rufus and Fredrick Lyman continued the work and collection of detailed testimonies for the Third Judicial Circuit (Island of Hawai'i). Those testimonies of *kama'āina* (native) witnesses and resident foreigners, described the lands of the Hilo District (such as Humu'ula and Pi'ihonua, being Crown Lands); Hāmākua (as Ka'ōhe was a Government land, it was described by its' boundaries with other lands held by private owners, and because of lease-hold interests within it); and South Kohala, in the Waimea and Waikōloa region.

In 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them (W.D. Alexander in Thrum 1891:117-118). The primary informants for the boundary descriptions were old native residents (generally born between the 1780s to 1820s) of the areas being discussed. The native witnesses usually spoke in Hawaiian, and their testimony was translated into English and transcribed as the proceedings occurred.

The recorded testimonies give insight into a variety of subjects, including traditional land use, changes in the landscape over time, natural resources, cultural practices, etc. The testimony of Waikili'i describes the border of Ka'ohē and Humu'ula Ahupua'a:

I was born at or near Humuula, district of Hilo, and have always lived in said district. I have often been on the mountain catching bullock, and know the boundaries of Humuula at shore. When I was on the mountain I was told that the boundary on Mauna Kea between Ka'ohē and Humuula was where the mamani ceases to grow, and that the pukeawe is on Ka'ohē. Was told that Humuula extends to Pohakuhanalei. I have not heard where Ka'ohē ceases to join Humuula, as you go towards Mauna Loa... [Humu'ula Boundary Commission, Hawaii, Volume B:28-59; from Maly 2004:199-200].

Another testimony mentions that "Ka'ohē is *mauka* side of Umi's road to Waimea and Puanahulu is *makai* of the road from Hapukaa... (from Maly 2001:233). Kahilo notes "Pohakuloa, a large rock by a water hole on the Kau slope of Ahuaumi above Hualalai, (from Maly 1999:234). Kahulialo discusses the intersection of Keauhou and Ka'ohē Ahupua'a:

I have been to Pupuewai it is on Keauhou. Honaunau does not reach there (My father told me it was Keauhou), my father also told me that Kapapala, Humuula and Ka'ohē reached Keauhou on the top of Mauna Loa.

Na Elemakule where the lava flow went that destroyed Kiholo [ca. 1859] is where Ka'ohē joins Keauhou at Uauakahoa cave...

...Uauakahoa cave is where the Ka'ohē Elemakule came to at the time of the settlement of lands. These are all the boundaries that I know [Boundary Commission Volume I-A; August 6, 1873; from Maly 1999:236].

3.2.3 Late 1800s-1900s

3.2.3.1 Ranching

Francis Spencer was an early entrepreneur involved mainly in cattle ranching. The beginning of ranching, however, was of goats and wild cattle (bullocks). In 1856, exported from Kawaihae were some 1,200 bullock hides, 5,000 goat skins and 35,000 lbs of tallow. Along with leases for the land, Francis Spencer also procured exclusion rights from "all unbranded cattle and horses" in the government lands of Pu'uanahulu and Ka'ohē [Int. Dept. Aug. 7, 1865; from Hammatt and Shideler 1991:13].

In 1859, the Crown and Government mountain lands of Humu'ula and Ka'ohē were leased to Francis Spencer and the Waimea Grazing and Agricultural Company, which established ranching stations and operations around the mountain lands... The lease took in all of the mountain lands (to the summit of Mauna Kea), across Ka'ohē to its Mauna Loa boundary [Maly 2004:3-4].

As a part of his operations, Spencer's activities included the entire mountain lands of Ka'ohē and Humu'ula, including the summit of Mauna Kea, and lands up to the summit of Mauna Loa. He also held leases on large tracts of the Waimea plain lands, and by the 1860s, leased the entire *'ili* of Waikōloa (more than 90,000 acres), and a short time later, also leased the *ahupua'a* of Pu'u Anahulu and Pu'u Wa'awa'a. During that time, Spencer had a monopoly on all sheep and

wild cattle on Mauna Kea and the mountain lands, including uses of the Pōhakuoloa plateau lands, Kalai'eha, Keanakolu, Hanaipoe, and smaller stations in between these areas. It wasn't until 1870, that John Palmer Parker began to work his way into leasehold interests in Ka'ohē, and not until 1914 that A.W. Carter, trustee of the Parker Ranch, secured a lease on the land of Humu'ula, including the sheep station at Kalai'eha [Maly 2004:53].

3.2.4 Modern Land Use

During modern times the area around the current project area has been used for military training at the adjacent Pōhakuoloa Training Area (PTA). Moreover, the surrounding wilderness provides a home to many species of game birds and mammals that are regularly hunted for sport and sustenance. The area just south of the study parcel is home to the Mauna Kea State Recreation Area. Also, situated on the summit of Mauna Kea are several astronomical observatories representing the worldwide community. During the winter months, provided there is an abundance of snowfall, the mountain summit and slopes are inundated with snowboarders and skiers. Furthermore, the site for the proposed Base yard has once housed a Department of Land and Natural Resources *nēnē* rearing facility. And lastly, a portion of the project area is currently used as a nursery.

3.2.4.1 Military Training and the Development of Pōhakuoloa Training Area

In his 2002 report about the lands of Waiki'i, Maly describes the role of the Parker Ranch during World War I and II. He notes that during World War II "Parker Ranch and other ranches in the Territory all developed programs to enhance the supply of meat and food resources with which to support the military effort, and with which to sustain the island population in case of embargoes," (Maly 2002:196). The effort to feed the 20,000 troops stationed in Waimea was a boon to the piggery at Waiki'i (Maly 2002:196).

One of the significant developments on the ranch landscape was the removal of tens of thousands of acres of land from the Waikōloa-Lālāmilo plains (down to the shore and Kawaihae Harbor) and adjoining land areas such as portions of Holoholoki, Ka'omoloa, and Pu'ukapu from ranch use. These lands were dedicated to military training, live fire ranges and camp facilities. The famed Camp Tarawa, located near Pu'u Opelu, in which was housed more than 20,000 U.S. Marine troops, served as the base of operations. During this action, the land area below the old Waimea-Kona Highway was removed from the ranch inventory. It was also during this time that weeds such as fountain (pampas) grass, which had generally been held at bay, got away, and spread across the land. In the years prior to World War II, the fountain grass which began at Ka'ūpūlehu (in 1917) had spread through the Pu'u Wa'awa'a-Pu'u Anahulu ranch lands, and A.W. Carter had implemented a strict program of daily weeding efforts; the sole purpose being to protect the quality and carrying capacity of the pasture lands. This matter was reportedly so important to Carter that, if he saw an employee pass by a designated weed, there was a likelihood that the employee would be fired (Hisao Kimura, interview of June 29, 2002). Once the land was turned over to military control and live ammunition fire, ranch employees were unable to access the region. By the time the war ended and the land returned to ranch use, it was

too late, as the fountain grass had spread across the Waikōloa plains... [Maly 2002:196-197].

Cactus also gained a foothold during this time of neglect. Parker Ranch never made any claims over the damages done the lands under military occupation, nor did they attempt to recoup the money spent on property taxes for these lands, despite the fact that they could not be used for pasturage during the occupation (Maly 2002:197). The government also failed to thoroughly clean up the unexploded ordinance left in the area, eventually resulting in the injury and death of certain ranch personnel (Maly 2002:198).

Maly goes on to describe how Parker Ranch and the Marine Corps eventually worked out an agreement that would mark the birth of Pōhakuloa Training Area:

After the end of World War II, Parker Ranch and the Marine Corps entered into discussions regarding leases permitting the continued use of ranch lands for training maneuvers. By the early 1950s, the Marine Corps were seeking land in which long-term training exercises could be conducted; the newly formed Marine Corps Air Station at Mōkapu, O'ahu, did not have adequate space for field training. A portion of the Lālāmilo lands, as well as lands adjoining the upper Waiki'i-Ke'-moku vicinity in Ka'ōhe 3, 4, and Pōhakuloa were considered [Maly 2002:198-199].

Maly includes this December 11, 1952 letter from A. Hartwell Carter to Lt. General Franklin A. Hart, of the United States Marine Corps in his report:

...I. Lalamilo. The land of Lalamilo is situated in the district of South Kohala on the north[west] side of the Island of Hawaii. As you can see from the map it is a long, narrow parcel. It contains approximately 9,000 acres and is eight miles long and two miles wide. The terrain is rough. The distance from this site to Hilo is 62 miles. Hilo, as you know, is the only sizable town and the only real deep water seaport on the island. If the land is to be used for a camp site and training area we believe that ultimately you will find it inadequate. In viewing the land on the ground it is not too easy to envision the boundaries since there are no distinguishing marks between Lalamilo and the adjacent land which is owned by us in fee simple...

During the war Parker Ranch, in order to cooperate fully in the war effort and particularly with the Marine Corps, made available an area of land approximately 70,000 to 80,000 acres, rent free, which was used for approximately two years. This involved the normal problems of any area where a full division or more was stationed. We enjoyed good relations with the command and the officers and men.

Since the war we have lost large tracts of land and are now unable to surrender additional areas without suffering a serious handicap in our operations...

II. Keonepoko [Puna]...

III. South Point (Kamaoa-Puueo) [Kau]...

IV. Ka'ōhe 3 and 4 – Pohakuloa. This land contains approximately 27,000 acres, a part of which is a territorial game reserve and Ka'ōhe 3 [Ahumoa – Pu'u

Ke'eke'e] is a horse pasture used by us. This particular site was indicated to your officers making the land inspection and it has since occurred to us to be more desirable than any of those heretofore under consideration. The area is adequate and it is not objectionable from the standpoint of being a long sliver of land such as Lalamilo. This tract is 35 miles from the city of Hilo and contains a spring which could be used to supply water tanks for storage if that is desired. At the same time there is a 500,000-gallon tank in use on the land. If this area were selected as the maneuver area it would be feasible and convenient for you to have camp site on the saddle road at the location of the old Prisoner-of-War camp. There is in this area approximately 100 acres which camp would be 9 miles from the city of Hilo and 26 miles from the maneuver area of Pohakuloa. Assuming that Lalamilo could not be used for both a maneuver area and camp site and that you would be obliged to acquire other lands for a maneuver area in the event you chose Lalamilo as a camp site, we point out that the distance from Lalamilo to Pohakuloa is 26 miles and the distance from Pohakuloa to the POW camp is likewise 26 miles...

If the proposed site at Pohakuloa meets with your approval and you are willing to forego the use of Lalamilo as a camp site in favor of the one which is nearer the city of Hilo as suggested, we would be quite willing to make available to the Marine Corps an area of Parker Ranch land adjacent to Ka'ohē 3 which is now used as our horse pasture, of approximately 6,000 acres. Moreover we will turn these areas over to the government for a reasonable period without rent... [Marine Corps File, Parker Ranch Collection; from Maly 2002:199-200].

A January 9, 1953 meeting between key ranch personnel and General Hart resulted in an agreement that the Lālāmilo Lands would be given back to the ranch in exchange for the Ka'ohē 3 and 4-Pōhakuloa lands (Maly 2002:200). Maly includes Ranch Manager Richard Penhallow's notes from this meeting:

6. Final Prospective: Obtain the agreement of Parker Ranch to convey 320 acres in the vicinity of Nahonohae [sic] to the U.S. for a permanent division camp site. Construct a 12" water main from the Kohala Mountains to this site. Obtain the agreement of Parker Ranch to permit infantry maneuvers in the adjacent pastures without any weapon firing, and coordinated with grazing usage. If this plan is agreeable then Pohakuloa and Ka'ohē together with our Puukeekee paddock land would be used for mechanized and fire problems, artillery fire being limited to the lava wastes of Pohakuloa and Mauna Loa. The cost of this development would be over 20 million dollars, which would render it almost prohibitive according to General Hart, who sets the odds against its adoption at 10 to 1.

7. Immediate Training: For the present, running concurrently with the plans for Maui, General Hart recommends unit by unit training in artillery and mechanized maneuvers, operating from a tent camp in Kaohe III game preserve, supplied with water from the Pohakuloa 500,000 gallon tank and supplementary truck hauling. The size of the units to be trained and the length of the training period will be

limited by the availability of water. This program would utilize the Puukeekee Paddock area which we have offered.

8. Conclusion: It seems advisable to cooperate with the Marines. They have adopted a serious and considerable attitude toward our problems and recommended withdrawal of Lalamilo. In the immediate future their training will be limited to from Pohakuloa to Puukeekee Paddock as we have suggested. The probability of their final prospective materializing is remote at this time and may be indefinitely postponed [Marine Corps File, Parker Ranch Collection; from Maly 2002:200].

Shortly after this meeting, on January 20, 1953, Penhallow detailed in a letter to Richard Smart about the impacts of the agreement:

...General Hart presented his immediate problem for unit training. His training officers have submitted to him their requirements which will involve greater depth than he had indicated previously. They contemplate as was reported before, to camp one regimental combat team in temporary buildings and tents for only two-week periods, at or near the Pohakuloa camp site. Their artillery range will be the lava wastes of Mauna Loa in that region. Specific small training problems of sub-units within the R.T.C. can be conducted near the camp and in Puukeekee.

But to round out the attack games of the whole regimental teams he asked that you permit the Marines to enter your land from the Saddle Road below Puumahaelua and attack mauka in the direction of Puukeekee and Pohakuloa, ending up with weapons firing over the heads of the attacking troops as they finally approach the artillery practice area in Pohakuloa. He specified that there would be no firing of any arms in your pastures and that the village of Waikii would be by-passed. Also Engineer troops would be with the advancing units to open and repair fences as vehicles were channeled through. He pointed out that there are no other clear areas in Hawaii with suitable depth from front to rear to permit a three day advance of ground forces with all their supporting units. In this sham attack sub-units, types of weapons and actions would be identified by colored arm bands...

After being shown their maps of the proposed maneuver grounds, Hartwell asked for a recess during which he and Garner [Anthony] Stanley Wright and myself developed a counter proposal which we thought would not interfere too much with our operations or installations and still be adequate for their needs.

We proposed, pending your approval, allowing them to initiate their advance at the Kona Road anywhere beyond the Nahonohae-Puupapapa I fence and confine their movements within the paddocks of Puupapapa 1 & 2, Big Heewai, Old Waikii and Puukeekee and also the outside paddocks along the edge of the lava near Keamoku house, reserving an out-of-bounds zone around the house, horse pasture and old shearing shed. This will allow plenty of room, and while it does involve passing over our pipe line still that will occur near the far end and the number of fences to be crossed will be held to a minimum by the confinement of

operations to large pastures only. It will keep their activities out of sight of the Saddle Road, except mauka of Waikii village, and at a considerable distance away from the village at all points, by denying them entry to any of the smaller pastures in that vicinity. Our proposal was acceptable to the Marines and the spirit of cooperation by both side a worth while outcome of delaying action which was started by your well timed letter.

...While my first contacts with the General were austere, I have found him to appear to better advantage and more human with each meeting. As Garner once told me, these conferences have been fruitful in teaching the General that he is not “dealing with children,” which he may have imagined at first.

Hartwell and I recommend your approval of our mutually acceptable results... [Marine Corps File, Parker Ranch Collection; from Maly 2002:200-201].

In 1942, the U.S. Army built Kaūmana Road (the current Saddle Road). The Pohakuloa Training Area (PTA) was established in its current location in 1956 (Shapiro and Cleghorn 1998:19).

3.2.4.2 Pōhakuloa Nene Propagation Project

In the later part of the 18th century, the population of *nēnē* (*Branta Sandvicensisi*) was estimated a 25,000. In 1902 Henshaw predicted that “the time will eventually come, and soon, when this goose will need protection from sportsman (and introduced predators) to save it from its otherwise inevitable face of extermination” (Henshaw 1902). According to the *Nene News*, in 1949 the Territorial Legislation appropriated \$6,000.00 for a two year breeding program at Pōhakuloa, Hawai'i to be managed by the Commission of Agriculture and Forestry (*Nene News*, 1996:1). During the programs' existence between 1949 and 1978 1,699 *nēnē* were successfully raised at the Pōhakuloa facility (Figure 6); of these 1,225 have been released on the Island of Hawai'i, and 268 at Haleakalā Crater on the Island of Maui (A. F. Lee 1978; 201).

3.2.4.3 Big Game and Bird Hunting

The Ka'ohē Game Management area is located approximately 10 miles west of the current project area. There are over 3,000 registered hunters on Hawaii Island, and hunting, for both recreation and sustenance, it is a common activity on Mauna Kea. A public hunting program is used to control the numbers of introduced animals including pigs, sheep, goats, turkey, pheasant, and quail. The Mauna Kea Recreation Area functions as a base camp for the sport. Also, the DFW and DLNR conduct periodical animal control activities specifically aerial shooting from helicopters to control herds of feral sheep and goats.

3.2.4.4 Mauna Kea State Recreation Area

Mauna Kea State Recreation Area lies adjacent (just South) of the current project area at the southern base of Mauna Kea approximately half way between Hilo and the Saddle Road Waimea-Waikoloa Junction; Hwy. 19. The park is administered by the Hawai'i Department of Land and Natural Resources.



Figure 6. Ah Fat Lee with gosling *nēnē* from Pōhakuloa Propagation Project

The Park is comprised of several cabins and caretakers quarters along with outbuildings and restroom facilities. In recent times there have been very few guests staying for the lodging; most tend to visit the restroom facilities or for the occasional picnic.

3.2.4.5 Astronomy

Mauna Kea currently has several astronomical observatories from the worldwide astronomical community located on its summit; (Table 2) below lists the telescopes and provides information on type, ownership, and year constructed.

Table 2. Mauna Kea Telescopes

Type of Facility	Affiliation	Year Constructed
UH 0.9 m Educational Telescope	University of Hawaii at Hilo	1970
UH 2.2 m Educational Telescope	University of Hawaii at Hilo	2010
NASA Infrared Telescope Facility	NASA	1979
Canada-France-Hawaii Telescope	Canada, France, UH	1979
United Kingdom Infrared Telescope	United Kingdom	1979

Type of Facility	Affiliation	Year Constructed
W.M. Keck (Keck I)	Cal/Tech University of California	1993
W.M. Keck (Keck II)	Cal/Tech University of California	1996
Subaru Telescope	Japan	1999
Gemini Northern Telescope	USA, UK, Canada, Argentina, Australia, Brazil, Chile	1999
Caltech Submillimeter Observatory	Caltech, NSF	1987
James Clerk Maxwell Telescope	UK, Canada, Netherlands	1987
Submillimeter Array	Smithsonian Astrophysical, Taiwan	2002
Very Long Baseline Array	NRAO, AUI, NSF	1992

3.3 Previous Archaeological Research

Nine archaeological investigations (Figure 7 and Table 3) have been conducted in the vicinity of the project area. The majority of these took place in the Pōhakuloa Training Area; these took place from the mid-1980s through 2006. Many previous studies have also covered large areas by helicopter survey, which only identifies very large sites. Site types documented at PTA include transportation features (trails and trail markers), occupation sites (lava tubes, blister caves, and overhang shelters), lithic resource sites (e.g., chill glass quarries and workshops), ritual/ceremonial sites (indicated by upright stones), excavated-pit features, historic features (walls, enclosures), and military modifications/impacts.

Currently, CSH is conducting investigations in the vicinity of the current study parcel. However, the findings are still in the draft phase and are not available.

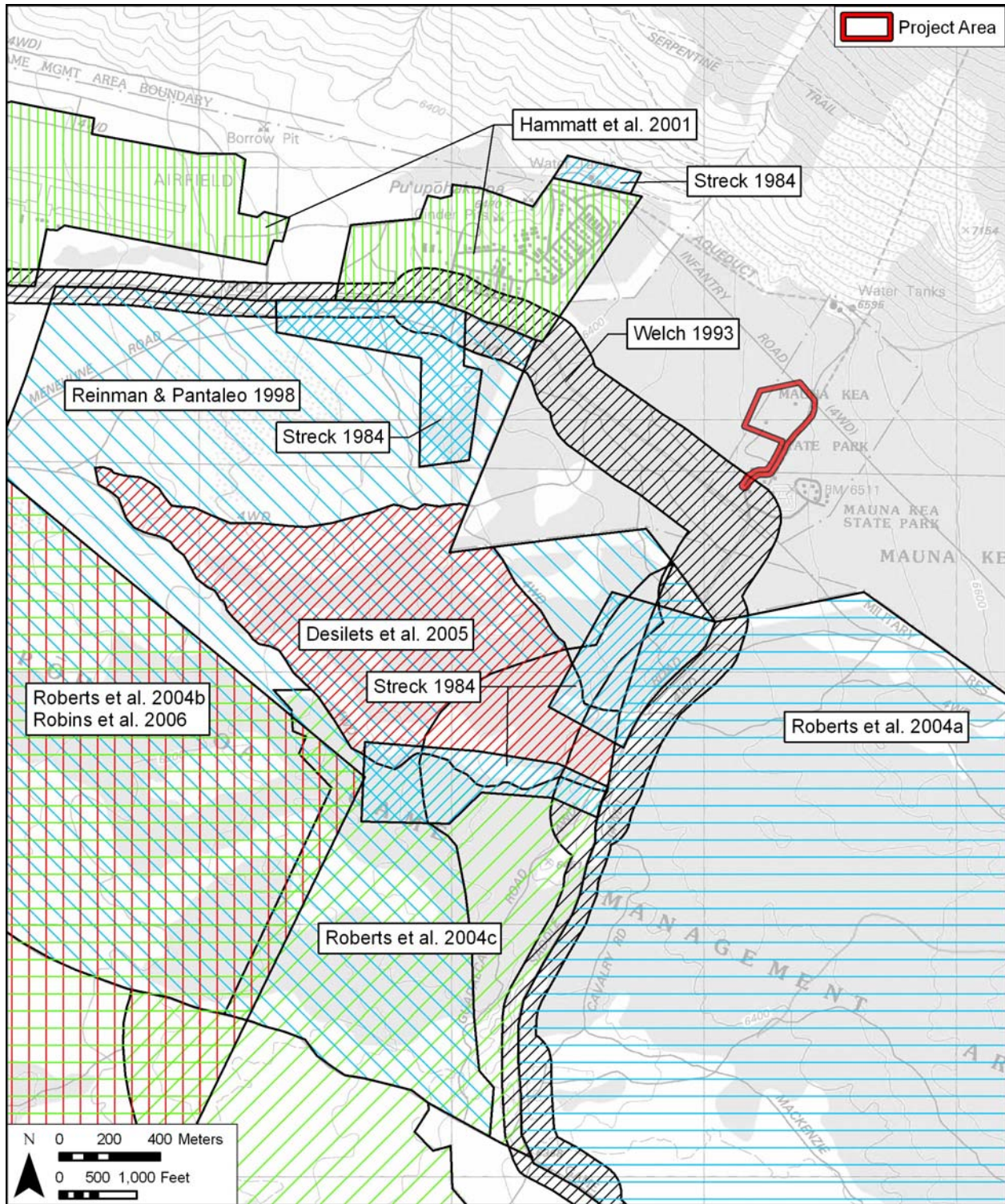


Figure 7. Map of Previous archaeological studies in the vicinity of the current project area

Table 3. Previous Archaeological Studies Conducted in the Vicinity of the Project Area

Date	Type of Investigation	Reference	Findings
1984	Reconnaissance of five land parcels at PTA	Streck 1984	No new historic properties identified
1993	Survey and testing for the Saddle Road improvement project at PTA	Welch 1993	One historic property identified; Site 50-10-31-14638, lithic scatter with three associated shallow lava tubes, possible temporary shelter
1998	Investigation of two work areas for the Legacy Resource Management Program at PTA	Reinman and Pantaleo 1998	Forty new pre Contact sites were identified attributable to short term habitation, possible bird hunting, quarrying, and transportation
2001	Survey for the proposed Pohakuloa Training Area base camp master plan and Bradshaw Army Airfield improvements	Hammatt et al 2001	Approximately 80 contemporary military structures were identified. None were regarded as significant under historic preservation criteria
2002	Re-survey of 2900 acres south of Saddle Road and east of Redleg Trail; and evaluation of chill glass quarry complex identified therein. Reconnaissance of portions of TA 5 and 21	Roberts et al. 2004b	The survey identified seven sites, including short term habitation lava tubes, chill glass quarries, and excavated pits, all were determined to be pre Contact
2002	Reconnaissance survey of 8,710 acres for BAX/AALFTR; 24,000 acres for Keamuku Land Purchase; and PTA Trail	Roberts et al. 2004a	Phase I; survey originally identified 24 potential archaeological sites, 15 of which were determined to be sites during Phase II. All 15 sites are pre Contact attributable to habitation, quarrying, possible bird hunting (excavated pits), and transportation (trails)
2003	Reconnaissance of Training Areas 1, 3, and 4	Roberts et al. 2004c	Fifteen new sites identified ten of which are pre Contact and five are attributable to historic ranching. Pre Contact Hawaiian sites attributable to short term habitation (lava tubes), possible bird hunting (excavated pits), quarrying, and transportation (<i>ahu</i>)

Date	Type of Investigation	Reference	Findings
2003	Reconnaissance survey for SBCT Go/No Go Maneuver Areas at PTA	Desilets et al. 2005	Fifty sites identified These include 3 modified sinks, 2 fence lines, 3 mounds/mound sets, 2 cairn/cairn sets, 3 rockshelters, 2 caves, 1 lithic scatter, 30 excavated pits and pit complexes, and 4 stonework complexes (walls, enclosures, mounds, modified outcrops etc.). Of these sites, six may be of traditional Hawaiian origin, three appear ranching related, and the remainder is of undetermined cultural affiliation. Traditional Hawaiian sites include a modified sink with pictographs, a lithic scatter, two excavated pit complexes, and two stonework complexes. Historic sites include fence-lines, walls, and stock pens possibly associated with Humu'ula Sheep Station. The remaining forty-one sites may be military in origin but were recorded because they lacked associated military debris.
2003	Phase II archaeological research of proposed BAX & AALFTR for SBCT	Robins et al. 2006	Phase II; identified 24 sites all classified as pre Contact Hawaiian sites attributable to short term habitation, possible bird hunting, quarrying, and transportation

3.4 Background Summary and Predictive Model

3.4.1 Background Summary

The project area is located adjacent to Mauna Kea Recreation Area in the Saddle Region of the island of Hawai'i at the base of Mauna Kea, Ka'oho Ahupua'a, Hāmākua District, Hawai'i Island, TMK (3) 4-4-016:003. Elevation at the study area for this project is located between approximately 6500 amsl. The terrain is dominated by lava flows, consisting of both 'a'ā (rough lava) and pāhoehoe (smooth lava), though the project area is underlain by Keekee series soils. Vegetation on this undulating landscape is typically sparse. According to Shaw and Castillo (1997), the biotic communities in this area consist of barren lava, *Myoporum* shrubland, *Myoporum-Chamaesyce* treeland, and small areas of *Metrosideros* treeland around the southern and eastern margins. The climate at the project area is relatively cool and dry by Hawaiian standards; mean annual temperatures range from approximately 50–60°F and minimum temperatures in the winter months regularly plunge into the 30s. The surrounding lacks permanent stream drainages but small amounts of fresh water may be available in the form of pools in lava tubes and other subterranean features.

Situated at the base of Mauna Kea, the current study parcel is part of a vast area known in Hawaiian traditions as *‘Āina Mauna*. Traditional uses of this area included transportation, resource collection and associated temporary habitation, and religious activities. This area is associated with many important historical figures in Hawai‘i including the high chief ‘Umi and Kamehameha I. Into the nineteenth century, the Saddle Region remained mostly Crown lands. Cattle, sheep and goats, originally introduced by Vancouver, were let loose to roam the Interior Plateau. Hunting of these feral ungulates was common (Bergin 2004:22-23). In the mid-1900’s PTA was established over vast portions of the interior, resulting in the construction of Route 200 or the “Saddle Road”. Around the same time, a *nēnē* rearing facility was opened at the present project area; this facility remained in operation until the late 1970s. Currently the property is being used by the DNLR and Department of Forestry and Wildlife (DFW).

3.4.2 Predictive Model

There is some potential for the presence of historic features and/or artifacts, based on prior land use including historic ranching and activities related to the *nēnē* rearing program. Given the history of extensive historic-era land disturbance, it is unlikely that pre-contact features are present within the project area. Nevertheless, there remains some potential for pre-contact features related to transportation, bird catching and/or temporary habitation in the relatively undisturbed portions of the study area.

Section 4 Results of Fieldwork

4.1 Survey Findings

The current pedestrian survey provided approximately 100% coverage of the project area. Five historic properties were identified and documented during the survey fieldwork (Table 4 and Figure 8). These include SIHP # 50-10-22-29222, a historic cabin; SIHP # 50-10-22-29223 *nēnē* propagation aviaries; SIHP # 50-10-22-29224, a historic stone enclosure; SIHP # 50-10-22-29225, a possible terrace remnant and alignments; and SIHP # 50-10-22-29226, ranching features including a feed trough and fence lines with gates. Site descriptions, photos, and field maps for these features are presented here.

Table 4. Historic Properties Documented During the Inventory Survey Fieldwork

SIHP #	# of Features	Formal Type	Function	Age
SIHP # 50-10-22-29222	1	Cabin	Temporary habitation	Historic
SIHP # 50-10-22-29223	3	Aviary	<i>Nēnē</i> propagation	Historic
SIHP # 50-10-22-29224	1	Enclosure	Animal husbandry	Historic
SIHP # 50-10-22-29225	1	Terrace and alignment	Unknown	Undetermined
SIHP # 50-10-22-29226	1	Cattle feed trough and fence lines	Animal husbandry and range control	Historic

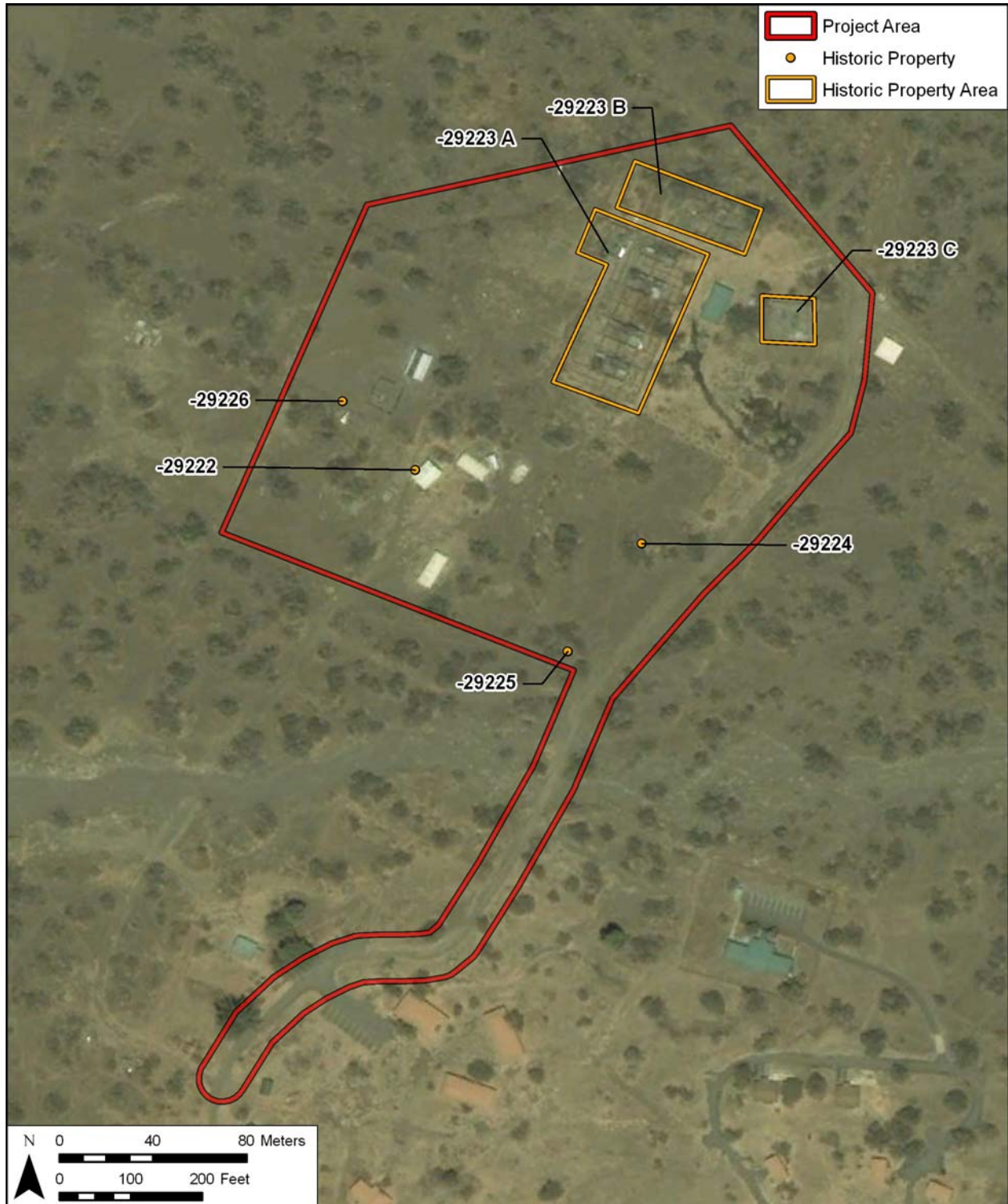


Figure 8. Aerial photo (Google Earth 2011) showing the locations of the historic properties within the project area

4.2 Site Descriptions

4.2.1 SIHP 50-10-22-29222

Temporary CSH Site No.: CSH-01

Number of features: 1

Dimensions: Overall approximately 9.2 m x 6.80 m

Elevation: 6,500 ft a.m.s.l.

Significance: D

Description: SIHP # 50-10-22-29222 represents a historic cabin possibly used during the Pōhakuoa Nene Propagation Project. Currently it is still in use by DLNR. The cabin is located in the southern portion of the project area (Figure 9). The feature is a single wall wooden cabin constructed upon concrete blocks with an attached porch. The cabin measures 9.2m long (N/S) by 6.8m wide (E/W) and rises c. 5.0m above the natural ground surface to the peak of the roof. The cabin is historic in age possibly constructed in the late 1940's. Given these observations, SIHP # 50-10-22-29222 is recommended eligible for the HRHP under Criterion D for its information content. No further work is recommended at this site.



Figure 9. Photo of SIHP # 50-10-22-29222 historic cabin; view to the northwest

4.2.2 SIHP #50-10-22-29223

Temporary CSH Site No.: CSH-02

Number of features: 3

Dimensions: Overall approximately 1 acre

Elevation: 6,500 ft a.m.s.l.

Significance: B, D

Description: SIHP # 50-10-22-29223, features A, B, and C represent a *nēnē* propagation facility that is no longer in use. The aviaries are located in the northern portion of the project area (Figure 8). They are constructed with milled and natural wood posts and beams overlaid with chicken wire. Overall, it is a sprawling facility with three separate aviaries. The largest of these aviaries is SIHP # 50-10-22-29223-A (Figure 8 and Figure 10); it measures c. 60.0m long (N/S) by 25.0m wide (E/W). Heights of this building varied from 2.0m to 4.0m. It is an irregular shaped building, inside of which there were many plum trees still growing. The second largest aviary (SIHP # 50-10-22-29223-B) is located just to the north of SIHP # 50-10-22-29223-A (Figure 8 and Figure 11). It is rectangular in shape and measures c. 65.0m long (E/W) by 30.0m wide (N/S) by 2m high. At one time this aviary had electricity supplied to it as evidenced by power line still connected to the building (Figure 11). SIHP # 50-10-22-29223-C represents the smallest aviary; it is located approximately 40.0m to the east of SIHP # 50-10-22-29223-A (Figure 8). It is square in shape, measuring c. 15.0m by 15.0m by 2.0m high. Feature C is a single-room, undivided aviary unlike the two others which had numerous holding pens, each equipped with a cement water bowl and spigot (Feature C had a single cement bowl and spigot). The majority of the water bowls were inscribed with the date and initials of Ah Fat Lee, AKA "Father Goose", who was the primary resident of the facility for many years (Figure 12 and Figure 13). In the majority of the aviaries plum trees were planted possibly for food, shade, and perches for the birds. Currently, there are many plum trees still growing within the aviaries and outside scattered around the project area. Signs are posted stating a permit is required to gather plums. Given these observations, SIHP # 50-10-22-29223 is recommended eligible for the HRHP under Criterion B for its' historical content and Criterion D for its information content. No further work is recommended at this site.



Figure 10. Photo showing the SIHP # 50-10-22-29223 *nēnē* propagation aviary; view to the west



Figure 11. Photo showing the SIHP # 50-10-22-29223-B *nēnē* propagation aviary; note the power line on the left side of the photo; view to the south west



Figure 12. Photo of a cement water bowl located in SIHP # 50-10-22-29223-A; view to the west



Figure 13. Photo of a cement water bowl showing inscribed date “11-8-61” and letter “A” on cement water bowl; overview

4.2.3 SIHP 50-10-22-29224

Temporary CSH Site No.: CSH-03

Number of features: 1

Dimensions: Overall approximately 5.5 m x 4.0 m

Elevation: 6,500 ft a.m.s.l.

Significance: D

Description: SIHP # 50-10-22-29224 is a historic core-filled stone enclosure located in the eastern portion of the project area c. 10.0m west of the fence line that serves as the project area’s eastern boundary (Figure 8). The feature is rectangular in shape (Figure 15 and Figure 16). Construction of the enclosure consists of stacked and faced (3-6 courses) sub-angular basalt boulders and cobbles along the wall edges, with smaller cobbles placed within the interior of the wall. This construction technique represents typical historic period core-filled architecture. The interior of the enclosure is level with soil and grass. A possible entry is indicated by an area of heavy collapse at the end of the northwestern wall, however no obvious entry point was observed. At the southwest corner of the enclosure an un-milled wooden post, with attached metal wire, has been set upright into the wall. The wooden post measures c. 140cm high with a diameter of c. 15cm. Overall, the enclosure measures c. 5.5m long (N/E/SW) by c. 4.0m wide (NW/SE) with exterior wall height ranges of 40-140cm and interior heights of 60-100cm. The enclosure is in good condition with a few areas of intact facing, however, there are also areas of collapse; see map (Figure 14). An iron bar with a vertical cylindrical piece extending from one

end and a hole at the other end was discovered on the surface of the interior of the enclosure. Due to the method of construction, presence of the wooden post with attached wire, and the iron bar it is suggested that the enclosure was constructed during the historic period and likely functioned as ranching feature associated with animal husbandry. A 1.0m x 1.0m test unit (TU-1) was placed within the enclosure; see Section 4.3 for results of the excavation. This site is recommended eligible for the HRHP under Criterion D for its informational content. No further work is recommended at this site.

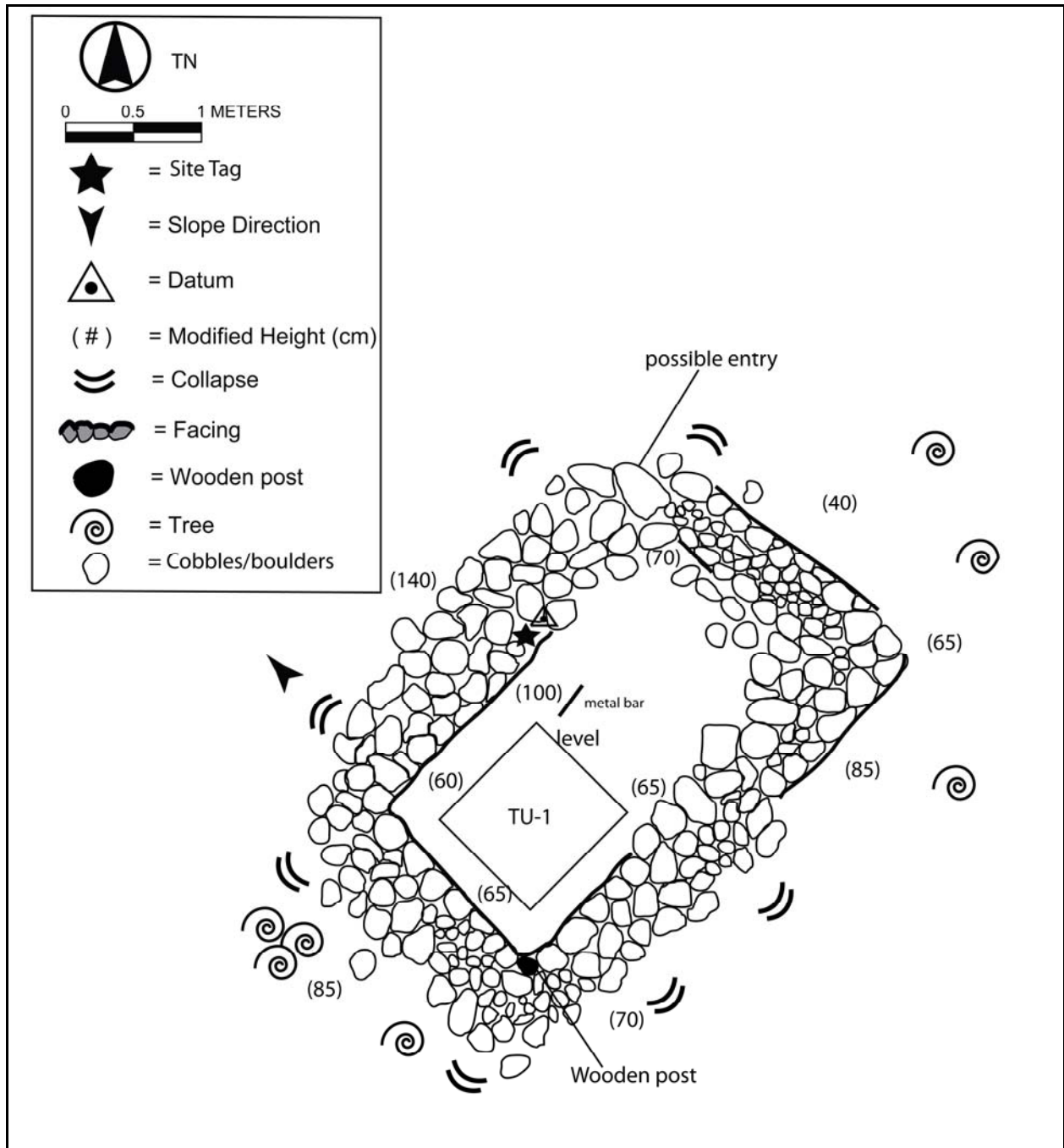


Figure 14. SIHP # 50-10-22-29224 Plan View of Stone Enclosure with Location of TU-1



Figure 15. Photo showing interior of SIHP # 50-10-22-29224; view to the southeast



Figure 16. Photo showing SIHP # 50-10-22-29224 exterior eastern wall; view to the northwest

4.2.4 SIHP 50-10-22-29225

Temporary CSH Site No.: CSH-04

Number of features: 1

Dimensions: Overall approximately 10.0 m x 3.0 m

Elevation: 6500 ft a.m.s.l.

Significance: N/A

Description: SIHP # 50-10-22-29225 represents a possible terrace remnant and trail alignment located in the southeastern corner of the project area (Figure 8). The feature is irregular in shape (Figure 17). The terrace remnant is L-shaped, and likely represents a corner of the structure. Behind the single course alignment that forms the terrace corner the ground surface is level and dominated by a large *māmane* tree (Figure 18). Interestingly, there is a section of metal rebar in the ground c. 2.5m north of the western portion of the terrace corner (Figure 17). In addition, there are two single coarse stone alignments, located 2.00m west of the terrace corner that appear to form the edges of a trail. The trail, which measures 1.20m wide (N/S) and 5.75m long (E/W), is visible as an area of level soil devoid of any stones (Figure 19). Construction of the feature consists of single-course alignments of sub-angular basalt cobbles and small boulders. Overall, the feature measures c.10.00 long (E/W) by c.3.00 wide (N/S) with height ranging from 10 to 30 cm. The feature is in fair condition. No cultural material was observed at the feature. SIHP # 50-10-22-29225 may represent a small activity area or a planting feature, associated with a trail. A 1.0m x 1.0m test unit (TU-2) was placed within the corner of the possible terrace remnant; see Section 4.3 for results of the excavation.

After the conclusion of testing, further evaluation concluded that this feature is nothing more than a bulldozer push pile as evidenced by the remains of modern trash (not collected) in the Test Unit and the presence of similar features in the vicinity that are definitely push piles. No further work is recommended at this site.

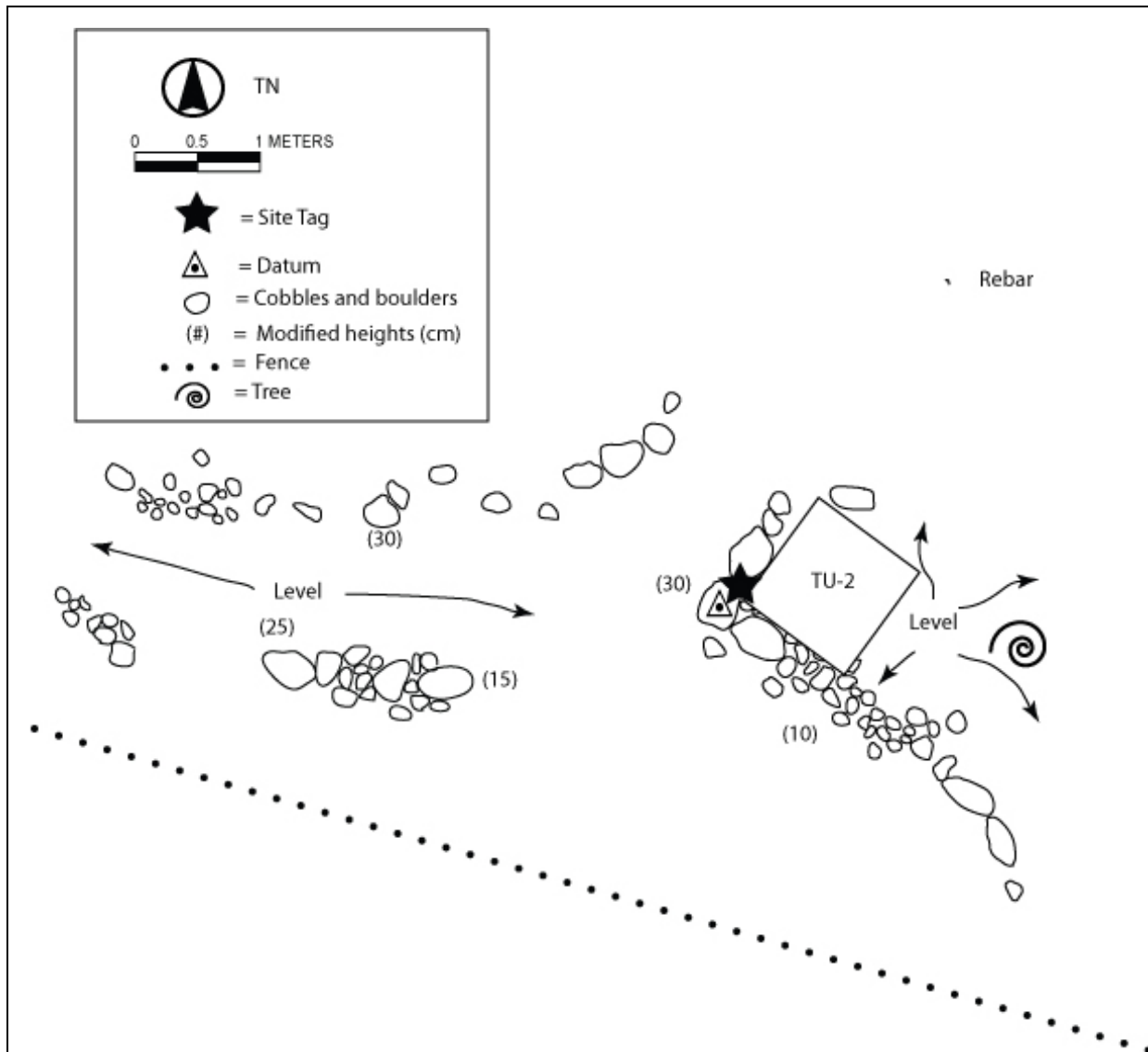


Figure 17. Plan view of SIHP # 50-10-22-29225, showing the location of TU-2



Figure 18. Photo of SIHP # 50-10-22-29225, possible corner of terrace; view to the northeast



Figure 19. Photo of SIHP # 50-10-22-29225; view to the northeast

4.2.5 SIHP 50-10-22-29226

Temporary CSH Site No.: CSH-05

Number of features: 1

Dimensions: Overall

Elevation: 6500 ft a.m.s.l.

Significance: D

Description: SIHP # 50-10-22-29226 represents a complex consisting of a historic feed trough and a series of fence lines located throughout the southwest quadrant of the project area (Figure 20). The fence lines are constructed using milled wood, natural wood posts, heavy gage barbed wire and range wire. Modern metal T-posts have been erected in places where original posts may have collapsed. The feed trough, which measures approximately 5.0 m x 5.0 m, was located near the southern portion of the project area along a section of historic fence line. The trough was in poor condition due to lack of use and exposure to the elements (Figure 21). The location of the trough was recorded on the Garmin. These features were likely associated with ranching activities. This site is recommended eligible for the SRHP under Criterion D for its informational content. No further work is recommended at this site.



Figure 20. Photo of SIHP # 50-10-22-29226, showing the animal feed trough (left) along a section of historic fence line; view to the northwest



Figure 21. Photo of the feed trough at SIHP # 50-10-22-29226; view to the southwest

4.3 Test Excavations Findings

Given the good excavation potential noted at SIHP # 50-10-22-29224, which represents a stone enclosure, a Test Unit (TU-1) was excavated inside the enclosure (Figure 15). A second Test Unit (TU-2) was excavated at SIHP # 50-10-22-29225, which represents a possible terrace and trail segment (Figure 18). The excavations were designed to test for the presence or absence of cultural deposits related to the history of land use within the project area, and to determine the potential for the presence of such deposits throughout the entire area of SIHP # 50-10-22-29224 and SIHP # 50-10-22-29225. A summary of the excavation results and the stratigraphic information recorded at each of the two test units follows. More detailed information on the artifacts discovered during excavation is given in Section 4.4. Excavations were undertaken according to the methodologies discussed in Section 2.

4.3.1 Test Unit 1

Test Unit 1 (TU-1) was excavated within the SIHP # 50-10-22-29224 enclosure (Figure 14). A 1.0 by 1.0 m (1.0 m²) unit was placed in the interior of the enclosure in an area of maximum soil and accessibility. Figure 22 shows the unit area marked out (with orange flagging tape at each corner) prior to excavation. The unit was excavated to bedrock through three stratigraphic levels or components. The stratigraphy observed at this location consisted of 10 YR 3/2, dark grayish brown silt (Stratum I) overlying a layer of gravel (Stratum II) atop fine loamy silt 5Yr 4/2 dark reddish grey, which rested upon bedrock (Table 5, Figure 24). A mammal rib bone possibly that of a sheep; and two rusted chain link fragments, and a small charcoal sample were recovered from stratum I. No other cultural material was observed in stratum II or III during excavation at TU-1. Figure 3 shows the stratigraphy of the southern face of TU-1 (Figure 23). Table 4 documents the unit post-excavation.



Figure 22. Photo showing the area of Test Unit 1 prior to excavation; view to the southeast

Table 5. Stratigraphy of Test Unit 1

Stratum	Depth (cmbs*)	Description
I	0-17	A Horizon; 10 YR 3/2, dark grayish brown; silt; single grain; weak, fine, granular structure; slightly sticky consistency; non-plastic; weak cementation; terrestrial origin; clear and wavy lower boundary; many very fine to coarse roots; includes non-human mammal bone, two pieces of rusted chain link, and <1.0gram of charcoal at c. 20cmbs
II	17-35	Indeterminate 10 YR 3/2, dark grayish brown; gravel; massive; coarse; blocky structure; non-sticky; non-plastic; weak cementation; terrestrial origin; clear and wavy lower boundary; no roots; no cultural materials present; just a band of gravel, possible alluvial deposit
III	35-50	B horizon; 5YR 4/2, dark reddish grey; silt; moderate, very fine, granular structure; slightly sticky consistency; non-plastic; weak cementation; terrestrial origin; very abrupt and irregular lower boundary; no roots; no cultural materials present

*cmbs = centimeters below surface

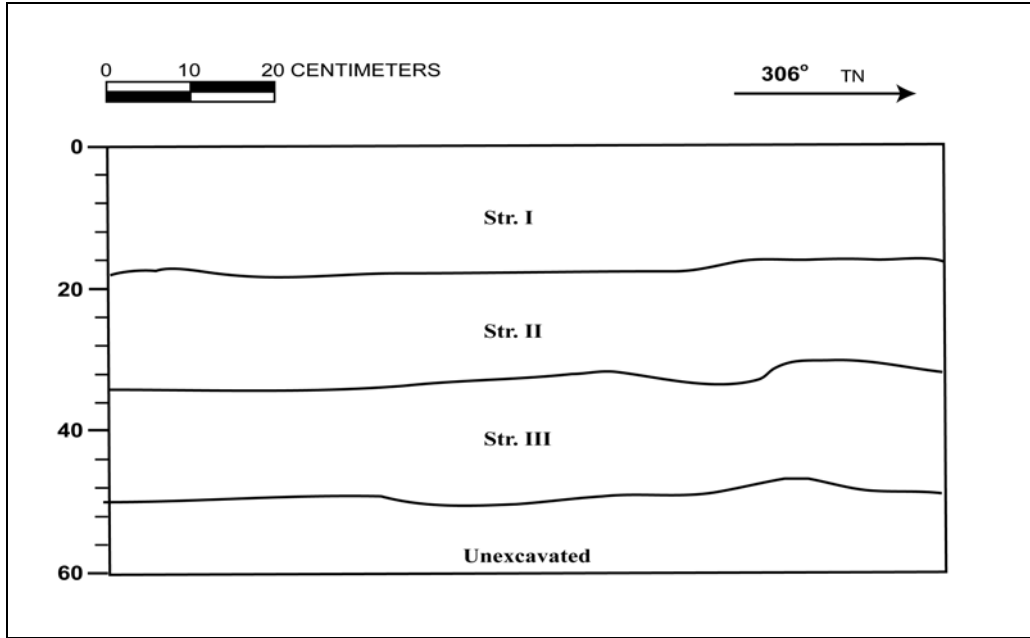


Figure 23. Profile drawing of the south face of Test Unit 1



Figure 24. Photo showing TU-1 post excavation; and the profiled southern face of Test Unit 1; view to the southwest

4.3.2 Test Unit 2

Test Unit 2 (TU-2) was excavated at the possible terrace at SIHP # 50-10-22-29225. A 1.0 by 1.0 m (1.0 m²) unit was placed in the corner of the L-shaped possible terrace remnant (Figure 17). Figure 25 shows the unit area marked out (with orange flagging tape at each corner) prior to excavation. The unit was excavated to bedrock through one stratigraphic level or component (Table 6, Figure 26 and Figure 27) The stratigraphy observed at this location consisted of dark reddish grey silt mixed with 60% gravel and cobbles. The unit terminated at bedrock at c. 40cmbs. While Stratum I did not contain any artifacts, a modern, decomposing piece of a Styrofoam coffee cup was observed (not collected) c. 20cmbs.



Figure 25. Photo showing the area of Test Unit 2 prior to excavation; view to the northeast

Table 6. Stratigraphy of Test Unit 2

Stratum	Depth (cmbs)	Description
I	0–40	5YR 4/2, dark reddish gray; extremely stony silt; weak, fine, granular structure; slightly sticky consistency; non-plastic; weak cementation; terrestrial origin; very abrupt and irregular lower boundary; no roots; includes approximately 60% gravel and small cobbles; decomposing modern Styrofoam coffee cup present (not collected) c. 20cmbs

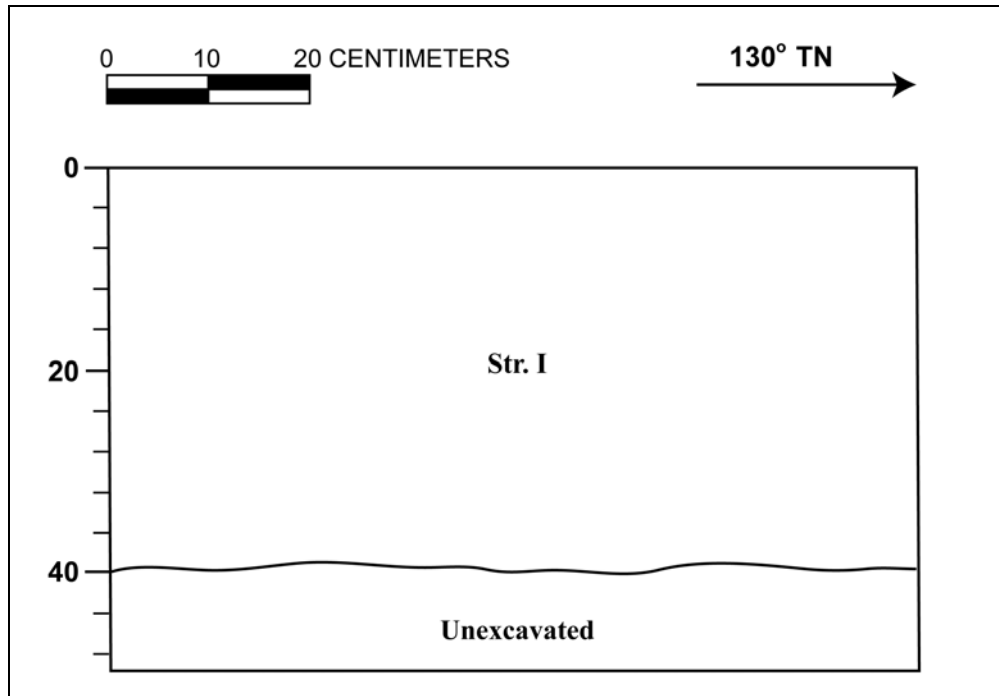


Figure 26. Profile drawing of the northern face of Test Unit 2



Figure 27. Photo showing the profiled north face of Test Unit 2 post-excitation; view to the northeast

Results of Laboratory Analysis

4.4 Artifacts from Test Unit Excavations

Two test units, TU-1 and TU-2, were excavated within the project area. TU-1, a 1.0m² test unit was excavated within the stone enclosure, SIHP # 50-10-22-29224. While all of Stratum II and III were culturally sterile, three artifacts were collected during screening of sediments from Stratum I (Table 5 Figure 28, Figure 29, and, Figure 30,). These artifacts are presented below in Table 7. TU-2, also a 1.0m² test unit, was excavated to bedrock through a single stratum which contained only modern trash. Accession #001 is a mammal rib bone, possibly sheep. Accession #002 and Accession #003 are machine-made, heavily rusted fragments of chain link (Table 7).

4.5 Charcoal Sample Collected in TU-1

A charcoal sample was collected at SIHP # 50-10-22-29224, TU-1, Stratum I, in situ at approximately 20 cmbs. (Table 5). The sample is very small (<1.0gram), and may likely be the result of a recent brush fire and associated root burn. For these reasons, the sample was not submitted for radiocarbon analysis.

4.6 Discussion

The artifacts recovered from TU-1 at SIHP # 50-10-22-29224 all confirm the suspected function of the stone enclosure, given the known history of ranching in and around the project area. The mammal rib bone is that of a juvenile sheep, and the metal chain link fragments at one time were more than likely used to secure the small stone enclosure. On the other hand, TU-2 at SIHP # 50-10-22-29225 contained only a modern Styrofoam cup fragment (which was not collected). Upon the termination of excavation it was concluded that the SIHP # 50-10-22-29225 may represent a modern bulldozer push pile or other disturbance, possibly related to installation of the adjacent fence line. The presence of modern rubbish within Stratum I also underscores the questionable nature and function of this feature. In summary, the artifacts subjected to laboratory analysis during the present study all indicate that the project area was used during the early twentieth century for ranching activities.

Table 7. Finds During Test Excavation at SIHP # 50-10-22-29224

Accession	Material Type	Provenience	Attributes	Approximate Dimensions	Age
#001	Bone	CSH 03, TU-1, Stratum I	Non-human rib bone fragment ; likely juvenile sheep	5.9cm x 0.9cm	Unknown
#002	Steel (heavily rusted)	CSH 03, TU-1, Stratum I	Machine-made; Chain link fragment	4.1cm x 0.2cm	20 th century
#003	Steel (heavily rusted)	CSH 03, TU-1, Stratum I	Machine-made; Chain link fragment	3.7cm x 0.2cm	20 th century



Figure 28. Photo of Accession #001, sheep rib bone



Figure 29. Photo of Accession #002, chain link fragment



Figure 30. Photo of Accession #003, chain link fragment

Section 5 Summary and Interpretation

5.1 Summary

The lands along the current project area lie at approximately 6,500 feet amsl. The parcel is located approximately at the southern base of Mauna Kea, directly behind Mauna Kea State Park. A wealth of traditional knowledge has been passed down about the *ahupua'a* comprising Ka'ohe, particularly concerning bird collection, the Mauna Kea adze quarry, and spiritual practices on Mauna Kea. Throughout the late 1800s and early twentieth century, sheep and cattle ranching was practiced extensively throughout Hāmākua. In the 1950s the development of the Pōhakuloa Training Area and the militarization of the saddle area began, necessitating the construction of an improved route over the Saddle. Around the same time, a *nēnē* rearing facility was opened at the present project area; this facility remained in operation until the late 1970s. Currently the property is being used by the DNLR and Department of Forestry and Wildlife (DFW). Improvements to Route 200 continue today; the proposed project would create a base yard for Saddle Road maintenance operations.

A total of five historic properties were identified during the present study. SIHP # 50-10-22-29222, a historic cabin; SIHP # 50-10-22-29223 features A, B, and C, *nēnē* propagation aviaries; SIHP # 50-10-22-29224, a historic enclosure; SIHP # 50-10-22-29225, possible terrace and trail remnants that may represent modern disturbance; and SIHP # 50-10-22-29226, a historic complex consisting of a feed trough and associated fencing. No pre-Contact or traditional Hawaiian historic properties were identified within the project area. Ground disturbance related to the construction of the numerous buildings and facilities may have impacted or completely destroyed any pre-Contact and historic properties located on the surface of the current project area.

5.2 Interpretation

The findings of the current inventory survey are largely as expected, considering land use in the vicinity of the current project area. Given the location of the project area in the saddle region, and the history of human (industrial and construction-related) disturbance, the presence of pre-Contact features was not anticipated. However, given the location of the former Pōhakuloa Nēnē Rearing facility within the project area and the history of ranching throughout this region, historic features were expected to be encountered. The results of fieldwork and subsequent laboratory analyses confirmed these expectations. These sites represent physical evidence supporting the results of the background research, namely that this location was once part of ranching endeavors and a *nēnē* propagation facility. Currently, portions of the study area are in use today by DLNR and DFW.

Section 6 Significance Assessments

6.1 Significance Assessments

Under Hawai'i state historic preservation legislation, archaeological inventory surveys are designed to identify, document, and provide significance and mitigation recommendations for historic properties. Under this legislation, historic properties are defined as any "building, structure, object, district, area, or site, including *heiau* and underwater site, which is over fifty years old" (HAR Chapter 13-284-2). A project's effect and potential mitigation measures are evaluated based on the project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established significance criteria, for inclusion in the Hawai'i Register). Determinations of eligibility to the Hawai'i Register result when a state agency official's historic property "significance assessment" is approved by the SHPD, or when the SHPD itself makes an eligibility determination for an historic property (HAR Chapter 13-284).

Sites were evaluated for significance according to the broad criteria established for the National and State Registers. The five criteria are: (with Criterion E being applicable to the Hawai'i Register only):

- A. Historic property reflects major trends or events in the history of the state or nation.
- B. Historic property is associated with the lives of persons significant in our past.
- C. Historic property is an excellent example of a site type.
- D. Historic property has yielded or may be likely to yield information important in prehistory or history.
- E. Historic property has cultural significance to an ethnic group, including, but not limited to, religious structures, burials, and traditional cultural properties.

6.1.1 SIHP # 50-10-22-29222

SIHP # 50-10-22-29222 is a historic wooden cabin. The cabin was likely occupied during the 1950's-1970's, as the primary housing for those in charge of the *nēnē* rearing facility. The site retains integrity of location, design, setting, workmanship, and feeling, despite its modern usage by DLNR and the lack of permanent inhabitants.

The data obtained at SIHP # 50-10-22-29222 suggests an affiliation with an event or person significant to the prehistory or history of the region, particularly Ah Fat Lee. However, since this connection cannot be definitely demonstrated, the site is recommended eligible to the Hawai'i Register of Historic Places (HRHP) solely under Criterion D.

6.1.2 SIHP # 50-10-22-29223, features A, B, and C

SIHP # 50-10-22-29223 represents a *nēnē* propagation facility that is no longer in use. The site retains integrity of location, design, setting, workmanship, and feeling, despite it being abandoned for several decades. The data obtained at SIHP # 50-10-22-29223 suggests an affiliation with an event or person significant to the prehistory or history of the region,

particularly Ah Fat Lee and the hugely successful program of *nēnē* propagation at the site. Therefore, the site is recommended eligible to the Hawai'i Register of Historic Places (HRHP) under Criterion B, and under Criterion D for its general information content.

6.1.3 SIHP # 50-10-22-29224

SIHP # 50-10-22-29224 represents a historic core-filled stone enclosure. The site retains integrity of location, design, setting, workmanship, and feeling, despite it being abandoned for several decades. None of the data obtained at SIHP # 50-10-22-29224 suggests an affiliation with an event or person significant to the prehistory or history of the region. Therefore, the site is not recommended eligible to the HRHP under Criteria A or B. Furthermore, this site cannot be said to represent the work of a master or possess high artistic values, nor does it appear to hold cultural significance to an ethnic group, so it is not eligible under Criteria C or E. Given these observations, SIHP # 50-10-22-29224 is recommended eligible for the HRHP under Criterion D for its informational content.

6.1.4 SIHP # 50-10-22-29225

SIHP # 50-10-22-29225 initially this site was thought to have been a terrace remnant and an associated trail remnant. However, after excavation and further study of the feature it was determined that it may simply be the result of modern disturbance. If this were a site, it could be said retain integrity of location, design, setting, workmanship, and feeling. None of the data obtained at SIHP # 50-10-22-29225 suggests an affiliation with an event or person significant to the prehistory or history of the region. Therefore, the site is not recommended eligible to the HRHP under Criteria A or B. Furthermore, this site cannot be said to represent the work of a master or possess high artistic values, nor does it appear to hold cultural significance to an ethnic group, so it is not eligible under Criteria C or E. Given these observations, SIHP # 50-10-22-29225 may be eligible for the HRHP under Criterion D for its informational content, if determined to represent an historic property. If these features are discounted as modern, the site should be retracted from the State Inventory of Historic Places.

6.1.5 SIHP # SIHP # 50-10-22-29226

SIHP # 50-10-22-29226 represents a historic complex consisting of a feed trough and associated fencing. The site retains integrity of location, design, setting, workmanship, and feeling, despite the addition of modern t-posts to the fence lines and its apparent present disuse. None of the data obtained at SIHP # 50-10-22-29226 suggests an affiliation with an event or person significant to the prehistory or history of the region. Therefore, the site is not recommended eligible to the HRHP under Criteria A or B. Furthermore, this site cannot be said to represent the work of a master or possess high artistic values, nor does it appear to hold cultural significance to an ethnic group, so it is not eligible under Criteria C or E. Given these observations, SIHP # 50-10-22-29226 is recommended eligible for the HRHP under Criterion D for its informational content.

Section 7 Project Effect and Mitigation Recommendations

7.1 Project Effect

CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The construction of the DOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of the historic properties identified within the project area. The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.

7.2 Mitigation Recommendations

No recommendations to undergo further research are made at any of the five sites identified within the project area, because it has been determined that these historic properties lack cultural or scientific significance beyond that documented during this archaeological inventory survey. Therefore, no further work is recommended at any of the five historic properties within the project area. These historic properties are classified under Criterion B and/or D significance only and are characterized as consisting of remnants of twentieth century historic features that were utilized for ranching operations or *nēnē* propagation. SIHP #50-10-22-29223 is associated with a historic figure, Ah Fat Lee, who was also known as "Father Goose". Ah Fat Lee was instrumental in the success of the propagation of the Hawaiian *nēnē* goose at SIHP #50-10-22-29223, and the subsequent reintroduction of the geese back into the wilds of Hawai'i and Maui Islands.

It is unlikely that the removal of these features would disturb any undiscovered subsurface features because they would have likely been impacted during the construction of the existing buildings and facilities. Therefore, archaeological monitoring is not recommended for construction-related ground disturbance.

However, if at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that the SHPD be contacted immediately.

7.3 Disposition of Materials

The artifacts documented during this archaeological inventory survey were collected from private lands; accordingly, this material belongs to the landowner. The artifacts associated with this archaeological inventory survey will be temporarily housed at a CSH storage facility. CSH will make arrangements with the landowner regarding the disposition of the project's collection. Should the landowner request archiving of material, then the archive location will be determined in consultation with the SHPD.

Section 8 References Cited

Athens, J. Stephen, and Michael W. Kaschko

1989 *Prehistoric Upland Bird Hunters: Archaeological Inventory Survey and Testing for the MPRC Project Area and the Bobcat Trail Road, Pohakuloa Training Area, Island of Hawai'i*. IARI, Inc., Honolulu, Hawai'i.

Bayman, James, Jadelyn Moniz Nakamura, Timothy Rieth, and Christine Paraso

2004 "Stone Adze Production and Resource Extraction at Pōhakuloa, Hawai'i Island." *Hawaiian Archaeology* 9:83-104.

Beckwith, Martha W. (editor)

1932 *Kepelino's Traditions of Hawaii*. Bernice P. Bishop Museum Bulletin 95, Bishop Museum Press, Honolulu, Hawai'i.

Bergin, B.

2004 *Loyal to the land: The Legendary Parker Ranch, 1750-1950*. University of Hawai'i Press, Honolulu, Hawai'i.

Bird, Isabella

1964 *Six Months in the Sandwich Islands*. The University of Hawai'i Press, Honolulu, Hawai'i.

Cordy, Ross

1994 *A Regional Synthesis of Hamakua District: Island of Hawai'i*. Prepared by the Historic Preservation Division Department of Land and Natural Resources, Honolulu, Hawai'i.

Michael Desilets, Cassidy DeBaker, and John Peterson

2006 *Phase II Archaeological Survey for Significance Determination of Cultural Resources in Stryker Brigade Combat Team Go/No Go Maneuver Areas and a 1,010-Acre Area Near Pu'u Ke'eke'e, Pohakuloa Training Area, Island of Hawai'i*. Garcia and Associates, Kailua, Hawai'i.

Desilets, Michael, Alice K.S. Roberts, Amy Buffum, and Stephen J. Roberts

2005 *Phase I Archaeological Reconnaissance Survey for SBCT Go/No Go Maneuver Areas at U.S. Army Pohakuloa Training Area, Ka'ohe Ahupua'a, Hamakua District and Pu'uanahulu Ahupua'a, North Kona District, Island of Hawai'i, Hawai'i, (TMKs 3-4-4-16:01 and 3-7-1-04:07)*. Prepared for U.S. Army Engineer District, Fort Shafter, Hawai'i, by Garcia and Associates, Kailua, Hawai'i.

Dye, Thomas S.

2005 *Cultural Impacts Assessment, Big Island Country Club, Pu'uanahulu, North Kona, Hawai'i (TMK:(3)7-1-05:various)*. T.S. Dye and Colleagues, Archaeologists, Inc., Honolulu, Hawai'i.

Ellis, William

1963 *A Narrative of a Tour Through Hawaii, or Owhyee; With Remarks on the History, Traditions, Manners, Customs, Language of the Inhabitants of the Sandwich Islands*. Reprint of a 1827 edition. Advertiser Publishing Company Ltd., Honolulu, Hawai'i.

Fornander, A.

1996 *Ancient History of the Hawaiian People to the Time of Kamehameha I*. Mutual Publishing, Honolulu, Hawai'i.

Giffen, Jon G.

2009 *Pu'u Wa'awa'a Biological Assessment, Pu'u Wa'awa'a, North Kona, Hawai'i*. Department of Land and Natural Resources, Division of Forestry and Wildlife, Division of State Parks, Hawai'i, Hawai'i.

Hammatt, Hallett H., and David W. Shideler

1991 *Archaeological Assessment and Sensitivity Map of the Pohakuloa Training Area (PTA), Hawai'i Island*. Prepared for Richard Sato and Associates by Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Hammatt, Hallett H., and David W. Shideler

2001 *Archaeological Inventory Survey for the proposed Pohakuloa Training Area Base Camp Master Plan and Bradshaw Army Airfield Improvements* Prepared for Townscape, Inc.

Hawai'i TMK Service

2011 Tax Map Key [3] 4-4-016:003. On file at Hawai'i TMK Service, 222 Vineyard Street, Suite 401, Honolulu, Hawai'i

Henke, L. A.

1929 *A Survey of Livestock in Hawaii*. University of Hawai'i Research Publication No. 65, University of Hawai'i.

Henshaw, Henry W.

1902 *Birds Of The Hawaiian Islands: Being A Complete List Of The Birds Of The Hawaiian Possessions*. Thos. G. Thrum, Honolulu, Hawai'i.

1982b *Inspection of Firebreak Route at Pohakuloa Training Area*. On file, Historic Preservation Division, Department of Land and Natural Resources, Honolulu, Hawai'i.

Kamakau, Samuel .M.

1992 *Ruling Chiefs of Hawaii (Revised Edition)*. Originally published in 1961. Kamehameha Schools Press, Honolulu, Hawai'i.

Kuykendall, Ralph Simpson

1968 *The Hawaiian Kingdom: 1778-1854, Foundation and Transformation Vol. I*. The University Press of Hawaii, Honolulu, Hawai'i.

Lee, Fat. Ah

1978 *Pohakuloa Propagation Project: A Continuing Success Story*. Wildlife Branch Hawai'i State Division of Fish and Game Department of Land and Natural Resources, Honolulu, Hawai'i.

Lyons, C.J.

1875 Land Matters in Hawaii. *The Islander* 1(19):111.

McEldowney, Holly and Patrick C. McCoy

- 1982 *Cultural Resource Reconnaissance of the Mauna Kea Summit*. Report 1. *Ethnographic Background of the Mauna Kea Summit Region*. By Holly McEldowney. Report 2. *Archaeological Reconnaissance Survey*. By Patrick C. McCoy. Prepared for Group 70, by Bishop Museum Department of Anthropology, Honolulu, Hawai'i.

Malo, David

- 1951 *Hawaiian Antiquities*. Bernice P. Bishop Museum Special Publication 2 (2nd edition), Bishop Museum Press, Honolulu, Hawai'i.

Maly, Kepā

- 1999 *Volume I. Pu'u Anahulu and Pu'u Wa'awa'a (Nāpu'u) at Kekaha – Kona, Hawaii. A Report on Archival-Historical Documentary Research, and Oral History Interviews; Cultural-Historical Documentation for Ahupua'a-Based Planning in the Lands of Pu'u Anahulu and Pu'u Wa'awa'a (Nāpu'u); District of Kona, Island of Hawai'i (TMK Overview Sheet 7-1)*. Kumu Pono Associates, Hilo, Hawai'i.
- 2001 *He wahi mo'olelo no na 'aina, a me nā ala hele i hehi 'ia, mai Keauhou a i Kealakekua, ma Kona, Hawai'i (A historical overview of the lands, and trails traveled, between Keauhou and Kealakekua, Kona, Hawai'i)*. With contributions by Pat Thiele. Kumu Pono Associates, Hilo, Hawai'i.
- 2004 *Humu'ula a me Pi'ihonua: he mau 'Āina Lei Ali'i ma ka 'Āina Mauna o Hawai'i; Humu'ula and Pi'ihonua (Lands that Adorn the Chiefs on the Mountain Lands of Hawai'i): A Collection of Native Traditions, Historical Accounts, and Oral History Interviews*. Kumu Pono Associates, Hilo, Hawai'i.

Maly, Kepā, and Onaona Maly

- 2002 *"He Wahi Mo'olelo no ka 'Āina a me nā 'Ohana o Waiki'i ma Waikōloa (Kalana o Waimea, Kohala), a me ka 'Āina Mauna"* (A Collection of Traditions and Historical Accounts of the Lands and Families of Waiki'i at Waikōloa [Waimea Region, South Kohala], and the Mountain Lands, Island of Hawai'i). Kumu Pono Associates, Hilo, Hawai'i.
- 2005 *"Mauna Kea-Ka Piko Kaulana O Ka 'Āina"* (Mauna Kea-The Famous Summit Of The Land). A Collection of Native Traditions, Historical Accounts, and Oral History Interviews for: Mauna Kea, the Lands of Ka'ohē, Humu'ula and the 'Āina Mauna on the Island of Hawai'i. Kumu Pono Associates, Hilo, Hawai'i.

Nene News Volume 1, Issue 2 April 1996

- 1996 Kaunakakai, Hawai'i.

Pukui, Mary Kawena

- 1983 *'Ōlelo No'eau: Hawaiian Proverbs and Poetical Sayings*. Bishop Museum Press, Honolulu, Hawai'i.

Pukui, Mary Kawena and Alfons L. Korn (eds.)

- 1973 *The Echo of Our Song: Chants & Poems of the Hawaiians*. University of Hawaii Press, Honolulu, Hawai'i.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini

1974 *Place Names of Hawaii: Revised and Expanded Edition*. University of Hawaii Press, Honolulu, Hawai'i.

Reinman, Fred M. and Jeffrey Pantaleo

1993 *Redleg Trail Archaeological Investigations for the Legacy Resource Management Program at Pohakuloa Training Area, Island of Hawai'i*. Prepared for U.S. Army Engineer District, Fort Shafter, Hawai'i, by Garcia and Associates, Kailua, Hawai'i.

1994 *Archaeological Data Recovery at the Multi-Purpose Range Complex Pohakuloa Training Area, Island of Hawai'i, Hawai'i*. Ogden Environmental and Energy Services Co., Inc., Honolulu, Hawai'i.

Roberts, Alice K.S., Amy Buffum, Rachel Davies, and Scott Williams

2004 *Archaeological Survey of Training Areas 5 and 21 and Eligibility Evaluations for Chill Glass Quarry Sites in the Vicinity of Redleg Trail (Range 10), U.S. Army Pohakuloa Training Area, Island of Hawaii, Hawaii*. Garcia and Associates, Kailua, Hawai'i.

Roberts, Alice K.S., Stephan Roberts, and Michael Desilets

2004 *Archaeological Survey of Training Areas 1, 3, and 4, U.S. Army Pohakuloa Training Area, Island of Hawai'i, Hawai'i*. Garcia and Associates, Kailua, Hawai'i.

Roberts, Alice K.S., Jennifer J. Robins, and Amy Buffum

2004 *Archaeological Surveys of Proposed Training Area for the Stryker Brigade Combat Team, U.S. Army, Pohakuloa Training Area, Island of Hawai'i, Hawai'i*. Garcia and Associates, Kailua, Hawai'i.

Robins, Jennifer J., Karen A. Desilets, and Ana Lucia González

2005 *Final Intensive Phase II Survey for Significance Determinations of Cultural Resources, Ke'āmuku Land Acquisition Area (WPAA) for the Stryker Brigade Combat Team (SBCT), U.S. Army Pōhakuloa Training Area, Hawai'i Island, Hawai'i*. Garcia and Associates, Kailua, Hawai'i.

Robins, Jennifer J., and Ana L. Gonzalez

2006 *Final Phase II Archaeological Research of Proposed Battle Area Complex (BAX) & Anti-Armor Live Fire and Training Range (AALFTR) Training Areas for Stryker Brigade Combat Team (SBCT), U.S. Army Pōhakuloa Training Area, Hawai'i Island, Hawai'i (TMK 3-4-4-16:1)*. Garcia and Associates, Kailua, Hawai'i.

Sato, Harry, Warren Ikeda, Robert Paeth, Richard Smythe, and Minoru Takehiro, Jr.

1973 *Soil Survey of the Island of Hawaii*. U.S. Department of Agriculture and Univ. of Hawai'i Agricultural Experiment Station.

Shapiro, Lisa, and Paul L. Cleghorn

1998 *Final Archaeological Investigations of Two Work Areas for The Legacy Resource Management Program at Pohakuloa Training Area, Hawai'i Island, Hawaii*. BioSystems Analysis, Inc., Kailua, Hawai'i.

Shaw, Robert B., and Michael Castillo

1997 *Plant Communities of Pohakuloa Training Area, Hawaii*. Center for Ecological Management of Military Lands, Fort Collins, Colorado.

Streck, Charles F., Jr.

1984 *Archaeological Reconnaissance Site Survey of Five Land Parcels at PTA, Island of Hawaii*. Dept. of the Army Headquarters United States Army Support Command, Fort Shafter, Hawai'i.

Streck, Charles F., Jr.

1986b *Aerial Archaeological Reconnaissance Site Survey for Proposed Artillery Firing Points, Firebreak/Road Route, and Other Facilities at Pohakuloa Training Area (PTA), Island of Hawai'i, Hawaii*. U.S. Army Engineer District, Honolulu, Fort Shafter, Hawai'i.

Summers, C. C.

1999 *Material Culture: The J. S. Emerson Collection of Hawaiian Artifacts*. Bishop Museum Press, Honolulu, Hawai'i.

U.S. Geological Survey Maps/ U.S. Department of War Maps

1993 USGS 7.5 minute topographic map, Ahumoa (1982) and Pu'ukoli (1993) Quads

Waihona 'Aina

2000 The Māhele Database. Electronic document, <http://waihona.com>, accessed July 10, 2010.

Welch, David

1993 *Archaeological Survey and Testing for the Saddle Road Improvement Project, Pohakuloa Area, Hawai'i Island, Hawaii*. National Technical Information Service, Washington D.C.

Wilkes, Charles

1970 *(1845) Narrative of the United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842*. Volume IV. Lea and Blanchard, Philadelphia, Pennsylvania.

Williams, Scott S. (ed.)

2002b *Final Report. Archaeological Reconnaissance Survey U.S. Army Pohakuloa Training Area (PTA) for the U.S. Army Garrison, Hawaii, Ecosystem Management Program, Hawai'i Island, Hawai'i*. Ogden Environmental and Energy Services Co., Inc., Honolulu, Hawai'i.

Appendix C

Cultural Resources Impact Assessment

Cultural Surveys Hawaii

March 2012

DRAFT

**A Cultural Impact Assessment for the Proposed Saddle
Road Maintenance Base Yard at the Mauna Kea State
Recreation Area, Ka'ohē Ahupua'a, District of Hāmākua,
Island of Hawai'i**

TMK: [3] 4-4-016:003

**Prepared for
R.M. Towill Corporation**

**Prepared by
'Auli'i Mitchell, B.A.,
Momi Wheeler, B.S.
and
Hallett H. Hammatt, Ph.D.**

**Cultural Surveys Hawai'i, Inc.
Kailua, Hawai'i
(Job Code: KAOHE 3)**

March 2012

**O'ahu Office
P.O. Box 1114
Kailua, Hawai'i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950**

www.culturalsurveys.com

**Hawai'i Island Office
P. O. Box 393
Pāhoa, Hawai'i 96778
Ph: (808) 965-6478
Fax: (808) 965-6582**

Table of Contents

Prefatory Remarks on Language and Style.....	ii
Acronyms	iii
Management Summary	iv
Section 1 Introduction	1
1.1 Project Background	1
1.2 Document Purpose.....	1
1.3 Scope of Work	2
1.4 Environmental Setting	2
1.4.1 Natural Environment.....	2
1.4.2 Soil and Vegetation.....	2
1.4.3 Cultural Context.....	5
1.4.4 Built Environment.....	5
Section 2 Methods	6
2.1 Archival Research.....	6
2.2 Community Consultation.....	6
2.2.1 Sampling and Recruitment.....	6
2.2.1 Informed Consent Protocol.....	7
2.2.2 Interview Techniques.....	8
2.2.3 Protection of Sensitive Information.....	9
2.3 Compensation and Contributions to Community	9
Section 3 Traditional Background.....	10
3.1 Overview.....	10
3.2 Place Names.....	10
3.3 <i>Wahi Pana</i> (Legendary Place).....	13
3.4 <i>Mo‘olelo</i> (Story, Myth, Tradition) Associated with Specific Place Names.....	14
3.5 Subsistence and Settlement.....	33
3.6 <i>Heiau</i> (Temple).....	33
3.7 <i>Nā Ala Hele</i> (Trails).....	34
3.8 Burials.....	36
3.9 <i>Nā Oli</i> (Chants), <i>Nā Pule</i> (Prayers) and <i>Nā Mele</i> (Songs)	36
3.10 Bird Hunting	40
3.11 Keanakāko‘i - Maunakea Adze Quarry	42
Section 4 Historical Background	44
4.1 Early Historic Period	44
4.1.1 Ascent of Mauna Kea	44
4.1.2 Sandalwood Collection	47
4.1.3 Cattle (Bullock) Hunting	47
4.1.4 Early Foreign Visitors.....	54
4.2 Mid-Nineteenth Century and the Māhele	72
4.2.1 The Māhele and Resulting Changes	72
4.3 Late 1800s to 1900s.....	76

4.3.1 Ranching	76
4.3.2 Development of the Saddle Road	88
4.3.3 The Mauna Kea Forest Reserve	89
4.4 Twentieth Century and Modern Land Use	91
4.4.1 ‘Oihana Kilokilo (Astronomy).....	91
4.4.2 Military Training and the Development of Pōhakuloa Training Area (PTA).....	92
4.4.3 Big Game and Bird Hunting	96
4.4.4 Mauna Kea State Recreation Area (SRA)	97
4.4.5 Pōhakuloa <i>Nēnē</i> Propagation Project.....	98
4.4.6 Previous Cultural Studies for Mauna Kea	101
Section 5 Archaeological Research	107
5.1 Overview.....	107
5.2 Early Observations and Previous Archaeological Research	108
5.2.1 Traditional Cultural Properties (TCPs).....	116
5.2.2 Burials and Possible Burials	116
5.2.3 Shrines	117
5.2.4 Adze Quarries and Manufacturing Workshops.....	118
5.3 Recent Archaeological Studies in the Vicinity of the Project Area.....	118
5.4 CSH Archaeological Inventory Survey (AIS)	122
5.4.1 Survey Findings.....	122
5.4.2 Test Excavation Findings.....	124
Section 6 Community Consultation.....	127
6.1 Community Consultation Effort.....	128
6.2 Written Responses	133
6.2.1 Office of Hawaiian Affairs (OHA) Response Letter	133
Section 7 Summaries of Kama‘āina “Talk Story” Interviews	134
7.1 Talk Story Interview.....	134
7.2 Acknowledgements.....	134
7.3 Mr. Reynolds Kamakawiwoole	134
7.4 Mr. Keali‘imaunalaniokēkē Bertlemann.....	139
Section 8 Cultural Landscape of Project Area	143
8.1 Overview.....	143
8.2 Gathering and Hunting Practices	143
8.3 Freshwater and Marine Resources.....	145
8.4 Trails.....	146
8.5 Historic and Cultural Properties	148
8.6 Burials.....	149
8.7 <i>Wahi Pana</i> and <i>Mo‘olelo</i>	150
Section 9 Summary and Recommendations	154
9.1 Results of Background Research	154
9.2 Results of Community Consultation.....	156
9.3 Recommendations.....	156
Section 10 References Cited	158

Appendix A Glossary 1
Appendix B Common and Scientific Names for Plants and Animals 1
Appendix C Authorization and Release..... 1
Appendix D CSH Community Contact Letter 1

DRAFT

List of Figures

Figure 1. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukole (1993) Quads, showing the location of the proposed project area	3
Figure 2. Portion of Tax Map Key (TMK) 4-4-016:003, showing the location of the Project area 1	
Figure 3. Tax Map Key [3] 4-4-016:003, inset "B"	1
Figure 4. Aerial photograph showing the location of the proposed project area (Source: Google Earth 2011).....	2
Figure 5. Site plan provided by client, R. M. Towill Corporation.....	1
Figure 6. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'u Koli (1993) Quads, overlain with USDA soil survey data (Sato et al. 1973), showing project area soils.....	4
Figure 7. The summit region of Mauna Kea showing some of its main <i>pu'u</i> (cinder cone) and an astronomical observatory, top center of the image (source: Ziegler 2002)	24
Figure 8. Photograph of cinder cones of Mauna Mea with Waiau (lower left) (Brigham 1909) ..	45
Figure 9. 1909 photograph of Lake Waiau from Brigham	45
Figure 10. 1911 photograph of cinder cones of Mauna Kea from Hitchcock (1911).....	46
Figure 11. Hitchcock's (1911) copy of W. D. Alexander's 1892 map of the Mauna Kea summit region	46
Figure 12. 1959 photograph of Pōhakuloa Park, formally the CCC camp (Quinn 2007)	97
Figure 13. 1966 photograph of the Group Cabins (Quinn 2007).....	98
Figure 14. Photograph of Ah Fat Lee, Father Goose, holding a <i>nēnē</i> gosling (Nēnē News 1996)100	
Figure 15. Photograph showing Mr. Lee caring for the incubated <i>nēnē</i> eggs (Nēnē News 1996)100	
Figure 16. Map showing the three SHPD designated TCPs on the Mauna Kea summit region (adapted from McCoy et al. 2008:2 – 25).....	105
Figure 17. Traditional Hawaiian <i>ahu</i> at Keanakāko'i – Mauna Kea adze quarry (Source: Kirch, 1985)	107
Figure 18. Map showing historic properties in the Mauna Kea summit region (Adapted from McCoy et al. 2008:2 - 16).....	108
Figure 19. Map of previous archaeological studies in the vicinity of the current proposed project area.....	121
Figure 20. Aerial photo showing the locations of the Historic Properties within the proposed project area (Source: Google Earth 2011)	123
Figure 21. Overview of Test Unit 1 prior to excavation facing southwest.....	124
Figure 22. Overview of Test Unit 2 prior to excavation facing northeast	125
Figure 23. OHA Response Letter dated December 6, 2011	133

List of Tables

Table 1. LCA Claims in Ka'ohē Ahupua'a	73
Table 2. Telescopes on the summit of Mauna Kea.....	91
Table 3. Cultural Studies in the Mauna Kea Summit Area.....	101
Table 4. Archaeological Studies in the Mauna Kea Summit Area	110
Table 5. Documented Archaeological Sites in the Summit Region.....	113
Table 6. Previous archaeological studies conducted in the vicinity of the proposed project area	118
Table 7. Historic Properties documented during the AIS fieldwork	122
Table 8. Artifacts Found During Test Excavation at SIHP #50-10-22-29224	126
Table 9. Summary of Community Consultation Efforts.....	128

DRAFT

Prefatory Remarks on Language and Style

A Note about Hawaiian and other non-English Words:

Cultural Surveys Hawai'i (CSH) recognizes that the Hawaiian language is an official language of the State of Hawai'i, it is important to daily life, and using it is essential to conveying a sense of place and identity. In consideration of a broad range of readers, CSH follows the conventional use of italics to identify and highlight all non-English (i.e., Hawaiian and foreign language) words in this report unless citing from a previous document that does not italicize them. CSH parenthetically translates or defines in the text the non-English words at first mention, and the commonly-used non-English words and their translations are also listed in the *Glossary* (Appendix A) for reference. However, translations of Hawaiian and other non-English words for plants and animals mentioned by community participants are referenced separately (see explanation below).

A Note about Plant and Animal Names:

When community participants mention specific plants and animals by Hawaiian, other non-English, or common names, CSH provides their possible scientific names (Genus and species) in the *Common and Scientific Names of Plants and Animals Mentioned by Community Participants* (Appendix B). CSH derives these possible names from authoritative sources, but since the community participants only name the organisms and do not taxonomically identify them, CSH cannot positively ascertain their scientific identifications. CSH does not attempt in this report to verify the possible scientific names of plants and animals in previously published documents; however, citations of previously published works that include both common and scientific names of plants and animals appear as in the original texts.

Acronyms

APE	Area of Potential Effect
CCC	Civilian Conservation Corps
CIA	Cultural Impact Assessment
CSH	Cultural Surveys Hawai'i, Inc.
DLNR	Department of Land and Natural Resources
DLNR/DOFAW	Department of Land and Natural Resources, Division of Forestry and Wildlife
DOH/OEQC	Department of Health/Office of Environmental Quality Control
DOT	Department of Transportation
HAR	Hawai'i Administrative Rules
HIBC	Hawai'i Island Burial Council
HRS	Hawai'i Revised Statutes
LCA	Land Commission Award
Mauna Kea SRA	Mauna Kea State Recreation Area
NAR	National Area Reserve
OHA	Office of Hawaiian Affairs
OEQC	State Office of Environmental Quality Control
OMKM	Office of Mauna Kea Management
PHRI	Paul H. Rosendahl, Ph. D., Inc.
PTA	Pōhakuloa Training Area
SHPD	State Historic Preservation Division
TCPs	Traditional Cultural Properties
TMK	Tax Map Key
TNC	The Nature Conservancy of Hawai'i
USGS	United States Geological Survey
WGAC	Waimea Grazing and Agricultural Company

Management Summary

Reference	A Cultural Impact Assessment for the Proposed Saddle Road Maintenance Base Yard in the Vicinity of Mauna Kea State Park, Ka'ohē Ahupua'a, District of Hāmākua, Hawai'i Island, TMK: [3] 4-4-016:003 (Mitchell et al. 2012)
Date	March 2012
Project Number (s)	Cultural Surveys Hawai'i (CSH) Job Code: KAOHE 3
Project Location	The proposed project site is north of Saddle Road (Route 200) in the vicinity of the Mauna Kea State Recreation Area, near mile marker 34. The project area is situated approximately 6,500 feet above sea level (amsl).
Land Jurisdiction	Government: State of Hawai'i, Department of Land and Natural Resources (DLNR)
Agencies	State of Hawai'i Department of Land and Natural Resources / State Historic Preservation Division (DLNR / SHPD) / Department of Transportation (DOT)
Project Description	Construction of a new maintenance facility for crews maintaining the newly improved Saddle Road
Project Acreage	Approximately 4 acres
Area of Potential Effect (APE) and Survey Acreage	The Area of Potential Effect (APE) is defined as the entire 4-acre Project Area. While this investigation focused on the Project APE, for the purposes of this CIA, the study area includes the entire Ka'ohē Ahupua'a
Document Purpose	The Project requires compliance with the State of Hawai'i environmental review process (Hawai'i Revised Statutes [HRS] Chapter 343), which requires consideration of a proposed Project's effect on cultural practices and resources. At the request of R. M. Towill Corporation, CSH is conducting this Draft CIA. Through document research and ongoing cultural consultation efforts, this report provides information pertinent to the assessment of the proposed Project's impacts to cultural practices and resources (per the <i>Office of Environmental Quality Control's Guidelines for Assessing Cultural Impacts</i>) which may include Traditional Cultural Properties (TCP) of ongoing cultural significance that may be eligible for inclusion on the State Register of Historic Places, in accordance with Hawai'i State Historic Preservation Statute (Chapter 6E) guidelines for significance criteria (HAR §13-284) under Criterion E. The document is intended to support the Project's environmental review and may also serve to support the Project's historic preservation review under HRS Chapter 6E-42 and Hawai'i Administrative Rules (HAR) Chapter 13-284.

<p>Community Consultation</p>	<p>Hawaiian organizations, agencies and community members were contacted in order to identify individuals with cultural expertise and/or knowledge of the Project area and the vicinity. The consulted organizations included the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), the Hawai‘i Island Burial Council (HIBC), the Nature Conservancy of Hawai‘i (TNC), Department of Land and Natural Resources (DLNR) Division of State Parks, and community and cultural organization in the Kailua-Kona and Hāmākua areas. Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the proposed project area and the vicinity.</p>
<p>Results of Background Research</p>	<p>Background research yielded the following results:</p> <ol style="list-style-type: none"> 1. The proposed project area is located adjacent to Mauna Kea State Recreation Area (SRA) in the Saddle Region of the island of Hawai‘i at the southern base of Mauna Kea. Elevation at the study area for this project is located at approximately 6,500 feet above sea level (amsl). The climate at the proposed project area is relatively cool and dry by Hawaiian standards; mean annual temperatures range from approximately 50–60°F and minimum temperatures in the winter months regularly plunge into the 30s. It receives between 20 and 30 inches of rain annually and experienced average annual soil temperatures between 50 and 53 degrees Fahrenheit (Sato et al. 1973:37). The surrounding area lacks permanent stream drainages but small amounts of fresh water may be available in the form of springs from surrounding gulches, pools in lava tubes and other subterranean features. 2. Situated at the base of Mauna Kea, the proposed project area is part of a vast area known in Hawaiian traditions as <i>‘Āina Mauna</i> (inland). This area is associated with many important historical figures in Hawai‘i including the high chief ‘Umi and Kamehameha I. Into the nineteenth century, the Saddle Region remained mostly Crown lands. Cattle, sheep and goats, originally introduced by Vancouver, were let loose to roam the Interior Plateau. Hunting of these feral ungulates was common (Bergin 2004:22-23). 3. The natural vegetation of the proposed project area consists of <i>māmane</i> (<i>Sophora chrysophylla</i>), mountain <i>pili</i> (<i>Heteropogon contortus</i>), <i>‘āweoweo</i> (<i>Chenopodium oahuense</i>, same as <i>‘āheahea</i>), <i>naio</i> (<i>Myoporum sandwicense</i>), golden crown beard, and lambsquarters. The entire project area is comprised of Ke‘eke‘e loamy sand (KTB), excessively drained sands formed

	<p>in alluvium derived from volcanic ash and cinders, 0 to 6% slopes (Sato et al. 1973). There are also small areas that have loose stones on the surface these areas tend to be at the mouths of drainages where coarse material accumulates. Permeability is rapid, runoff is slow, and the hazard of soil blowing is moderate to severe. Roots can penetrate up to a depth of three feet or more (Sato et al. 1973).</p> <ol style="list-style-type: none"> 4. Located in the <i>moku</i> (district) of Hāmākua, Ka'ohē Ahupua'a is a vast regional land division <i>mauka</i> (upland) to <i>makai</i> (ocean) that includes the summit of Mauna Kea and land westward to the summit of Mauna Loa and smaller <i>ahupua'a</i> (traditional land division) such as Waipunalei, Laupāhoehoe, Kapehu, Welokā, and Maulua nui, which adjoin them on the lower mountain slopes, including a wide range of named environmental zones (<i>wao</i>). Ka'ohē Ahupua'a is bounded by similar vast <i>ahupua'a</i> and districts such as Humu'ula, North Kohala, South Kohala, Keauhou, and Ka'ū. Each of these <i>wao</i> are noted resources extending from the sea to the forest lands, and in some instances, to the summits of the mountains. It was these resources that sustained Hawaiian life, culture and spirituality (Maly, 2005). In Hawai'i the very landscape is legendary (<i>wahi pana</i>). 5. The <i>ahupua'a</i> of Ka'ohē was government land on which four native claims were made following the Māhele in 1848. Only one <i>kuleana</i> (title) claim was awarded in the entire <i>ahupua'a</i>. The single awarded claim indicates coffee, arrowroot, banana, and taro were all cultivated in the lands of Ka'ohē. Ka'ohē was also known as a habitat for <i>uwa'u</i>, or 'ua'u (dark-rumped petrel) seabirds that reside in rocky, dry, elevated areas (Foster 1893). 6. Ka'ohē Ahupua'a is rich in <i>mo'olelo</i> (legends), <i>mele</i> (songs), <i>oli</i> (chants), and 'ōlelo no'eau (proverbs, poetical sayings) associated with <i>akua</i> (God, male and female deities, spirits) and legendary places (<i>wahi pana</i>). Poli'ahu, the snow goddess, and Pele, the volcano goddess, engaged in legendary battles to control Mauna Kea. Pele also had legendary battles with the pig demi-god Kamapua'a on the summit of Mauna Kea. Numerous stories of Wākea and Papa, Poli'ahu, Pōhakulua, Līlīnoe, Waiau, Kūkahau'ula and Mo'oinanea, to name a few, are written into the landscape. 7. Mauna Kea is a sacred cultural landscape; symbolic of Wākea (the 'Sky Father' to all Hawaiians), home of Poli'ahu, the goddess of snow and foe of Pele (the fire goddess), and of
--	--

	<p>many other resident deities and supernatural entities (e.g., Līlīnoe, Kūkahau‘ula and Mo‘oinanea) and the <i>piko</i> (umbilical cord) of the island-child, Hawai‘i which connects the land to the heavens (Maly and Maly 2005:v); home of Waiau, the highest permanent lake in the Hawaiian Islands; location of the highest and most extensive basalt quarry in all of Polynesia and perhaps the entire world; and numerous trails, <i>ahu</i> (stone markers), <i>heiau</i> (temple, place of worship) and cinder cone <i>pu‘u</i> (hill).</p> <p>8. While historic accounts and <i>mo‘olelo</i> tell of the presence of burials on Mauna Kea (Maly and Maly 2005), archaeological evidence until recently, was relatively limited concerning confirmed human burials in the summit region. Prior to 2005, archaeological authorities on Mauna Kea, including Pat McCoy, had documented only one confirmed burial site (with multiple burials) and four possible burial sites in the summit region (McCoy 1991). All of these sites are located on Pu‘u Mākanaka. In progress work by McCoy and Nees however, has documented 28 sites designated as burials and possible burials (McCoy et al. 2008).</p> <p>9. The Mauna Kea Adze Quarry, also known as Ke-ana-kāko‘i, “the adze-making cave” (Pukui et al. 1974:103), is located on the southern slopes of the mountain, at elevations up to 12,400 feet. The site was listed on the National Register of Historic Places in 1969, and the Hawai‘i State Register of Historic Places in 1981.</p> <p>10. Past studies identify Traditional Cultural Properties (TCPs) on Mauna Kea. Figure 16 shows the three places that have been identified by the SHPD as TCPs and documented in a study done by PHRI (1999) are: (1) Kūkahau‘ula, the summit (Site 21438), (2) Līlīnoe (Site 21439) and (3) Lake Waiau (Site 21440). Other traditional places may also qualify. Maly (1998:29) has suggested the entire Mauna Kea summit region down to the 6,000 foot elevation contour be designated a TCP.</p>
<p>Summary of Consultation Efforts</p>	<p>Twenty-two Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the proposed project area and the vicinity. The agencies consulted include the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), The Nature Conservancy of Hawai‘i (TNC), Big Island National Wildlife Refuge Complex, PTA Cultural Advisory Committee, Office of Mauna Kea Management (OMKM), Department of Land Natural Resources Division of State Parks and</p>

	<p>the Hawai‘i Island Burial Council (HIBC) in addition to community groups such as Hui Mālama I Nā Kūpuna ‘O Hawai‘i Nei, Mauna Kea Anaina Hou, Waimea Civic Club, Kona Civic Club, Hawai‘i Forestry Industry Association and Kahu Kū Mauna. This effort was made by letter, e-mail, telephone, and in person contact. In the majority of cases, letters were mailed along with a map and an aerial photograph of the proposed project area.</p>
<p>Results of Community Consultation</p>	<p>CSH attempted to contact twenty-two community members (government agencies or community organization representatives or individuals such as cultural and lineal descendants including cultural practitioners) for the purpose of this CIA. Eight community members responded and two <i>kūpuna</i> (elders) and/or <i>kama‘āina</i> (native born) were interviewed for more in-depth contributions. Community consultation yielded the following results:</p> <ol style="list-style-type: none"> 1. Participants expressed their concern with the destruction to the <i>‘āina</i> (land) and the native plants that grow nowhere else in the world. 2. Participants discussed the association of Mauna Kea to its cultural and spiritual links in <i>mo‘olelo</i> (myths, legends, oral histories), <i>wahi pana</i> (legendary or storied places), <i>mele</i> (chants and songs) and poetical sayings as well as proverbs (<i>ōlelo no‘eau</i>). 3. <i>Kupuna</i>, ‘<i>anakala</i> (uncle) Reynolds recommends within the construction, assemble a place for Hawaiian cultural practitioners to practice and perpetuate their culture. For example, an outside <i>hale</i> (house) similar to a small pavilion, an open area where cultural practitioners are able to gather, practice and share. ‘<i>Anakala</i> Reynolds states, “Knowing what this area is so that we can perpetuate the culture, this is the culture. This is the key, when they construct, they develop it up and they’re perpetuating the culture by giving us a place by providing us a site so we can do our culture so that we can teach the culture.” 4. All of the community members interviewed for this study stress that Mauna Kea is a sacred landscape and that any future development activities on/vicinity of the mountain proceed with greater awareness of, and the utmost respect for Hawaiian culture, Hawaiians’ spiritual connection to the mountain, and the sanctity of Mauna Kea.
<p>CIA Recommendations</p>	<p>The findings of this CIA indicate that there is a wealth of Native Hawaiian cultural resources, beliefs and on-going practices associated with Ka‘ohe Ahupua‘a and the proposed project area. The results of</p>

	<p>this CIA present a number of possible mitigation measures for the landowner/developer's consideration. The following recommendations are offered as a way to begin to address some of the concerns expressed:</p> <ol style="list-style-type: none">1. Construction consideration to the natural resources within the proposed project area.2. If at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that SHPD be contacted immediately.3. CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The construction of the DOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of the historic properties identified within the project area. The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.
--	---

DRAFT

Section 1 Introduction

1.1 Project Background

At the request of R.M. Towill Corporation, Cultural Surveys Hawai'i Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed Department of Transportation Base yard, behind Mauna Kea State Recreation Area (commonly known as Mauna Kea State Park) in the *ahupua'a* (traditional land division) of Ka'ohē, Hāmākua District, on the Island of Hawai'i, TMK: [3] 4-4-016:003. The approximately 4-acre project area is depicted on a portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukole (1993) Quads, (Figure 1), tax map key [3] 4-4-016:003 (Figure 2 and Figure 3) and aerial photograph (Figure 4).

The project site is north of Saddle Road and the former Department of Land and Natural Resources (DLNR) *Nēnē* (Hawaiian goose, *Nesochen sandvicensis*) Rearing Facility located in back of the Mauna Kea State Recreation Area, mile marker 34. The site is enclosed by fencing and is approximately 4-acres. The site is gated and will require advance notification to Department of Transportation (DOT) and DLNR to gain access.

The site will be used as a road maintenance facility and will include 1 – 2 buildings that will house trucks, road equipment, workshop, restroom and lockers, and a small office (Figure 5). Total building area approximately 5,000 plus square feet. In addition, fronting this building, there will be an open area for material storage and equipment parking pad. The roadway to the site is in poor condition and will be paved. The site will be shared with DLNR who operates approximately an acre plant nursery. The site contains many structures left over from the *nēnē* facility which will be demolished. DLNR will receive a new building approximately 700 – 800 square feet, site to be determined.

The purpose of this project is to provide a new maintenance facility for crews maintaining the newly acquired Saddle Road.

1.2 Document Purpose

The Project requires compliance with the State of Hawai'i environmental review process (Hawai'i Revised Statutes [HRS] Chapter 343), which requires consideration of a proposed Project's effect on cultural practices. CSH is conducting this CIA at the request of R. M. Towill Corporation. Through document research and ongoing cultural consultation efforts this draft report provides information pertinent to the assessment of the proposed Project's impacts to cultural practices and resources (per the *Office of Environmental Quality Control's Guidelines for Assessing Cultural Impacts*), which may include Traditional Cultural Properties (TCPs) of ongoing cultural significance that may be eligible for inclusion on the State Register of Historic Places, in accordance with Hawai'i State Historic Preservation Statute (Chapter 6E) guidelines for significance criteria (HAR §13–284–6) under Criterion E which states to be significant an historic property shall:

Have an important value to the Native Hawaiian people or to another ethnic group of the state due to associations with 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.

The document is intended to support the Project's environmental review and may also serve to support the Project's historic preservation review under HRS Chapter 6E-42 and Hawai'i Administrative Rules Chapter 13-284.

1.3 Scope of Work

1. Examination of cultural and historical resources, including Land Commission documents, historic maps, and previous research reports, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. Review of previous archaeological work at and near the subject parcel that may be relevant to reconstructions of traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.
3. Consultation and interviews with knowledgeable parties regarding cultural and natural resources and practices at or near the parcel; present and past uses of the parcel; and/or other practices, uses, or traditions associated with the parcel and environs.
4. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings.

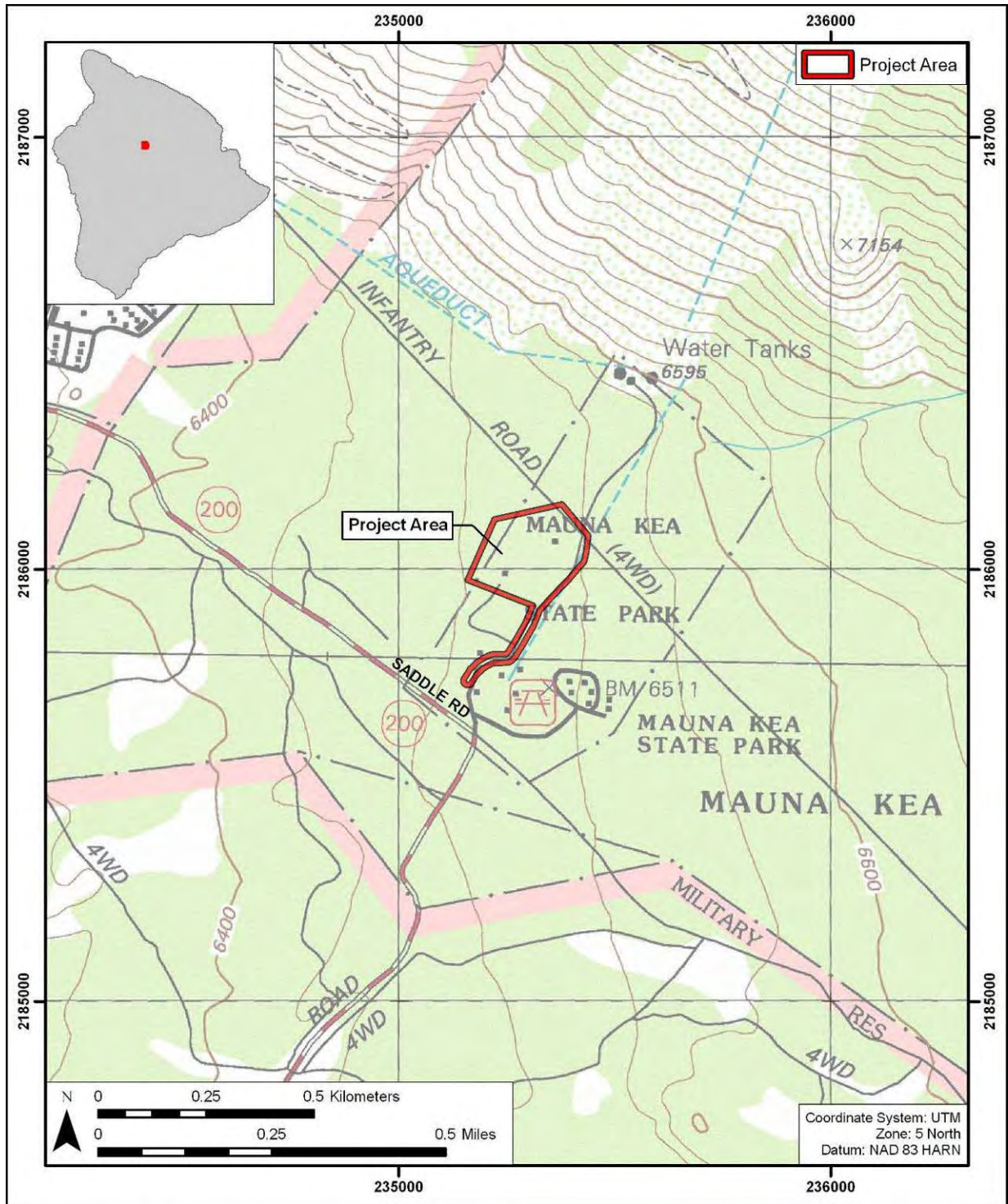


Figure 1. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'ukole (1993) Quads, showing the location of the proposed project area

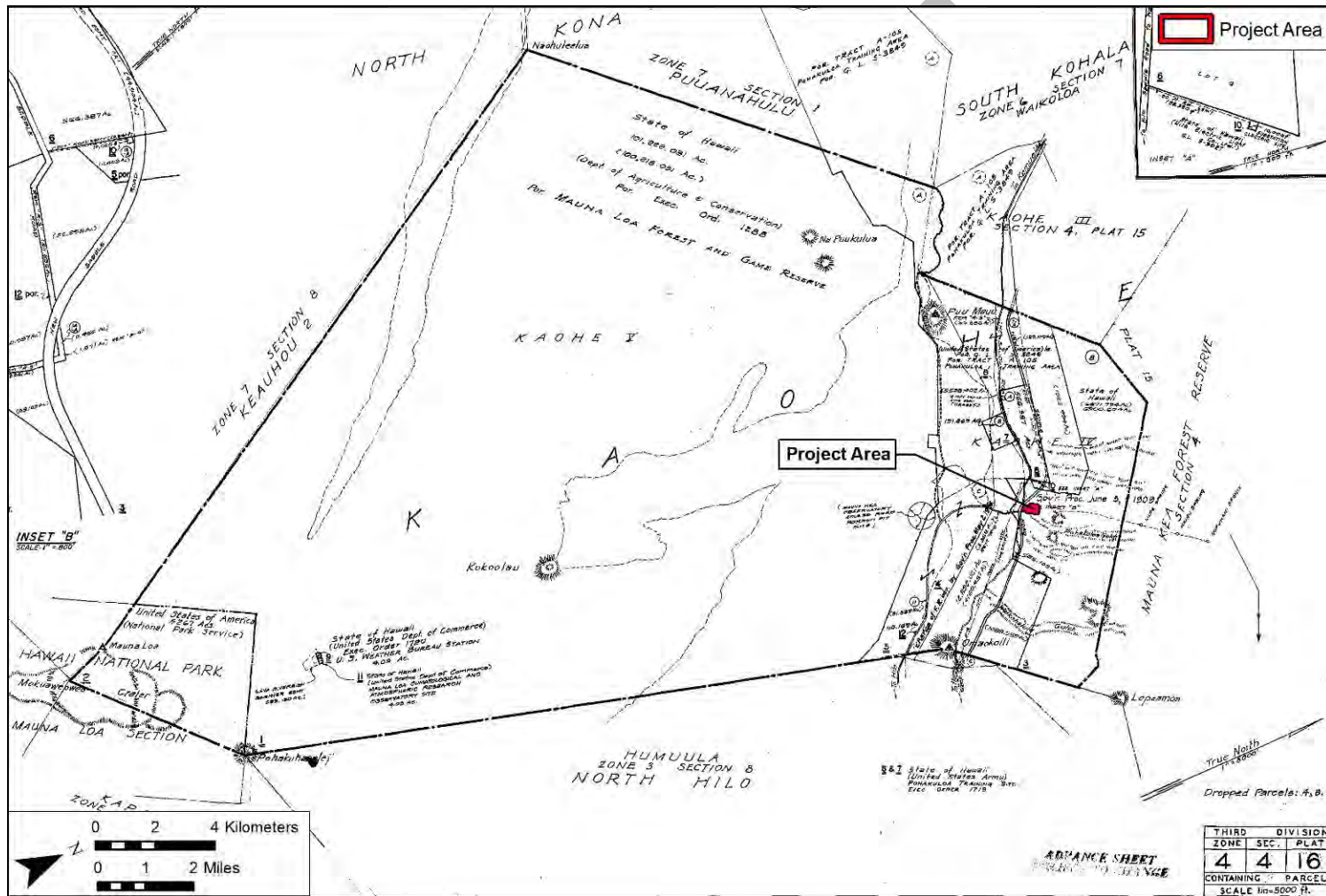


Figure 2. Portion of Tax Map Key (TMK) 4-4-016:003, showing the location of the Project area

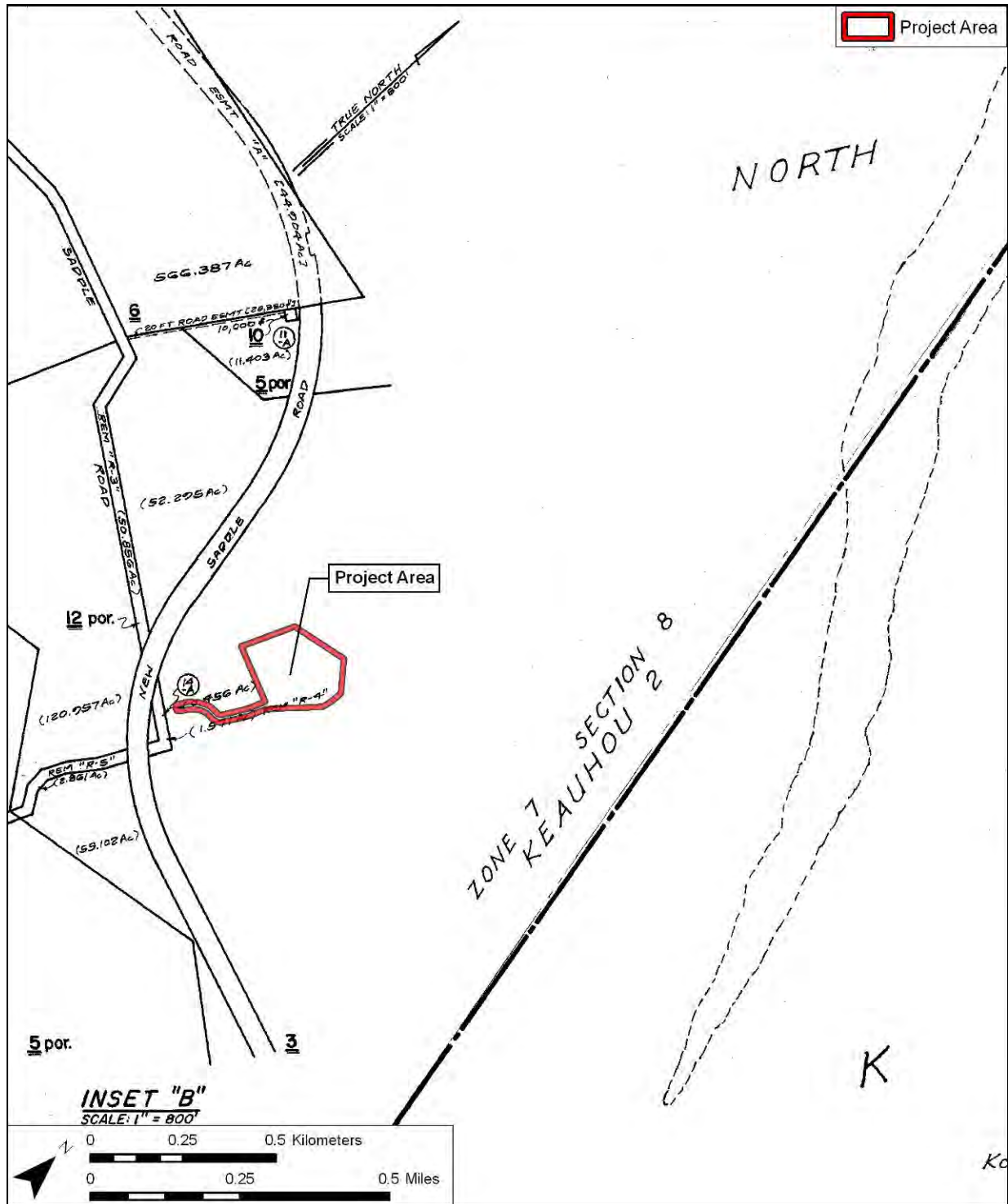


Figure 3. Tax Map Key [3] 4-4-016:003, inset "B"

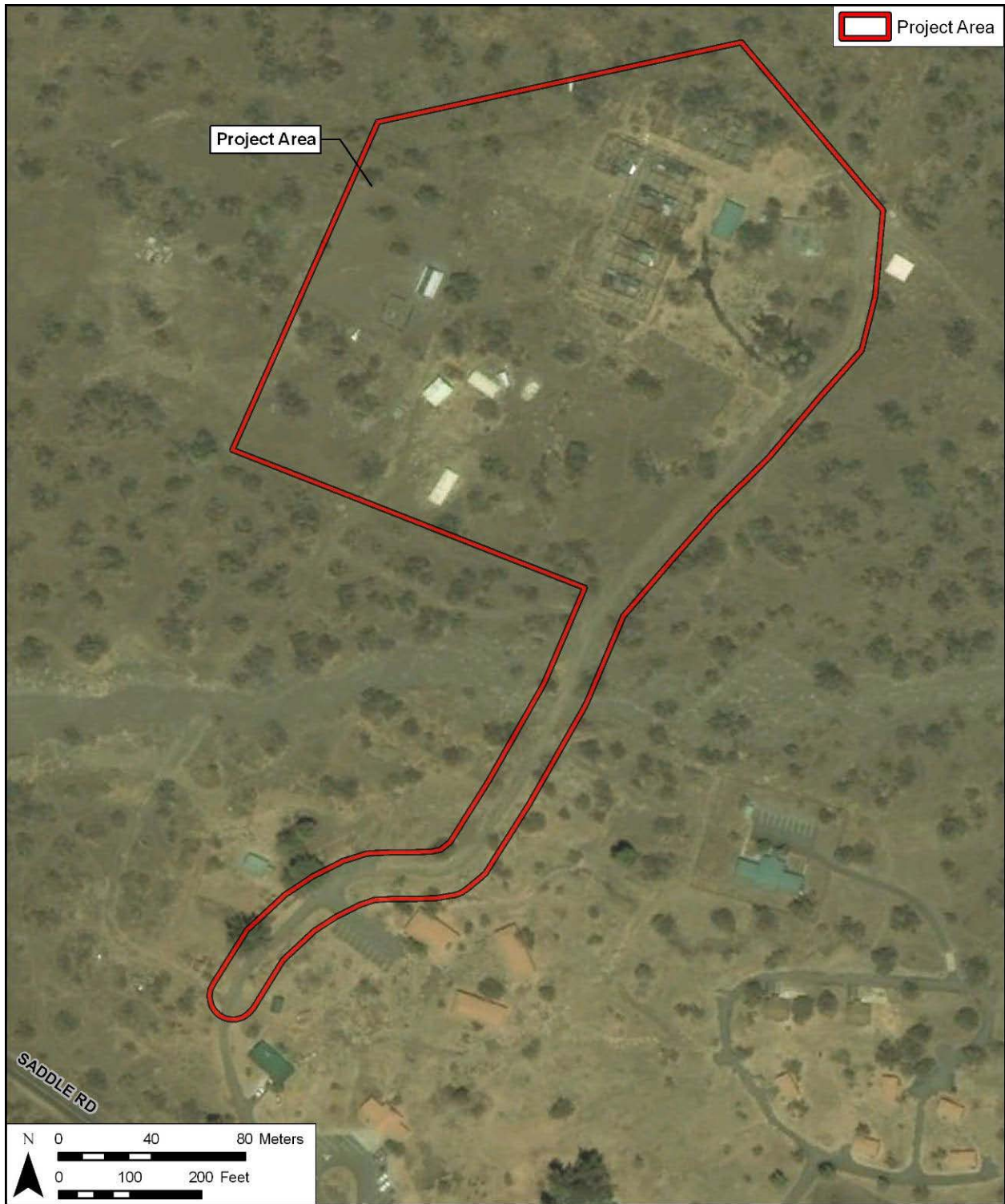
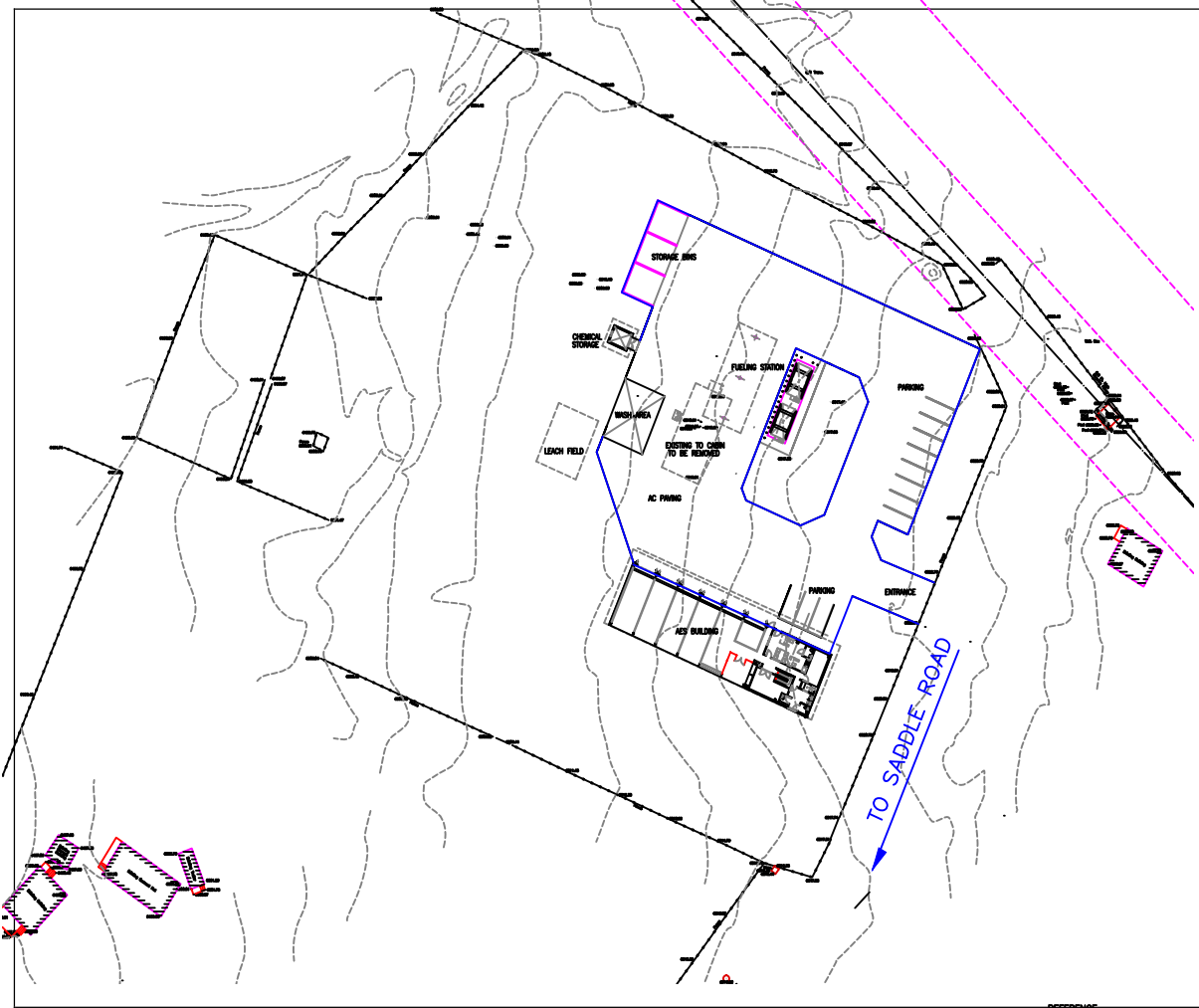


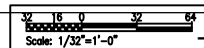
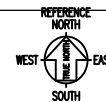
Figure 4. Aerial photograph showing the location of the proposed project area (Source: Google Earth 2011)

72C-01-07M 2012 0 0



PARTIAL SITE PLAN

Figure 5. Site plan provided by client, R. M. Towill Corporation



A-2



STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
SITE PLAN
SADDLE ROAD BASEYARD
REDEVELOPMENT
Saddle Road Baseyard
 Project No. _____
 Scale: As Noted Date: 08/08/2012

Cultural Impact Assessment for the Proposed Saddle Road Maintenance Base Yard, Ka'ohāhupua'a, District of Hamakua, Hawaii Island

TMK: [3] 4 -4-016:003

1.4 Environmental Setting

1.4.1 Natural Environment

The proposed project area is located adjacent to Mauna Kea State Recreation Area (SRA) in the Saddle Region of the island of Hawai'i at the southern base of Mauna Kea, Ka'ohē Ahupua'a, Hāmākua District, Hawai'i Island, TMK (3) 4-4-016:003 (see Figures 1 through Figure 4). Elevation at the study area for this proposed project is located at approximately 6,500 feet above sea level (amsl). The climate at the project area is relatively cool and dry by Hawaiian standards; mean annual temperatures range from approximately 50–60°F and minimum temperatures in the winter months regularly plunge into the 30s. It receives between 20 and 30 inches of rain annually and experienced average annual soil temperatures between 50 and 53 degrees Fahrenheit (Sato et al. 1973:37). The surrounding area lacks permanent stream drainages but small amounts of fresh water may be available in the form of pools in lava tubes and other subterranean features.

The lands of Ka'ohē is the largest *ahupua'a* in the Hāmākua District, an immense stretch of land neighboring what is now the Kalōpā State Forest Reserve, crossing the inland Saddle Plateau and reaching all the way to Ka'ū in the south. The lands of Ka'ohē in the district of Kona comprise former and existing forest lands in the southern Nāpō'opo'o Basin, reaching *mauka* (upland) from the shore to the South Kona Forest Reserve. This area is distinguished by a temperate microclimate, diverse botany, and a dynamic vantage of the rugged Kona coast. With an average rainfall of 40 to 60 inches per year and variable soil depth, the land provides favorable growing conditions for coffee, mango, banana, papaya, and tropical exotic plants. Hundreds of species of wild birds and pheasants, some of which exists only on Hawai'i Island, inhabit the forest slopes, blanketed with the dense canopies of 'ōhi'a lehua (*Metrosideros macropus*) and koa (*Acacia koa*) (Foster, 2010).

1.4.2 Soil and Vegetation

The proposed project area falls within late Pleistocene to Holocene alluvial deposits (Wolfe and Morris 1996) found at the base of Mauna Kea as a broad alluvial apron at a 0 – 6% slope. This apron was built from alluvium derived from Pōhakuloa Gulch, a prominent erosional landform located approximately ¾ miles east of the proposed project area. This gulch was created primarily by melt-water from the Pōhakuloa lobe of the glacier that occupied the summit area of Mauna Kea most recently about 9,000 years ago (McDonald et al. 1983:257 – 258) and therefore these alluvial aprons are largely relict landforms. Other prominent features associated with Pōhakuloa Gulch are Kahoupokani (Ka Houpo Kāne), Liloē and Wāihu Springs including several post-glacial scoria cones upslope and east of the proposed project area (Quinn 2007). The present day intermittent stream channel emanating from Pōhakuloa Gulch is approximately 600 feet upslope of the Mauna Kea State Park.

The landscape upslope from the proposed project area is dominated by the Pleistocene Hāmākua Volcanics, basaltic rocks with associated glacial deposits and areas down slope from the proposed project area are dominated by more recent Holocene flows without the veneer of sediment from the alluvial apron (Quinn 2007). While the flows beneath the deep alluvial

deposits were derived from Mauna Kea, the flows within nearby PTA are mostly from Mauna Loa and date between 200 – 400 years B.P. (radiocarbon years “before present”) to 10,000 years B.P. Three historic flows crossed through what is now PTA in 1843, 1899 and 1935 (Quinn 2007).

This area is underlain by Ke‘eke‘e soil series (Figure 6). According to Sato et al. (1973:37), the Ke‘eke‘e series consist of somewhat excessively drained loamy sands that formed in alluvium from volcanic ash and cinders. These soils are nearly level to gently sloping. They are located on uplands in the saddle between Mauna Kea and Mauna Loa. The natural vegetation of the proposed project area consists of *māmane* (*Sophora chrysophylla*), mountain *pili* (*Heteropogon contortus*), ‘āweoweo (*Chenopodium oahuense*, same as ‘āheahea), *naio* (*Myoporum sandwicense*), golden crown beard, and lambsquarters. The entire project area is comprised of Ke‘eke‘e loamy sand (KTB), 0 to 6% slope (Sato et al. 1973). There are also small areas that have loose stones on the surface these areas tend to be at the mouths of drainages where coarse material accumulates. Permeability is rapid, runoff is slow, and the hazard of soil blowing is moderate to severe. Roots can penetrate up to a depth of three feet or more (Sato et al. 1973). Currently these soils are used for wildlife habitat. It was formally used as sheep grazing (Sato et al. 1973).

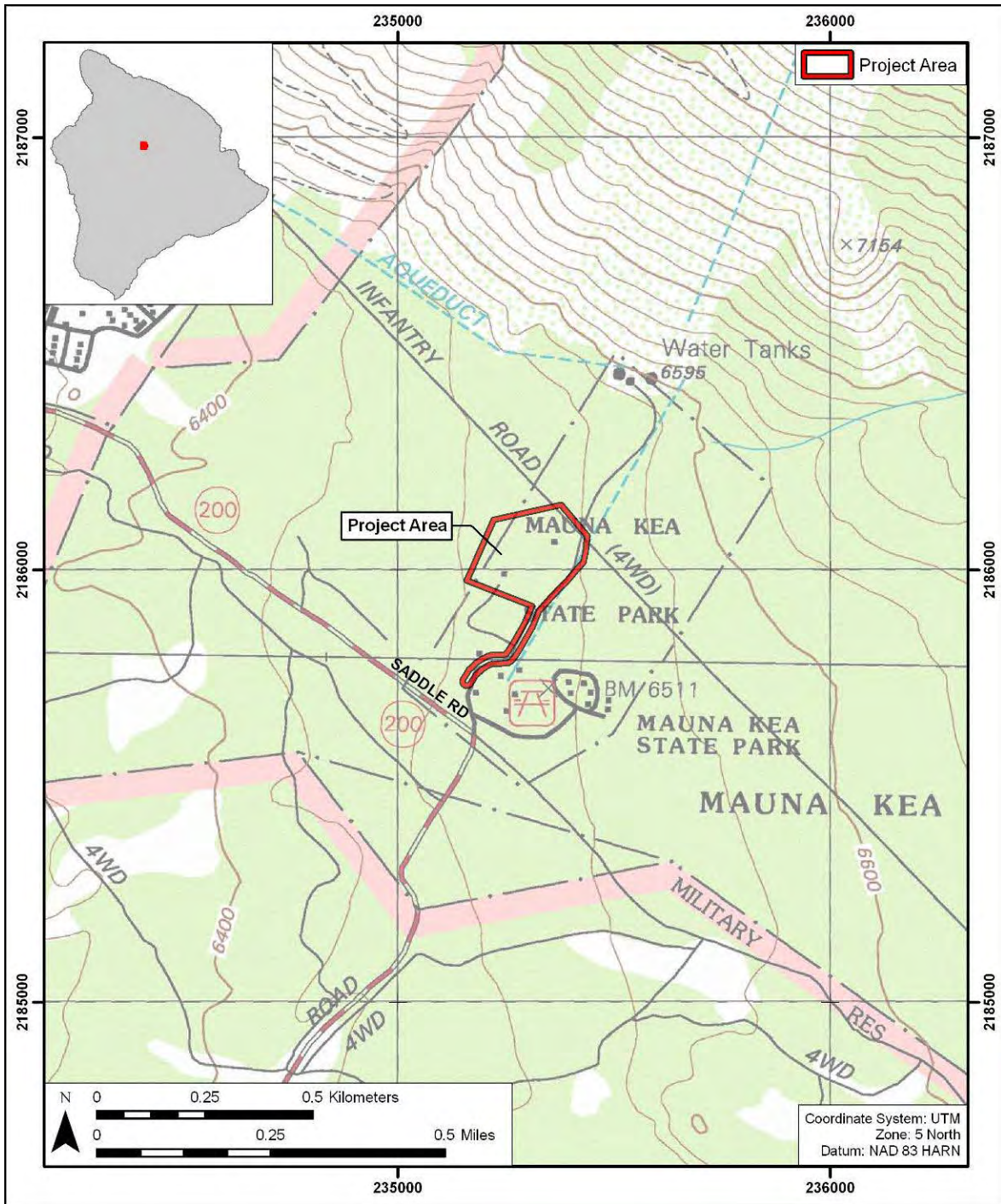


Figure 6. Portion of the U.S. Geological Survey (USGS) 7.5' topographic map, Ahumoa (1982) and Pu'u Koli (1993) Quads, overlain with USDA soil survey data (Sato et al. 1973), showing project area soils

1.4.3 Cultural Context

Situated at the base of Mauna Kea, the proposed project area is part of a vast area known in Hawaiian traditions as *‘Āina Mauna* (inland). This area is associated with many important historical figures in Hawai'i including the high chief 'Umi and Kamehameha I. Into the nineteenth century, the Saddle Region remained mostly Crown lands. Cattle, sheep and goats, originally introduced by Vancouver, were let loose to roam the Interior Plateau. Hunting of these feral ungulates was common (Bergin 2004:22-23).

From an archaeological perspective, the Saddle Region is particularly interesting as a place that was, until relatively recently, thought to contain few significant cultural resources. This view of the Saddle Region as a barren place that Hawaiians did not use or visit extensively in pre-Contact and early historic times—or mainly just traveled through on their way to other places—has been revised over the past 10 or 15 years. According to Bayman et al. (2004), more than 300 archaeological sites have now been documented at PTA including lava tube/blister shelters, trails, shrines, *ahu* (rock cairns or markers), petroglyphs, lithic quarries and thousands of pits excavated into *pāhoehoe* (smooth, unbroken type of lava). Thus, while it is true Hawaiians did not live permanently in the Saddle Region and that large-scale cultivation in this high and dry landscape has always been impractical, it is clear that this area was an important source of a variety of resources important to the maintenance of Hawaiian society including sandalwood (*'iliahi*, *Santalum* spp.), forest plants, birds (*ua'u* or dark rumped petrel), song birds for their feathers and lithic material, among others.

1.4.4 Built Environment

The project area has numerous modern and historic buildings, and is fenced in. The largest of these structures is the *nēnē* rearing facility, which is comprised of three separate aviaries (SIHP #50-10-22-29223). There is also a cabin (SIHP #50-10-22-29222), two Quonset huts, a small cabin on wheels, a large modern cabin, a fenced in nursery with a green house, several small storage sheds, and a cattle feeding trough (SIHP #50-10-22-29226). Furthermore, there are several fence lines and gates that separate the *nēnē* rearing facility, greenhouse, and cabins. It appears that SIHP #50-10-22-29222 (the larger modern cabin), the nursery and green house are currently still in use. The remaining structures are dilapidated and appear abandoned, though they indicate modern-era usage. Existing dirt roadways provide access from the Park headquarters to and throughout the project area. The project area is strewn with abandoned military vehicles and materials.

Section 2 Methods

2.1 Archival Research

Historical documents, maps and existing archaeological information pertaining to Ka'ohē Ahupua'a, Hawai'i Island and the Project area vicinity were researched at the CSH library and other archives including the University of Hawai'i at Mānoa's Hamilton Library, the State Historic Preservation Division (SHPD) library, the Hawai'i State Archives, the State Land Survey Division, and the archives of the Bishop Museum. Previous archaeological reports for the area were reviewed, as were historic maps and photographs and primary and secondary historical sources. Information on Land Commission Awards (LCAs) was accessed through Waihona 'Āina Corporation's Māhele Data Base (www.waihona.com) as well as a selection of CSH library references.

The definitive source for Hawaiian place names is Pukui et al.'s (1974) *Place Names of Hawai'i*, but additional place-name translations and interpretations were also gleaned from Soehren's "Hawaiian Place Names" database on the internet (<http://www.ulukau.org>), historical maps, Land Commission documents available at the Hawai'i State Archives or on the internet at <http://www.waihona.com>, and from other place-name texts such as Thrum (1922).

For cultural studies, research for the Traditional Background section centered on Hawaiian activities including: religious and ceremonial knowledge and practices; traditional subsistence land use and settlement patterns; gathering practices and agricultural pursuits; as well as Hawaiian place names and *mo'olelo* (story, tale, myth), *mele* (song), *oli* (chant), *'ōlelo no'eau* (proverb) and more. For the Historic Background section research focused on land transformation, development and population changes beginning in the early post-European Contact era to the present day (see Scope of Work above).

2.2 Community Consultation

2.2.1 Sampling and Recruitment

A combination of qualitative methods, including purposive, snowball, and expert (or judgment) sampling, were used to identify and invite potential participants to the study. These methods are used for intensive case studies, such as CIAs, to recruit people that are hard to identify, or are members of elite groups (Bernard 2006:190). Our purpose is not to establish a representative or random sample. It is to "identify specific groups of people who either possess characteristics or live in circumstances relevant to the social phenomenon being studied....This approach to sampling allows the researcher deliberately to include a wide range of types of informants and also to select key informants with access to important sources of knowledge" (Mays and Pope 1995:110).

We began with purposive sampling informed by referrals from known specialists and relevant agencies. For example, we contacted the SHPD, Office of Hawaiian Affairs, Hawai'i Island Burial Council (HIBC), and community and cultural organizations in Kailua-Kona and Hāmākua for their brief response/review of the Project and to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the Project area and vicinity, cultural and

lineal descendants, and other appropriate community representatives and members. Based on their in-depth knowledge and experiences, these key respondents then referred CSH to additional potential participants who were added to the pool of invited participants. This is snowball sampling, a chain referral method that entails asking a few key individuals (including agency and organization representatives) to provide their comments and referrals to other locally recognized experts or stakeholders who would be likely candidates for the study (Bernard 2006:192). CSH also employs expert or judgment sampling which involves assembling a group of people with recognized experience and expertise in a specific area (Bernard 2006:189–191). CSH maintains a database that draws on over two decades of established relationships with community consultants: cultural practitioners and specialists, community representatives and cultural and lineal descendants. The names of new potential contacts were also provided by colleagues at CSH and from the researchers' familiarity with people who live in or around the study area. Researchers often attend public forums (e.g., Neighborhood Board, Burial Council and Civic Club meetings) in (or near) the study area to scope for participants. Please refer to Table 9, Section 6, for a complete list of individuals and organizations contacted for this CIA.

CSH focuses on obtaining in-depth information with a high level of validity from a targeted group of relevant stakeholders and local experts. Our qualitative methods do not aim to survey an entire population or subgroup. A depth of understanding about complex issues cannot be gained through comprehensive surveying. Our qualitative methodologies do not include quantitative (statistical) analyses, yet they are recognized as rigorous and thorough. Bernard (2006:25) describes the qualitative methods as “a kind of measurement, an integral part of the complex whole that comprises scientific research.” Depending on the size and complexity of the Project, CSH reports include in-depth contributions from about one-third of all participating respondents. Typically this means three to twelve interviews.

2.2.1 Informed Consent Protocol

An informed consent process was conducted as follows: (1) before beginning the interview the CSH researcher explained to the participant how the consent process works, the Project purpose, the intent of the study and how his/her information will be used; (2) the researcher gave him/her a copy of the Authorization and Release Form to read and sign (Appendix C); (3) if the person agreed to participate by way of signing the consent form *or* by providing oral consent, the researcher started the interview; (4) the interviewee received a copy of the Authorization and Release Form for his/her records, while the original is stored at CSH; (5) after the interview was summarized at CSH (and possibly transcribed in full), the study participant was afforded an opportunity to review the interview notes (or transcription) and summary and to make any corrections, deletions or additions to the substance of their testimony/oral history interview; this was accomplished primarily via phone, post or email follow-up and secondarily by in-person visits; (6) participants received the final approved interview, photographs and the audio-recording and/or transcripts their interview if it was recorded. They were also given information on how to view the draft report on the OEQC website and offered a hardcopy of the report once the report is a public document.

If an interviewee agreed to participate on the condition that his/her name be withheld, procedures were taken to protect his/her confidentiality (see Protection of Sensitive Information below).

2.2.2 Interview Techniques

To assist in discussion of natural and cultural resources and cultural practices specific to the study area, CSH initiated semi-structured interviews (as described by Bernard 2006) asking questions from the following broad categories: gathering practices and *mauka* (inland) and *makai* (ocean) resources, burials, trails, historic properties and *wahi pana* (legendary place/s). The interview protocol is tailored to the specific natural and cultural features of the landscape in the study area identified through archival research and community consultation. These interviews and oral histories supplement and provide depth to consultations from government agencies and community organizations that may provide brief responses, reviews and/or referrals gathered via phone, email and occasionally face-to-face commentary.

2.2.2.1 In-depth Interviews and Oral Histories

Interviews were conducted initially at a place of the study participant's choosing (usually at the participant's home or at a public meeting place) and/or—whenever feasible—during site visits to the Project area. Generally, CSH's preference is to interview a participant individually or in small groups (two–four); occasionally participants are interviewed in focus groups (six–eight). Following the consent protocol outlined above, interviews may be recorded on tape or a digital audio device and in handwritten notes, and the participant photographed. The interview typically lasts one to four hours, and records the “who, what, when and where” of the interview. In addition to questions outlined above, the interviewee is asked to provide biographical information (e.g., connection to the study area, genealogy, professional and volunteer affiliations, etc.).

2.2.2.2 Field Interviews

Field interviews are conducted with individuals or in focus groups comprised of *kūpuna* (elders) and *kama'āina* (native born) who have a similar experience or background (e.g., the members of an area club, elders, fishermen, *hula* dancers) who are physically able and interested in visiting the Project area. In some cases, field visits are preceded by an off-site interview to gather basic biographical, affiliation and other information about the participant. Initially, CSH researchers try to visit the Project area to become familiar with the land and recognized (or potential) cultural places and historic properties in preparation for field interviews. All field activities are performed in a manner so as to minimize impact to the natural and cultural environment in the Project area. Where appropriate, Hawaiian protocol may be used before going on to the study area and may include the offering of *ho'okupu* (offering), *pule* (prayer) and *oli* (chant). All participants on field visits are asked to respect the integrity of natural and cultural features of the landscape and not remove any cultural artifacts or other resources from the area.

Building on open-ended and semi-structured approaches, field interviews included the structured methods enumerated in the above section. In some cases, participants may create a community resource map by surveying the Project area with the researcher/s in order to identify significant cultural and natural features of the landscape. If the participant was comfortable sharing the location of resources; they were geo-referenced using GPS and included on the cultural resource map. If the participant preferred to keep the location private or to only identify its general location, the specific location was *not* recorded.

2.2.3 Protection of Sensitive Information

It is sometimes the case that participants in cultural studies agree to contribute their comments or be interviewed for a study on the condition that their names are withheld from the report. Their reasons for doing so vary from concern about protecting the identity of resource collectors and/or revealing the precise location of certain natural and cultural resources to opposition to the proposed Project. For the interviewee who agrees to participate on the condition that his/her name is withheld from public disclosure, CSH takes all precautions to make sure his/her contribution remains confidential. The confidentiality of subjects is maintained via protected files. For this reason, CIA reports sometimes include a subsection of Summaries of Kama'āina "Talk-Story" Interviews entitled, Additional Statements.

2.3 Compensation and Contributions to Community

Many individuals and communities have generously worked with CSH over the years to identify and document the rich natural and cultural resources of these islands for cultural impact, ethno-historical and, more recently, TCP studies. CSH makes every effort to provide some form of compensation to individuals and communities who contribute to cultural studies. This is done in a variety of ways: individual interview participants are compensated for their time in the form of a small honorarium and/or other *makana* (gift); community organization representatives (who may not be allowed to receive a gift) are asked if they would like a donation to a Hawaiian charter school or nonprofit of their choice to be made anonymously or in the name of the individual or organization participating in the study; contributors are provided their transcripts, interview summaries, photographs and—when possible—a copy of the CIA report; CSH is working to identify a public repository for all cultural studies that will allow easy access to current and past reports; CSH staff do volunteer work for community initiatives that serve to preserve and protect historic and cultural resources (for example in, Lāna'i and Kaho'olawe). Generally our goal is to provide educational opportunities to students through internships, share our knowledge of historic preservation and cultural resources and the State and Federal laws that guide the historic preservation process, and through involvement in an ongoing working group of public and private stakeholders collaborating to improve and strengthen the Chapter 343 environmental review process.

Section 3 Traditional Background

3.1 Overview

This section focuses on the traditional background of Ka'ohē Ahupua'a. For the purposes of this background section, the proposed project area is defined as the entire *ahupua'a* of Ka'ohē and the culturally significant landscape features and natural resources within its boundary.

This section includes important examples and excerpts from previous studies of the cultural significance of Ka'ohē Ahupua'a and Mauna Kea to Hawaiians including Kanahēle and Kanahēle (1997) and Maly (1998, 1999, 2005); numerous examples and observations are also included from an excellent website maintained by Nā Maka o ka 'Āina (2008).

3.2 Place Names

Translations presented without attribution in this subsection are from Pukui et al. (1974). Spelling and diacriticals also follow Pukui et al.'s (1974) usage.

Houpo o Kāne or **Ka Houpo o Kāne**, may literally be translated as “the chest (bosom) of Kāne.” The god Kāne is believed to be foremost of the Hawaiian gods who is credited with creation, procreation, light, waters of life, abundance and many other attributes. A land being likened to the chest of Kāne can imply that the land was endowed with the body form of Kāne. Houpo o Kāne is a spring situated at the 10,500 foot above sea level.

Humu'ula, in Pukui's et al.'s (1974), Humu'ula literally translated as “jasper stone.” Apparently named for a type of stone (Red jasper stone) that was used in making *ko'i* (adze) (Maly, 2004).

Ka'ohē, in Pukui's et al.'s (1974) “Place Names of Hawai'i” Ka'ohē is in the land sections of Hāmākua, Humu'ula and Waiki'i quadrangle and its literal translation is “the bamboo” or named for a type of *kalo* (taro) that may have been common in this region.

Dr. Pualani Kanahēle mentions:

I would also know by indication of the names that they gave to land, why they named the land a certain way. There's a large ahupua'a [land division] that goes all the way from Hāmākua coast and goes around Mauna Kea all the way up to Mauna Loa. That ahupua'a is Ka'ohē. Ka'ohē, to us, means bamboo and one of the earlier reasons for bamboo was to transport water. So what does that relationship, Ka'ohē, have to do with water? And so, the idea that part of the land may be producing a lot water...The tops of the mountains were important to the kupuna's [elder's] because that's where the water would go into the earth, seep into the earth...and then come out. So, now they're bombing up there and that's detrimental to our water source, higher source (Meyer 2004: 172 – 173).

Foster (2010) describes:

Kaohe (pronounced KAH OH HAY) is derived from the Hawaiian words ka ("the") and ohe ("bamboo"). It can also refer to any bamboo-shaped object, such

as a tube or pipe. The name Ka'ohe was one of the first place names in ancient Hawaii, the largest and most geographically diverse of the land divisions that flourished during the reign of Kamehameha. Originally, the name referred to a sweeping stretch of land extending from the north shore of Hawaii Island to Mauna Loa in the south. On early homestead maps, the name Kaohe was also attached to five land divisions on the western slopes of Mauna Loa, makai (toward the sea, i.e., downslope) from present-day South Kona Forest reserve.

Keanakāko'i (or Ke-ana-kāko'i), literally “the adze-making cave” (Pukui et al. 1974:103), is named for an ancient and most famous basalt quarry complex extending up to 12,400 feet in elevation on the southern slope of Mauna Kea. It is important to note that this place name is also fairly common in the Hawaiian Islands, and refers more generally to places at which excellent basalt for tool-making can be obtained. This particular Keanakāko'i on Mauna Kea, however, is the finest such source in the islands.

Mauna Kea, in Pukui's et al.'s (1974: 148 and 149) Mauna Kea is listed as two words “Mauna” and “Kea” and is literally translated as “white mountain (often the mountain is snowcapped).” A 2008 article in the Office of Hawaiian Affairs newspaper “Ka Wai Ola” presents a good argument for spelling Mauna Kea as one word—Maunakea. The article is presented in full below:

By Larry Kimura

Hawaiian names, both personal and place names, are usually made up of several root words combined together to represent the person or place. Hawaiian tradition is to write these root words together as a single word, for example, Kamehameha not Ka Mehameha, Kalākaua not Ka Lā Kaua, Waikīkī not Wai Kīkī, Keauhou not Ke Au Hou. The Hawaiian tradition is different from the English one, as in English the parts of a place name are sometimes written separately, e.g., Mount Vernon, New York, Red River Valley. It is also common in English to write “native” names as separate words: Sitting Bull, Crazy Horse, Red Cloud.

The Hawaiian tradition is based in the Hawaiian grammar of the oral language that marks separate words differently from names. In the case of the two mountains on Hawai'i Island that scientist from outside Hawai'i have come to dominate, Maunakea and Maunaloa, American English spelling traditions have been imposed on earlier Hawaiian spelling traditions. The earlier Hawaiian spelling traditions can be seen in places with the same name where American scientist have not had as much of an influence, e.g., Maunaloa on Moloka'i, Maunakea Street in Honolulu, and the Maunakea family name. Older Hawaiian writings also include examples of Maunakea and Maunaloa written as one word when referring to the mountains on Hawai'i.

Larry Kimura is an assistant professor at Ka Haka 'Ula O Ke'elikōlani College of Hawaiian Language, University of Hawai'i at Hilo. (Vol. 25, No. 11, November 2008:16).

However, according to Nā Maka o ka 'Āina (2008) and other authorities on Hawaiian culture (e.g., Kepā Maly, Pualani Kanahēle), Mauna Kea has numerous other meanings and translations. It is a short version of Mauna a Wākea, a name that refers to the sky father, Wākea; this would be one of its *kaona* (hidden or more subtle meanings). An excerpt from Maly's testimony to the Hawai'i Island Burial Council in 2000 (reproduced by Nā Maka o ka 'Āina 2008) effectively illustrates this point:

When I spoke with *kūpuna* about Mauna Kea, some of them believed that the name shouldn't be translated literally "white mountain."

Mauna Kea, not just simply the "white mountain" because it's periodically snow-covered. But that it is Mauna Akea, Ka Piko a Wākea. The summit, the *piko* that ties this earth to Wākea, the God father who is the sky.

They see it as the *piko kaulana o ka 'āina*, the famous peak, summit of the land. But that peak, or *piko*, is also what we would call navel or belly button. It's that which connects you back to the generations preceding you.

'*Aha ho'owili mo'o*, this line, this cord that connects the Hawaiian people from these lands, from these islands, which were the children of the gods or creative forces of nature, back to their cosmic origins.

Not just "white mountain." The mountain of Wākea, the progenitor of the Hawaiian race.

Mauna Loa, literally means "long mountain" (Pukui et al., 1974:149).

Pi'ihonua, literally means "land incline" (Pukui et al., 1974:184). It is a land area that rises to the uplands.

Pōhakuloa, literally means "long stone" (Pukui et al., 1974:186). The boundary point between Keauhou, Waiākea and 'Ōla'a which is also the land division in the saddle between Mauna Kea and Mauna Loa. Pōhakuloa was a deity of the forest lands which extended across Mauna Loa towards Mauna Kea and he was called upon by canoe makers; in his human form, he was an *'ōlohe* (skilled) expert and wood worker (Maly and Maly, 2004).

Pu'u Kūkahau'ula, is the summit cluster of volcanic cones and the traditional name of the summit of Mauna Kea. According to Nā Maka o ka 'Āina (2008), Kūkahau'ula translates as "[the peak of] Kū of the red-tinted snow," in reference to the light effects of the rising sun on this, the highest of peaks of Mauna Kea. Said to be named for a male deity form of the god Kū, also a lover of Poli'ahu, goddess of the mountain.

Pu'u Līlīnoe, also known simply as Līlīnoe, is one of the major peaks (approximately 12,956 feet above sea level) situated to the southeast of the summit peak, Pu'u o Kūkahau'ula; Līlīnoe translates as "mists," and is associated with a goddess of mists by the same name, sister of Poli'ahu (Pukui et al. 1974). Traditional accounts also identify Līlīnoe as having been a chiefess who secluded herself on Mauna Kea and, upon her death, was buried in a cave near the summit.

Pu'u Poli'ahu is named for Poli'ahu, "the woman who wears the snow mantle of Mauna Kea"; Poli'ahu, which is also the name of a land division on Mauna Kea, is translated as

“garment [for the] bosom (referring to the snow)” by Pukui et al. (1974) and as “Snow goddess of Mauna Kea *literally meaning* Bosom goddess” by Pukui and Elbert (1986). Poli‘ahu is the guardian of Mauna Kea and respect to her and her mountain domain is of great importance in Hawaiian beliefs. Pu‘u Poli‘ahu is to the west of the summit peak that reaches 13,612 feet above sea level.

Maly and Maly (2005:200) include a citation by W.D. Alexander regarding the naming of Pu‘u Poli‘ahu. As the peak was nameless, Alexander called it “Poliahu” because he believed it to be “a poetical name, being that of the demigoddess with snow mantle who haunts Mauna Kea” (Maly and Maly 2005:200). This assignation of names to various places and peaks of Mauna Kea by non-Hawaiians was not an uncommon occurrence (Maly and Maly 2005).

Other main *pu‘u* in the summit area include **Pu‘u Kanakaleonui**, which translates as “loud-voiced man”; **Pu‘u Mākanaka**, which translates as “hill crowded with people (*mā-* is short for *maka*)”; and **Pu‘u Loa**, or the “long hill.” It is worth stating that there are many places named *pu‘u loa* in the Hawaiian Islands, since it is a fairly generic descriptor. Another *pu‘u* is **Papalekōkī**, which Pukui et al. (1974) does not define.

Waiau, the crater that became a lake, situated to the southwest of the summit of Mauna Kea at approximately 13,020 feet above sea level. Literally translates as “swirling water” or “water current.” This entity, Waiau, was named for “Kapiko o Waiau,” a goddess who was the ward of Poli‘ahu and Līlīnoe, Waiau and Ka Haupo o Kāne were three goddess-companions of Poli‘ahu.

3.3 *Wahi Pana* (Legendary Place)

Located in the *moku* (district) of Hāmākua, Ka‘ohe Ahupua‘a is a vast regional land division *mauka* to *makai* that includes the summit of Mauna Kea and land westward to the summit of Mauna Loa and smaller *ahupua‘a* such as Waipunalei, Laupāhoehoe, Kapehu, Welokā, and Maulua nui, which adjoin them on the lower mountain slopes, including a wide range of named environmental zones (*wao*). Ka‘ohe Ahupua‘a is bounded by similar vast *ahupua‘a* and districts such as Humu‘ula, North Kohala, South Kohala, Keauhou, and Ka‘ū. Each of these *wao* were noted resources extending from the sea to the forest lands, and in some instances, to the summits of the mountains. It was these resources that sustained Hawaiian life, culture and spirituality (Maly, 2005). In Hawai‘i the very landscape is storied (*wahi pana*).

Several early descriptions of the lands of Humu‘ula and Ka‘ohe, described them as sharing the summit region of Mauna Kea. While final settlement of the boundaries of Humu‘ula and Ka‘ohe, in 1891, took Humu‘ula down to around the 9,300 foot elevation, the land rests on Mauna Kea and with Ka‘ohe, extend to the summit of Mauna Loa (Maly, 2004).

In the generations that followed initial settlement, the Hawaiians developed a sophisticated system of land use and resource management. By the time ‘Umi-a-Līloa rose to rule the island of Hawai‘i in ca. 1525, the *moku puni* (island) was divided into six *moku o loko* (districts). Hilo, extending from the sea to the mountain slopes of Mauna Kea and on to the summit of Mauna Loa – through the *ahupua‘a* of Humu‘ula – is one of those six major districts (Maly, 2004).

In 1875, Curtis J. Lyons, son of Reverend Lorenzo Lyons, of Waimea and one of the foremost surveyors of the Hawaiian Kingdom, authored a paper on “Hawaiian Land Matters” (Lyons, 1875). In his discussion, he provided readers important references to the rights of native tenants

on the *ahupua'a* of Humu'ula and Ka'ohe. He also discusses their relationship with neighboring mountain lands such as Pi'ihonua, which is situated on the slopes of Mauna Kea:

The ordinary ahupuaa extends from half a mile to a mile into this [forest] belt. Then there are larger ahupuaas which are wider in the open country than others, and on entering the woods expand laterally so as to cut off all the smaller ones, and extend toward the mountain till they emerge to the open interior country; not however to converge to a point at the tops of the respective mountains. Only a rare few reach those elevations, sweeping past the upper ends of all the others, and by virtue of some privilege in bird-catching or some analogous right, taking the whole mountain to themselves... The whole main body of Mauna Kea belongs to one land from Hamakua, viz., Kaohe, to whose owners belonged the sole privilege of capturing the ua'u, a mountain-inhabiting but sea-fishing bird. High up on its eastern flank, however, stretched the already mentioned land of Humu'ula, whose upper limits coincide with those of the mamane, a valuable mountain acacia, and which starting from the shore near Laupahoehoe, extends across the upper ends of all other Hilo lands to the crater of Mokuaweoweo... [Lyons, 1875: 111].

Traditions and historical records tell us that the practices of district subdividing and land use as described above, were integral to Hawaiian life and were the product of strictly adhered to resource management planning. In this system, the people learned to live within the wealth and limitations of their natural environment and were able to sustain themselves on the land and the ocean. It is in this cultural system that we can understand the significance of the lands of Humu'ula, Ka'ohe, Pi'ihonua and the neighboring *'āina mauna*.

Numerous cinder cone (*pu'u*) are located around the Mauna Kea summit area which are all in the *ahupua'a* of Ka'ohe. The main peaks include: Pu'u Kūkahau'ula, which is the highest of several cinder cones peaks around the summit of Mauna Kea, Pu'u Līlīnoe, Pu'u Kanakaleonui, Pu'u Mākanaka, Pu'u Papalekōkī, Pu'u Kanakaleonui, Pu'u Poli'ahu and Pu'u Waiau.

From a geological perspective, these cinder cones formed during the latest phase of shield-building of the volcano. The nearly symmetrical shape of these formations is a truly remarkable and beautiful sight; most of these *pu'u* are *wahi pana* and all are associated with specific *mo'olelo* that connect the landscape, genealogy and actual and/or legendary people, demi-gods and -goddesses and gods and goddesses.

3.4 *Mo'olelo* (Story, Myth, Tradition) Associated with Specific Place Names

Kūkahau'ula, or Kū of the red-tinted snow, is Mauna Kea's summit and highest *pu'u*. The following *mo'olelo* about the love affair between Kūkahau'ula and Poli'ahu (another nearby peak named for the goddess of snows) comes from the July, 1931, edition of the *Paradise of the Pacific*, and was recounted by Ahuena (source: website maintained by Nā Maka o ka 'Āina 2008):

The Betrothal of the Pink God and the Snow Goddess

The Pink Snow Is Always Seen Upon Mauna Kea
by Ahuena
(edited)

Tell me one of your many legends, Puna, some tale belonging to the Big Island of Hawaii ...something different, something altogether apart from the lore of Pele, goddess of Volcanoes, creator of the Islands.

So spoke a tawny-skinned young girl to her indulgent old Hawaiian nurse whose bent form bespoke four score years and more.

Her devoted old nurse sat on the edge of the mat, facing her.

Let us finish this task first...while I tell you the legend of the betrothal of the Pink God and the Snow Goddess of Mauna Kea. The Pink God's devotion to the Snow Goddess of Mauna Kea is most wonderful to behold. He is known as the most constant lover on the island of Hawaii.

“How beautiful!” exclaimed the maiden. “What a pleasure it would be to see them in real life — but continue with the story, please.”

Then the old nurse's voice floated out in a low tremulous chant, apparently chiding the young girl for her impatience —

The youths of Kohala never travel unprepared;
Their kapa togas are already on;
They heed not the rain nor the wind
for their shoulders are ever kept warm.
So worry not for thou shalt hear
The story of the Pink God of Mauna Kea
whose glowing beam is seen afar,
And she of the snow-white bosom
Whose heart melts at his caress.

“Listen,” continued Puna, “the Pink Snow is always seen on Mauna Kea, the great white mountain that towers above and almost touches the blue heavens. Its summit of snow-clad peaks clings to the clouds that float near the sun, at Hikiana (the Beginning), where the rosy Kipu'upu'u (chilling) rain continually dwells and comes sweeping down to the district of Waimea and at Lanimamao, and away up on this great white mountain dwells a beautiful snow-white maiden whose name is Poliahu...who wears a wreath of the silvery, snow-white hina-hina blossoms that grow upon the mountain tops.

She is known as the Snow Goddess of Mauna Kea. She is the favorite daughter of the red-headed god, Ka-ne, Creator of Waters, and the Goddess of the Mist called Hina. Her nurse's name is Lihau (the Chilling Frost).

Ka-ne, her father, created a silvery swimming pool with beautiful clear water within it for Poliahu, upon the summit of Mauna Kea, reflecting the heavens, forming a basin behind the snow-clad peaks. And in this wonderful, cool basin of

Wai-au...he placed a Merman there, as a sentinel, to guard over it and keep a loving watch over the Snow Goddess. The name of this favored sentinel was Moo-i-nanea. [note, this description of Moo-i-nanea as a male is almost certainly in error, as these supernatural water spirits, *mo'o*, were always female in Hawaiian traditions.] It was, and is, he that drives all admiring lovers from there, all who dare climb the mountain slopes and steep precipices to catch a glimpse of Poliahu and chant poems of love and admiration to her. Others he entrances until they become numb and fall asleep before they can behold the face of the beautiful Snow Goddess as she passes by on her way to the icy pool.

But there was a devoted lover whom he helped to cross the kapu pool, for he found this lover to be constant and true despite his trials and disappointment.

This lover was the handsomest and most daring man that he had ever seen. He was known as Ku-kahau-ula (The Pink Tinted Snow's Arrival), the Pink-Tinted Snow-God of Mauna Kea, who made daily pilgrimages to court the Snow Goddess at morn and in afternoon.

Throwing his pink kapa toga over his shoulders, and starting down on the first sun's ray, beyond Haehae, the Land of Desire at the eastern gateway of the sun at Kahiki (the Beyond), he tried to approach as near as possible the place where she dwelt upon the snow-capped mountain. He watched her each day as she played with the kini-akuas (fairies) amongst the silversword (hina-hina) near the pool, and, sometimes further down near the fern belt. But her faithful attendant, Lihau (the Chilling Frost), was always with her.

Each day he became more fascinated and made every effort to reach her abode and court her — win her for his bride — but Lili-noe, another spirit (the Fine Rain) drove him back, and at other times when he started, Pele's sister at the eastern gateway of the sun endeavored to entice him away, all striving to prevent him visiting Poliahu, at Mauna Kea.

Undaunted, he continued his pilgrimages, sending his beam towards Mauna Kea. One day when Poliahu had grown into womanhood, the handsome prince espied her, identifying her by her fine soft white kapa robe that Hina, her mother, had beaten out so beautifully from the bark of the Wauke plant with her magic kapa beater, until it resembled soft white clouds when finished. Her nurse, Lihau, wrapped it around her.

Poliahu was coming slowly down the mountainside almost to where plant life grew when he saw her, and immediately was enraptured with her beauty, beholding her from his place of vantage. Her sparkling face and divine form were radiantly beautiful, and it seemed to him that she even out-rivaled the silvery-white hina-hina blossoms. Throwing his pink kapa toga over his shoulder again, he hastened to greet her, but her nurse, Lihau (the Chilling Frost) and Kipu'upu'u (the Hail) came out and found her. It became so chilly he withdrew his beam.

However, that did not weaken his resolution to court her. The next day he departed earlier than usual on his love quest — for he planned all night how this feat of winning the Snow Goddess for his own could be accomplished, and when dawn arrived he departed bravely, but Lilinoe (the Fine Rain) chased him away again. Again and again he made the attempt at each new dawn of day and near sunset, approaching closer and closer, until one day Poliahu's mother, Hina (Goddess of Mist) discovered him just as he was nearing the Snow Goddess' abode. She immediately covered the mountain with mist and sent out Lilinoe (the Fine Rain), and then the biting, black, drizzling rains, Kua-uli and Kipu'upu'u to sweep across the forest, all in her anger and fear of losing her beautiful snow-white child.

So, the Snow Goddess was hidden from view, and he had to return alone to the Land of Paradise, disappointed.

Another dawn came and he started again, wearing his usual pink kapa robe, full of hope, and determined to win his heart's desire that day.

Hina, who was on guard, saw him and sent the biting black rain after him. He glided back and forth and waited until the rain had disappeared, when he departed again, his pink kapa so vivid as he traversed the heavens that its reflection caused a glorious rainbow to arch. When the sentinel Merman saw the rainbow caused by the radiant form of the Pink God reflected in the mist, he understood the omen of love and took pity on him, and blew his conch shell, calling out to him:

“Oh, Magnificent Pink Lord, come tomorrow at dawn and I will show you the way to meet Poliahu and conquer Hina; come with thy iridescent pink robe; part the Gray Veil of Night, and send thy red glow to fascinate her;

“I have watched thee daily as thou sailed the heavens in quest of thy loved one, at morn and in afternoons, and am convinced of your love; come to the swimming pool; be not afraid of Lihau's anger; you can overcome her coldness.”

Ku-kahau-ula did as he was told, and as he started down in all his radiant beauty, he saw Moo-i-nanea beckoning and he came a little nearer to the topmost peak with his pink kapa cloth outspread prepared to throw one end of it over the shoulder of the Snow Goddess.

Poliahu, seeing him at that moment, called out to her mother in ecstasy and delight.

“Oh, Hina! Behold the handsome one as he stands at the very edge of the sun's ray — all ray himself — and his rosy form is sending a warmth to my bosom. He is wearing a pink helmet and is swathed in a pink cape. Look, mother Hina! Call to him to come nearer that I may chant a message of aloha to him.”

Hina was beside herself with fear and grief at the possibility of losing her daughter, for she saw that his beauty had attracted Poliahu, and again, she sent the biting, driving rain and the cold, white mist over the land until the Pink Snow God

was lost in the fog and it took him some time to find his home. He became discouraged, and he chanted to the sentinel of the pool, appealing to him to come to his assistance, for he was burning with an unquenchable love for Poliahu.

“Lead me over the swimming pool, to my beloved; to the gods Ka-ne and Hina that they may know of my devotion.”

“‘Then,’ the sentinel called to him, ‘come, brave one of the sky, but you must first conceal your beautiful pink kapa robe from view until you arrive at the pool; then take it out and wear it that you may go forward and snare the goddess with it. But you must come humbly, steadily and stealthily, spreading your radiant pink kapa well out as you approach the Goddess of the Treasure Bosom, Queen of the Snow.’

“Ku-kahau-ula followed the instructions minutely. The sun’s ray glided over the swimming pool causing a rainbow to arch, turning the silvery waters to a shimmering pink. As the god approached the spot where the snow-white goddess was reclining upon a couch of snow and hina-hina blossoms, clad in her soft white kapa robe, her faithful nurse was watching over her in the sacred stillness of the mountains.

“He advanced slowly, his pink robe outspread, radiantly gilding the brow of Mauna Kea with its glorious hue, until it was almost noon, chanting softly to her of his love, in the stillness of god’s acres until he was close enough to throw his brilliant pink toga over her shoulder. Drawing her within his arms, he wrapped the robe entirely around her until they both were concealed within its folds.

“The Merman, Moo-i-nanea, blew the conch-shell that the world would know of the betrothal, and chanted these words:

Ku-kahau-ula and Poliahu, Oh!
 These two were betrothed in the Chilling Frost
 In the cold region of Mauna Kea;
 They are the residents of the uplands,
 The children of the thicket of wild-woods
 The thicket that radiates their love
 From the summit of Mauna Kea
 Is most beautiful to behold;
 ‘Tis there the pink Sun’s beam
 Embraces and kisses the snow.

“And, from these early days, when the gods were betrothed on the heights of Mauna Kea we have followed the tradition of their marriage ceremony, the chieftain men, folding the feather cape of kapa around the chosen maiden, just as the sun’s ray is reflected on the snow mountain and turns it pink at morn and noon and the treasure-heart of the goddess melts and overflows with love and feeds the mountain streams with her refreshing gift for man and nature to thrive upon.

“You have heard of the waters of Poliahu that our ancient and noble chieftains of that great island preferred to any other, to quench their thirst with, and how each day, starting at early dawn, carrying their water gourds all the way up the steep slopes of Mauna Kea, to a place called Pohaku-loa to fetch the drinking water from the melted snow accumulated there, bestowed by the goddess, for their feudal lords.

“Well, child, that is the aloha of Ku-kahau-ula and Poli-ahu who were betrothed in the cold region.”

Then, as the story ended, and a chant floated out upon the air and faded away, the young girl sighed, and said, dreamily:

“Thank you, Puna,” and smilingly gazed out toward the glinting blue sea of Waikiki and whispered,

“I, too, shall watch for the arrival of the glorious sunbeam that brings happiness and plenty, called the Pink God (Ku-kahau-ula) of Mauna Kea.”

Lilinoe, is associated with *mo'olelo* about a legendary “woman of the mountains” who was reportedly buried on Mauna Kea. Kamakau, whose description makes it evident that Līlinoe was understood by post-Contact Hawaiians to have been of great antiquity, makes two related references to this legendary figure:

It was an old custom to hide the bones of chiefs who were beloved, as ‘Umi’s bones were hidden by Koi, in order that they might not be made into arrows to shoot rats with, into fishhooks, needles for sewing tapa, or *kahili* handles, as is still done today. There is a story told about the bones of Pae which illustrates this custom. Pae was a kahuna and high chief in the time of ‘Umi son of Liloa [i.e., early 16th century] and a descendant of Lilinoe, the woman of the mountains... (Kamakau 1992:215).

The year 1828 is notable for the visit of Ka‘ahumanu to Hawai‘i to fulfill a vow that she made to attempt the recovery of the bones of Līlinoe on Mauna Kea where her body was said to have lain for more than a thousand years in a well-preserved condition, not even the hair having fallen out. Others deny this and say her body was too well-hidden ever to have been found. Her [Līlinoe] offspring count from Hua-nui-i-ka-la‘ila‘i; she was the ancestress of ruling chiefs, and from her line was born ‘Umi-ka-lani... It is said that Ka‘ahumanu did not find the bones of Līlinoe, but only those of Liloa... [and others] (Kamakau 1992:285).

Mauna Kea, Hawaiian *mo'olelo* provide insight into the traditional Hawaiian existence. While traditionally these stories were passed down through the generations orally, in the 19th century Hawaiian language newspapers began publishing some of them.

In Beckwith’s translation, Poli‘ahu is referred to as the “goddess of the snow covered mountain,” Mauna Kea. Mentioned below, Beckwith focuses on the main characters of the tradition and their association with Mauna Kea:

The young chief [Aiwohikupua] of Kaua‘i when he goes to seek the beauty of Puna makes a vow to enjoy no other woman until he has won Laieikawai. At

Hana on Maui, he is attracted by the lovely Hina-i-ka-malama as she rides the famous surf at Puhele, and he turns in at Haneoo. The chiefess falls in love with the handsome stranger and wins him at a game of *kōnane* (Hawaiian checkers). He excuses himself until his return and goes on to Hawaii, where he courts an even more beautiful chiefess in the person of Poliahu, who also promises him her hand. When he finally loses hope of winning Laie-i-ka-wai, he “claps his hands before his god” to free himself from his rash vow and proceeds to a marriage with Poliahu, whom he fetches home with a great cortege to Kauai. While the festivities are proceeding at Mana, the disappointed Hina, apprised of her lover’s duplicity, appears and claims the forfeited stake. Aiwohikupua is obliged to relinquish himself to her embraces, but the angry Poliahu envelopes the lovers in alternate waves of unendurable heat and cold until they are obliged to separate, when the mountain goddess retires to her home attended by her three maidens, Lilinoe, Waiaie, and Kahoupokane, and Aiwohikupua finds himself bereft of both ladies... [Beckwith 1970:222].

Excerpts that mention Humu‘ula and specific locations on the upper slopes of Mauna Kea (sites today identified as being in the *ahupua‘a* of Ka‘ohe) are focused below:

Mokuna VII (Dekemaba 27, 2862) Ia Aiwohikupua ma i haalele ai ia Paliuli, hoi aku la laua a hiki i Keaau, Hoomakaukau no waa, a ma ia wanaao, kau maluna o na waa, a hoi i Kauai...

Chapter VII (December 27, 1862) Aiwohihikupua and his companion departed from Paliuli, and went to Keaau, where the canoe was readied in the early morning, and they boarded the canoe to return to Kauai...

Ma keia holo ana mai Keaau mai, a kau i Kamaee, ma Hilopaliku, a ma kekahi la ae, haalele lakou ia laila, hiki lakou i Humuula, ma ka palena o Hilo, me Hamakua...A hala hope o Humuula ia lakou, hiki lakou mawaho pono o Kealakaha, ike mai la lakou nei i keia wahine e noho ana i ka pali Kahakai, e hiamoe an anae ke Alii ia manawa.

While on their way from Keaau, they arrived at Kamaee, in Hilopaliku, and on the following day they departed and arrived at Humuula, on the boundary of Hilo and Hamakua... Passing Humuula, they were outside of Kealakaha, where they saw a woman sitting along the ocean cliff. The chief (Aiwohikupua) was asleep at that time.

Ia la kou ike aku ai i kela wahine, hooho ana lakou iluna o na waa, “E! ka wahine maikai hoi!”

See the woman, they called out from the canoe, “Oh! What a beautiful woman!”

A no keia, hikilele ae la ka hiamoe o Aiwohikupua, ninau ae la i ka lakou mea e walaau nei, haiia aku la, "He wahine maikai aia ke noho mai la i ka pali." Alawa ae la ke Alii, a ike aku la he mea e o ka wahine maikai.

Because of this, the sleep quickly departed from Aiwohikupua, and he asked what was this that they were talking about, they said, "There is a beautiful woman there, sitting on the cliffs." The Chief looked, and he saw indeed that there was a beautiful woman there.

A no keia mea, kauoha ae la ke Alii i na hoewaa e hoe pololei aku ma kahi a ka wahine e noho mai ana, a holo aku la a kokoke, halawai mua iho la lakou me ke kanaka e paeaea ana, ninau aku la, "Owai kela wahine e noho mai la iluna o ka pali maluna pono ou?"

Because of this, the Chief ordered the canoe paddlers to paddle straight to the place where the woman was sitting. Arriving there shortly, they met with a man who was pole fishing, and asked, "Who is that woman sitting there atop the cliff above you?"

Haiia mai la, "O Poliahu."

He answered, "It is Poliahu."

A no ka manao nui o ke Alii e ike i kela wahine, peahiia aku la, a iho koke mai la kela me kona aahukapa i hoopuniia i ka hau, a haawi mai la i kona aloha ia Aiwohikupua...

Great was the Chiefs desire to see this woman, he waved to her, and she quickly surrounded herself with her snow garment, and then extended her aloha to Aiwohikupua...

Ia laua e halawai malihini ana, I aku o maikai o ka pali, pomaikai wale wau ia oe ma ko kaula halawai ana iho nei, a nolaila e ke Alii wahine o ka pali nei, ke makemake nei wau e lawe oe ia'u i kane hoao nau, a e noho kanaka lawelawe aku malalo ou, ma kau mau olelo e olelo ai, a malaila wale no wau. Ina hoi e ae oe e lawe ia'u e like me ka'u e noi aku nei ia oe, alaila, e kau kaula maluna o na waa, a holo aku i Kauai, a pehea ia?"

Meeting as strangers, Aiwohikupua spoke, "Say Poliahu!" The beautiful woman of the cliff, I am indeed blessed by you, at our meeting here. So you, Chiefess of these cliffs here, I desire that you would take me as your husband, as on who will live as a person below you. If you will speak the words, there I will be. If you agree to take me as I have asked you, then we two shall board the canoe, and travel to Kauai. How would that be?"

I mai la ka wahine, “Aole wau he wahine no keia pali, no uka lilo mai wau, mai ka piko mai o kela mauna, e aahu mau ana i na kappa keokeo e like me keia kapa a'u e aahu aku nei. A pehea la i hikiwawe ai ka loa ana o ko'u inoa ia oe e ke Alii?”

The woman responded, “I am not a woman of these cliffs, I come from the distant uplands, from the summit of that mountain, always adorned in the white garment, just as I am wearing now. And how is it that you come to have my name, o Chief?”

Olelo aku la o Aiwohikupua, “Akahi no wau a maopopo no Maunakea mai oe, a ua loa koke kou inoa ia makou ma ka haiia ana e kela kanaka paeaea.”

Aiwohikupua then said, “I only now, understand that you are the Maunakea, but I got your name from the man that is fishing here.”

“A no kau noi e ke Alii,” wahi a Poliahu, “E lawe wau ia oe i kane na'u, a nolaila, ke hai aku nei wau ia oe, me ka ninau aku; aole anei o oe ke Alii i ku iluna a hoohiki ma ka inoa o kou mau Akua, aole oe e lawe i hookah wahine o keia mau mokupuni, mai Hawaii nei, a Kauai; aia kau wahine lawe noloko mai o Moaulanuiakea? Aole anei oe i hoopalau me Hinaikamalama, ke kaikamahine Alii kaulana o Hana? A pau ko huakai kaapuni ia Hawaii nei, alaila, hoi aku a hoao olua? A no kau noi mai e lawe kua ia kua i mau mea hoohui nolaila, ke hai aku nei wau ia oe; aia a hoopau oe I kau hoohiki mua, alaila, aole na'u e lawe ia oe, nau no e lawe ia'u a hui kua e like me kou makemake.”

“And regarding your request, o Chief,” Poliahu said, “I will consider taking you as my husband. But, I say this of your, request; are you not the Chief who stood and made an oath in the name of your Gods, that you would not take a wife, from Hawaii to Kauai; for your wife is to be taken from Moaulanuiakea? Yet, are you not betrothed to Hinikamalama, the famous young chiefess of Hana? And when your journey around Hawaii was completed, that you would return and you two would be married? Now that you have asked that the two of us be joined together, I tell you that you must end your previous oath, or else I cannot take you; if you do, then you may have me as you desire.”

A no keia olelo a Poliahu, pili pu iho la ko Aiwohikupua manao me ke kaumaha no hoi; a liuliu hoopuka aku la o Aiwohikupua i wahi ninau pokole penei, “Pehea la oe i ike ai, a i lohe ai hoi no ka'u mau hana au e hai mai nei? He oiaio, e Poliahu e, o na mea a pau au e olelo mai nei, ua hana wau e like me ia nolaila, e hai mai i ka mea nana i olelo aku ia oe.”

Because of these words of Poliahu, Aiwohikupua's thoughts were saddened: Aiwohikupua then asked, “How do you know, how have you heard of my tasks,

as you have stated? Poliahu, it is true, all the things that you have said, I have done as you've described. So tell who told you these things.”

“Aole o'u mea nana i hai mai i keia mau mea, e ke Alii kane, no'u iho no ko'u ike,” wahi a ke Alii wahine, “no ka mea, ua hanau kupuaia mai wau e like me oe, a ua loaa no ia'u ka ike mai ke Akua mai o ko'u mau kupuna a hooili ia'u, e like me oe, a na ia Akua wau i kuhikuhi mai e like me ka'u e olelo nei ia oukou. Ia oukou no e holo mai ana i Humuula, ua ike wau nou na waa, a pela wau i ike ai ia oe.”

“No one has told me these things, o Chief, it is known to me by my own knowledge,” the Chiefess said. “Because I, like you, am of a wondrous birth, and I have the knowledge from the Gods, from my ancestors, as inherited by me, like you. These Gods have directed me in my words to you. When you traveled to Humuula, I saw your canoes, and thus, I saw you.”

A no keia olelo, kukuli iho la o Aiwohikupua, a hoomaikai aku la imua o Poliahu, me ke noi aku e lilo ia i kane hooopalau na Poliahu, me ke noi aku a holo pu i Kauai...

Because of these words, Aiwohikūpua, kneeled down, and praised Poliahu, asking her to take him as the promised one of Poliahu, and also asked that she travel with him to Kauai...[Maly translator; from Maly, 2004: 10 – 15].

In Kalākaua's *Legends and Myths of Hawaii* (1888:455-480) account of: “Laie i ka Wai,” a *kupua* (demigod) of Wailua, Kaua'i, named Aiwohikupua is sailing the seas of Hāmākua, Hawai'i, and “saw a woman of extraordinary beauty reclining on a cliff by the shore. She was graceful in every movement and wore a snow-white mantle. They landed and made her acquaintance. Her name was Poli'ahu of Mauna Kea” (Kalākaua 1888: 462). She relates that she is also supernatural (“*kupua*”). They promise to marry and exchange mantles. Eventually Aiwohikupua returns in state to claim Poli'ahu. “The three mountains [understood as Mauna Kea, Mauna Loa and Hualālai] were covered with snow, which was the sign promised by Poli'ahu.” Aiwohikupua and his party “were met by Poli'ahu, Lilinoe, Waiiau and Kahoupokane, the three later being mountain goddesses. The men suffered from cold but on being apprised of the fact Poli'ahu and her friends removed their snow mantles, causing snow on the mountains to retire to its usual limits” (Kalākaua 1888: 467). The couple sailed to Kaua'i but Poli'ahu soon learns of the fecklessness of Aiwohikupua: “Poli'ahu was enraged and returned to Mauna Kea.” Poli'ahu repeated thwarts Aiwohikupua's love life by sending waves of cold or heat over the object of his affections: “Poli'ahu sent the chill of her snow mantle upon her rival, and she was benumbed with cold...” When Aiwohikupua met his new bride at noon the next day to consummate their marriage “Poli'ahu put on her sun mantle, and a scorching heat almost consumed her rival” (Kalākaua 1888: 468).



Figure 7. The summit region of Mauna Kea showing some of its main *pu'u* (cinder cone) and an astronomical observatory, top center of the image (source: Ziegler 2002)

Another *mo'olelo*, “*Na Kaa a Kekahi Elemakule Hawaii*,” printed in 1863 in the paper *Ke Au Okoa*, represents a collection of stories documented by the Frenchman Jules Remy during his time in Hawaii. This account, excerpted below, describes the construction of the Ahi-A-Umi:

Umi ruled in place of Hakau, and his friends Koi and Omaokamau dwelt with him. Piimaiwaa, Umi's war leader dwelt in Hilo. With Umi, there was also his trusted companion Pakaa, and his priest Lono. At this time, Umi ruled the eastern side of Hawaii, while on the western side, his relative Keliokaloa, ruled and dwelt at Kailua... In the time that he dwelt in Kailua, Keliokaloa was known as an evil chief, he cut down the coconut trees and desecrated the cultivated fields. It was because of these evil deeds that Umi made preparations to go to war against him. Umi marched to battle, joined by his famous warrior, Piimaiwaa, and his companions Koi and Omaokamau. Also with him were his favorite, Pakaa, and his priest Lono.

Between Mauna Kea and Hualalai the chief and all his party traveled, with the thought of descending to Kailua. Keliokaloa did not wait though, but instead, traveled with his warriors to meet Umi in battle. The two armies met on a broad open plain, surrounded by the three mountains, at the place [now] called Ahu a Umi. There, Laepuni and them (people who were unattached to a chief) fought with Umi. Umi was almost killed, but Piimaiwaa leapt in and helped him, it was he who turned the battle in the favor of Umi's side. There is not much else that is said, but, it is known that the chief of Kailua died in the battle. Thus, with this battle, the entire kingdom was gained by Umi. He became the chief that controlled the entire island of Hawaii. So that the battle would be remembered from generation to generation, he (Umi) built the stone altar, that remains to this day, the altar (ahu) of Umi...

...He (Umi) also built a heiau (temple) below Pohaku Hanalei, it is called the ahu o Hanalei (altar of Hanalei); and on the side of Mauna Kea, by where one travels to Hilo, he built the third of his temples, at the place called Puukekee [also written Puu Keekee in historical texts]; and there at Mauna Halepohaku he built the fourth of his temples; there, it is said, Umi dwelt with his many people. It is said that Umi was a chief who dwelt upon the mountain, it was because of his love of his people, that he (Umi) returned and dwelt in the middle of the island [Ahu-a-Umi], that is where he dwelt with his beloved people. His commoners lived along the shores, and they brought food for them (in the uplands), from one side of the island to the other... [*Ke Au Okoa*; Mei 22, 18 65; Maly, translator; from Maly 2004:16-18].

Perhaps of the most detailed native traditions which includes rich accounts of place names and practices of natives of the land and describing land features of Mauna Kea, Humu'ula, Ka'ohē, Pi'ihonua and the *'āina mauna* is the historical account titled "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki*" or "The Heart Stirring Tale of Ka-Miki," and was reproduced in the Hawaiian language newspaper *Ka Hōkū o Hawai'i* from 1914 to 1917 (Maly 2004:19). Excerpted below are sections of the account referencing the summit of Mauna Kea, to the plains of Humu'ula and Ka'ohē which demonstrates the depth of the relationship of various points of land and resources to one another:

Born in *'e'epa* (mysterious – premature) forms, Ka-Miki and Maka-'iole were the children of Pōhaku-o-Kāne (*kāne*) and Kapa'ihilani (*wahine*), the *ali'i* of the lands of Kohana-iki and Kaloko, North Kona. Maka-'iole was the first born child and Ka-Miki was the second. Following their birth, Ka-Miki was given up for dead and placed in the cave of Pōnahanaha, and though Maka-'iole was of a misshapen form, he was taken to his paternal grandparents Pohokinikini and Pu'uwalea to be cared for. Being aware of all that took place at the time of their birth, Ka-uluhe retrieved Ka-Miki from the cave and reared him at Kalama'ula on the heights of Hualālai. It was there that Ka-uluhe began instructing Ka-Miki in the uses of his supernatural powers. Maka-'iole joined his young brother and together, they learned various techniques of contest skills, in preparation for their journey around Hawai'i Island.

After a period of training and tests, Ka-uluhe instructed Ka-Miki to journey to the *hālau ali'i* (royal compound) of one of their elder relatives, *Poli'ahu*. Poli'ahu and her companion *Lilinoe*, were the guardians of *Waiau* and the sacred water of *Kāne*. Maka-'iole, in turn, was to go collect the *'awa* (*Piper methysticum*) of the god Luanu'u at Waipi'o. These two items would be used in an *'ai-lolo* (ceremony of graduation), commemorating sacred nature of the brothers and completion of their training in *'ōlohe* skills. Ka-uluhe told the brothers:

...You, Maka-'iole, are to fetch the yellow barked *'awa* which the gods drink till they are drunk and bleary eyed, till their eyes are reeling, it is the *'awa* that is

there along the sacred cliff of Waipi'o in the breast (the ledge) of Ha'iwahine - at the long plain of 'Āpua...

Maka'iole stood up straight, prepared to fly like the 'iwa bird soaring upon the winds... The ancestress then called to Ka-Miki, telling him:

...You are to fetch the water of Kāne which is atop the summit of the mountain (Mauna kea), at the royal compound of Poli'ahu, Lilinoe and their ward, Ka-piko-o-Waiiau. The water is there below the ledge of the platform of Pōhakuakāne, from where you may look down to Pōhakuloa; they are your family through you father's genealogy. You are to fetch the water that will be used to make the 'awa for you two...

...Then they were to circle around to the heights of Humu'ula and inquire of 'Ōma'oko'ili and 'Ōma'okanihae if either of them knew who this rascal thief was. "Encircle Ka-piko-o-Waiiau, the ward of the chiefesses Poli'ahu and Lilinoe. Pier down upon the multitudes and watch the sacred water of Kāne mā. Look too, to where they dug the 'auwai (water channel)." Then Luanu'u commanded them to "go to Pu'u-o-Moe'awa in the forest of Mahiki and stand guard"... [*Ka Hōkū o Hawai'i*; March 12, 1914; from Maly 2004:19-23].

There are several references to associations between Mauna Kea and other other islands, including an overlook and *pali* (cliff) at Haleakalā Crater on Maui:

*Hahai 'o Kaha 'i me Haui iā Pele i ka 'āina o Maui,
hakakā lākou i ke alo o Kamohoali 'i.
Pū 'ā 'ā ka iwi o Pele,
mākole ka maka o Kānemilohai i ka uahi.
Hoaka ke ko 'i 'ula o Pele i luna o 'Alenuihāhā,
kūhaka lunalilo 'o Mauna Kea i ka 'ihi 'awa 'awa.*

Kaha'i and Haui pursued Pele to the land of Maui where they battled in Kamohoali'i's presence, Pele's bones scattered in the crater of 'Alenuihāhā, where Kānemilohai's eyes are inflamed by smoke. The red cloud of Pele flames above 'Alenuihāhā where Mauna Kea rises abovethe storm (Landgraf, 2003).

Pukui provides two relevant *'ōlelo no'eau* dealing with Mauna Kea: 1) Mauna Kea, kuahiwi ku ha'o i ka mālie (Mauna Kea, standing alone in the calm) and 2) Poli'ahu, ka wahine kapa hau anu o Mauna Kea (Poli'ahu, the woman who wears the snow mantle of Mauna Kea) (Pukui 1983:234, 294). These sayings reflect a number of important Hawaiian beliefs and values about Mauna Kea, including her unique status as the unparalleled "top of the world," her calm and reassuring presence, and her gifts of *hau* (snow).

A common reference to Mauna Kea is as the most visible landmark of the islands. Hence, the Mauna Kea summit has become symbolic for the Hawaiian Islands. In Fornander's "The Legend

of Kila (*He Ka'ao no Kila*),” the ruling chief of Kaua'i, Mō'ikeha commands his son Kila to set sail in a double canoe for the Society Islands. As they leave the relative safety of the waters of the Hawaiian Islands they have their first strife with malevolent monster demi-gods of the deep when “they sailed on until the islands of Hawai'i here were blotted out of sight and the land disappeared and all that could be seen was the top of Mauna Kea... (*Holo aku la lākou a nahā nā moku o Hawai'i nei, a nalowale ka 'āina, koe o Mauna Kea, 'a'ole i nalowale*)” (Fornander 1919: Volume IV:160-161).

In Fornander's “Story of 'Umi: One of the Most Noted of Hawaiian Kings (*He Mo'olelo no 'Umi: Kekāhi Ali'i Kaulana o ko Hawai'i Nei Pae'āina*),” the ruling chief 'Umi-a-Līloa leads a war party out of Waipi'o, Hāmākua, to attack Hilo:

Up through the mountains of Mauna Kea and right back of Kaūmana, running towards Hilo, was a short cut over the mountains to the trail of Poli'ahu and the well of Poli'ahu at the top of Mauna Kea, the trail leading down to Hilo. It was an old trail for those of Hāmākua, of Kohala and of Waimea to take when going to Hilo. Therefore, preparations were made and the army ascended the Mauna Kea mountain and descended on the upper side of Hilo...

Aia ma ke kuahiwi a ma ka mauna o Mauna Kea, a mauka pono o Kaūmana iho i kai o Hilo, he alanui pōkole ma ke kuahiwi, o ke alanui o Poli'ahu a me ka punawai o Poli'ahu, iluna pono o Mauna Kea, a iho ma ka 'ao'ao ma Hilo. He alanui kahiko ia, no ko Hāmākua, no ko Kohala, a me ko Waimea, ke hele ma Hilo. Nolaila, ho'omakaukau iho la ka pi'i o ka huaka'i kua ma Mauna Kea, a iho ma ka 'ao'ao maluna o Hilo... (Fornander 1919: Volume IV:224-225).

As Fornander (1919) documents in “Legend of Kūapāka'a (*He Ka'ao no Kūapāka'a*),” the hero, Kūapāka'a, is sailing in a double canoe with the ruling chief Keawenuia'umi past Kaua'i for Kaula Rock. When the ruling chief and his men fall asleep, Kūapāka'a turns the canoe around and sails straight for the Big Island and: “...when they saw the top of Mauna Kea above the mist, passing and repassing in the distance like a pointed cloud. At this the men all woke up at the call 'There is Hawaii' (... *'ike aku la lākou i ka piko o Mauna Kea i loko o ka 'ohu, e mā'alo ana me he 'ōpua la. O nā kānaka a pau o luna o ka wa'a, aia 'ae la lākou, 'aia o Hawai'i*)” (Fornander 1919: Volume V:124-125). This is another account of Mauna Kea as a significant landmark for long-distance voyagers in Polynesia.

Fornander also recounts “Tradition of Kamapua'a (*Ka'ao no Kamapua'a*),” the pig deity sees the fires of Pele, the goddess of volcanoes, and begins to chant:

The fire by Lonomakua	<i>O ke ahi a Lonomakua la,</i>
Of the woman Pele	<i>A ka wahine a Pele,</i>
It is burning in the uplands of Puna	<i>Ke a ala i uka o Puna,</i>
By the white snow of Mauna Kea	<i>I ka hau a'ia'i o Mauna Kea</i>
The smoke darkens the heaven	<i>I ka uwahi pō i ka lani</i>

(Fornander 1919: Volume V:340-341)

Here, the brilliant whiteness of the snows (*hau a'ia'i*) of Mauna Kea provide poetic contrast with the darkening smoke (*uwahi pō*) of Pele.

Fornander (1919) provides an account of “Famous Men of Early Days (*Po‘e Kaulana o ka Wā i Hala*)” he tells a story of Uma of Pūehuehu, Kohala, who lived in the time of Kamehameha I and was of very small stature (*‘u‘uku loa*). He was an expert in the art of bone-breaking (*akamai loa ia i ka lua*). Uma has a number of adventures dispatching brigands and muggers as he proceeds from Pu‘uhue in southern Kohala to Kapia at Waimea, looking toward Mauna Kea (*e nānā ala ia Mauna Kea kuahiwi*), proceeding on to Manauea Stream and on to Pu‘u o Moeawa at Mahiki between Waimea and Hāmākua, and then on to Kaupakuea in upper Hilo. The passing reference to Maunakea appears to serve as a geographic reference to Kapia. Kapia may be the first place from which Mauna Kea can be seen as one traverses the mid-slope of the west side of the Kohala Range arcing around to the southeast. The account notes that at the time “there was much robbery amongst the people in lonely places (*he nui loa ka pōwā ana o nā kanāka ‘oia wā ma nā wahi mehameha*),” and certainly suggests that the trails around the north slope of Maunakea were among such lonely places (Fornander 1919: Volume V:500-501).

Fornander also tells of “The Flood in Hawaii in the Olden Times (*No Ke Kaiakahinali‘i Ma Hawaii Nei*)” is an odd account of the goddess Pele bringing “the sea of Kahinali‘i” to Hawai‘i at a time when “here in Hawaii in the earliest times there was no sea (*ma Hawaii nei mamua loa, ‘a‘ole he kai...*)” (Fornander 1919: Volume V:524-525). Pele poured out the sea from her head submerging almost all of the land except for the highest peaks including Mauna Kea (*...ua koe iki ‘ae kekāhi wahi, ‘oia no o luna o Haleakalā, a me Mauna Kea a me Mauna loa, ‘a‘ole i nalowale loa...*) and then caused the sea to recede to what it is today.

Hawaiian genealogy reveals the importance of *kalo* (taro) and the reasons Hawaiians have such a sacred connection to this plant and to Mauna Kea. According to Hawaiian mythology, the first man was born from the taro plant. Wākea, the sky father, and Papahānaumoku, the earth mother, on the summit of Mauna Kea, birthed a child who was premature.

The first-born son of Wākea was of premature birth (*keiki alualu*) and was given the name of Haloa-naka. The little thing died, however, and its body was buried in the ground at one end of the house. After a while, from the child’s body, shot up a taro plant, the leaf of which was named *lau-kapa-lili*, quivering leaf; but the stem was given the name Haloa.

After that, another child was born to them whom they called Haloa, from the stalk of the taro. He is the progenitor of all the peoples of the earth. (Malo 1951:244).

Hāloa is therefore both plant and man. “Wākea’s stillborn son is reborn as a taro plant which produces his second son, a human child Hāloa” (Kanahele 1995:18). Taro therefore becomes a metaphor for life, because both need to be rooted in good soil and nourished with waters of Kāne. The *kalo* stalks and Hawaiians both grow towards the sun, striving to be nearer to the heavenly spirit, and as every plant must die, so too will every human. What remains of the plant lives on for the next generations. Because of this close interconnection between life and *kalo*, *kalo* and *poi* (pounded taro thinned with water) thereby became the main staples of the Hawaiian diet (Kanahele 1995:18).

For nutritional and spiritual significance *lo'i kalo* became vital for Hawaiian way of life. The work was for men and required marshland, a large supply of *kalo* cuttings, and advanced irrigation systems (Kanahele 1995:19-22).

Pōhakuloa was a multi-formed deity; in one form he was guardian of Kāne's water at Mauna Kea and a relative of Pōhaku o Kāne (the father of Kamiki *mā* [and company]); in another form, he was a deity and guardian of the forests which stretch across Mauna Loa towards Mauna Kea, and was called upon by canoe makers; and in his human form, he was an *'ōlohe* expert and wood worker:

Ka-Miki and Maka-'iole departed from Uwēkahuna and Keonenui at Kahualoa, and continued their journey past Kīlauea. Along the way, they heard the striking sounds of *ko 'i pōhaku pāhoa* adze stones. Ka-Miki thought that perhaps canoe makers were working nearby, and as the brothers approached the source of the sounds, they saw a large round house (*hale poepoe*), of the type with a high pitched roof (*pū 'o 'a*). And at the center of the house a man was working on a *koa* log which was seven fathoms long and three feet in diameter.

Working vigorously, this man was startled at hearing a voice call to him, thus he stopped his carving. Ka-Miki then asked, "Is this the path which one travels to Kea'au?" Angered at being interrupted, Pōhakuloa responded, "Dont you know the direction of the path upon which you two travel? If you just go straight on you will reach Kea'au." He then went on to say, "My job is not to stand here directing travelers along the trails." Ka-Miki told Pōhakuloa, "We only asked because we thought that you were a man like us. Had we known you were one of the—*Pahulu ke akua 'āhuluhulu o ka mauna* (Ghoulish broad adze gods of the mountain)—we would not have bothered you."

Ka-Miki and Pōhakuloa exchanged taunts, and Pōhakuloa threatened to throw Ka-Miki *mā* into a deep pit. Ka-Miki then told Pōhakuloa, "It is unlikely that you could beat *Nana-i-ke-kihi* and *Kahuelo-ku*. It was more likely that the great grandchildren of *Ka-uluhe* and *Lani-nui-ku 'i-a-mamao-loa* will bind you like a pig, and leave you along the *ala loa* for travelers to see."

Angered, Pōhakuloa leapt to attack Ka-Miki, and was immediately bound, unable to move. Though he tried with all his might and skill, Pōhakuloa was unable to free himself.

Ka-Miki called to Pōhakuloa —

Pa 'a ba e Pōhakuloa. Pa 'a i ka 'alihi o Kanlkawī ke kōkō aīwaiwa a ku 'u mau kūpuna wahine... Pa 'a 'oe i [ke] kāwelewele o Halekumuka 'aha ka 'upena ku 'u a

ka nananana, o Kai-halulu ia, o ku i a holo, pi ia noho, pupu u a moe mālie, kau ike Kōkō Wailau...

Pōhakuloa is secured. Bound in the lines of *Kanikawī*, the mysterious net of my female ancestors... You are bound in the ropes of Halekumuka'aha, the net set down by the spider, [though you] thrash about like the sea of Kaihalulu which strikes and runs, which rises and recedes, which mounds up and lies calm [you cannot escape], for you are placed [like the shrimp] at Kōkō, Wailau.

Pōhakuloa realized that these young travelers were no ordinary people, but traveled with the gods, deities and guardians of the *'ōlohe*, and he surrendered, acknowledging the skill and nature of Ka-Miki *mā*. Pōhakuloa also promised to use his knowledge wisely... He then went to introduce the brothers to his own relative, Kapu'euihi...(Maly and Maly, 2004:45).

Poli'ahu, lives within Lake Waiau atop Mauna Kea, from which she emerges each winter and to which she returns with the summer sun. She and her sisters are closely associated with Mauna Kea and are sometimes referred to as the "Four Sisters." At other times, Poli'ahu's sisters are referred to as her maidens (Beckwith 1976:222). The four sisters were born as fully grown women who had great talents and wisdom. Waiau is the guardian of the lake that bears her name. The lake provides drinking and bathing water where Waiau bathes Poli'ahu. Waiau sometimes assumes a bird form to fly to sources of sweet water to fill her drinking gourd. Līlīnoe is the goddess of the mists of the mountain. She maintains Poli'ahu's hair so that it will float like a cloud at the summit. The fourth sister, Kahoupokāne is the goddess of Hualālai. Known as a master kapa maker, the sound of thunder is said to be Kahoupokāne beating her kapa while during heavy rains, Kahoupokāne is tossing water on her kapa while she beats it (Ka'ahale Hawai'i 1999).

There are many *mo'olelo* regarding Poli'ahu, usually in association with her sisters, and also with other major gods and goddesses such as Hina ('Moon Goddess'), Wākea, Kāne, Kū, and others that date from very ancient Hawaiian cosmological times. Westervelt (1915), for example, translated and published a lengthy story entitled "Ke Au Mele Mele, The Maid of the Golden Cloud," a brief portion of which is reproduced below. This small part of the legend ties the natural phenomenon of snow atop Mauna Kea to Poli'ahu's mischievous nature:

[Referring to a high chief of the Hilo area] The chief looked up Mauna Kea and there saw the mountain women, who lived in the white land above the trees. Poliahu stood above the precipices in her kupua-ano (wizard character), revealing herself as a very beautiful woman wearing a white mantle.

When the chief and his friends came near the cold place where she was sitting, she invited them to her home, inland and mountainward. The chief asked his friends to go with him to the mountain house of the beauty of Mauna Kea.

They were well entertained. Poliahu called her sisters, Lilinoe and Ka-lau-a-kolea, beautiful girls, and gave them sweet-sounding shells to blow. All through the

night they made music and chanted the stirring songs of the grand mountains, The chief delighted in Poliahu and lived many months on the mountain.

One morning Paliula in her home above Hilo awoke from a dream in which she saw Poliahu and the chief together, so she told Wakea, asking if the dream were true. Wakea, by her magic power [note, in many other legends and *mo'olelo*, Wakea is a male form], looked over the island and saw the three young men living with the three maidens of the snow mantle. She called with a penetrating voice for the chief to return to his own home. She went in the form of a great bird and brought him back.

But Poliahu followed, met the chief secretly and took him up to Mauna Kea again, covering the mountain with snow so that Wakea could not go find them. (Westervelt 1915).

Poli'ahu, the snow goddess, and Pele, the volcano goddess, engaged in legendary battles to control Mauna Kea. The following legend is often told and relates how the outcome of an *hōlua* (sled) competition established control over portions of the mountain and formed the peninsula of Laupāhoehoe.

Pele loved the holua-coasting—the race of sleds, long and narrow, down sloping, grassy hillsides. She usually appeared as a woman of wonderfully beautiful countenance and form—a stranger unknown to any of the different companies entering into the sport....

Poliahu and her friends had come down Mauna Kea to a sloping hillside south of Hamakua. Suddenly in their midst appeared a stranger of surpassing beauty. Poliahu welcomed her and the races were continued. Some of the legend-tellers think that Pele was angered by the superiority, real or fancied, of Poliahu. The ground began to grow warm and Poliahu knew her enemy.

Pele threw off all disguise and called for the forces of fire to burst open the doors of the subterranean caverns of Mauna Kea. Up toward the mountain she marshaled her fire-fountains. Poliahu fled toward the summit. The snow-mantle was seized by the outbursting lava and began to burn up. Poliahu grasped the robe, dragging it away and carrying it with her. Soon she regained strength and threw the mantle over the mountain.

There were earthquakes upon earthquakes, shaking the great island from sea to sea. The mountains trembled while the tossing waves of the conflict between fire and snow passed through and over them. Great rock precipices staggered and fell down the sides of the mountains. Clouds gathered over the mountain summit at the call of the snow-goddess. Each cloud was gray with frozen moisture and the snows fell deep and fast on the mountain. Farther and farther down the sides the snow-mantle unfolded until it dropped on the very fountains of fire. The lava chilled and hardened and choked the flowing, burning rivers.

Pele's servants became her enemies. The lava, becoming stone, filled up the holes out of which the red melted mass was trying to force itself. Checked and chilled, the lava streams were beaten back into the depths of Mauna Loa and Kilauea. The fire-rivers, already rushing to the sea, were narrowed and driven downward so rapidly that they leaped out from the land, becoming immediately the prey of the remorseless ocean.

Thus the ragged mass of Laupahoe-hoe formed, and the great ledge of the arch of Onomea, and the different sharp and torn lavas in the edge of the sea which mark the various eruptions of centuries past (Westervelt 1916:60-62).

Waiau, Lake Waiau is situated within Pu'u Waiau and is the highest permanent lake in the Hawaiian Islands at 13,020 feet above sea level which is one of the highest permanent lakes in the world. Its area extent varies throughout the year, but is typically on the order of a couple hundred feet in diameter and is full of algae and microscopic life. It is generally assumed that in this otherwise arid region, this lake is permanent, on account of the underlying substrate that consists of a permafrost zone only three meters below the ground surface. This permafrost zone blocks the downward seepage of water into the porous bedrock (Ziegler 2002).

Lake Waiau is home of the goddess of snow, Poli'ahu, and is guarded by the supernatural water spirit (*mo'o*) known as Mo'o-i-nanea, or "the matriarch of all *mo'o* gods and goddesses," according Nā Maka o Ka 'Āina (2008). Waiau is located along the major Waiki'i-Waiiau Trail.

Westervelt relates that Waiau was one of the "four maidens with white mantles" in Hawaiian legends:

...has been almost entirely forgotten. There is a beautiful lake glistening in one of the crater-cones on the summit of the mountain. This was sometimes called "The Bottomless Lake," and was supposed to go down deep into the heart of the mountain. It is really forty feet in its greatest depth—deep enough for the bath of the goddess. The name Wai-au means water of sufficient depth to bathe (Westervelt 1915:56).

Maly's (1999) research demonstrates that the waters of Waiau were considered to be highly sacred by Hawaiians in the 19th century:

Mauna Kea falls in the senior line genealogy. During the 1880's, Emma Rooke, the wife of the late Alexander Liholiho Kamehameha, and David La'amea Kalakaua were in competition for the position of ruling chief for this kingdom of Hawai'i. Both of them needed to prove their connection to the senior line and connect back to a *wahi pana* [legendary or storied place].

David La'amea Kalakaua went to Kanaloa-Kaho'olawe to bathe in the waters of the ocean god Kanaloa. Emma went to the top of Mauna Kea to bathe in the waters of Waiau. The ceremony was to cleanse in Lake Waiau at the *piko* of the island. The water caught at Lake Waiau was considered pure water of the gods much like the water caught in the *piko* of the *kalo* leaf is thought of as being pure therefore it was used medicinally. (Nā Maka o ka 'Āina 2008)

3.5 Subsistence and Settlement

Over a period of several centuries, areas with the richest natural resources became populated and perhaps crowded, and by ca. 900 to 1100 A.D., the population began expanding to the *kona* (leeward side) and more remote regions of the island (Cordy 2000:130). Kirch (1985) reported that by ca. A.D. 1200, there were small coastal settlements at various areas along the western shore line of Hawai'i. In this system of settlement and residency, the near-shore communities shared extended familial relations with those of the uplands.

By the 1400s, upland regions to around the 3,000 foot elevation were being developed into areas of residence and a system of agricultural fields. By the 1500s to 1600s, residency in the uplands was becoming permanent, and there was an increasing separation of royal class from commoners. During the latter part of this period, the population stabilized and a system of land management was established as a political and socio-economic factor (Kamakau 1961; Ellis 1963; Handy, Handy with Pukui, 1972; and Cordy 2000).

The lowlands of Humu'ula-Ka'ohē and Pi'ihonua, extending from the shore to around the 3,000 foot elevation, supported residential and agricultural activities, spanning centuries of Hawaiian residency. The upper mountain lands were frequented by travelers, collectors of natural resources and for a wide range of cultural practices (Kamakau 1961).

3.6 Heiau (Temple)

Fornander states that 'Umi constructed a *heiau* (place of worship) east of Hualālai along the Kona-Waimea road, called "Ahu-a-'Umi," where his court resided (1996:101). However, a translation provided by Maly and Maly (2005:9-12; 2004:18) indicates this *heiau* was instead built to commemorate the battle which consolidated 'Umi's rule. According to Hammatt and Shideler (1991:72-73), "the burst of activity in the west corner of the PTA circa 1500 may well be associated with the movement of numbers of people to live and work at the Ahu a 'Umi project which lies just 5 miles to the southwest." Maly and Maly (2005:12) also describe the report of another *heiau* of 'Umi, built atop Pu'u Ke'eke'e.

In Maly (2004), among the early accounts penned by Hawaiian writers, in which reference to features associated with Humu'ula, Ka'ohē and the *āina mauna* are found, is an 1865 account, originally collected in 1853. The Hawaiian newspaper "*Ke Au Okoa*" published an article titled "*Na Kaa a Kekahi Elemakule o Hawaii*" (May 8, 15 and 22, 1865) taken from the stories collected by Jules Remy, a French man who came to Hawai'i in 1851. Remy befriended an old man whose name was Kanuha, a man of chiefly descent, born before the time that Alapa'i-nui died in 1752. Kanuha was nearly 116 years old and in good health. Among the traditions Kanuha shared with Rema, was an account of the ascent of 'Umi to the position of king on the island of Hawai'i. He describes the history behind the construction of the famed *heiau* Ahu a 'Umi and the construction of three other *heiau*: one on Mauna Kea, one on Mauna Loa and one on a hill near the Ka'ohē-Waikōloa boundary. These *heiau* were situated in the lands of Humu'ula (possibly two of the *heiau*), Ka'ohē and Keauhou. Remy's recording of Kanuha's story in 1853 and published in *Ke Au Okoa* on May 22, 1865:

Umi ruled in place of Hakau, and his friends Koi and Omaokamau dwelt with him. Piimaiwaa, Umi's war leader dwelt in Hilo. With Umi, there was also his

trusted companion Pakaa, and his priest Lono. At this time, Umi ruled the eastern side of Hawaii, while on the western side, his relative Keliokaloa, ruled and dwelt at Kailua... In the time that he dwelt in Kailua, Keliokaloa was known as an evil chief, he cut down the coconut trees and desecrated the cultivated fields. It was because of these evil deeds that Umi made preparations to go to war against him. Umi marched to battle, joined by his famous warrior, Piimaiwaa, and his companions Koi and Omaokamau. Also with him were his favorite, Pakaa, and his priest Lono.

Between Mauna Kea and Hualalai the chief and all his party traveled, with the thought of descending to Kailua. Keliokaloa did not wait though, but instead, traveled with his warriors to meet Umi in battle. The two armies met on a broad open plain, surrounded by the three mountains, at the place [now] called Ahu a Umi. There, Laepuni and them (people who were unattached to a chief) fought with Umi. Umi was almost killed, but Piimaiwaa leapt in and helped him, it was he who turned the battle in the favor of Umi's side. There is not much else that is said, but, it is known that the chief of Kailua died in the battle. Thus, with this battle, the entire kingdom was gained by Umi. He became the chief that controlled the entire island of Hawaii. So that the battle would be remembered from generation to generation, he (Umi) built the stone altar, that remains to this day, the altar (ahua) of Umi... [*Ke Au Okoa*; Mei 22, 1865 reported in Maly 2004: 16-18]

3.7 *Nā Ala Hele* (Trails)

Numerous pre-Contact trails, or *ala hele*, cross the Saddle Region; three major trail systems were documented by early historic travelers. Cordy (1994:194) proposed that these early post-Contact routes probably followed pre-Contact trails. The first trail connected Hilo to Waimea along a route generally following the modern Saddle Road. The second connected Waimea to Kona along the border between the Hāmākua and North Kona Districts. The third trail connected Ka'ū to the Waimea-Kona trail at the Ahu a 'Umi Heiau celebrated temple site, passing just south of the Hāmākua District boundary (Williams 2002b). Robins et al. (2006:8) reports that both the Waimea to Kona route and the route connecting Ka'ū to the Waimea-Kona trail were often referred to as "'Umi's Roads.'" SIHP 19528 is associated with 'Umi's Road to Waimea" (in reference to the famous ruling chief 'Umi-a-Līloa) (Williams 2002b:9).

Kamakau's *Ruling Chiefs of Hawai'i* described Keawe-nui-a-'Umi's (son of 'Umi-a-Līloa) use of the trail system to wage war against other districts:

When Keawe-nui-a-'Umi learned of the unjust rule of Ke-li'i-o-kaloa and the burdening of the common people, he was filled with compassion for the chiefs and commoners of Kona. Therefore he made himself ready with his chiefs, war lords, war leaders, and warriors from Hilo, Puna, and Ka-'u to make war on Kona. The war party [met?] at the volcano (pit of Pele) before going on to battle along the southern side of Mauna Kea and the northern side of Mauna Loa. The mountain road lay stretched on the level. At the north flank of Hualalai, before the

highway, was a very wide, rough bed of lava - barren, waterless, and a desert of rocks. It was a mountain place familiar to 'Umi-a-Līloa when he battled against the chiefs of Hilo, Ka-'u, and Kona. There on that extensive stretch of lava stood the mound (*ahu*), the road, the house, and the heiau of 'Umi. It was through there that Keawe-nui-a-'Umi's army went to do battle against his older brother, Ke-li-'i-o-kalua [Kamakau 1992:35].

In the early 1780s, Kamehameha used a trail across the mountains from Kawaihae to Kīlauea to attack Ka'ū and Hilo chiefs. This trail is believed to have been located along the Saddle Road corridor, but Williams (2002b:8) reported no remains of this trail have been found to date.

Dye (2005:6) discusses the problems with attempting to identify prehistoric trails in the region:

The widespread historic-era use of high elevation areas on Hawai'i Island, primarily for cattle ranching, has made it difficult for archaeologists to reconstruct the traditional Hawaiian trails there. The problem is being able to determine the age of a modern trail—is it new, or was it laid out over an existing trail? This problem is compounded somewhat by the lack of a detailed record of trails and by the nature of the trails themselves; over rough 'a'ā lava a definite route is often marked, but over *pāhoehoe*, which is easily traversed, the "trail" might be poorly marked, if at all, and hikers could have walked anywhere within a wide corridor...

...The difficulty of fixing precise locations in remote areas complicated archaeological efforts to record trails before the advent of the geographic positioning system. An example of this is trail site -19528 which might have been recorded and incorrectly located earlier as site -5006, the Nā'ōhule'elua curbstone trail (Reinman and Pantaleo 1998:101).

Naturalist Archibald Menzies visited the islands with Captain Vancouver in 1793. While on Hawai'i, he ascended Mauna Loa. During this expedition, he noticed "...that the Hawaiians kept '*Morai*' (*heiau* – ceremonial sites) along the trails at which they regularly stopped in prayer and with offerings," (Menzies 1908:110; from Maly and Maly 2005:454). Maly and Maly include Menzie's description of this practice in their 2005 report on the lands of Mauna Kea:

So bigoted are these people to their religion that here and there, on the sides of the path, they have little Morais, or spots consecrated to their Deity, which none of them ever pass without leaving something—let it be ever so trifling—to obtain his good will, and they were highly delighted, indeed, when we followed their example in throwing a nail or a few beads, or a piece of tapa, before their Deity, which the women were not allowed to pass without uncovering their breasts and shoulders [Menzies 1908:110; from Maly 2005:454].

Maly and Maly (2005:454) note that:

While the above narrative was recorded on a trip to Mauna Loa, such protocol was uniformly practiced throughout the islands, and is deeply rooted in the

spiritual beliefs of the people. There remain to this day examples of small shrines, upright stones (Pōhaku a Kāne) and other features along trails across the mountain plateau, leading across the *‘āina mauna*, and to the summit of Mauna Kea.

3.8 Burials

While historic accounts and *mo‘olelo* tell of the presence burials on Mauna Kea (Maly and Maly 2005), archaeological evidence until recently, was relatively limited concerning confirmed human burials in the summit region. Prior to 2005, archaeological authorities on Maunakea, including Pat McCoy, had documented only one confirmed burial site (with multiple burials) and four possible burial sites in the summit region (McCoy 1991). All of these sites are located on Pu‘u Mākanaka. However, McCoy (1999:28) also comments:

There is good reason to expect that more burials are to be found in the Science Reserve on the tops of cinder cones, either in cairns or in a small rock shelter or overhang. The basis of this prediction is that all of the known and suspected burial sites on the summit plateau are located on the tops of cinder cones and, more particularly, on the southern and eastern sides. No burials have been found on the sides or at the base of a cone, or on a ridgetop amongst any of the shrines. There in fact appears to be a clear separation between burial locations and shrine locations.

His comments appear to be apt as current in progress work by McCoy and Nees has documented 28 sites designated as burials and possible burials (McCoy et al. 2008).

Later during the reign of ‘Umi, Kamakau relates an account of the death and burial of the *kahuna* (priest), Pae, who served ‘Umi. Kamakau reports that Pae was “a descendant of Lilinoe, the woman of the mountains” (Kamakau 1961:215). Kamakau also reported that Lilinoe was an important ancestral figure in the genealogy’s of Hawai‘i’s *ali‘i* (royalty), and that she was buried on Mauna Kea. He observes that in 1828 Ka‘ahumanu traveled to Hawai‘i to:

...attempt the recovery of the bones of Lilinoe on Maunakea where her body was said to have lain for more than a thousand years in a well-preserved condition, not even the hair having fallen out. Others deny this and say her body was too well-hidden ever to have been found. Her offspring count from Hua-nui-i-ka-la‘ila‘i; she was the ancestress of ruling chiefs, and from her line was born ‘Umi-ka-lani [father of the Mahi family on Hawaii], son of Keawe-nui-a-‘Umi by Ho‘opili-a-Hae. It is said that Ka-‘ahu-manu did not find the bones of Lilinoe...(Kamakau 1961:285)

3.9 *Nā Oli* (Chants), *Nā Pule* (Prayers) and *Nā Mele* (Songs)

There are many different *oli* (chant), *pule* (prayer) and *mele* (song) about Mauna Kea and its summit region. The following examples and brief accompanying comments are from the *Nā Maka o ka ‘Āina* website (2008). These examples date from different times periods: some are modern, some are post-Contact in age, and some are much older (e.g., excerpts from the Kumulipo or creation chant). These *oli*, *pule* and *mele* associate Mauna Kea with the original

progenitors of life in Hawai'i, including Wākea and Papa, with the mountain's status as the *piko* of the *moku puni* (island), and with various mountaintop deities:

In some genealogical chants, Mauna Kea is referred to as “Ka Mauna o Kea” (Wakea's Mountain), and it is likened to the first-born of the island of Hawai'i (Pukui and Korn 1973). A *mele hanau* (birth chant) for Kauikeaouli (Kamehameha III) describes Mauna Kea in this genealogical context:

O hanau ka mauna a Kea
Born of Kea was the mountain

‘Opu‘u a‘e ka mauna a Kea
The mountain of Kea budded forth

‘O Wakea ke kane, ‘o Papa
Wakea was the husband, Papa

‘O Walinu‘u ka wahine.
Walinu‘u was the wife

Hanau Ho‘ohoku he wahine
Born was Ho‘ohoku, a daughter

Hanau Haloa he ali‘i,
Born was Haloa, a chief

Hanau ka mauna,
Born was the mountain,

He keiki mauna na Kea...
a mountain-son of Kea

A Social Impact Assessment
Indigenous Hawaiian Cultural Values
of the Proposed Saddle Road Alignments
Kanahele, Pualani K. and Edward L.H. Kanahele 1997

Mauna Kea is the *piko* of the island and this is another reason this area is considered sacred. This *piko* is the initial provider of the land mass of Hawai'i *mokupuni*. Hawai'i was also the first child of Papa and Wakea as stated in “Mele a Paku‘i”:

‘O Wakea Kahikoluamea ea
Wakea the son of Kahikoluamea

‘O Papa, Papa-nui-hanau-moku ka wahine
Papa, Papa-nui-hanau-moku the wife

Hanau o Kahiki-ku, Kahiki-moe
Kahiki-ku and Kahiki-moe were born

Hanau ke ‘apapanu‘u

The upper stratum was born
 Hanau ke 'apapalani
 The uppermost stratus was born
 Hanau Hawai'i i ka moku makahiapo
 Hawai'i was born, the first-born of the islands
 Ke keiki makahiapo a laua
 The first born child of the two
 Wakea laua 'o Kane
 Of Wakea together with Kane
 'O Papa Walinu'u ka wahine
 And Papa of Walinu'u was the woman

In 1980, Tutu Kawena Pukui shared a *mele* she had composed for Mauna Kea with me.

O Poli'ahu i ke kualono o Mauna Kea
 Poli'ahu is on the mountaintop of Mauna Kea
 Noho ana i ka lau o ke kuahiwi
 Dwelling on the expanse of the mountain.
 Wahine noho anu o uka o Lihu'e
 Woman who dwells in the cold above Lihu'e [on the Waimea plain]
 E ku ana iluna o ke ki'eki'e
 Standing atop the heights
 Ho'anoano wale ana i Pali-uli e...
 Awe-inspiring [as seen from] Pali-uli...

Excerpts from Mauna Kea – Kuahiwi Kū Ha'o i ka Malie, A Report on Archival and Historical Documentary Research, Ahupua'a of Humu'ula, Ka'ohē, districts of Hilo and Hāmākua, Island of Hawai'i, by Kepa Maly, ©1997 Kepa Maly, Kumu Pono Associates and Native Lands Institute

Mauna Kea
 translation by Mary Kawena Pukui

E aha 'ia ana o Mauna Kea
 What is doing with Mauna Kea?
 Kuahiwi 'alo pu me ka kehau
 Mountain ever moist with dew
 Alawa iho 'oe ia Mauna Loa
 Take a glance at Mauna Loa
 Kohu moa uakea i ka malie

It is like a white cock standing in the calm

Ku aku au mahalo o ka nani
I stand and admire the beautiful scene

Ka haale a ka wai hui a ka manu
The rippling of the cold water of the birds

Kau aku ka manao a e ike lihi
Think constantly and to glimpse

Ka uwahi noe a o Kilauea
Of the gray, misty smoke of Kilauea

Ke hea mai nei Halemaumau
Halema'uma'u is calling

'Ena'ena i ke ahi a ke wahine
She who is ever burning with the woman's fire

Ka wahine kui pua lehua o Olaa
The woman who strings the lehua blossoms of 'Ola'a

I hoa hoouipo no ka Malanai
Is the sweetheart of the Malanai wind

I ahona Puna i ka hone a ke kai
Relieving Puna in the sweetness by the sea

Ke ala o ka hinano ka'u aloha
And the fragrance of the hinano I love so well

Aloha ia uka puanuanu
I love the chilly uplands

I ka hoopulu ia e ke kehau
in the wet and the snow

Haina ia mai ana ka puana
This is the end of my chant

Pulu elo i ka wai a ka Naulu.
Soaked, drenched in the water of the sudden shower.

Aia na kulu pakaua ko loku mau la ma na Kona i keia mau la.
There are dripping raindrops downpour unceasing days there at Kona to this day.

Ola aku la no hoi ia mau kini!
lived that return many.

3.10 Bird Hunting

Dye (2005:6) writes of the avian resources of the upland forests and the saddle:

The testimony by elderly *kama'āina* clearly distinguishes the forested [upland zone] lands from those above the forest line. Within the forest are noted the homes or temporary camps of canoe makers and bird feather collectors. These are specifically noted at elevations as high as 5,500 ft... The available records do not identify any substantial construction that might have taken place at these temporary camps, however. Above the forest line, the primary traditional Hawaiian resources appear to have been 'ua'u [or dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*)] and *nēnē* [or Hawaiian Goose (*Branta sandvicensis*)] birds. These resources were actively managed...

Hammatt and Shideler (1991:73) also discuss the importance of avian resources in and around PTA:

While there are no specific references tying 'Umi to the PTA, it is nevertheless clear that his lifetime is much associated with the acquisition of avian resources in the uplands, with high elevation trails, and with the plateau area. 'Umi and some of his friends are specifically referred to as hunting birds for feathers and food. Their primary area of operation appears to be ten miles or more to the northeast of the PTA but it seems reasonable to assume that some similar bird hunting was going on within the PTA in this time frame...

Prominent surveyor Curtis J. Lyons penned "Hawaiian Land Matters," an 1875 paper describing "the rights of native tenants on the *ahupua'a* of Humu'ula and Ka'ohē," (Maly 2004:8). In this paper, he notes that "The whole main body of Mauna Kea belongs to one land from Hamakua...Kaohe, to whose owners belonged the sole privilege of capturing the *ua'u*, a mountain-inhabiting but sea-fishing bird," (Lyons 1875:111; from Maly 2004:8). Hammatt and Shideler (1991:34) remark that "[b]oundary disputes . . . were common in the interior with men of one district killing men of other districts 'for stealing food.'"

The Saddle Region was once home to a variety of bird species including vast quantities of ground-nesting seabirds, the most common of which was the 'ua'u. According to retired Forestry and Wildlife Manager Jon G. Giffin (2009:40), "[f]ossil records indicate that many kinds of seabirds formerly concentrated their activities at Pu'u Wa'awa'a." Lyons (1875:111) mentions that the *ahupua'a* of Ka'ohē was a well known location to catch seabirds to eat. Henshaw reported that the Hawaiians went to the lava fields of the Saddle Region to capture young birds in their nests. The immature birds were said to be a delicacy restricted to the *ali'i*, or chiefly class (Henshaw 1902:102; Beckwith 1932:88).

Bird hunters also sought other species for food, including: the *moho*, or Common Hawai'i Rail (*Porzana sandwichensis*); the *nēnē*; and the 'alalā, or Hawaiian Crow (*Corvus hawaiiensis*). Like the 'ua'u, the *moho* nested in holes and crevices, and were probably exploited in the same fashion. The *nēnē*, *mamo* (*Drepanis pacifica*), and 'alalā were taken for their plumage as well as for food (Malo 1951:38).

Other bird species collected in the Saddle Region for their feathers included: the Hawai'i 'amakihi (*Loxops virens virens*); 'apapane, or Hawaiian honeycreeper (*Himatione sanguinea*); 'elepaio, or Hawaiian flycatcher (*Chasiempis sandwichensis*); 'i'iwi, a scarlet honeycreeper (*Vestiaria coccinea*); 'akepa, a honeycreeper (*Loxops coccinea*); kōlea, or Pacific Golden-Plover (*Pluvialis fulva*); palila (*Loxioides bailleui*); pueo, Hawaiian owl (*Asio flammeus*); 'akialoa (*Hemignathus* spp.); 'ō'ō (*Moho* spp.); and 'ō'ū (*Psittirostra psittacea*) (Athens and Kaschko 1989:39). Their plumage was used for making symbols of chiefly rank such as feather cloaks, capes, helmets, and standards.

Maly and Maly (2005:37) relate a 1985 article written by Emerson, in which Emerson states that "...in the economic system of ancient Hawai'i a higher valuation was set upon bird-feathers (those of *mamo* [a species of honeycreeper] and 'ō'ō) than upon any other species of property."

Giffen's 2009 biological assessment of Pu'u Wa'awa'a Ahupua'a discusses the now-extinct giant flightless goose, which was discovered at Pu'u Wa'awa'a:

The giant flightless goose discovered at Pu'u Wa'awa'a is the largest terrestrial vertebrate ever found on the Island of Hawaii. This extinct bird (*Branta* n. sp.) was over twice the size of the modern nene (*Branta sandvicensis*). It had a massive skull, heavy body, stocky legs, and wings too small for sustained flight. This large terrestrial goose was apparently very common in mesic montane forests at Pu'u Wa'awa'a. Remains of over 100 giant flightless geese were found in lava tubes during the survey period. Distributional range of the subfossils varied from 3,000 to 6,000 feet in elevation. I also found subfossil goose bones at two other locations on the Big Island: Honomalino (4,000 ft. elevation) and Manuka Natural Area Reserve (2,500 ft. elevation)...

Paxinos (1998) aged subfossil bones from...flightless geese collected from Pu'u Wa'awa'a lava tubes. These samples yielded radiocarbon dates of 510, 870, and 900 years before present. Based on these results, it appears that flightless geese survived until fairly recent times, possibly a few hundred years before the islands were visited by Captain Cook in 1778.

Ancient Hawaiians were certainly aware of flightless geese and probably hunted them for food. Bird catchers must have encountered these large birds while collecting feathers in the forest. In fact, fragments of bone from a flightless goose have been recovered from archaeological middens on the Island of Hawaii (H. James, personal communication). Flightless geese were a conspicuous component of the native avifauna, yet surprisingly, no legends remain about them. These birds shared the same habitat as the o'o (*Moho nobilis*), i'iwi (*Vestiaria coccinea*), and other species prized for their brilliant feathers. The only Hawaiian word known for native geese is nene. This generally refers to the historically known flighted species (*Branta sandvicensis*). It is interesting to note, however, that there is a locality on Hualalai (5,080 feet elevation), not far from where flightless goose subfossils were found, called "nenenui". This literally means "large goose."

Perhaps two species of geese were recognized by ancient Hawaiians, *nene* and *nenenui*.

Reasons for the extinction of flightless geese can only be surmised. Kirch (1982) determined that Hawaii's prehistoric human population increased rapidly after A.D. 1200 and reached a peak about A.D. 1650. Human food resources must have been greatly stressed during the latter period and large birds like flightless geese were probably severely exploited. This along with increased predation from introduced rats may have resulted in the rapid demise of giant flightless geese [Giffen 2009:36-37].

J.S. Emerson relates how the game birds, once captured and killed, were cooked using stones, or *pōhaku eho manu*:

The stone was heated red hot and inserted in the interior of the bird to be cooked. Bird and stone were then wrapped in suitable leaves and covered with earth to steam in its own juice. This saved the use of water which was often a scarce article on the southern and western slopes of the mountains of Hawai'i [Emerson in Summers 1999:2].

3.11 Keanakāko'i - Maunakea Adze Quarry

This brief subsection is based primarily on Kirch's (1985) summary. The Mauna Kea Adze Quarry (State Inventory of Historic Properties [SIHP] No. 50-10-23-4136), also known as *Keanakāko'i* "the adze-making cave" (Pukui et al. 1974:103)", is located on the southern slopes of the mountain, at elevations up to 12,400 feet. The site was listed on the National Register of Historic Places in 1969, and the Hawai'i State Register of Historic Places in 1981.

The quarry occupies an area of at least 4,800 acres and is the largest site of its kind in all of Polynesia; in fact, there are very few quarry sites of its kind and size in the entire world. Kirch explains:

The attraction that drew prehistoric Hawaiians to these inhospitable heights, inducing them to brave sudden and frequently severe winds and snowstorms, was a single flow of extremely hard and dense blue-black basalt, probably the best single source of adz rock in the archipelago. The flow had erupted at a time when the summit of Mauna Kea was capped with glacial ice, with the sudden cooling effect causing the extreme density of the basalt. (Kirch 1985:179-180)

Archaeological surveys of the quarry site have identified hundreds of features, including "extraction areas...workshops, open-air shelters, shrines, overhang shelters, and rockshelters" (Kirch 1985:180). Plant and animal food debris has also been recovered in excavation, which has yielded radiocarbon-dated hearth materials from as early as the fifteenth century. Other evidence suggests the quarry was likely used up until the time of European contact (i.e., late 18th century).

Abbott (1992), citing Allen (1981), notes that *pōpolo* (glossy nightshade, *Solanum americanum*) seeds have been recovered in excavations at the Mauna Kea Adze Quarry and dated to A.D. 1650.

Paul Cleghorn, who analyzed much of the Mauna Kea quarry material for his dissertation (1982) and has conducted extensive experiments with its properties and production techniques, characterized the makers of these tools as follows:

...there was a tremendous amount of standardization at the Quarry—standardization in adze form, standardization in size proportions, and standardization in procedure. This high degree of standardization supports the contention that the adze makers were craft specialists.

This study has also provided details on the development of behavior at the Quarry. It appears that expert craftsmen worked at the escarpment where there was abundant raw material. Novices or, perhaps more accurately, apprentices foraged for suitable raw material on the outwash plain, where they practiced their skills. (Cleghorn 1982:343)

DRAFT

Section 4 Historical Background

4.1 Early Historic Period

4.1.1 Ascent of Mauna Kea

The first recorded ascent of Mauna Kea was in 1823 by the missionary Joseph Goodrich (who lived 1794-1852). Like many missionaries, the Yale-educated Goodrich was also a naturalist and he published his observations on Hawai'i Island volcanoes in the *American Journal of Science* in 1826 and 1829. According to records, the preacher hiked from Waimea to the Mauna Kea summit and back to Waimea in one 24-hour marathon. He approached via Kawaihae and Waimea. In the vicinity of Waimea he spent the night (at approximately 2,700 feet elevation). Leaving early, and approaching the summit from the north, he followed a steep ravine reaching the tree line at about 9,000 feet elevation approximately 15 miles from Waimea where he rested for a few hours recording the temperature at 43° F at sunset. At 11:00 PM, he pushed on in bright moonlight encountering snow at 1:00 AM and recording a temperature of 27° F. Goodrich attained the highest of several summits around 3:00 AM noting the presence of a pile of stones which he assumed had been constructed by Hawaiians. He roughly retraced his steps back to the vicinity of Waimea. Given that all of his time above 9,000 feet was in the dead of night and the distance he needed to cover, few details were recorded. Goodrich made a second trip up Mauna Kea in 1825 noting dead sheep on one of the cones at an estimated 13,612 feet elevation and speculating they had been driven there by wild dogs. For 150 years, the near perfect Pu'u Hau Kea (elevation 13,441 feet), as it is presently known, was popularly known as the "Goodrich Cone" (see Kilmartin 1974:13; Macdonald et al. 1983:18) in his honor.

Hitchcock (1911) described several early scientific ascents of Mauna Kea (Figure 8 through Figure 11):

Several of the party of the Blonde [i.e., the H.M.S. Blonde] ascended Mauna Kea in July, 1825, accompanied by a "missionary and botanist." Rev. Mr. Goodrich of Hilo writes of an ascent made by him in August 27, 1825. He brought back specimens of the "granite" [i.e., basalt] from the summit, as well as the fine grained basalt used for the manufacture of adzes. James Jackson Jarves climbed to the summit in 1840, bringing back specimens of "augite, hornblende and olivine." He looked into Mokuaweoweo and reported that there were no signs of activity, not even ascending vapors. In the early part of January, 1841, Dr. Charles Pickering of the Wilkes Exploring Expedition, made the ascent and noted the same features mentioned by his predecessors, such as the ice and several cones of volcanic origin. In a desolate and gravelly plain he found a few plants suggestive of a colder climate, probably the same that were brought back by Mr. Preston and named authoritatively, such as *Cystopteris fragilis*, *Trisetum glomeratum*, *Poa annua* and *Deschampsia australis*.

The English botanist David Douglas (for whom the common name of the Western American Douglas Fir [*Pseudotsuga menzies*] was named) carried out scientific ascents of Mauna Kea and

Mauna Loa and died of mysterious circumstances (at the age of 36) on the slopes of Mauna Kea in 1834 (Ziegler 2002).



Figure 8. Photograph of cinder cones of Mauna Mea with Waiiau (lower left) (Brigham 1909)



Figure 9. 1909 photograph of Lake Waiiau from Brigham



Figure 10. 1911 photograph of cinder cones of Mauna Kea from Hitchcock (1911)

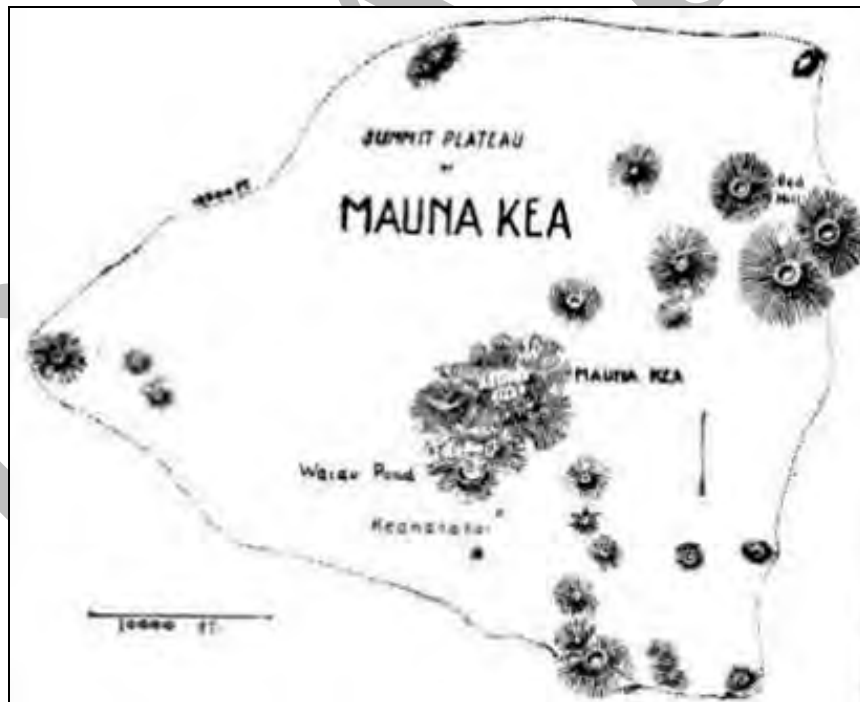


Figure 11. Hitchcock's (1911) copy of W. D. Alexander's 1892 map of the Mauna Kea summit region

4.1.2 Sandalwood Collection

In the first decades of the 19th century, *'iliahi* or sandalwood (*Santalum* spp.) was harvested throughout the Hawaiian Islands for export to China. Thousands of trees were taken from the uplands, devastating the forests; by the 1840s only saplings remained (Robins et al. 2006:11-13). Wilkes (1845:100) observed caves along the Kona-Waimea Trail that were reported to have served to house sandalwood collectors. When Shapiro and Cleghorn (1998) documented a lava tube, (SIHP 19491), on the western edge of PTA near the border separating North Kona from Hāmākua, three bundles of sandalwood wrapped in nets were found in the lava tube (Shapiro and Cleghorn 1998:48).

4.1.3 Cattle (Bullock) Hunting

Captain George Vancouver introduced cattle to the islands in 1793 with the gift of a bull and a cow to Kamehameha I. L.A. Henke details this event:

On the 19th of February, 1793, he [Vancouver] landed a bull and cow from California for Kamehameha I in the canoe of Krimamahoo [Kalaimamahū, a half brother of Kamehameha I], off the coast of Hawaii. On the 22nd of February, 1793, he landed five cows, two ewes and a ram, in the bay of Kealakekua for Kamehameha I; on the 15th of January, 1794, he landed a bull, two cows, two bull calves, five rams, and five ewe sheep from California in Kealakekua Bay for Kamehameha I [Henke 1929:9].

Kuykendall notes that Vancouver saw that the introduction of cattle to Hawai'i "...would not only be of advantage to the native people but would also enhance the value of the islands as a commercial depot and rendezvous," (Kuykendall 1968:40-41).

Kuykendall (1968:40-41) notes that Vancouver saw that the introduction of cattle to Hawai'i "...would not only be of advantage to the native people but would also enhance the value of the islands as a commercial depot and rendezvous." Upon the arrival of cattle, Kamehameha I placed a *kapu* (taboo) on the killing of cattle for a ten year period, so that they could multiply, "...except the males should [they] become too numerous," (Henke 1929:9). Maly (1999:110) notes that the *kapu* may have actually lasted thirty years, leading "...to a great proliferation of the cattle, which led to their being moved from Kona to the plains of Waimea, which led to their spreading through the mountain lands of Mauna Kea, Mauna Loa and Hualālai."

At this point in time, all of cattle and other introduced livestock—including horses, which were first brought to Hawai'i in 1803, and goats, introduced by Captain Cook in 1778—were considered property of the government, though a few foreigners had been granted the right to handle the cattle (Henke 1929:5-20). Henke (1929:22) estimated that of the 20,000 cattle on the island of Hawai'i in 1851, 12,000 were wild. In 1847, the branding of wild cattle became a government function, overseen by William C. Beckley (Bergin 2004:141). In 1850, the King appointed George Davis Hueu, of Waikōloa, as "Keeper of the Cattle:"

Honolulu, Oahu—June 10, 1850

Public Notice—Charles Gordon Hopkins, Land Agent of the King:

...Know all me by these presents, that we, the undersigned Agents of the King and the Government, hereby appoint G.D. Hueu, as Keeper of the Cattle at Waimea & Mauna Kea and surrounding districts, or wherever the cattle may roam, the cattle in the woods and the Government; those are the ones he is to keep and run in places where the food is good; to brand and perform other duties as are usually performed by a cattle herder, always looking after the interest of both parties; until such time as the King and Government may send for them, and to deliver the cattle only upon receipt of an order. In case any trouble should happen to the cattle, whether stolen or feloniously branded, the said G.D. Hueu is empowered to bring law suits in the courts, in the names of the persons who own the cattle. He to speak the word, and the management and other powers usually given to a cattle herder [HSA ID Ltr. Book 2. Pt. 2; from Maly 2004:60].

4.1.3.1 *The Spanish Influence*

Cattle herds spread quickly around Waimea and the upland slopes (including the Saddle Region). By 1818, the wild cattle had become such a nuisance that foreign “bullock hunters” (including John P. Parker, who later founded the Parker Ranch) were hired to shoot cattle and prepare the meat for sale to foreign ships (Williams 2002b:25). In the 1820s Reverend William Ellis (1963:402) described the practice:

Although there are immense herds of them [cattle], they do not attempt to tame any; and the only advantage they derive is by employing persons, principally foreigners, to shoot them, 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 with great labour and expense. They first carry all the salt into the mountains. When they have killed the animals, the flesh is cut off their bones, salted immediately, and afterwards put into small barrels, which are brought on men's shoulders ten or fifteen miles to the sea-shore.

The problem of the wild cattle persisted and, in the 1830s, the King decided to hire Mexican *vaqueros*, or cowboys, to train the ranchers in better handling techniques. In 1831, a Mexican man named Joaquin Armas, who was known to be an expert in catching wild cattle, was headed to London on the whaling ship *Harriet*. The ship docked in Honolulu. Armas had no intention of staying in Hawai'i, but when Kamehameha III learned of his presence on the *Harriet*, he requested that Armas stay and help with the problem of the wild cattle. Armas worked for nine years in Waimea (Bergin 2004:34). Other *vaqueros* worked throughout the islands over the next two decades, sharing their knowledge and marking a wave of Mexican immigration.

Henke (1929:21) writes of some of the first *vaqueros* and their influences:

According to Eben Low, three celebrated Mexican cowboys, Kossuth, Lozuida and Ramon were brought to Hawaii and sent to Waimea about 1832. Among the wild longhorned cattle, descendants of Vancouver's original importation, they found their home and occupation.

Curtis J. Lyons in a paper presented to the Historical Society interestingly describes them. They brought with them the saddle, richly adorned, of stamped bull hide leather and brood winged stirrups. They brought along the jingling spurs, the hand wrought bit and tile hair rope with alternate strands of black and white. They made the lasso or lariat evenly braided from four strands of well chosen hide. They taught their worthy successors, the Hawaiian cowboys, how to throw the lasso, guide the horse by causing the rein to bear on the horse's neck and how to conquer the wild herds on the slopes of Mauna Kea.

One of the most important contributions of the *vaqueros* was their introduction of the rawhide lasso. Bergin (2004:36) discusses this method of handling the wild cattle:

The use of the rawhide lasso drastically changed the movement of cattle closer to market and into confinement for eventual domestication. The Spanish method replaced the labor-intensive system of packing salt to the mountain and hauling kegs of salted beef (*i'a kōpī* or *pipi miko*) back to the shoreline communities. As part of the method, the bullock was roped in the remote range, snubbed to a tree, and tethered snugly over a night or two for a cooling-off period. This process is called *po'owaiū* by the *paniolo*. At the appropriate time, usually at daybreak, the bullock was shorn of his horn tips (*'oki hau*), and then led (*alaka'i*) by a single head rope or two to a central corral. These corrals were often located at a rudimentary camp or village (*kauhale*). At these strategic locations, the butchering (*kua'i lole*) and salting process (*kōpī*) culminated with the salted barrels of beef via ox (*pipi kauō*) or horse-drawn carts (*lio kauō*) being sent to the marketplaces, located in ports or communal gathering sites.

An article about bullock hunting from 1865 in *Gazlay's Pacific Monthly* gives an account of the process by which the cattle would be dried on the mountain and then delivered to Waimea for shipment:

An agent resides at Waimea, who engages the hunters, agreeing to pay them at the rate of one dollar and twenty-five cents for each bull's hide, and one dollar for each cow's hide, properly dried and delivered at a certain point on the mountain. From thence they are conveyed to Waimea in carts, and after undergoing the process of salting, are shipped to Honolulu, where they figure among our list of domestic exports, to a very respectable amount... [*Gazlay's Pacific Monthly*, VOL. I. No.4; April, 1865:344].

The writer Hualalaj, in the 1859 *Pacific Commercial Advertiser* article cited earlier in this report, discusses the process of hunting wild cattle for hides and the life of the "native *vaquero*:"

Cattle Hunting (1859)

The government conjointly with the King, I believe, are the owners of the unmarked wild cattle on Hawaii, and have sold or leased the right to slaughter to private parties, upon what precise terms I am unable to say. An agent resides at Waimea, who engages the hunters, agreeing to pay them at the rate of \$1.25 for

each bull hide and \$1 for each cow's hide, properly dried and delivered at a certain point on the mountains. From thence they are conveyed to Waimea in carts, salted and shipped to Honolulu. During the first half of 1859, 222,170 lbs. of hides were exported, mostly, I presume, to the United States, where a fair quotation per last mail, would be twenty-five cents per lb., giving us an export value of \$55,542, wherewith to help pay our debts in New York and Boston...

The wild cattle are now hunted almost solely for their hides, and they possess the advantage over those of the tame herds for the purposes of commerce that they are not mutilated with the branding iron. Under the present indiscriminate and systematic slaughter of these cattle, by which young and old, male and female, are hunted alike for the sake of their skins alone, they have greatly diminished in numbers, and a few years only will suffice to render a wild bullock a rare site where they now flock in thousands.

The country through which they roam is in many parts composed of fine grazing lands. Thousands of acres could be devoted to wheat growing, being composed, to a good depth, of a light, sandy soil, capable of being plowed with facility. The only drawbacks to this as an agricultural country, would be, - first, the great scarcity of water, second, the depredation of the wild hogs. As to the first, water no doubt could be found in plenty by digging; and the hogs would have to be exterminated. I wonder that some one has not, ere this, purchased the government right in these hogs, and set up a lard factory on the mountain. Why would not it pay at 12 ½ cents per lb., - or even for soap grease?

But I started to tell you something about the life of the hide-hunters. First, for their camp. This was situated on a side hill, in a grove of koa trees, that sheltered them somewhat from the trade winds, which here blow fresh and Pu'u Anahulu and Pu'u Wa'awa'a cold, and furnish them with firewood - no small consideration at this elevation. The hut was built of three walls of stone, open to the south, the roof formed of *koa* logs, plastered on the outside with dry grass and mud. The floor was the ground covered with hides for a flooring, and perfectly swarmed with fleas of enormous size and bloodthirsty dispositions. In front, within a few feet of the sleeping places, a large fire was constantly kept burning, and all around, for an acre or so, the ground was covered with drying hides.

In the hut, within a space of about 15 by 20 feet, some twenty-five or thirty native *vaqueros* found a sleeping place by night; and a place to play cards in by day when not engaged in the chase. Near by was their "corral," and enclosure of sticks and hides, containing some sixty horses, all owned by natives, and which had been collected for a grand "drive in," to take place on the morrow... ..The pen which generally encloses a half an acre, is built square of strong posts and rails, and from the narrow entrance a long line of fence gradually diverges like the upper half of the Y, extending its arms out towards the mountain from which cattle are to be driven...

...we spied a great cloud of dust some three or four miles up the mountain side, and here came at a full gallop several hundred head of cattle of all sizes, closely pursued by semicircles of vaqueros, driving the game right down for corral. As they rapidly approached the arms of the trap, the ground shook beneath their hoofs, and they wedged crowded each other into a compact body to avoid the dreaded horsemen...

...Mixed up with the cattle, and driven along with them, were probably not far from a thousand wild hogs, who, disturbed in their interior haunts, had got into the trap designed for nobler game. Their piercing squeals as, kicked and tossed by the frantic cattle, they rolled over in the dust, added no little to the amusement of the scene... [*Pacific Commercial Advertiser*, August 11, 1859; from Maly 1999:112-113].

Bergin (2004:36) writes that "...by 1859, the vaqueros were no longer riding the ranges at Waimea."

4.1.3.2 *Later Kapu (prohibited) on Bullock Hunting*

By 1837 more than 60 bullock hunters were reported to be working in the uplands, and wild cattle were hunted in every district of the island (Bergin 2004:28). McCoy (1984:17-20) documented rock walls and an enclosure associated with bullock hunting on the slope of Mauna Kea above PTA.

In the year 1840, the government again placed a *kapu* on the slaughter of cattle solely for hides and tallow. Wilkes (1970:200) described the reasoning behind this decision:

The cattle have been tabooed for five years, from the year 1840, in consequence of the slaughter that had been made among them. Upwards of five thousand hides, I was told, had been procured in a single year, and when this became known to the government, it interdicted the hunting of the animal. I heard no estimate of the number of the wild cattle, but they are believed to be very considerable, and all from the stock left by Vancouver in 1795.

In 1942, Kamehameha III allowed rancher George Bush to hunt 300 head of wild cattle, despite the *kapu*:

Lahaina—March 26, 1842

Kamehameha III and Kekauluohi; to John Davis Kuakini:

...This is our communication to you. George Bush is going up to Hawaii for the purpose of taking cattle on the mountain, to the amount of three hundred. These three hundred cattle are to settle the difficulty with Bill, formerly spoken of. These are what we have given him for the settlement of that difficulty. When those three hundred are taken, then the *kapu* shall again be put on the cattle, according to the former charge...

Lahaina—March 26, 1842

Kamehameha III and Kekauluohi; to William Beckley:

...This is our charge to you. George Bush is going up there to take cattle to the amount of three hundred, and when those hundreds are taken, then they are to be kapu again, according to the former charge. Furthermore, you are to aid George Bush by yourself and horses in all his business and necessities... [HSA ID Misc. Box 141; from Maly 2004:56].

A 1973 article by Bud Wellmon entitled “Frontier Traders and Pioneer Cattlemen: An Hawaiian Perspective” from the *Hawaiian Journal of History* notes another taboo on killing any of the king’s cattle, starting in 1849:

The growing shipment of beef to Honolulu and the demands for the hides and tallow drastically reduced the numerous herds of wild cattle of northern Hawaii. By 1849 the decrease became so evident that the government invoked a tabu prohibiting the killing of any of the king's animals for four years. This was an unmistakable indication that the old days were passing. Farsighted men at this time established their own herds and began to pressure the government to provide them with well defined properties on which to range these animals...

...To make a living in the cattle business it became necessary to secure defined pasture lands and to brand and to keep close supervision over private herds. Within the next few years this economic reality brought great changes to the island. Men could no longer make a living collecting unbranded hides. The former cattle hunters became men without occupations. As a result many drifted into obscurity, adopting slovenly habits, and becoming addicted to excessive bouts with alcohol [Bud Wellmon; *Hawaiian Journal of History*; Vol 7:52].

4.1.3.3 Destruction of the Upland Forests

From the beginning of the 19th century, the damages wrought on the upland forests by cattle—and the sandalwood industry—were beginning to become very obvious. Giffen (2009:14-15) reports the observations of Professor Koebele from the turn of the century:

Government observers began reporting forest destruction at Pu‘u Wa‘awa‘a as early as 1900. Professor Koebele visited the area sometime between 1899 and 1900 and noted that cattle were rapidly changing the forest. He reported that “The upper part of the ranch [presumably the forest bird sanctuary area] comprises some 12,000 acres of fertile Government land, covered with valuable forest trees, among them the famous koa. It is here where we have seen the sandalwood 14 tree over eighteen inches in diameter. Five years since the present leaseholder had to hew a trail to see the condition of the land; today we find a handsome open park land, so to speak, where one can ride anywhere on horseback. I venture to say that at the expiration of the lease, twenty years hence, we will find an open pasture land, very much in want of moisture.” (Koebele 1900).

Forest decline did occur much as Koebele predicted, but over a slightly longer period. Rock considered the Waihou section of Pu'u Wa'awa'a to be one of the most botanically rich areas in the Hawaiian Islands. In 1909, he noted that *akoko* (*Chamaesyce olowaluana*) practically covered 5,000 acres "between Huehue and Pu'u Wa'awa'a" (Rock 1913). Even as late as 1959, the mamane canopy was still intact according to Billy Pairs, former Pu'u Wa'awa'a Ranch manager (personal communication). Blackmore and Vitousek (2000) used aerial photos to measure the long-term loss of forest cover at Waihou. They found that the aerial extent of dense forest decreased 62 percent between 1954 and 1994 and that the area covered by grassland increased by 237 percent. Today, Waihou is an open pasture marked by standing skeletons of dead or dying mamane trees and akoko is almost extirpated. Droughts are common and invasive grasses and weeds have almost completely replaced native understory plants.

Maly (1999:114) notes that "[a]s early as the 1870s ... and through out the 1890s to 1950s lease of Pu'u Wa'awa'a-Pu'u Anahulu to the Hinds ... lessees were required to implement a wide variety of conservation activities," in an attempt to stem the damage. In 1898 Walter Maxwell wrote of the depredations of the cattle, and of their movement further *mauka*:

The forest areas of the Hawaiian Islands were very considerable, covering the upland plateaus and mountain slopes at altitudes above the lands now devoted to sugar growing and other cultures. Those areas, however, have suffered great reduction, and much of the most valuable forest cover has been devastated and laid bare. The causes given, and to-day seen, of the great destruction that has occurred are the direct removal of forest without any replacement by replanting. Again, in consequence of the wholesale crushing and killing off of forest trees by cattle which have been allowed to traverse the woods and to trample out the brush and undergrowth which protected the roots and trunks of trees, vast breadths of superb forests have dried up, and are now dead and bare. All authorities of the past and of the present agree in ascribing to mountain cattle, which were not confined to ranching areas, but allowed to run wild in the woods, the chief part in the decimation of the forest-covered lands...

... the meat-eating population has increased, while the areas devoted to grazing and the numbers of cattle have gradually diminished... Formerly [cattle]... had wider ranges to rove over and feed upon; they were possessors of the land, and their value consisted chiefly in the labor and hides that they yielded. At that time the plantations, which were of smaller areas than now, were almost wholly worked by bullock labor... In the course of time, and that very recent, the sugar industry has undergone great expansion. The lands, some of which formerly were among the best for meat-making uses, have been absorbed by the plantations, and the cattle have been gradually forced within narrower limits at higher altitudes [Maxwell in Thrum 1900:73, 75-76; from Maly 1999:113-114].

A 1939 article by forester Lester W. Bryan in the *Paradise of the Pacific* discusses the difficulties of hunting wild cattle in these remote areas:

The last real stand of wild cattle is being made on the southeast slopes of Mauna Loa above the 5,000 foot contour. In this almost inaccessible section, small hands of these animals can still be found and offer thrilling sport to the hunter with either rope or gun. The "Longhorns" of the early Mexican cattle have gradually disappeared until today there are none to be found except as mounted trophies of the past. The present strain of wild cattle is a mixture of practically all the breeds ever introduced here and the result is often a queer looking animal. The Bulls are usually Red or Black and apparently have good blood for they are big fellows and offer plenty of fight when cornered or wounded. Except in dry weather, these animals are usually in good condition and the meat is well worth packing out.

In hunting them it is necessary to stalk them with considerable care and silence. They are easily alarmed and are off at the first sign of danger. They live in a rough, lava strewn area, over which a horse or man makes slow progress and once they start to run it is difficult to catch them even with dogs. We find that a 30-30 is a little too light for these animals particularly the bulls which are very hard to kill. I recall hitting a full grown bull between the eyes with a 30-30, hi-speed bullet and afterward (when he was dead from other shots), picking it out of the hair on his forehead where it had lodged without penetrating his thick skull...

...It is estimated that about two hundred of these wild animals yet remain on the slopes of Mauna Loa, where they range, live and die, and seldom see man. Their days are numbered for a new forest fence, eighteen miles long, is being built along the upper boundary of the Kau Forest Reserve by the CCC boys working under the direction of the Territorial Division of Forestry. When completed this fence will aid in confining these animals and eventually they will disappear as they have from other sections of the Island [Bryan; *Paradise of the Pacific*; September 1937:9-10].

4.1.4 Early Foreign Visitors

First-hand accounts of early foreign visitors to the Hawaiian Islands provide valuable insight into the natural landscape and the transition from the traditional lifestyle to one influenced by the introduction of western culture. Many of these travelers traversed the saddle region, often as a launching point for travels to the summit of Mauna Kea. In Maly's 2004 report on the lands of Humu'ula and Pi'ihonua, he discusses how the routes the early visitors would usually take through the saddle:

By the early 1800s, foreign visitors began making regular trips across the *'āina mauna* and to the summit of Mauna Kea. Based on their accounts, travel in the region through the middle 1800s basically followed the old trails, or cut across new areas. By the 1850s, the Kingdom of Hawai'i entered into a program of improving ancient trails and identifying new routes, by which to improve travel between various locations and facilitate commerce. [Maly 2004:5]

4.1.4.1 William Ellis

The journals of the British missionary William Ellis contain references to his visit to Mauna Kea (Mouna-Kea), Mauna Loa (Mouna Roa), Hualālai (Mouna Huararai), and to the saddle, or “interior,” in the 1820s:

On approaching the islands, I have more than once observed the mountains of the interior long before the coast was visible, or any of the usual indications of land had been seen. On these occasions, the elevated summit of Mouna Kea, or Mouna Roa, has appeared above the mass of clouds that usually skirt the horizon, like a stately pyramid, or the silvered dome of a magnificent temple, distinguished from the clouds beneath, only by its well-defined outline, unchanging position, and intensity of brilliancy occasioned by the reflection of the sun's rays from the surface of the snow.

The height of these mountains has been computed by some navigators who have visited the Sandwich Islands, at 12,000, and by others at 18,000 feet. The estimate of Captain King [1779], we think exceeds their actual elevations, and the peaks of Mouna Kea, in the opinion of those of our number who have ascended its summit, are not more than 1000 feet high. But admitting the snow to remain permanent on the mountains of the torrid zone at the height of 14,600 feet, the altitude of Mouna Kea and Mouna Roa is probably not less than 15,000 feet.

The base of these mountains, is, at the distance of a few miles from the seas shore, covered with trees; higher up, their sides are clothed with bushes, ferns, and alpine plants; but their summits are formed of lava, partly decomposed, yet destitute of every kind of verdure.

There are few inland settlements on the east and north-west parts of the island, but, in general the interior is an uninhabited wilderness. The heart of Hawaii, forming a vast central valley between Mouna Roa, Mouna Kea, and Mouna Huararai, is almost unknown, no road leads across it from the east to the western shore, but it is reported by the natives who have entered it, to be “Bristled with forests of *ohia*,” or to exhibit vast tracts of sterile and indurated lava... [Ellis 1963:3-4].

Ellis also recorded the observations of his travel companion, a Mr. Goodrich, during the latter's ascent of Mauna Kea. Mr. Goodrich described to Ellis his views of the saddle from the mountain, in particular, the herds of wild cattle seen there:

In his way down, he saw at a distance several herds of wild cattle, which are very numerous in the mountains and inland parts of the island, and are the produce of those taken there, and presented to the king, by Captain Vancouver. They were at his request, tabued for ten years, during which time they resorted to the mountains, and 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 them, 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 with great labour 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 into small barrels, which are brought on men's shoulders ten or fifteen miles to the sea-shore [Ellis 1963:290].

4.1.4.2 Reverend Hiram Bingham

According to Maly (2004:33), “[i]n 1830, Reverend Hiram Bingham and family visited Waimea, and in September they were joined by members of the royal household. It was during the September visit that Kamehameha III and party, in the company of Bingham, traveled to the summit of Mauna Kea, via the Waimea-Waiki‘i-Kalai‘eha route.” Bingham described the party’s journey toward Mauna Kea over the saddle:

...The king set out with a party of more than a hundred, for an excursion further into the heart of the island, and an ascent to the summit of Mauna Kea. To watch over and instruct my young pupil, and to benefit my health, I accompanied him. The excursion occupied nearly five days, though it might have been accomplished much sooner. Crossing in a southerly direction the plain of Waimea, some on horseback and some on foot, the party ascended a small part of the elevation of the mountain, and being in the afternoon enveloped in dense fog, they halted and encamped for the night. The next day they passed over the western slope of the mountain to the southern side, thence eastward along a nearly level plain, some seven thousand feet above the level of the sea, to a point south of the summit, and encamped out again, in the mild open air. In the course of this day’s journey, the youthful king on horseback, pursued, ran down, and caught a yearling wild bullock, for amusement and for a luncheon for his attendants. A foreigner lassoed and killed a wild cow [Bingham 1969:375].

4.1.4.3 Lieutenant Charles Wilkes

A decade after Bingham’s visit, Lieutenant Charles Wilkes of the U.S. Navy visited Hawai‘i as part of his assignment to explore and survey routes in the Pacific. Wilkes’ party traveled over the saddle, and the following written account documented much of what they saw there, including a description of the “Temple of Kaili, or the Ahu a ‘Umi. Wilkes describes the saddle region as “...barren lava plains...between Mauna Kea and Mauna Loa, where desolation reigns,” (Wilkes 1970:216):

(In the forests above Keauhou)

...they arose at sunrise, when Mr. Hall and the natives, as they did regularly every morning during the journey, prayed and sang a hymn, before setting out. They soon passed beyond the woods, and entered a country of barren appearance, composed of hard solid lavas, in the crevices of which were found several

shrubby *Geraniums*, *Vacciniums*, *Daphnes*, numerous *Compositae* of a stiff rigid character, and some small ohea bushes, a kind of sweet whortleberry [‘ōhelo].

On their route, many deep caverns were observed under the lava. The signs of wild cattle and dogs were frequent; the latter seek shelter in these caves. The cattle are now rapidly on the increase, there being a prohibition against killing them until a certain number of years have passed.

After a day's travel, they reached the site of the ancient temple of Kaili. These ruins lie about equally distant from three mountains, Mauna Kea, Mauna Loa, and Hualalai. This temple is said to have been built by Umi, who, with his wife Papa, is supposed to have inhabited it, when he was king of the island. The three northern pyramids forming the front were originally erected by Umi, to represent the districts of the island he then governed; and as he conquered other districts, he obliged each of them to build a pyramid on the side of the temple.

This temple is represented in the adjoining plate [Maly and Maly 2002:39]. The main building A, is ninety-two feet long, by seventy-one feet ten inches wide; the walls are six feet nine inches high, seven feet thick at the top, and nearly perpendicular; the partition walls are three feet high: B and C are said to have been pedestals for idols; D, E, and F, are the pyramids built by Umi, eighteen feet high; G is the residence of Kaili's wife, Papa, also built by Umi.

The five remaining pyramids, H, I, J, K, L, are those erected by the conquered districts. All these are built of compact blocks of lava, laid without cement.

The building is said to have formerly been covered with idols, and offerings were required to be brought from a great distance, consisting generally of provisions.

There are now no traces left of these idols. The situation of the temple is at an elevation of five thousand feet above the sea.

They proceeded a few miles beyond this point with their horses, but found the ground, consisting of broken lava and scoria, too rough for them. They therefore put them in charge of three little boys, to take them back to Kealakeakua Bay.

Mr. Peale shot two of the mountain geese peculiar to this part of the island; they are remarkably fine birds, and live entirely upon berries. In their route this day they passed several caves, which the natives were said to have inhabited while collecting sandalwood on the mountains for the chiefs. The walking now became extremely fatiguing, over vast piles of scoria, thrown up in loose heaps. There was no vegetation except a few small trees of *Metrosideros*, scattered here and there, and whortleberries. The heaps of scoria were to appearance like those from some huge foundry.

On the 18th, they resumed their journey at an early hour, passing in a direction towards Mauna Kea, over many rough ridges of the old lava streams, that were found from a quarter of a mile to a mile in width. One in particular, that pursued a northwest direction, their guides informed them was forty miles in length, and had flowed down towards the centre of the island. It had not a particle of vegetation on it; not even a lichen was to be seen. The lava of this stream is broken up into pieces of all sorts of shapes and sizes, weighing from a pound to many tons. Mr. Peale remarks, that the whole mass looked so fresh, that it appeared as though it ought to burn the feet of the passing traveller—and yet this eruption took place anterior to native tradition.

One of the native guides, Kimo, gave out here from fatigue, and after sharing his load they left him to follow.

They next passed two old craters covered with bushes and grass, at whose base was a fresh-looking stream of glassy lava. The first crater was in many respects like an old stone quarry, though on a gigantic scale: the rocks were broken up, and thrown about in great confusion; one side of the wall appeared as though it had been blown out, and strewed on the plain beneath; the sides that were left were nearly perpendicular, and presented distinct layers. Many plants were growing in the crevices.

The second crater was of a regular conical shape, both within and without, the interior being an inverted cone. Although the interior presented this great regularity, yet its sides were apparently composed of large blocks of lava, thrown out from its bottom, and lodged on its sides one above the other.

They encamped at the foot of a very old crater, now covered with trees of *Edwardsia* and *Acacia*, where they found water. The natives sought out one of the lava caves, as a protection against the cold and misty wind. Kimo again joined them at dark.

Although the next day they had fine weather and clear sunshine, yet they could see the rain falling from the clouds on the route before them. This rain they experienced shortly afterwards, and were obliged to travel through a driving mist all day, with a very chilly atmosphere. The natives complained so much of cold, that the party were induced to stop, light a fire, and give them some provisions, which had now become rather scarce. Seeing abundant signs of wild cattle, and hearing the sound of a distant gun, one of the guides went off to the haunts of the cattle-hunters in the neighbourhood, and shortly after returned with a supply of jerked beef.

Their route lay next through some very good grazing ground; and large herds of cattle find subsistence here, which are killed for the hides. Bones were lying in all directions. There is also some very good arable land, covered with large grass.

This part of the island would make valuable grazing farms, for there is a sufficiency of soil to support them, and wood to build with, though scarcely enough of the latter article for fuel. The loose scoria would make excellent fences, as the cattle can with difficulty be driven over it. The distance from the coast and the want of roads, however, would interpose many obstacles to its settlement; and the climate, so unlike what the natives are accustomed to on the coast, would probably prevent their services from being obtained.

The next morning they perceived that the tops of both Mauna Kea and Mauna Loa were covered with snow, which, however, disappeared by ten o'clock. They now took a southerly course, crossing over many ancient beds of lava much decomposed, and now covered with vegetation. The trees were the *koa* (*Acacia*), *Edwardsia*, and *Dodonaea*. They now first met the curious *Compositae* mentioned by Douglass, and named by Dr. Hooker, *Aygrophyton Douglassia*; it was seen about eight feet in height, covered with a silver pubescence, which gives it a beautiful appearance. They found many pools of water in the lava. They had crossed over the flank of Mauna Loa, and supposed themselves to be about two-thirds of the way up towards its summit.

The temperature at night fell to 40°.

The beautiful columnar cloud of the volcano of Kilauea, which is always seen to hang over the crater, both by day and by night, was now in full view.

The next day they were on their route early, and passed some rich grazing country, with the grass full four feet high. From all appearances, these parts are not visited by cattle. There were many trees of *koa* (*Acacia*), *Edwardsia*, &c., as before. A fog coming on, they lost their way, and were obliged to retrace their steps. Our gentlemen, having their pocket-compasses, now took the lead, to the no small astonishment of their guides, that they could, in a thick fog, direct the way through places they had never visited before. Kimo, their Oahu guide, again gave out, and was left to follow; and as he did not come up as soon as he was expected, the guides and natives set out, in a praiseworthy manner, to hunt him up, although they were all more or less lamed by crossing over the rough lava during the day. They soon succeeded in finding him, and returned to the camp... [Wilkes 1970:98-102].

4.1.4.4 Dr. David Douglas

Dr. David Douglas, an early visitor to Mauna Kea, commented on the remarkable stillness and ability of sound to carry as he descended the mountain, calling this phenomenon an "apparent non diminunon of sound," (Maly 2004:31). Charles De Varigny, Secretary of the French Consulate, also described the atmosphere during his 1857 visit to Mauna Kea:

Here the atmosphere of these upland plateaus has an exceptional power to carry the sound of the human voice, making ordinary tones audible a mile away; But

there are no traces of inhabitants. Only some great wild cattle, recognizable by their curly hair, trouble the silence of these solitudes when during their wanderings a dead branch is broken... Halemakule [the native guide] was struck by the unfortunate idea of testing the effects of his Hawaiian chanting as it reverberated among the mountain echoes. Still one more point on which we failed to agree. We preferred the song of the native birds to his slow, monotonous *melopoeia*... [De Varigny in Korn, 1981:86; from Maly 2004:36-37].

4.1.4.5 The Writer Hualālai

In 1859, an individual writing under the pen name “Hualalai” published an account of his travels across the saddle region in the Pacific Commercial Advertiser, which coincided with the 1859 eruption of Mauna Loa:

July 21, 1859

Mr. Editor—Having just returned from a trip to Mauna Kea, it has occurred to me that in this dull season of the year, a short account of our jaunt might perhaps prove sufficiently interesting to find a place in your journal.

Our party consisted of six, on horseback, with blankets and guns, followed by three natives with pack bullocks, carrying a canvas tent and the provisions and other necessary outfits for a ten days' absence from the haunts of civilization. We were also provided with a cook, in the person of a dapper little Chinaman, who was by no means an unnecessary part of the inventory. One of our party, whom I shall call “The Mountain” —he being an old ranger among the wilds of Hawaii and fond of relating his adventures—started early on Monday morning, June 27, for the lava flow, in order to ascertain whether it was passable for animals, while the rest were to follow on Thursday, arranging to meet him at Waikapee, near the general camping ground of March last, where at one time not far from three hundred persons watched the descending river of fire.

At 8 o'clock on Tuesday morning, we were aroused by “The Captain,” and saddling up in the dark, cold morning, we were well into the woods which extend from the base of Hualalai before daylight. A chill, damp fog surrounded us, but as the day dawned it disappeared, and the approach of the good of day was hailed by a grand concert from thousands of feathered warblers, combined with the chirping of myriad insects, and varied now and then by the clarion voice of the wild cock. I have traveled through forests in different parts of the world where nature's choristers “warbled their wood-notes wild,” but I never before heard such a bewildering gush of melody as on that lovely morning went up in a hymn of praise from the *koa* woods of Kona. Our road, which was a very decent one for Hawaii nei, lay for an hour through a forest of *koa* trees, some of them of large size, but mostly of a young growth, thickly interspersed with tall ohias and many kinds of trees and shrubs, the names of which I cannot remember. All along the side of the road was a rank growth of Irish potatoes, their tall stalks indicating a

very rich soil, while every patch of greensward was blushing with wild strawberries. The potatoes have sprung from seed, “dropped by the wayside” accidentally, and the strawberries, though quite ripe and of a goodly size had not the rich flavor of the cultivated fruit. Here we heard, some of us for the first time in many years, the unmistakable “caw, caw” of a crow, as he sat perched on a tall *ohia* tree and eyed our party with the same inquisitive cock of the head that we remembered langsyne and far away among the cornfields of New England. We felt inclined rather to respect him for the recollections he stirred up.

Just before emerging into the open plain we passed a number of young sandal wood trees, with their oval, bright-green leaves, standing amongst a young growth of *koa*, while here and there were seen the charred remains of huge trees lying scattered about. In reply to our inquiries, “The Captain” said, a number of years ago, when sandal wood was in great demand and the chiefs forced the people to work like slaves in gathering it, here it grew very abundantly. The people at last rid themselves of the burden by setting fire to the forest, which was mostly consumed—sandal wood and all. These half burned trunks were once stately *koa* trees. The old story of the goose that lay the golden egg, thought I. About nine o’clock, we got sight of the smoke rising through the still air in a perpendicular column from the crater, whence issued the late eruption of Mauna Loa. Pele had apparently exhausted her materials, or was resting herself, and the comparatively small show of smoke led us to argue that there was but a small supply of fire.

At noon, after a long ride over a sandy plain, barren of everything but stunted ohelos, and past the old *heiau* or heathen temple called “Ke Ahu a Umi,” we came to Waikapē, where we halted and lunched. A long ride through the mountain air had sharpened our appetites, and the hot coffee and solid food disappeared at a rate and in quantities that would have dismayed a boardinghouse keeper. What a piquant sauce is real hunger! Here we found our old friend and pioneer, “The Mountain,” who had paid a visit to the flow and pronounced it quite passable. After resting our animals an hour, we started again and soon came up with the late flow or rather flows, for there have been two. Those who visited the eruption in March represent the stream at this point to have been composed entirely of *aa* or clinkers. We found the entire surface of the united stream,—say three miles wide,—composed of a bluish, shining *pahoehoe*, which had oozed out and quite covered up the clinkers, and which had run into and cooled in every imaginable shape. We found no difficulty in getting along with our animals, traveling up and down the miniature hills and valleys, with the exception of here and there a great crack in the surface, caused by the cooling of the mass, and which forced us to go round it. The rock was however quite cool until we got about a half a mile from the edge, when we came upon a streak of about a hundred yards in extent, where our path lay over and amongst holes and fissures innumerable, from which issued steam and gas. It was evident to all that we were walking over a subterranean stream of fire, rushing along on its way to the sea, and we knew not at what moment it might receive a fresh impetus from its mountain source, and, bursting

the frail shell on which we stood, engulf us in a horrible death. When we had safely passed this “Valley of the Shadow of Death,” we—I at least can answer for one—drew a long breath of relief. In fact, as one of our party—“The Sheriff,”—remarked: “It was mighty skeery kind of traveling; and it wouldn’t have required an unreasonable amount of coaxing to have induced him to stop and turn about when we got to that confoundedly hot streak.” Half a mile further on we came to a place where a section of one of the underground tunnels had fallen in, exposing to our wondering gaze the liquid rock over which we were traveling. Some writer on metaphysics has said that a certain degree of fear is one of the essential ingredients which go to make up the feeling of sublimity. Such being the case, it follows that our party was duly impressed with the sublime nature of the yawning, fiery, white hot abyss before us, for all kept at a most respectful distance. Familiarity, in this case, would have failed to breed contempt. While gazing into this “horrible pit,” I was forcibly reminded of the fiery furnace of which we read in Sacred Writ, that was heated seven times hotter than it was wont” for the reception of the three children of Israel. Our artist,—for we had a good one in “Paul Phiz” —took a sketch of the scene, and we passed on. We crossed the flow in a northeast direction instead of going straight over, and thus we traveled five miles over the flow instead of three, which is about its breadth. During the latter two miles we frequently passed holes in the surface rock, from which Pele glared at us as we slowly picked our way along, at times sickened and half suffocated by the offensive gasses exhaled. It was quite sundown when we reached the farther edge of the flow and touched again what we felt was terra firma. Here we camped for the night on the old *pahoehoe*, —perhaps hundreds of years old,—and were fortunate in finding in a little hollow plenty of *pili* grass for our animals and wood for a fire. Scarcely had we halted, when the “honk” of a goose was heard and we shot three fat fellows, which made us a delicious supper. Building up a rousing fire, more for the cheering light than for warmth, we spread blankets on the ground and with our saddles for pillows; slept soundly till daylight... [*Pacific Commercial Advertiser*; July 21, 1859; from Maly and Maly 2002:49-51].

July 28, 1859

The next day was a hard day’s travel for our animals, over about fifteen miles of clinkers, until we came to the rolling hills above Puakou [Puako, the Waikii vicinity]. A worse piece of road it would be hard to imagine. Fancy that distance of country terribly cut up into ravines and gullies, and the only path or semblance of a road made of equal parts of broken bottles and slag from a blacksmith’s forge, and you will get some idea of the plain between Mauna Loa and Mauna Kea. All these beds of clinkers—for we passed four or five—have come from the former mountain, while Mauna Kea appears to have discharged scarcely anything, latterly, but sand and ashes. On reaching the open ground we found our horses were much cut up and bleeding about the feet, while one bullock was so exhausted and worn down that we were obliged to take off his load and leave him to shift for himself. Pushing along, we arrived at sundown at our camping ground

in “the big gulch” [Pōhakuloa] among the hills which form the base of Mauna Kea. This was a beautiful spot, the grass growing luxuriantly in the valleys, and the ravines being lined with mamani trees. Wild hogs were plentiful; we disturbed a drove of forty or fifty as we entered the gulch, and they went scampering up the mountain. Cattle too, were seen in droves, but very shy. Unfortunately, however, there was no water in the gulch, and, after stopping one night, we started on Thursday morning for Kalaieha, an elevated point on the east side of Mauna Kea, where report said that water and game were to be found in plenty.

From the “big gulch [Pōhakuloa]” to Kalaieha, a distance of some fifteen or twenty miles, the road lays over a beautiful rolling country, made up of wash from the conical hills which so frequently occur along the base of Mauna Kea, with here and there patches of sand [the area between Pu‘u Ke‘eke‘e-Pōhakuloa and Pu‘u Huluhulu]. This would be a magnificent country for sheep farms, or for wheat growing, but for one drawback—the want of water. There is ample evidence, however, in the numerous water courses with which the face of the country is seamed, that at times there is “too much of water.” Huge boulders are seen scattered about, brought from the hills and carried far out on the plains by the streams; but at the time of our visit not a drop of water could be found in any of the gulches or ravines... [*Pacific Commercial Advertiser*; July 21 and 28, 1859; from Maly and Maly 2002:51-52].

4.1.4.6 *Isabella Bird*

Isabella Bird was an English woman who traveled the Hawaiian Islands extensively, with the guidance of the local people. In 1873 she stayed for a short time with rancher Francis Spencer, observing:

...Mr. S. [Spencer] is a Tasmanian, married to a young half-white lady... Sheep are the source of my host’s wealth. He has 25,000 at three stations on Mauna Kea, and, at an altitude of 6000 feet they flourish, and are free from some of the maladies to which they are liable elsewhere. Though there are only three or four sheep owners on the islands, they exported 288,526 lbs. of wool in 1872. Mr. S— has also 1000 head of cattle and 50 horses... [Bird 1964:133].

Bird also traveled to Mauna Kea. An account of her trip there is given:

...A few days ago I was so fortunate as to make the acquaintance of Mr. W. L. Green (now Minister of Foreign Affairs), an English resident in Honolulu... He asked me to make the ascent of Mauna Kea with him, and we have satisfactorily accomplished it today.

The interior of the island, in which we have spent the last two days, is totally different, not only from the luxuriant windward slopes, but from the fiery leeward margin. The altitude of the central plateau is from 5000 to 6000 feet, there is not a single native dwelling on it, or even a trail across it, it is totally destitute of water, and sustains only a miserable scrub of *mamane*, stunted *ohias*, *pukeawe*, *ohelos*, a

few compositae, and some of the hardiest ferns. The transient residents of this sheep station [Kalai'eha], and those of another [Kealapū'ali] on Hualalai, thirty miles off, are the only human inhabitants of a region as large as Kent. Wild goats, wild geese (*Bernicla sandvicensis*), and the *Melithreptes Pacifica*, constitute its chief population. These geese are web-footed, though water does not exist. They build their nests in the grass, and lay two or three white eggs.

Our track from Waimea lay for the first few miles over light soil, destitute of any vegetation, across dry, glaring, rocky beds of streams, and round the bases of numerous tufa cones, from 200 to 1500 feet in height, with steep, smooth sides, composed of a very red ash. We crossed a flank of Mauna Kea at a height of 6000 feet [around Pu'u Lā'au], and a short descent brought us out upon this vast tableland [the Pu'u Ke'eke'e-Pōhakuloa region], which lies between the bulbous domes of Mauna Kea, Mauna Loa, and Hualalai, the loneliest, saddest, dreariest expanse I ever saw.

The air was clear and the sun bright, yet nothing softened into beauty this formless desert of volcanic sand, stones, and lava, on which tufts of grass and a harsh scrub war with wind and drought for a loveless existence. Yet, such is the effect of atmosphere, that Mauna Loa, utterly destitute of vegetation, and with his sides scored and stained by the black lava-flows of ages, looked like a sapphire streaked with lapis lazuli. Nearly blinded by scuds of sand, we rode for hours through the volcanic wilderness; always the same rigid *mamane* (*Sophora Chrysophylla* ?) the same withered grass, and the same thornless thistles, through which the strong wind swept with a desolate screech.

The trail, which dips 1000 feet, again ascends, the country becomes very wild, there are ancient craters of great height densely wooded, wooded ravines, the great bulk of Mauna Kea with his ragged crest towers above tumbled rocky regions, which look as if nature, disgusted with her work, had broke it to pieces in a passion; there are living and dead trees, a steep elevation, and below, a broad river of most jagged and uneven aa. The afternoon fog, which serves instead of rain, rolled up in dense masses, through which we heard the plaintive bleating of sheep, and among blasted trees and distorted rocks we came upon Kalaieha.

I have described the "foreign residences" elsewhere. Here is one of another type, in which a wealthy sheep owner's son, married to a very pretty native woman, leads for some months in the year, from choice, a life so rough, that most people would think it a hardship to lead it from necessity. There are two apartments, a loft and a "lean-to." The hospitable owners gave me their sleeping-room, which was divided from the "living-room" by a canvas partition. This last has a rude stone chimney split by an earthquake, holding fire enough to roast an ox. Round it the floor is paved with great rough stones. A fire of logs, fully three feet high, was burning, but there was a faulty draught, and it emitted a stinging smoke. I looked for something to sit upon, but there was nothing but a high bench, or chopping-

block, and a fixed seat in the corner of the wall. The rest of the furniture consisted of a small table, some pots, a frying-pan, a tin dish and plates, a dipper, and some tin pannikins. Four or five rifles and "shot-guns," and a piece of raw meat, were hanging against the wall. A tin bowl was brought to me for washing, which served the same purpose for everyone. The oil was exhausted, so recourse was had to the native expedient of a jar of beef fat with a wick in it.

We were most hospitably received, but the native wife, as is usually the case, was too shy to eat with us, or even to appear at all. Our host is a superb young man, very frank and pre-possessing looking, a thorough mountaineer, most expert with the lasso and in hunting wild cattle. The "station" consists of a wool shed, a low grass hut, a hut with one side gone, a bell-tent, and the more substantial cabin in which we are lodged. Several saddled horses were tethered outside, and some natives were shearing sheep, but the fog shut out whatever else there might be of an outer world. Every now and then a native came in and sat on the floor to warm himself, but there were no mats as in native houses. It was intolerably cold. I singed my clothes by sitting in the chimney, but could not warm myself. A fowl was stewed native fashion, and some rice was boiled, and we had sheep's milk and some ice cold water, the drip, I think, from a neighbouring cave, as running and standing water are unknown.

There are 9000 sheep here, but they require hardly any attendance except at shearing time, and dogs are not used in herding them. Indeed, labour is much dispensed with, as the sheep are shorn unwashed, a great contrast to the elaborate washings of the flocks of the Australian Riverina. They come down at night of their own sagacity, in close converging columns, sleep on the gravel about the station, and in the early morning betake themselves to their feeding grounds on the mountain.

Mauna Kea, and the forests which skirt his base, are the resort of thousands of wild cattle, and there are many men nearly as wild, who live half savage lives in the woods, gaining their living by lassoing and shooting these animals for their skins. Wild black swine also abound.

The mist as usual disappeared at night, leaving a sky wonderful with stars, which burned blue and pale against the furnace glare on the top of Mauna Loa, to which we are comparatively near. I woke at three from the hopeless cold, and before five went out with Mr. Green to explore the adjacent lava. The atmosphere was perfectly pure, and suffused with rose-colour, not a cloud-fleece hung round the mountain tops, hoar-frost whitened the ground, the pure, white smoke of the volcano rose into the reddening sky, and the air was elixir. It has been said and written that there are no steam-cracks or similar traces of volcanic action on Mauna Kea, but in several fissures I noticed ferns growing belonging to an altitude 4000 feet lower, and on putting my arm down, found a heat which compelled me to withdraw it, and as the sun rose these cracks steamed in all

directions. There are caves full of ferns, lava bubbles in reality, crust over crust, each from twelve to eighteen inches thick, rolls of lava cooled in coils, and hideous a-a streams on which it is impossible to walk two yards without the risk of breaking one's limbs or cutting one's boots to pieces.

I will not weary you with the details of our mountain ascent. Our host provided ourselves and the native servant with three strong bullock-horses, and accompanied us himself. The first climb is through deep volcanic sand slashed by deep clefts, showing bands of red and black ash. We saw no birds, but twice started a rout of wild black hogs, and once came upon a wild bull of large size with some cows and a calf, all so tired with tramping over the lava that they only managed to keep just out of our way. They usually keep near the mountain top in the daytime for fear of the hunters, and come down at night to feed. About 11,000 were shot and lassoed last year. Mr. S— says that they don't need any water but that of the dew-drenched grass, and that horses reared on the mountains refuse to drink, and are scared by the sight of pools or running streams...

The actual forest, which is principally *koa*, ceases at a height of about 6000 feet, but a deplorable vegetation beginning with *mamane* scrub, and ending with withered wormwood and tufts of coarse grass, straggles up 3000 feet higher, and a scaly orange lichen is found in rare patches at a height of 11,000 feet... [Bird 1964:207-210].

4.1.4.7 Captain Clarence E. Dutton

Kalai'eha lies along the eastern edge of the saddle, and was the location of the Humu'ula Sheep Station. Surveyor Captain Clarence E. Dutton extensively described Kalai'eha and the saddle region during an 1882 trip to the region:

...From Hilo I decided to make an advance at once upon Mauna Kea and to visit the interval between that mountain and Mauna Loa. Mauna Kea may be approached from many directions, the easiest lines of access being from the northwest and north. The approach from Hilo is the most difficult of all, because it involves the necessity of traversing the belt of forest which lies between the middle slopes of the mountain and the sea. No one can imagine the density and exuberance of tropical vegetation until he has seen it. In truth, the forest can be penetrated only by hewing a way through it or by traversing a route which has already been cut by main force...

...There are two routes leading from Hilo to Mauna Kea. One extends along the coast northwestward for about 30 miles, then turns abruptly upwards, striking the northeastern flank of the mountain. The other leads directly inland, and passing through the forest belt reaches the southern base of the mountain and the interval between it and Mauna Loa. Each route has difficulties peculiar to itself...

In going from Hilo to Mauna Kea I declined the coast route across the gorges, and chose the much more direct line of approach passing through the forest...

...Three miles of travel through tall Hilo grass growing in a muddy soil brings us to the verge of the forest. Years ago a trail leading from Hilo up into the central wilderness of the island was cut through the forest and corduroyed. The trees used for the corduroy were trunks of the great tree ferns which form a large part of the undergrowth of the forest. These are soft, spongy, and perishable, and lasted but a very few years. They quickly became rotten, and wherever they were laid the trail has become worse than it would be if they had never been put there. The effects of the incessant rain are now abundantly visible, and that to our great discomfiture. The trail is a mixture of rocks, mire, and fragments of rotten fern-trees. Progress is difficult and extremely harassing. Every few rods some poor animal sinks his fore legs or hind legs into tough, pasty mud, and must be unloaded and pried out. Four miles of this kind of travel was accomplished in the space of about six hours. Suddenly and without warning a sharp turn of the trail brought us upon a wide expanse of naked pahoehoe. The relief was indescribable. Nobody would pretend that pahoehoe is pleasant traveling. It is good only in comparison with clinker fields and forests. The exchange is that of misery which is intolerable for misery which can be borne readily by the exercise of patience. The animals being exhausted by the desperate struggle, we at once made camp upon the lava rock, finding a pool of swampy water hard by.

We had landed upon the termination of the great flow of 1855, the grandest of all the historic eruptions of Mauna Loa. The next day we had an opportunity to observe and appreciate its immensity. Our route lay upon the upward course of this flow, which soon widened out on either hand until the forest was miles away from us in both directions. Already a few straggling ferns and other humble plants have begun to take root upon its surface, but without a vestige of soil. Except for these stragglers all is now bare rock, rolling in heaps and mounds, twisted ropes and huge wrinkles, with now and then a network of cracks rifting the mass into fragments, and large holes where the arch over some great lava pipe has fallen in. One characteristic of this great flow is the exceptional unevenness of it and the large size of the mounds and hills formed by the pahoehoe. It seems to lie very much thicker than in most other eruptions. In many places it has formed high hills or ridges, and everywhere there are abundant indications that sheet after sheet of lava was piled up to form its final mass. The width of it a few miles above its extremity could only be estimated roughly by the eye, and seemed in many places to exceed six miles. In the course of an hour the forest was dim in the distance on either hand, the tall ohia trees appearing like mere shrubs...

...A little more than 20 miles from the end of the flow we found ourselves confronted by a high barrier of clinkers stretching far out towards the base of Mauna Loa on the left and plunging into the forest on the right. Turning sharply to the right the trail crosses several spurs of this ridge of clinkers and at length

leaves the lava field and enters the forest. The character of the forest is now greatly changed. It is no longer a swamp and jungle. We have gained an altitude of about 5,500 feet, and although we are not wholly above the wet region we are in one which is considerably dryer than that which is occupied by the main forest belt. The soil in the summertime is generally dry, and the undergrowth is so moderate that it offers little obstruction to progress. Winding through the forest we come frequently upon open parks densely clothed with mountain grass. The trail ascends slowly but steadily, and as we progress the trees become fewer and the parks larger and more numerous. Numberless trails of wild or half wild cattle traverse the country in every direction. The soil is abundant, but so too are the ledges of lava and fragments of clinker which project through it. Ascending a rocky shelf, Mauna Kea discloses its magnificent mass in close proximity on the one hand, while Mauna Loa, more distant and yet more grand, rises sublimely upon the other... Turning around with Mauna Loa at our backs, the majestic pile of Mauna Kea rises immediately before us. The contrast is very great. The eye is instantly caught by the large number of cinder cones which everywhere stud its surface, from the summit where they cluster thickly, down its flanks to the plain below. All of them are symmetrical and normal in their outline, and in an admirable state of preservation. They are truncated at their tops, showing the existence of regular craters within the truncated portions. Some of these cones, by a careful eye estimate and comparison with known magnitudes, appear to be more than 1,000 feet in height and more than three-fourths of a mile in diameter. The number is too great to be easily counted. They are most numerous upon the summit platform, but they are very abundant, not only upon the immediate base of the mountain, but at all intermediate zones, and they ramble away far beyond the base like a crowd dispersing from a common center...

...The volcano has been extinct for many centuries, and although the degradation on this side of the mountain has made comparatively little progress, we shall soon find reason for believing that the epoch of final cessation, historically speaking, is quite ancient. The impression produced is that the period which has elapsed since the last sign of activity should be reckoned by thousands of years rather than by hundreds. Soil is everywhere abundant, and no fresh looking rocks are known. The dense forest comes up only to the level where the steeper part of the mountain begins its ascent; that is, to altitudes varying from 5,000 to 6,000 feet. Above that are many scattering groves with a gradually increasing proportion of open spaces. Up to an altitude of nearly 10,000 feet the mountain is clothed with long mountain-grass, which has a pale yellowish color. The cinder cones have that faint reddish cast often assumed by basaltic lapilli which has long been exposed to weathering.

Winding onward by a rough stony trail, where old rotten clinkers and slabs of weathered basalt project up out of the soil, we at length reach a pool of stagnant water, where we make camp. Just before reaching camp the way was somewhat obstructed by a thicket of thorny bushes which at once aroused the keenest

interest. They were apparently raspberries, but such raspberries! The bushes were gigantic and the fruit equally so, the berries being over two inches in length and an inch in diameter. Conceive our ordinary pale red garden raspberries magnified two and half to three times in linear dimensions whether in stalk, leaf, or fruit, and we shall have a very good idea of its appearance. Its flavor, however, was somewhat inferior, though by no means unacceptable. The taste of the fruit is almost exactly the same as our common Lawton blackberry. The abundance of fruit was remarkable. For two or three miles the banks and hillsides were covered with them and they could have been gathered by thousands of bushels. They were growing at an altitude of about 6,000 feet, where snow frequently falls in winter and where the climate probably does not differ greatly from that of the coast range of California; though I presume this climate is rather the more equable of the two, being cooler in summer and perhaps a trifle milder in winter.

The journey from Hilo had been a very long and arduous one. Unpleasant as was the struggle with the forest, the journey of twenty miles over pahoehoe, so coarse and rough as that of the flow of 1855, proved in the end to be almost as harassing to the animals. The foothold upon the rocks is all that could be desired, but the constant ascent and descent of the smooth rounded hummocks produced an incessant lurching and strain upon the animals the effects of which were now manifest in the shape of sore and scalded backs. Two days' rest was deemed absolutely necessary to recuperate the sore, weary, and half-starved brutes. I occupied the time in tramping over the rolling hills and half-concealed lava beds around the base of Mauna Kea, and in exploring three or four long caverns or ancient lava pipes, which are quite as common here as they are upon Mauna Loa. No results of any importance attended the investigation...

...After two days' rest and recuperation the ascent of Mauna Kea was determined upon. The summit is easily reached from the southern side, so easily in fact that no great precaution is necessary in the choice of routes. Still, some routes are much easier than others, and it was thought best, in view of the long and tedious character of the ascent, to take a guide familiar with the mountain. I found a native who had been to the summit many times and who had hunted sheep, cattle, and goats all over its southern flanks. At daylight the party was in motion with three pack animals carrying photographic apparatus, provisions, and also blankets, in case it should be found necessary to spend the night upon the mountain top. The guide went afoot from preference, a most unusual thing for a kanaka, while the rest of the party were well mounted.

Our camp was situated at an altitude of about 5,670 feet, and the top of the mountain was more than 8,000 feet above us. Two hours were spent winding deviously among the foothills and cinder cones around the base of the mountain before the principal slope of the mass was reached...

...In the afternoon of the day following the ascent of Mauna Kea, I moved camp about five miles further westward, to a locality called Kalaieha. This point is now used as a sheep station. The pasturage upon the slopes of Mauna Kea is very abundant and rich, but there is no water. At first it was a mystery to me how these animals could flourish with nothing to drink. It appears, however, that the fog is so abundant that a night rarely passes without more or less rain or a condensation of vapor sufficient to thoroughly saturate the grass, and the animals thus obtain sufficient moisture from the grasses they feed upon. They seem to thrive very well, and I have never heard of any serious loss arising from want of moisture.

Kalaieha is situated near the summit of the pass between Mauna Kea and Mauna Loa, at an altitude of about 6,900 feet. Both to the eastward and to the westward there is a very gentle slope towards the ocean, so gentle in fact that from here it appears to the eye like a broad level plain. The lavas from Mauna Loa have flooded it again and again, and are now outspread over a vast expanse in fields of black, ominous, naked aa. These lava floods stretch all the way up to the very base of Mauna Kea and find a sharp line of demarkation upon its lowest slopes. The base of Mauna Kea is well covered with soil and volcanic sand, giving life to an abundant herbage and no inconsiderable number of trees, thus offering a strong contrast to the desolation and blackness of the lava fields beyond. Around us are very many cinder cones, some of noble proportions, and from the summit of any one [page 165] of them we may obtain an overlook of these Phlegrean fields. The sense of desolation which they awaken is exceedingly impressive... Several days were spent at Kalaieha searching for varieties among the lavas and for such other facts of interest as might present themselves. Very little, however, was discovered. The lavas of Mauna Kea, especially around the base of the mountain, show but little variety, and those of Mauna Loa are even more homogeneous.

Leaving Kalaieha, my next objective point was the valley of Waimea, on the northern side of Mauna Kea. To reach it, it was necessary to go over the mountain. This was not a serious undertaking, for it presents no difficulty except the length of the journey, and this is readily overcome by dividing up the march between two days... [Dutton 1884:150-166; from Maly 2004:42].

4.1.4.8 *W. D. Alexander and the Pendulum Party*

Maly (2004:50) writes of a group of prominent men, also known as the “Pendulum Party,” that set out to ascend Mauna Kea:

In June 1892, W.D. Alexander, Surveyor General of the Kingdom; E.D. Preston, astronomer with the U.S. Coast and Geodetic Survey; W.W. Chamberlain, L. Koch, and W.E. Wall, traveled to the Island of Hawai'i to ascend Mauna Kea—the journey undertaken between June to July 1892. At Kalei'eha, the party was met by A. Haneberg, station manager, and also joined by surveyor, E.D. Baldwin, and J.J. Muir. Alexander penned an article documenting the trip, published in the

Pacific Commercial Advertiser, titled "*The Ascent of Mauna Kea, Hawaii*" (September 14, 1892).

An excerpt from this article follows:

Although the ascent of Mauna Kea presents no great difficulty and has often been described, yet a brief account of a late scientific expedition to its summit may be of interest to your readers...

...The party left Honolulu for Kawaihae June 25th, consisting of Mr. E.D. Preston, astronomer, Mr. W.E. Wall, his assistant, Prof. W.D. Alexander, surveyor and quartermaster for the party, and Messrs. W.W. Chamberlain and Louis Koch.

The first station occupied was in the village of Kawaihae, near the sea, in a lot belonging to His Ex. S. Parker, to whom as well as to his agent, Mr. Jarrett the party are indebted for many repeated kind and generous acts... Our next move was to the grassy and windswept plain of Waimea, 2600 feet above the sea, where we enjoyed a complete change of climate, and had glorious views of the three great mountains of Hawaii... Here we engaged our guide, hired our horses and part of our pack mules, and had our freight, ("impedimenta," as Caesar appropriately called it,) carted thirty-five miles farther, half-way around the mountain to the Kalaieha Sheep Station. We made this our base of operations in attacking the mountain, in order to dispense as much as possible with the use of pack mules, on a ccount of the heavy and costly instruments which we were obliged to carry. A wagon road made by the owners of the Humuula Sheep Ranch leads from Waimea around the western and southern sides of Mauna Kea. On the western side of the mountain it passes through a region which only needs more rainfall to make it a superb grazing country. The ancient forests here, as at Waimea, have been nearly exterminated, but a fine grove of mamane trees still survives at the Auwaiakeakua Ranch.

The *manienie* grass is gradually spreading and will in time add immensely to the value of the land. At the half-way station, called Waikii, water tanks and a rest house have been provided for teamsters. After turning the corner we skirted the desolate plain studded with volcanic cones that lies between the giant mountains of Hawaii, riding through loose volcanic sand amid clouds of dust. Occasional flocks of quails or pigeons were the only living creatures to be seen.

At length the vegetation began to be more dense, the patches of *piipii* grass and the groves of the beautiful and useful *mamane* or *sophora* tree more frequent, as we approached the Hilo district. Barbed wire fences showed that we were approaching civilization, and at last we came in sight of the Kalaieha Sheep Station with its neat buildings, its water tanks and telephone lines, and general air of thrift, all testifying to the energy and foresight of its manager, A. Haneberg, Esq.

Nearly every afternoon this region is enveloped in dense fog which pours in from the east, driven by the trade wind. At night, during our stay, the thermometer generally fell below 40° Fahr., and frost is not uncommon. The elevation, according to the barometer, is about 6700 feet.

Quails abound, and the mountain geese and wild ducks are found in the “Middle Ground.” The mongoose has not yet arrived there. Wild cattle and boars are still numerous on the slopes of Mauna Kea, and the former supplied the best beef we have tasted in these islands. The present manager has been at much labor and expense in extirpating two pests, which are said to have been accidentally introduced from New Zealand, viz., the Scotch thistle and the gorse [*Pacific Commercial Advertiser*; September 14, 1892; from Maly 2004:50-52].

4.2 Mid-Nineteenth Century and the Māhele

4.2.1 The Māhele and Resulting Changes

In 1848, Kamehameha III decreed a division of lands called the *Māhele 'Āina*. Lands were divided into three portions: crown lands (for the occupant of the throne), government lands (to support public works and government programs), and lands set aside for the chiefs (*konohiki*). Giffen (2009:3) describes how native peoples could obtain land within these lands:

From these three classes of lands, native tenants were allowed to file claims for kuleana (approximately 1848-1855); then for grant lands (by Royal Patent); and then by the 1880's, lands for homesteading purposes. When the monarchy was overthrown in 1893, both Crown and Government lands were ceded to the United States and later the State of Hawai'i. These two land inventories make up the land base of the State at the present time.

The lands awarded to the *hoa'āina* (native tenants) became known as “*kuleana* lands.” All of the claims and awards were numbered (Land Commission Awards or LCA) and the LCA numbers remain in use to this day to identify the original owners of lands in Hawai'i.

This new system of land ownership was in stark contrast to the traditional system, in which all land and natural resources were held in trust by the hierarchy of chiefs. According to Maly (1999:58-59), “[t]his change in land tenure was ardently sought after by the growing Western population and business interests in the island kingdom...” Researching the claims and testimonies that were given in the mid-1800s can sometimes assist in forming a settlement pattern for the region at that time and possibly earlier.

4.2.1.1 Land Commission Awards (LCA)

Ka'ohē Ahupua'a was relinquished by Victoria Kamamalu to Kamehameha III on January 27, 1848...given by Kamehameha III to Government Land Inventory on March 8, 1848. Two natives claims registered, one awarded; Humu'ula Ahupua'a relinquished by Victoria Kamamalu to Kamehameha III On January 27, 1848. Part of the Crown Land Inventory; no native claims registered or awarded; Pi'ihonua Ahupua'a relinquished by Kalaeokekoi to Kamehameha III on January 28, 1848. Crown Land Inventory. Twenty native claims registered, fourteen awarded

(*Buke Mahele*, 1848:5-6; from Maly 2004:59). These same records state that four native claims were registered in Ka'ohē Ahupua'a (Table 1) but only one was awarded.

Table 1. LCA Claims in Ka'ohē Ahupua'a

LCA	Claimant	District	Ahpua'a	'Ili	Award
08297	Kookooku	Hāmākua	Koholalele, Ka'ohē	Lipelau	Awarded 1 āpana in Koholalele
10180	Malao, Tatina	Hāmākua	Kemau 2, Ka'ohē	Kahaumake, Manele, Haleolono	Awarded 2 āpana in Kemau 2
03705B	Koolau	Hāmākua	Ka'ohē		Awarded 1 āpana in Ka'ohē
03722B	Keopohaku	Hāmākua	Ka'ohē		None

The following testimony was provided as Native Testimony in support of Ko'olau's claim on October 30th, 1848:

Keopohaku, sworn, He has seen in Kaohu ahupuaa of Hamakua, Hawaii, 10 sections.

Section 1: House site: All konohiki boundaries, 2 houses for Koolau, no fence.

Section 2: All konohiki boundaries, 1 cultivated taro kihapai.

Section 3: Mauka, Kohala, Makai also by konohiki Hilo by Nuumalolo's land. 1 cultivated taro kihapai.

Section 4: All konohiki boundaries, 1 cultivated potato kihapai.

Section 5: Mauka & Kohala by konohiki. Makai by Moano's land. Hilo by konohiki. 1 cultivated banana and coffee kihapai.

Section 6: Koholalele ahupuaa: All konohiki boundaries, 2 cultivated banana kihapai.

Section 7: All konohiki boundaries, 1 cultivated coffee kihapai.

Section 8: All konohiki boundaries, 1 cultivated arrowroot kihapai.

Section 9: All konohiki boundaries, 1 cultivated arrowroot kihapai.

Section 10: All konohiki boundaries, 1 cultivated taro kihapai.

Land from Keopohaku in 1836; no one has objected to him. (Native Testimony; 389v4)

Of the ten *āpana* that Ko'olau claimed, he was awarded only one 7-acre *āpana*. This was the sole *kuleana* (property) award in Ka'ohē Ahupua'a. This single awarded *kuleana* claim indicates coffee, arrowroot, banana, and taro were all cultivated in the lands of Ka'ohē.

Testimonies regarding *ahupua'a* boundaries were initially heard in 1873, although the Ka'ohē and Humu'ula boundary was not completely documented. Additional testimonies were provided and a determination was made. In 1891 the boundary was determined to run along the Kaula Gulch (Foster 1893:455). This area supported the habitats of two native bird species:

From the mass of evidence taken we find that in ancient time the main value of the land of Kaohe was the "uwa'o," a sea-bird, whose habitat was the dry, rocky and elevated portion of the mountain. The habitat of the bird "oo," whose feathers were valuable, was in the mamane of Humuula. So the bird-catchers, retainers of the chief to whom Humuula was assigned, were limited to this area on which to take the "oo," and could not take the "uwa'o," for those belonged to Kaohe. (Foster 1893:456)

The "uwa'u" bird is also spelled 'ua'u; this is a dark-rumped petrel.

During a discussion of the testimony, court documents note that:

The kamaainas of forty years ago [1851] were less likely then to be mistaken as to the correct boundaries of lands than those of these days. They lived on the lands, pursuing their occupations under the chiefs of gathering feathers, canoe making and getting articles of various kinds from the mountains. (Foster 1893:458)

McEldowney's (1982:A-10) ethno-historical summary of the Mauna Kea summit region provides Boundary Commission Testimony of a man named Haiki for the disputed boundary. He asserts that: "my parents told me Humuula went to Kaluakaakoi and Poliahu. We used to go there after adzes for Humuula people."

Maly's 1999 archival study included a reference in border testimony to burials within Ka'ohē Ahupua'a:

[Pu'uokihi] it belongs to Kaohe and above that is where people were buried in old times, when people used to make fishhooks from the bones. [Testimony of Kahue, 1880, BCB, Hawai'i, B:444] (Maly 1999:D-4).

4.2.1.2 The Boundary Commission

Maly discusses the creation and function of the Boundary Commission:

In 1862, a Commission of Boundaries (the Boundary Commission) was established in the Kingdom of Hawai'i to legally set the boundaries of *ahupua'a*

that had been awarded to *Ali'i*, *Konohiki*, and foreigners during the *Māhele*. By the middle 1860s, land owners and their lessees were petitioning to have the boundaries of their respective lands—which were the foundation of ranching interests on Hawai'i—settled. The mountain lands on the Island of Hawai'i, including those completely surrounding Mauna Kea, made up the heart land of the largest ranch in the Hawaiian Kingdom. As a result, Commissioner G.M. Robertson began taking testimonies from native residents early in the Commission's history. Following Robertson's death, brothers, Rufus and Fredrick Lyman continued the work and collection of detailed testimonies for the Third Judicial Circuit (Island of Hawai'i). Those testimonies of *kama'āina* (native) witnesses and resident foreigners, described the lands of the Hilo District (such as Humu'ula and Pi'ihonua, being Crown Lands); Hāmākua (as Ka'ohē was a Government land, it was described by its' boundaries with other lands held by private owners, and because of lease-hold interests within it); and South Kohala, in the Waimea and Waikōloa region.

In 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them (W.D. Alexander in Thrum 1891:117-118). The primary informants for the boundary descriptions were old native residents (generally born between the 1780s to 1820s) of the areas being discussed. The native witnesses usually spoke in Hawaiian, and their testimony was translated into English and transcribed as the proceedings occurred.

The recorded testimonies give insight into a variety of subjects, including traditional land use, changes in the landscape over time, natural resources, cultural practices, etc. The testimony of Waikili'ili'i describes the border of Ka'ohē and Humu'ula Ahupua'a:

I was born at or near Humuula, district of Hilo, and have always lived in said district. I have often been on the mountain catching bullock, and know the boundaries of Humuula at shore. When I was on the mountain I was told that the boundary on Mauna Kea between Ka'ohē and Humuula was where the mamani ceases to grow, and that the pukeawe is on K a'ohē. Was told that Humuula extends to Pohakuhanalei. I have not heard where Ka'ohē ceases to join Humuula, as you go towards Mauna Loa... [Humu'ula Boundary Commission, Hawaii, Volume B:28-59; from Maly 2004:199-200].

Another testimony mentions that “Ka'ohē is *mauka* side of Umi's road to Waimea and Puanahulu is *makai* of the road from Hapukaa... (from Maly 2001:233). Kahilo notes “Pohakuloa, a large rock by a water hole on the Kau slope of Ahuaumi above Hualalai, (from Maly 1999:234). Kahulialo discusses the intersection of Keauhou and Ka'ohē Ahupua'a:

I have been to Pupuewai it is on Keauhou. Honaunau does not reach there (My father told me it was Keauhou), my father also told me that Kapapala, Humuula and Ka'ohē reached Keauhou on the top of Mauna Loa.

Na Elemakule where the lava flow went that destroyed Kiholo [ca. 1859] is where Ka'ohē joins Keauhou at Uauakahoa cave...

...Uauakahoa cave is where the Ka'ohē Elemakule came to at the time of the settlement of lands. These are all the boundaries that I know [Boundary Commission Volume I-A; August 6, 1873; from Maly 1999:236].

4.3 Late 1800s to 1900s

4.3.1 Ranching

Francis Spencer was an early entrepreneur involved mainly in cattle ranching. The beginning of ranching, however, was of goats and wild cattle (bullocks). In 1856, exported from Kawaihae were some 1,200 bullock hides, 5,000 goat skins and 35,000 lbs. of tallow. Along with leases for the land, Francis Spencer also procured exclusion rights from "all unbranded cattle and horses" in the government lands of Pu'u Anahulu and Ka'ohē [Int. Dept. Aug. 7, 1865; from Hammatt and Shideler 1991:13].

In 1859, the Crown and Government mountain lands of Humu'ula and Ka'ohē were leased to Francis Spencer and the Waimea Grazing and Agricultural Company, which established ranching stations and operations around the mountain lands...The lease took in all of the mountain lands (to the summit of Mauna Kea), across Ka'ohē to its Mauna Loa boundary [Maly 2004:3-4].

As a part of his operations, Spencer's activities included the entire mountain lands of Ka'ohē and Humu'ula, including the summit of Mauna Kea, and lands up to the summit of Mauna Loa. He also held leases on large tracts of the Waimea plain lands, and by the 1860s, leased the entire 'ili of Waikōloa (more than 90,000 acres), and a short time later, also leased the *ahupua'a* of Pu'u Anahulu and Pu'u Wa'awa'a. During that time, Spencer had a monopoly on all sheep and wild cattle on Mauna Kea and the mountain lands, including uses of the Pōhakuloa plateau lands, Kalai'eha, Keanakolu, Hanaipoe, and smaller stations in between these areas. It wasn't until 1870, that John Palmer Parker began to work his way into leasehold interests in Ka'ohē, and not until 1914 that A.W. Carter, trustee of the Parker Ranch, secured a lease on the land of Humu'ula, including the sheep station at Kalai'eha [Maly 2004:53].

In 1871, Parker Ranch was granted a five-year lease in Ka'ohē:

June 5, 1871—F. Hutchinson, Minister of the Interior; to J.P. Parker

Government Lease no. 156

(Demising a Five Year lease on the Land of Kaohe, and Right to take Unbranded Wild Cattle from the Land.):

This Indenture of Lease made this fifth day of June A.D. One Thousand Eight hundred and Seventy-one by and between His Excellency Ferd. Hutchinson, His Hawaiian Majesty's Minister of the Interior on behalf of the Hawaiian Government party of the first part and John Parker of Waimea, Hawaii, party of the second part, Witnesseth that the said party of the first part for and in

consideration of the covenants and agreements hereinafter set forth has leased and doth hereby lease unto the said party of the second part all that tract of lands known as Kaohe situated in the district of Hamakua, Island of Hawaii. Which land the said party of the second part, his heirs, executors, administrators and assigns, are to possess together with all its present improvements and advantages, also the right to kill the wild unbranded cattle thereon, for the term of five years from the date of this indenture, without unlawful molestation, provided that he or his said representatives will yearly pay or cause to be paid unto the said party of the first part the sum of Four Hundred Dollars in four quarterly payments at the Interior Office in Honolulu, that is to say One Hundred Dollars on the fifth day of June, September, December and March of each and every year during the term of this Lease, and in addition thereto pay any taxes now or to be hereafter imposed by law on landed property which are applicable to leasehold estates... [HSA – DLNR 2 Vol. 15; from Maly 2004:76-77].

When the lease expired in 1876, John Parker II "...renewed his lease of the region in Lease No. 217, which covered the Government land of Nienie, 'And also, all that tract or parcel of Government land situate in the district of Hamakua, Hawaii, known as 'Kaohe' (Land Division – Lease No. 217). The terms of the lease ran for fifteen years at a cost of \$800.00 per year," (Maly 2004:79).

Maly (1999:147) writes that upon the expiration of Lease No. 217 "[i]n 1891, the Ka'ohē Ahupua'a which J.P. Parker had previously held in its entirety, was subdivided into several large tracts. On September 9, 1891, Samuel Parker secured Ka'ohē Tract No. 3, adjoining Kalopā and Pā'auhau, and containing an area of 38,700 acres, at \$620.00 per year (Lease No. 436)."

When John Parker died in 1868, he left half of his estate to his son John Parker II and half to his grandson Samuel Parker (nephew of John Parker II). In 1880, George Bowser wrote a description of "Samuel Parker, Esq." in his article "An Account of the Sugar Plantations and the Principal Stock Ranches on the Hawaiian Islands" in *The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide 1880-1881*. Bowser (1880:418) describes the ranch's holding under Sam:

Owns 25,000 acres and rents 200,000 acres. Owns about 25,000 head of cattle and 1,000 head of horses. This is the largest tract of land owned and rented by any one individual of the Hawaiian Islands. The soil is remarkably rich, and the cattle in this large ranch are very choice breeds. In the near future, providing artesian wells could be brought to bear in tens of thousands of acres of this land, the value of this estate would be almost beyond calculation.

A drought in 1877 killed many cattle, and proved downright disastrous for some other outfits. WGAC sold their herds to Parker Ranch at this time. Bergin (2004:162) writes that "[a]s ranch management control moved out of the direct hands of the Parker family, both water development and fencing would be seen as serious steps in modern livestock and range stewardship."

Samuel Parker was prone to impulsive and sometimes bull-headed behavior, leading an ailing John Parker II to grant control over the ranch to trustees in 1887. Paul Jarrett oversaw operations

of the ranch from 1887, through the death of John Parker II in 1891 and through untimely death of John Parker III in 1894. John Parker III had died before reaching the age at which he would have been granted half of the ranch, left to him by his father. John Dowsett, the father-in-law of John Parker III, became the guardian of John's daughter Annie Thelma Kahiluonapuaapiilani Parker, and soon discovered that she had inherited her father's half of the ranch. Before his death in 1898, Dowsett told Elizabeth, Thelma's mother, that she must see to the inheritance (Bergin 2004:166-167). Bergin (2004:167) writes that Elizabeth, determined to see her daughter's interest through, "...chose A.W. Carter to be Thelma's guardian and trustee manager of her property. Shortly thereafter, and in concert with Sam's agreement for management of his half interest, A.W. Carter assumed responsibility for running the entire ranch."

Upon his arrival to the ranch in 1900, Carter noted numerous problems, including lack of water and fence infrastructure. His assessment is included in Lucille Brundage's book *Alfred W. Carter: Hawaii's Dead of Cattlemen and Notes on Hawaiian Livestock*:

On my first visit to the Ranch, I found the place undeveloped in every way. The stock consisted in part of about five thousand head of wild cattle, which had been inbreeding from the time Vancouver landed a few head over a hundred years previously and of which these animals on the Ranch were descendants. Aside from the wild cattle, the balance were inbred, long-legged long horned slab sided individuals. The steers at five years would not average over five hundred pounds dressed weight...

Aside from half a dozen small paddocks, there was no fencing, no segregation and, but for a short line of pipe from the Kohala Mountains, there was no distribution of water. Some cattle had to travel fourteen miles to their grazing ground. The Waikii Paddock and the fattening paddock had no water. Much of the land was unproductive from a grass standpoint, having either been overstocked or never having had any grass on it [Brundage 1971:50-51].

Aside from observing the practical problems of the ranch, Carter was struck by the lack of support for the ranch employees. He constructed homes for the employees which he sold to them, interest free, believing "...this to be a sound business policy," (Brundage 1971:97). He served as doctor and judge for the people of the ranch, always concerned about their welfare. This genial approach led him to eventually be called Makua, which means "father" or "parent," (Brundage 1971:96).

Maly and Maly (2002:162) write that Sam Parker was unhappy about Carter's appointment as trustee of the ranch. Parker:

...began to seek out ways by which to remove Carter and gain control over the combined ranch assets. There appear to have been four primary areas of leverage sought by Sam Parker and associates in their bid for the ranch—the first was water; the second, the land of Waikōloa (including the Waiki'i and Ke'āmoku sections); the third, guardianship over Annie Thelma Kahiluonapuaapiilani Parker; and the fourth, acquisition of the leasehold interest in Humu'ula and the Kalai'eha Sheep Station.

Carter tried to work with Parker in solving the immediate problems on the ranch. He wrote of his encounters with Parker in attempting to assuage the water crisis:

I told Mr. Sam Parker that there were two things that should be done immediately; one was to acquire the land of Waikoloa which had a very short lease; the other was to get water across the plain to below Waikii, as cattle in that neighborhood, although there were not many head, had to walk a ways into Waimea to get water at the stream back of Puuopelu, from six to ten miles distant. Mr. Parker agreed that both things should be done.

Later.

Regarding the pipe line Mr. Parker repudiated this, and said he wanted all the profits and didn't want anything expended for improvements. I told him I could borrow the money. He absolutely refused to give his consent.

He then talked with some of the surveyors in town who knew nothing of hydraulics and they contended that if I went ahead with this scheme that there would not be a drop of water come out of the other end of the pipe.

I had prepared myself for this connection and I told him, that unless a certain amount of water was obtained at that end of the long pipe in twenty-four hours I would pay for it myself. (My recollection is that I said 7,000 gallons within the twenty-four hours.)

The quantity which flowed at the end of the pipe when completed was 15,840 gallons per twenty-four hours... [A.W. Carter Water files, in collection of PPS; from Maly and Maly 2002:162].

Maly and Maly (2002:162) provide an excellent summary of the state of affairs between Sam Parker and his backers and A.W. Carter over the next few years:

By 1902, Sam Parker, cousin Eben Low and backers set in motion plans to take over the ranch and remove A.W. Carter. Their first action was to contest Carter's trusteeship of Annie Thelma K. Parker. Parker and party also bid, unsuccessfully, on the Waikōloa lands from heirs of the Davis estate, and attempted to demonstrate that expenditure of Parker estate funds on the development of the water lines was a waste. Things got so heated between Sam Parker, his partners, and A.W. Carter, that a take over was attempted, and on June 7th, 1904, Eben Low, J.A. Magoon, and J. Lightfoot stormed Carter's office, with Low apparently brandishing his pistols (A.W. Carter & Parker files 1904). Things were heated, but no shots were fired. Subsequently, John "Keoni Poko" Lindsey (father of interviewee Elizabeth Lindsey-Kimura) slept in Carter's office, armed, in case of an attack.

In 1903, Carter purchased 9/10ths interest in Waikōloa from the estate of G. Hueu Davis. His notes indicate that half of this purchase would benefit his ward, Thelma Parker, and half would go to Sam Parker (Maly and Maly 2002:171).

In 1905, it was decided in court that A.W. Carter would remain trustee. In 1906, the case regarding partition of assets was decided, "...thus bringing an end to more than five years of disagreements and litigation. The result was that water flowed across the land to outlying regions, and A.W. Carter went on to develop Parker Ranch to its fullest potential," (Maly and Maly 2002:171). Part of this realization of potential included obtaining the lands of the Humu'ula Sheep Station Company. Maly (2004:127) writes that:

Following settlement of the law suit between Parker and Carter in 1906, the two once again entered into a cautious working relationship. By 1914, Parkers' efforts in business at Humu'ula were floundering, and in that year A.W. Carter, on behalf of the Parker Ranch, sought out a means of purchasing the Humuula Sheep Station Company for Parker Ranch. In the months leading up to the sale in 1915, A.W. Carter researched and documented the conditions, and extent of the Humu'ula holdings.

On November 9th, 1915 Carter took possession of the Humu'ula Sheep Station Company holdings, in a 15 year lease. In August of the same year, the Company had been dissolved (Maly 2004:129). In 1929 the Humu'ula lease was renewed (General Lease No. 608) for a period of 21 years, from January 1st, 1930 to December 31st, 1950, under Parker Ranch ownership. Carter was originally out-bid on the lease, but the winning bid fell through. Carter writes that Parker Ranch:

...was run up tremendously on all of the leases. Humuula went from \$8,150.00 to \$25,100.00. It was an outrageous price to pay for this but I am glad that we got it. I would have even gone some higher to obtain it. We can make money on this rental. I doubt, however, if anybody else would have. We have the stock and we need the land.

The road to Humuula [the Pōhakuloa flats of Ka'ohē], consisting of about 16,000 acres, was bought by a Portuguese at an annual rental of \$8,000.00. This is largely a desert section and runs well up into the rocks on the Mauna Kea side. The lease provided for a fence to be built by the successful bidder of sixteen (16) miles, which will cost him, I think, not less than \$1,000 a mile. No one, I think, can make anything out of the place on the price paid for the lease and the conditions of the lease.

The other section of Kaohe between the Waikii gate and the last gate [the Ahumoa section] consisting of about 11,000 or 12,000 acres, I was run up to \$4,000.00, which is an excessive rental but considering the fact that it butts right into our Waikii paddock, it was essential that we get it.

There is considerable good land in this lease and I feel that we can make it pay its way. The other two leases, one back of the homesteads in Waimea Village and the

other one on the mountain back of the old dairy, I obtained. We got all our leases with the exception of Kaohe section above mentioned, and the rent to the purchaser of this lease is prohibitive [Parker Ranch-PPS, Humuula File; from Maly 2004:134].

In 1904, Parker Ranch had also purchased what, at the time, was known as the Pu'uloa Sheep and Stock Ranch at Ke'āmuku, which was owned by Macfarlane and Company. The purchase included 6,175 sheep. Richard Smart wrote an article for the *Paka Paniolo* in 1965 in which he discussed the quality of the wool produced at the Ke'āmuku, and why the station eventually abandoned the practice of raising sheep:

By June 1908 the station had increased its stock to 10,997 sheep and produced 30,000 pounds of wool which was almost completely free of kikania (cockle burr). Therefore, Parker Ranch wool always brought good prices in Boston where it was marketed. Shearing was done early in the Spring before the kikania burrs had a chance to mature and harden and stick to the wool. For this reason also Parker Ranch wool was always preferred in the Islands as padding for the Hawaiian quilts. Speaking of quilts, Mrs. Theresa Quinn of Kohala was contracted to make a quilt for Queen Liliuokalani's bed at Washington Place during Governor Stainback's term of office. The wool for this quilt was donated by Parker Ranch

After Mr. Smith's resignation in July 1908 as manager of Keamuku Sheep Station, Mr. Donald Macalister became the manager but only remained at Keamuku for a year as he was transferred to Waikii to replace Wilmot Vredenburg who had met with an accident and was killed. Raising sheep at Keamuku had its problems. There were severe droughts, and the constant menace of wild dogs. After the purchase of the Humuula Sheep Station Keamuku gradually eased out of the sheep business and was turned over to raising cattle. [R. Smart in *Paka Paniolo*, September 1965; courtesy of Alan "Uku" Lindsey; from Maly and Maly 2002:209-212].

Waiki'i would also become an important holding of the ranch during the early 1900s. By 1909, corn was planted there for feed, and pig and turkey farms were started. Maly and Maly (2002:171) summarize the writings of Cater on the subject of Waiki'i:

The records describe early work being done primarily by Hawaiian, Chinese, Japanese, and Portuguese employees. The plowing of fields and construction of water lines, tanks, troughs, fences, and support buildings were undertaken first, with much of the construction done by Japanese laborers. Subsequently, the Japanese laborers also began the cultivation of the corn fields. It appears that by 1910, disagreements had arisen between station managers and some of the Japanese hands, and it was in that period, that A.W. Carter sought out and secured the employment of Russian immigrants at Waiki'i.

Another change of importance to the Waiki'i-Ke'āmoku vicinity landscape was that by 1918, A.W. Carter closed the Ke'āmoku Sheep Station operation, which had been in place since the 1860s. The stock and resources were combined with the assets of the Humu'ula Sheep Station at Kalai'eha. Several factors were considered in this move, among them were weather and improved pasturage in the uplands, and the spread of the kīkania and other burrs which made shearing difficult. Waiki'i and the lower Pu'u Pāpapa paddocks continued to serve as an important link between Kalai'eha and Waimea until closure of the sheep operations in 1964. Through the 1950s, sheep were walked via the Kalai'eha-Waiki'i-Waimea road, with rest stops in the Ahumoa-Pu'u Lā'au, Waiki'i, Pu'u Pāpapa and Holoholokū paddocks. Bales of wool from Humu'ula were also stored in Waiki'i facilities until shipping quotas were met.

The 1956 withdrawal from lease of the Ka'ohē IV, or Pōhakuloa, lands by the military marked the beginning of a period of changes in ranch operations and management (Maly 2004:138). Maly and Maly (2002:202) remark that “[b]y 1957, closure of the Waiki'i Village Station was completed and most of the houses were moved to “Little Waiki'i” in Waimea. Today, a corn crib, part of the stable facilities, the manager's house, and three “bread ovens” from the early village may still be seen.” Part of this closure was due to a change in weather patterns:

Up until the late 1940s, the annual rains remained consistent. There was a time for planting and for rotating livestock through regional paddocks, and the weather could be counted on. This changed and by the early 1950s, crops were lost, and the ranch's feed planting program diminished, adjusting to the weather patterns. As a result, there was no longer a need to have a village at Waiki'i [Maly and Maly 2002:202].

Despite the relocation of the village, some cattle and turkeys were still kept at Waiki'i. “and a few men, who were responsible for weed control and fence work in the outer region of Ke'āmuku, continued to live there as well,” (Maly and Maly 2002:204).

In 1962, Richard Smart reported that the Ke'āmuku Station had been renovated, but it was closed only a few years later in 1965. In 1963 the sheep operation at Humu'ula had been shut down as well, as the ranch wanted to focus on cattle (Maly 2004:138). Smart wrote of the closure of the Ke'āmuku Station in *Paka Paniolo*:

The Keamuku Camp was closed several months ago when it was consolidated into one operation with Waikii, thus withdrawing the need to maintain two camps instead of one in the same general vicinity. In the early days it was necessary to maintain Keamuku as an outpost camp as transportation and communication to and from the camp were difficult but with the modern means of communication of today the Keamuku area may be inspected and worked very readily from headquarters at Waikii. This was a decision by management in the interest of streamlining ranch operations.

The present buildings at the Keamuku camp will eventually be dismantled. Standing there now are several interesting old buildings including an old shearing

barn [R. Smart in *Paka Paniolo*, September 1965; courtesy of Alan "Uku" Lindsey; from Maly and Maly 2002:209-212].

4.3.1.1 Waimea Grazing and Agricultural Company (WGAC)

Borthwick et al. (1991:13) write that Francis Spencer "...was an early entrepreneur involved mainly in cattle ranching," though goats also made up a substantial part of his ranch, and "[i]n 1856, [Spencer] exported from Kawaihae were some 1,200 bullock hides, 5,000 goat skins and 35,000 lbs of tallow." Maly's 2004 report on the lands of Waimea includes reproductions of correspondence regarding the early lease holdings of Spencer and his company. Included in this extensive collection of documents is the following letter in which Spencer requests a lease on the lands of Kalai'eha and Ka'ohē, for the purpose of raising sheep:

January 16, 1857—Francis Spencer; to John Young, Minister of Interior

(Regarding lease of Kalaieha and Kaohe for Development of Sheep Ranching interests):

...The undersigned carrying on Sheep Farming &c. at Lihue, Waimea, Island of Hawaii, and being anxious to increase his Flock to an extent that would enable him to raise sufficient wool to make it a profitable business to export the same. And having ordered some pure blood Marino Sheep from Germany and New South Wales.

Beg respectfully to offer to lease for a term of Twenty or more Years — Kalaieha part of the Government Land called Kaohe, district of Hamakua between Maunakea and Maunaloa. A small portion of which was let at five cents per Acre in mistake for his Majesty King Kamehameha IV. Land your petitioner is now informed the land belongs to the Government and Respectfully offers to lease say Ten Thousand Acres at Three Hundred Dollars per Annum allowing your petitioner at any time to annul the same. By forfeiting one years rent and all improvements. Your petitioner would further say there are no inhabitants within Thirty or Forty miles of the place and through the scarcity of water is not likely to be that, together with wild Dogs induces your petitioner to ask the privilege of annulling the lease with the above proviso. Trusting that your Excellency will be graciously pleased to grant my petition...

Resolved that the Minister of the Interior be authorized to lease 10,000 acres of land in Kaohe, Hamakua, Hawaii to F. Spencer at the rate of 6 cents per acre a year for such time as the Minister may see fit, provided however that the thousand acres applied for and now occupied by Mr. J. Low shall not be included in the 10,000 acres [HSA-Interior Department Lands; from Maly 2004:63].

Spencer was granted the lease in 1859. This gave Spencer "...a monopoly on all sheep and wild cattle on Mauna Kea and the mountain lands, including uses of the Pōhakuloa plateau lands, Kalai'eha, Keanakolu, Hanaipoe, and smaller stations in between these areas," (Maly 2004:53).

In 1861 the Waimea Grazing & Agricultural Company (WGAC) was created, co-owned by Spencer and Robert C. Janion. The following indenture document describes the formation of the company and the lands under its control at that point:

August 1, 1861—Indenture of Francis Spencer & Robert C. Janion; to Waimea Grazing Company

(Regarding formation of the Waimea Grazing & Agricultural Company and transfer of interest in lands on the slopes of Mauna Kea; the lands of Ka'ohē and Humu'ula; and other properties and rights):

This Indenture made the first day of August A.D., One Thousand Eight Hundred & Sixty one, between Francis Spencer & Robert C. Janion, lately copartners in the Grazing business at Puuloa, Waimea, on the Island of Hawaii, under the name & Style of F. Spencer & Company, of the first part, & the Waimea Grazing & Agricultural Company of the other part. Whereas by articles of agreement & co partnership made & entered into & concluded by & between the said F. Spencer & R.C. Janion of the one part and Francis Spencer, James Louzada and Henry Cornell copartners in another Grazing Establishment at Lihue in the District of Kohala in the said Island of Hawaii, of the other part, reciting that the said several parties & firms respectively had agreed & did thereby agree to consolidate & unite their several partnership propositions that the same should be therefore held, managed & conducted as a Joint Stock Establishment in the name style & title of "The Waimea Grazing & Agricultural Company..."

Now this Indenture witnesseth that in perusal of the premises & the said recited agreement...conveying and making over to the said Waimea Grazing & Agricultural Company all the said several properties owned by them as copartners in the said Lihue establishment & in further consideration of Ten Dollars in hand paid by the said Waimea Grazing & Agricultural Company... They...have granted...all the right, title, & interest in & to all that tract of land in Hamakua on the Island of Hawaii aforesaid granted to George S. Kenway by Royal Patent No. 632, & by said G.S. Kenway afterwards duly conveyed to R.C. Janion & John Montgomery...

...And Also all that piece of Land & Houses there all in Waimea... And Also all that tract of Land called & known as Waikoekoe in the District of Hamakua...the personal property of W.C. Lunalilo by Indenture of Lease bearing the date of the 25th day of January 1860...

And Also all that piece of Land situated in Waimea, Hawaii & Known by the name of Kailiohia, being a Kuleana from His Late Majesty Kamehameha III, as demised to the said Francis Spencer by Anthony D. Allen by lease bearing date of the 5th day of January AD 1861...

...And Also all the joint interest of the said Francis Spencer & Robert Janion parties here to in a certain Indenture of Lease bearing date of the 16th day of November AD 1859 made between His Royal Highness, Prince L. Kamehameha, His Majesty's Minister of the Interior on behalf of His Majesty King Kamehameha IV & the Hawaiian Government of the first part & the said Robert C. Janion party hereto of the second part where by the said party of the first part demised to the said Robert C. Janion his executors, administrators & assigns, all that part of those lands belonging to His Majesty & the Government on the Mountain of Mauna Kea [the lands of Ka'ohē and Humu'ula], lying above the forest on the Hilo side of the Mountain & on the Waimea side of the Mountain above the lands of Paauhau & Waikoloa (except certain lands therein specified) with the privilege of catching & killing the wild unbranded cattle on any of the lands belong to His Majesty or the Hawaiian Government on the Districts of Hilo, Hamakua & South Kohala (excepting His Majesty's land at Puukapu), for and during the term of five years from & after the first day of August 1859... [Bureau of Conveyances Liber 15:24-28; from Maly 2004:68-69].

According to Maly (1999:137), "[t]he addition of Pu'u Anahulu to his [Spencer's] holdings gave him almost continuous grazing coverage from Hilo, Hāmākua, South Kohala and Kona. The exception being the land of Waikōloa which was owned and being used by G. Hueu Davis, the Māhele awardee of the land division." Spencer's interests in Waikōloa bore fruit when, in July 1868, Davis "...granted a lease of Waikōloa to Wm. Green on behalf of the WGAC for an initial term of 20 years," (Maly 1999:137). Maly (1999:137) describes how the company expanded its interests in the Waikōloa region over the next several decades, until Carter acquired the lands in 1903:

The interest of the Grazing company in Ke'āmoku-Waikōloa vicinity lands was extended through several owners of the company, and only terminated in 1903, when A.W. Carter purchased the entire land from heirs of the Davis Estate. Throughout this time, the primary operation focused on sheep herding and the exporting of wool, though records below also document the taking and sale of bullocks from the Waiki'i and Ke'āmoku section lands.

After Parker Ranch was awarded the lease over Ka'ohē in 1871, the WGAC lost all of its interests there. Another blow to the WGAC would come when, on March 6, 1876, the Commissioners of Crown Lands entered into a new lease for the land of Humu'ula with James W. Gay. According to Maly:

The conveyance of March 6th, 1876, granted all the land of Humu'ula by terms of 25 years, including the right to kill wild and unbranded cattle from the land; though reserved the trees on the land. Also of importance, all improvements ranging from buildings, walls, trails and roads were to become the property of the Crown upon termination of the [Spencer] lease Crown Lands Lease No. 75 [Maly 2004:79].

4.3.1.2 Humu'ula Sheep Station Company

A.W. Carter recorded his recollections of the Humu'ula Sheep Station Company, established by James W. Gay. He wrote that after being awarded the Humu'ula lease in 1876, James Gay "...established his headquarters at Keanakolu and built the sheep shearing shed there...He found that this section was so wet, it was impossible to handle the wool," (Journal of A.W. Carter, December 12, 1946; from Maly 2004:54). Gay then moved his headquarters to Kalai'eha, some thirty miles away. Carter notes that while Gay was operating mainly as a sheep station, he was also occupied with hunting wild cattle and selling the hides (Journal of A.W. Carter, December 12, 1946; from Maly 2004:54). In 1880, Bowser (1880:418) attributed 20,000 acres of rented land and 6,000 sheep to "James Gay, Esq." Carter provides a description of the incorporation of the company:

Subsequently, on October 30, 1883, a Charter of Incorporation of the Humuula Sheep Station Co. was given to James W. Gay by Chas. T. Gulick, Minister of the Interior. Capital was \$100,000.00. 1000 shares at \$100, the stock being owned by James W. Gay (400 shares) Conrad Henke (400 shares), and Paul Isenberg (200 shares). On October 31, 1883, the lease was assigned to the Humuula Sheep Station Co. by James W. Gay, consent to this assignment having been given on July 30, 1883 by Charles H. Judd, Crown Commissioner and Land Agent. At that time also (July 30, 1883) the Commissioner of Crown Lands extended the term of the lease for a period of 7 years and the rent was increased to \$1,000. per annum and the additional reservation given to Mr. Gay, as follows:

"Adding to the reservations that all indigenous wild birds for the time being on the said lands, with the full right to take, kill or capture the same."

At the time James W. Gay assigned the lease (October 31, 1883) he reserved to himself "the lower or makai portion bounded on the East by the sea, on the south by Kaawalii Gulch in Waipunalei, on the north by the land of Ookala and on the west by a line through the woods to include in the above makai reserved portion, an area of 1200 acres more or less." By this same document, he sold all herds and flocks of sheep and cattle running in and upon the land of Humuula, 150 head of horses, and all agricultural implements and other chattels used in connection with the sheep station [Journal of A.W. Carter, December 12, 1946; from Maly 2004:54-55].

In 1887 A. Haneberg went to work as manager of the station. Carter mentions that "[t]he Humu'ula holdings subsequently transferred from Gay to the Haneberg brothers and H. Hackfeld & Company in the early 1890s," (Journal of A.W. Carter, December 12, 1946; from Maly 2004:54). After his transfer of ownership of the Humu'ula Sheep Station Company, Spencer "...maintained a residence and station at Ke'amoku through the 1880s, and held his interests in the Pu'u Anahulu Ranch lease through 1895," (Maly 1999:146).

After the subdivision of Ka'ohē Ahupua'a in 1891, Haneberg, now president of the Humu'ula Sheep Station Company, was granted Government Lease No. 451 and 457 (both in Ka'ohē IV), giving the company control over Pōhakuloa, the summit of Mauna Kea, and the Ka'ohē lands

extending to the summit of Mauna Loa (Maly 1999:147; Maly 2004:110). When Haneberg went into business with retailer H. Hackfield in 1895, lease 451 was adapted to reflect this change:

Honolulu September 30, 1895.

Office of the Commissioners of Public Lands.

Permission is hereby given to the Humuula Sheep Station Co. to assign the within lease No. 451 to Messrs. H. Hackfeld & Co. it being expressly conditioned that no other or further assignment of the same shall be made without the written consent of the Commissioners of Public Lands (or their successors in office) being first obtained for such purposes and subject to the terms and conditions of said lease.

For the Commissioners

J. F. Brown

Commissioner and Agent of Public Lands. [State Land Division Lease File; from Maly 2004:111].

Carter notes that while Hackfield and Co. held the lease over Pōhakula, "...they routed much of their transportation from Kalai'eha- Humu'ula via the Hāmākua route. This was perhaps a function of the Hackfeld association with the Kūka'iau-Pa'auilo lands," (Journal of A.W. Carter, December 12, 1946; from Maly 2004:55). Maly (1999:148) writes of the eventual transfer of the Humu'ula Sheep Company lands to Samuel Parker and company:

[B]y 1899, negotiations for transfer of the lease between Haneberg, Hackfeld, and Samuel Parker were underway. By 1900, the Humu'ula and Ka'ohē lease lands were both held by [Sam's] Parker Ranch interests and regular transportation of wool, sheep, and other livestock between Humu'ula, Waiki'i, Ke'-moku, and the larger Waimea region resumed. Additionally, since the ranch held interest in the lands and outlying stations which encircled Mauna Kea, transportation was facilitated by both the Waimea-Waiki'i and Hāmākua routes, depending on needs.

Several articles in Island newspapers chronicled the transfer of the Humu'ula lease into Parker family hands, and the large-scale development of the sheep operations of the ranch. Articles from 1899 and 1900...summarize the venture...

Carter wrote of the circumstances under which the Humu'ula property would become part of Parker Ranch proper in 1915:

Sam Parker Jr. decided to sell Humuula, or the stock of the [Humu'ula HSheep Station] company. He promised Davies & Co. to give them the first chance to purchase it but Davies & Co. considered his price too high. He promised Shingle the second chance but Shingle ridiculed Sam for the amount he was asking. He then came to my man and the Parker Ranch purchased all of the corporation stock

for the price he asked. The Parker Ranch has held the lease continuously since that time.

At the time I purchased the lease of Humu'ula [conveyance of 1915], the piece of land at Waipunalei, which was owned by Sam Parker, was conveyed to me. This has been a valuable addition to Humu'ula on a count of the water in the gulch [Journal of A.W. Carter, December 12, 1946; from Maly 2004:54-55].

Cattle were an important part of the Parker Ranch operations at Humu'ula. Ranching there continued until the Station closed in 1970. The former Humu'ula Sheep Station borders on the northeast portion of PTA, and walls associated with the Station have been documented in PTA Training Areas 1 and 4 (Desilets et al. 2005:12).

4.3.2 Development of the Saddle Road

As described in the Traditional Background section of this report, *ala hele*, or trails, were an important asset in the saddle region. Many of the traditional trail systems throughout the islands continued to be used after contact, for visiting travelers and for movement of goods. Maly (1999:73) notes that:

By the mid nineteenth century, wheeled carts were being used on some of the trails. In Nāpu'u, portions of both the near shore and upland *ala hele-ala loa* were realigned (straightened out), widened, and smoothed over, while other sections were simply abandoned for newer more direct routes... By the 1840s, the modified alignments became a part of a system of "roads" called the "*Ala Nui Aupuni*" or Government Roads. Work on the roads was funded in part by government appropriations, and through the labor or financial contributions of area residents and prisoners working off penalties.

Maly and Maly (2002:117) state that "...while in most locations roads were improved through populated areas, on the mountain lands old trails were modified or realigned to improve access to large tracts of Crown and Government Land." An 1850 Report of the Minister of the Interior provides one example of early correspondence regarding the construction of a "Mountain Road":

April 1850—Report of the Minister of Interior for the Years of 1848 & 1849

(Reports on Status of Kona to Hilo Mountain Road – Judd Road):

...A Mountain Road is being constructed on the Island of Hawaii, from the District of Kona to that of Hilo. This is a great and important work, and the Prisoners on that Island have been employed upon it. It is said that about 10 miles of the road are completed. Should this Road be finished, it will be of immense advantage to the People of the Island, and greatly facilitate the business of the Government. But work of such magnitude must require time... [HSA – Interior Department, Misc. Box 141; from Maly and Maly 2002:117].

This route, which was also known as the Waimea-Waiki'i-Kalai'eha Route, was formally surveyed in 1862 (Maly 2004:145). This route would become what is referred to now as the "Saddle Road":

The section between Waiki'i and Kalai'eha basically remained on the same alignment until after World War II and the eventual paving of the "Saddle Road." In the area from Kilohana (on the north side of the present-day girl scout camp) to Waiki'i proper, the route is almost as it was laid out in 1866 (overlying one of the ancient trails through the area), except for widening [Maly and Maly 2002:117].

Maly and Maly's report (2002:117-121) includes an extensive record of correspondence through the year 1871 regarding the construction progress of the mountain road. They concludes that, particularly after the turn of the century, road maintenance and access were under the control of Parker Ranch (Maly and Maly 2002:121).

4.3.3 The Mauna Kea Forest Reserve

Despite the inclusion of conservation clauses in leases from the early 1800s, the depredations of the upland forests continued. The problem, often attributed to wild animals, escalated throughout the 19th century, until in 1876 King Kalākaua enacted the "Act for the Protection and Preservation of Woods." This act authorized the Minister of the Interior "...to set apart and protect from 'damage by trespass of animals or otherwise, such woods and forest lands, the property of government...best suited for the protection of water resources...'" (Maly 2004:225). In 1893, Queen Lili'uokalani established the Bureau of Agriculture and Forestry, which was to focus on protecting the forests (Maly 2004: 225). That same year, the Commissioner of Forestry included in a letter to the President of the Bureau of Forestry and Agriculture a description of the threat posed by deforestation in the Hamākua and Kohala Districts:

...[T]he Ranching industry in the neighborhood of Waimea has been largely increased. The cattle in grazing around Waimea, and in the adjoining mountains have gradually caused the destruction of the underbrush and finally the large trees throughout that section of the District.

The areas of land affected was at first small, but year by year it has steadily increased until now there are probably 100,000 acres entirely cleared, except for an occasional dead stump still standing. As the above area has increased so the rainfall has diminished, so that now there are two causes, lack of moisture, and the damaging effects of the cattle, for the rapid denudation of all the Forest land in this District... The ranching industry extensively carried on between the Hamakua and Kohala Districts, is also seriously threatened from the reduced feed and water supplies... [HSA – Interior Department Box 2 Agriculture & Forestry; May 29, 1893; from Maly 2004:225].

In the year 1900, the Bureau became the Board of Commissioners of Agriculture and Forestry, which established forest reserves throughout the state (Hawai'i State Archives – Com 2, Box 11; from Maly 2004:225). Maly (2004:226) writes:

Leasehold interests in the Government land of Ka'ōhe, which in 1891 had been divided into several parcels, and included the entire summit region of Mauna Kea, were modified during this time. The lands generally above the 7,500 to 9,500 foot elevation were removed from the leases. Parker Ranch, Kukaiau Ranch and the Humu'ula Sheep Station Company had also been required to fence their boundaries between pasture lands and mountain lands. This was done in part, to keep ranch herds separate from the remaining wild herds on the mountain...

A few years later, the Board of Commissioners of Agriculture and Forestry recommended that the lands of Kaohe IV be removed entirely from lease:

The report on the land of Kaohe 4, Hamakua, Hawaii, brings out the position of the Board on the question of the disposition of the so-called "waste land" above the area of good grazing country on the higher mountains in the Territory present PTA. The Board believes that land of this character should not be included with the better land as has been the custom in the past, but that it should be retained by the Government against such time as it may be utilized for some now unforeseen industry, or until it can be planted with forest trees from the temperate zone... [HFA, 1905:124; from Maly 2004:236-237].

A 1906 resolution of Board of Agriculture and Forestry described the portions of Ka'ōhe to be reserved from lease and included in the forest reserve:

Resolved, that the Board recommends to the Governor that the portion of Kaohe lying above a line roughly described as beginning on the boundary between Kaohe 4 and 5 at the end of the mauka fence required to be built across Kaohe 4 by a lease sold to Mr. A.M. Brown in December, 1904, and running in a general northwesterly direction, mauka of Puu Ahumoa to Puu Laau, thence northeasterly along the mauka boundary of Paauhau to Puu Kemole, thence mauka of Puu Kaluamakani to a point on the division line between Kaohe 3 and Kaohe 5, thence along said division line to the northwest end of the existing fence across Kaohe 5, built by the Kukaiau Plantation Company, thence in a general southeasterly direction across Kaohe 5, following said fence, to the Humuula boundary, thence following said Humuula boundary to the south and west around Mauna Kea to the southeast line of Kaohe 4, thence across Kaohe 4, following the above described fence to the point of beginning, and also the portion of the land of Kaohe that lies above the Keamuku and the 1843 lava flows on the north slope of Mauna Loa, be for the present, reserved by the Government from sale or lease and retained by the Land Office as waste land [HFA, 1907:429; from Maly 2004:245].

Maly (2004:248) describes how these lands would finally become the Mauna Kea Forest Reserve in 1909:

In 1908, Commissioner, L.A. Thurston reported on the lands of Ka'ōhe and Humu'ula, and a proposal to set aside such lands for a new reserve, to the Board of Commissioners. This proposal would become the Mauna Kea Forest Reserve,

and implement a fencing project across Humu'ula and Ka'ohē, around most of Mauna Kea. The resulting reserve, established in 1909, would become one of the major projects undertaken by the Civilian Conservation Corps (CCC) program in the 1920s-1930s...

The 1909 inception of the forest reserve resulted in the removal of the Mauna Kea summit and adjacent lands from private lease. Maly (2004:262) writes that “[i]n 1937, the boundaries of the Mauna Kea forest Reserve were modified, to take in additional portions of the lands of Humu'ula, Ka'ohē, and some lands lying *makai* of the two. As a result further lands were removed from the grazing operation of the Humu'ula Sheep Station.”

4.4 Twentieth Century and Modern Land Use

4.4.1 'Oihana Kilokilo (Astronomy)

Starting in the early 1960s, Mauna Kea was promoted as a prime location for developing astronomical facilities by a group of business leaders on Hawai'i led by Mr. Tetsuo Akiyama. A road was built to the summit in 1964, with the support of then Governor John A. Burns. After testing at the top of the mountain showed superb conditions for astronomical observations, two facilities were constructed by the University of Hawai'i at the end of the decade. By the turn of the millennium, Mauna Kea was home to a total of 13 astronomical facilities, making it “the largest concentration of telescopes in the world” with facilities being operated by astronomers from ten countries (Juvik and Juvik 1998).

Some of the most important recent discoveries in the field of astronomy have taken place at observatories on Mauna Kea, and proponents and advocates of these facilities have stressed that this work in many ways represents a continuation of the long tradition of Polynesian celestial observation and navigation that was integral to the initial discovery and peopling of the Hawaiian Islands (Juvik and Juvik 1998). At the same time, many Kānaka Maoli (or Native Hawaiian) individuals and groups have become increasingly opposed to any additional development atop Mauna Kea; a sacred mountain which should not be subject to additional ground disturbance, vehicular traffic, trash and human wastes.

Table 2 lists the telescopes and provides information on type, ownership, and year constructed.

Table 2. Telescopes on the summit of Mauna Kea

Type of Facility	Affiliation	Year Constructed
UH 0.9 m Educational Telescope	University of Hawai'i at Hilo	1970
UH 2.2 m Educational Telescope	University of Hawai'i at Hilo	2010
NASA Infrared Telescope Facility	NASA	1979

Type of Facility	Affiliation	Year Constructed
Canada-France-Hawai'i Telescope	Canada, France, UH	1979
United Kingdom Infrared Telescope	United Kingdom	1979
W.M. Keck (Keck I)	Cal/Tech University of California	1993
W.M. Keck (Keck II)	Cal/Tech University of California	1996
Subaru Telescope	Japan	1999
Gemini Northern Telescope	USA, UK, Canada, Argentina, Australia, Brazil, Chile	1999
Caltech Submillimeter Observatory	Caltech, NSF	1987
James Clerk Maxwell Telescope	UK, Canada, Netherlands	1987
Submillimeter Array	Smithsonian Astrophysical, Taiwan	2002
Very Long Baseline Array	NRAO, AUI, NSF	1992

4.4.2 Military Training and the Development of Pōhakuloa Training Area (PTA)

In his 2002 report about the lands of Waiki'i, Maly and Maly (2002) describe the role of the Parker Ranch during World War I and II. They note that during World War II, "Parker Ranch and other ranches in the Territory all developed programs to enhance the supply of meat and food resources with which to support the military effort, and with which to sustain the island population in case of embargoes," (Maly and Maly 2002:196). The effort to feed the 20,000 troops stationed in Waimea was a boon to the piggery at Waiki'i (Maly and Maly 2002:196).

One of the significant developments on the ranch landscape was the removal of tens of thousands of acres of land from the Waikōloa-Lālāmilo plains (down to the shore and Kawaihae Harbor) and adjoining land areas such as portions of Holoholokī, Ka'omoloa, and Pu'ukapu from ranch use. These lands were dedicated to military training, live fire ranges and camp facilities. The famed Camp Tarawa, located near Pu'u Opelu, in which was housed more than 20,000 U.S. Marine troops, served as the base of operations. During this action, the land area below the old Waimea-Kona Highway was removed from the ranch inventory. It was also during this time that weeds such as fountain (pampas) grass, which had generally been held at bay, got away, and spread across the land. In the years prior to World War II, the fountain grass which began at Ka'ūpūlehu (in 1917) had spread through the Pu'u Wa'awa'a-Pu'u Anahulu ranch lands, and A.W. Carter had implemented a strict program of daily weeding efforts; the sole purpose being to protect the quality and carrying capacity of the pasture lands.

This matter was reportedly so important to Carter that, if he saw an employee pass by a designated weed, there was a likelihood that the employee would be fired (Hisao Kimura, interview of June 29, 2002). Once the land was turned over to military control and live ammunition fire, ranch employees were unable to access the region. By the time the war ended and the land returned to ranch use, it was too late, as the fountain grass had spread across the Waikōloa plains... [Maly and Maly 2002:196-197].

Cactus also gained a foothold during this time of neglect. Parker Ranch never made any claims over the damages done the lands under military occupation, nor did they attempt to recoup the money spent on property taxes for these lands, despite the fact that they could not be used for pasturage during the occupation (Maly and Maly 2002:197). The government also failed to thoroughly clean up the unexploded ordinance left in the area, eventually resulting in the injury and death of certain ranch personnel (Maly and Maly 2002:198).

Maly and Maly (2002:198-199) go on to describe how Parker Ranch and the Marine Corps eventually worked out an agreement that would mark the birth of Pōhakuloa Training Area:

After the end of World War II, Parker Ranch and the Marine Corps entered into discussions regarding leases permitting the continued use of ranch lands for training maneuvers. By the early 1950s, the Marine Corps were seeking land in which long-term training exercises could be conducted; the newly formed Marine Corps Air Station at Mōkapu, O'ahu, did not have adequate space for field training. A portion of the Lālāmilo lands, as well as lands adjoining the upper Waiki'i-Ke'-moku vicinity in Ka'ōhe 3, 4, and Pōhakuloa were considered.

Maly and Maly (2002) include this December 11, 1952 letter from A. Hartwell Carter to Lt. General Franklin A. Hart, of the United States Marine Corps in his report:

...I. Lalamilo. The land of Lalamilo is situated in the district of South Kohala on the north[west] side of the Island of Hawaii. As you can see from the map it is a long, narrow parcel. It contains approximately 9,000 acres and is eight miles long and two miles wide. The terrain is rough. The distance from this site to Hilo is 62 miles. Hilo, as you know, is the only sizable town and the only real deep water seaport on the island. If the land is to be used for a camp site and training area we believe that ultimately you will find it inadequate. In viewing the land on the ground it is not too easy to envision the boundaries since there are no distinguishing marks between Lalamilo and the adjacent land which is owned by us in fee simple...

During the war Parker Ranch, in order to cooperate fully in the war effort and particularly with the Marine Corps, made available an area of land approximately 70,000 to 80,000 acres, rent free, which was used for approximately two years. This involved the normal problems of any area where a full division or more was stationed. We enjoyed good relations with the command and the officers and men.

Since the war we have lost large tracts of land and are now unable to surrender additional areas without suffering a serious handicap in our operations...

II. Keonepoko [Puna]...

III. South Point (Kamaoa-Puueo) [Kau]...

IV. Kaohe 3 and 4 – Pohakuloa. This land contains approximately 27,000 acres, a part of which is a territorial game reserve and Kaohe 3 [Ahumoa – Pu'u Ke'eke'e] is a horse pasture used by us. This particular site was indicated to your officers making the land inspection and it has since occurred to us to be more desirable than any of those heretofore under consideration. The area is adequate and it is not objectionable from the standpoint of being a long sliver of land such as Lalamilo. This tract is 35 miles from the city of Hilo and contains a spring which could be used to supply water tanks for storage if that is desired. At the same time there is a 500,000-gallon tank in use on the land. If this area were selected as the maneuver area it would be feasible and convenient for you to have camp site on the saddle road at the location of the old Prisoner-of-War camp. There is in this area approximately 100 acres which camp would be 9 miles from the city of Hilo and 26 miles from the maneuver area of Pohakuloa. Assuming that Lalamilo could not be used for both a maneuver area and camp site and that you would be obliged to acquire other lands for a maneuver area in the event you chose Lalamilo as a camp site, we point out that the distance from Lalamilo to Pohakuloa is 26 miles and the distance from Pohakuloa to the POW camp is likewise 26 miles...

If the proposed site at Pohakuloa meets with your approval and you are willing to forego the use of Lalamilo as a camp site in favor of the one which is nearer the city of Hilo as suggested, we would be quite willing to make available to the Marine Corps an area of Parker Ranch land adjacent to Kaohe 3 which is now used as our horse pasture, of approximately 6,000 acres. Moreover we will turn these areas over to the government for a reasonable period without rent... [Marine Corps File, Parker Ranch Collection; from Maly 2002:199-200].

A January 9, 1953 meeting between key ranch personnel and General Hart resulted in an agreement that the Lālāmilo Lands would be given back to the ranch in exchange for the Ka'ohē 3 and 4 Pōhakuloa lands (Maly and Maly 2002:200). Maly and Maly (2002) include Ranch Manager Richard Penhallow's notes from this meeting:

6. Final Prospective: Obtain the agreement of Parker Ranch to convey 320 acres in the vicinity of Nahonohae [sic] to the U.S. for a permanent division camp site. Construct a 12" water main from the Kohala Mountains to this site. Obtain the agreement of Parker Ranch to permit infantry maneuvers in the adjacent pastures without any weapon firing, and coordinated with grazing usage. If this plan is agreeable then Pohakuloa and Kaohe together with our Puukeekee paddock land would be used for mechanized and fire problems, artillery fire being limited to the

lava wastes of Pohakuloa and Mauna Loa. The cost of this development would be over 20 million dollars, which would render it almost prohibitive according to General Hart, who sets the odds against its adoption at 10 to 1.

7. Immediate Training: For the present, running concurrently with the plans for Maui, General Hart recommends unit by unit training in artillery and mechanized maneuvers, operating from a tent camp in Kaohe III game preserve, supplied with water from the Pohakuloa 500,000 gallon tank and supplementary truck hauling. The size of the units to be trained and the length of the training period will be limited by the availability of water. This program would utilize the Puukeekee Paddock area which we have offered.

8. Conclusion: It seems advisable to cooperate with the Marines. They have adopted a serious and considerable attitude toward our problems and recommended withdrawal of Lalamilo. In the immediate future their training will be limited to from Pohakuloa to Puukeekee Paddock as we have suggested. The probability of their final prospective materializing is remote at this time and may be indefinitely postponed [Marine Corps File, Parker Ranch Collection; from Maly and Maly 2002:200].

Shortly after this meeting, on January 20, 1953, Penhallow detailed in a letter to Richard Smart about the impacts of the agreement:

...General Hart presented his immediate problem for unit training. His training officers have submitted to him their requirements which will involve greater depth than he had indicated previously. They contemplate as was reported before, to camp one regimental combat team in temporary buildings and tents for only two-week periods, at or near the Pohakuloa camp site. Their artillery range will be the lava wastes of Mauna Loa in that region. Specific small training problems of sub-units within the R.T.C. can be conducted near the camp and in Puukeekee.

But to round out the attack games of the whole regimental teams he asked that you permit the Marines to enter your land from the Saddle Road below Puumahaelua and attack mauka in the direction of Puukeekee and Pohakuloa, ending up with weapons firing over the heads of the attacking troops as they finally approach the artillery practice area in Pohakuloa. He specified that there would be no firing of any arms in your pastures and that the village of Waikii would be by-passed. Also Engineer troops would be with the advancing units to open and repair fences as vehicles were channeled through. He pointed out that there are no other clear areas in Hawaii with suitable depth from front to rear to permit a three day advance of ground forces with all their supporting units. In this sham attack sub-units, types of weapons and actions would be identified by colored arm bands...

After being shown their maps of the proposed maneuver grounds, Hartwell asked for a recess during which he and Garner [Anthony] Stanley Wright and myself

developed a counter proposal which we thought would not interfere too much with our operations or installations and still be adequate for their needs.

We proposed, pending your approval, allowing them to initiate their advance at the Kona Road anywhere beyond the Nahonohae-Puupapapa I fence and

confine their movements within the paddocks of Puupapapa 1 & 2, Big Heewai, Old Waikii and Puukeeke and also the outside paddocks along the edge of the lava near Keamoku house, reserving an out-of-bounds zone around the house, horse pasture and old shearing shed. This will allow plenty of room, and while it does involve passing over our pipe line, still that will occur near the far end and the number of fences to be crossed will be held to a minimum by the confinement of operations to large pastures only. It will keep their activities out of sight of the Saddle Road, except mauka of Waikii village, and at a considerable distance away from the village at all points, by denying them entry to any of the smaller pastures in that vicinity. Our proposal was acceptable to the Marines and the spirit of cooperation by both side a worth while outcome of delaying action which was started by your well timed letter.

...While my first contacts with the General were austere, I have found him to appear to better advantage and more human with each meeting. As Garner once told me, these conferences have been fruitful in teaching the General that he is not "dealing with children," which he may have imagined at first.

Hartwell and I recommend your approval of our mutually acceptable results... [Marine Corps File, Parker Ranch Collection; from Maly and Maly 2002:200-201].

In 1942, the U.S. Army built Kaumana Road (the current Sadddle Road). The Pōhakuloa Training Area was established in its current location in 1956 (Shapiro and Cleghorn 1998:19).

4.4.3 Big Game and Bird Hunting

The Ka'ohē game Management area is located approximately 10 miles west of the current project area. There are over 3,000 registered hunters on Hawai'i Island, and hunting, for both recreation and sustenance, it is a common activity on Mauna Kea. A public hunting program is used to control the numbers of introduced animals including pigs, sheep, goats, turkey, pheasant, and quail. The Mauna Kea Recreation Area functions as a base camp for the sport. Also, the DLNR/DOFAW (Division of Fish and Wildlife) conduct periodical animal control activities specifically aerial shooting from helicopters to control herds of feral sheep and goats.

4.4.4 Mauna Kea State Recreation Area (SRA)

Built in the mid-1930's, the park was established at the site of the Civilian Conservation Corps (CCC) camps to house their crews as they worked on a variety of Forest Reserve projects. After the end of the CCC programs and World War II, the old CCC facilities were primarily used by staff of the Territorial Divisions of Forestry, Fish and Game including lodging by sheep and bird hunters or by other members of the public seeking recreational accommodations. By 1954, Pōhakuloa Park, sometimes called "Pōhakuloa Hunting Lodge," was one of 12 parks officially set aside to the newly created Division of Territorial Parks (Figure 12; Quinn 2007). During this time period, a wayside picnic area was also created across from the CCC/Hunter's camp on the southern side of the Saddle Road. In 1963, this area was moved to the north side of Saddle Road in the area near the current comfort station.



Figure 12. 1959 photograph of Pōhakuloa Park, formally the CCC camp (Quinn 2007)

In August 1962, the Division of State Parks officially assumed all responsibility for administering these facilities and booking overnight accommodations. Forestry, Fish and Game staff continued to use a number of older structures. Facilities were constructed between 1961 and 1970 in what is now the Mauna Kea SRA (State Recreation Area). In 1961, the first of three "housekeeping/family" cabins were constructed and the next two cabins were completed in 1962. The cabins were named "Loxide Cabins" that were all of identical construction and design. In 1963, the existing comfort station was built. In 1967, dirt roads leading to various facilities were paved with the completion of two "group" cabins including the recreation and dining hall (Figure 13). By 1968, all of the primary CCC camp facilities were demolished. Final construction phase

was completed in 1970 which included park headquarters, caretaker cabin, storage shed and two additional “family” cabins.



Figure 13. 1966 photograph of the Group Cabins (Quinn 2007)

4.4.5 Pōhakuloa *Nēnē* Propagation Project

In the later part of the 18th century, the population of *nēnē*, was estimated a 25,000. In 1902 Henshaw predicted that “the time will eventually come, and soon. When this goose will need protection from sportsman (and introduced predators) to save it from its otherwise inevitable face of extermination” (Henshaw 1902). According to the *Nēnē News*, in 1949 the Territorial Legislation appropriated \$6,000.00 for a two year *nēnē* breeding program at Pōhakuloa, Hawai‘i to be managed by the Commission of Agriculture and Forestry (*Nēnē News*, Volume 1, Issue 2 1996). When Ah Fat Lee arrived six years later the program was still going but was falling far short of the expectations of those who had begun it. Egg fertilization hovered at 40% and of those eggs only 53% had hatchability. Although the project was still in its infancy there were many unanswered questions about this endangered goose.

Ah Fat Lee was born on March 13, 1914 and graduated from Hilo High School in 1931. After graduating from high school, he held several jobs and eventually became the poultry superintendent for Parker Ranch. When doctors recommended he leave the poultry industry because of the dust, he applied for a position at the Pōhakuloa *nēnē* project. At that time employees were rotated between various duties but very quickly Mr. Lee was assigned as full-time *nēnē* propagator (*Nēnē News*, Volume 1, Issue 2 1996).

As reported in the *Nēnē News* (1996) (Figure 14 and Figure 15):

Mr. Lee worked tirelessly for the nēnē. He developed a pedigree record keeping system based on what he had learned in the poultry industry for breeding bloodlines to preserve genetic diversity. He also maintained records of the cull nēnē, the birds that were not considered valuable because they carried an undesirable gene, were aggressive, infertile, or could not be utilized as a foster parent. Daily chores kept Mr. Lee busy from dawn till dusk. Besides incubation duties during breeding season, weekly tasks included cleaning the cement ponds and providing adequate food for the growing nēnē flock. Two days a week Mr. Lee would scour the back roads from Waimea to North Kohala looking for pualele, a sow thistle, which is a favorite food of nēnē. Fresh mountain strawberries, 'ōhelo, and kūkaenēnē would also be gathered and offered along with kukuiya and pangola grasses.

Over the next few years the labor intensive procedures of raising nēnē were reevaluated and incubation and rearing techniques were modified. The muscovy ducks used for incubation (which were sometimes not broody during the nēnē breeding season) were replaced with silky bantam chickens. To increase productivity Mr. Lee would place nēnē eggs under the bantams until they piped on day 29, and then put them in a hatcher to prevent ants (a serious problem at the facility) from harming or damaging the new goslings. Once dried, the goslings were brooded outdoors under lights.

Second clutches were allowed to stay under the goose until piped, when they were moved to an incubator for hatching and, once out of the shell, returned to the goose for warmth.

In ten years Mr. Lee doubled egg fertility and hatchability. By 1968, his success with ganders 8 to 11 years old was striking with 80 - 96% fertility and 80% hatchability.

Over the following years and until his retirement in 1984 Mr. Lee continued to utilize his successful breeding techniques. Ah Fat Lee raised over 1,765 nēnē for release into the wild during his 29-year career with the project, a significant contribution to the restoration of the species [Nēnē News, Volume 1, Issue 2 April 1996].

During the programs existence between 1949 and 1978 1,699 nēnē have been successfully raised at the Pōhakuloa facility, of these 1,225 have been released on the Island of Hawai'i, and 268 at Haleakalā Crater on the Island of Maui.



Figure 14. Photograph of Ah Fat Lee, Father Goose, holding a *nēnē* gosling (Nēnē News 1996)



Figure 15. Photograph showing Mr. Lee caring for the incubated *nēnē* eggs (Nēnē News 1996)

4.4.6 Previous Cultural Studies for Mauna Kea

Several extensive cultural studies and management plans have been previously carried out for Mauna Kea. This section summarizes these cultural studies (Table 3).

Table 3. Cultural Studies in the Mauna Kea Summit Area

Reference	Comments
McEldowney 1982	First ethnographic study prepared and included in an EIS. No consultations were conducted.
Kanahele and Kanahele 1997	Cultural assessment for the proposed realignment of the Saddle Road, detailed discussion of cultural values, protocols and practices
Maly 1998	Archival and historical documentary research, including "limited" oral historical interviews not formally part of the study
Langlas 1999	Archaeological Inventory Survey and cultural assessment along Saddle Road and Hawai'i Defense Access Road
Maly 1999	Oral history and consultation study including 22 interviews, and 3 interviews dating 1956-1967 translated by Maly
PHRI 1999	First Cultural Impact Assessment study prepared for the University of Hawai'i Mauna Kea Science Reserve Master Plan Project Area. Basis of the study was Maly (1999)
Maly and Maly 2005	Study includes extensive background research and oral histories and recommendations that have been ongoing since 1996

4.4.6.1 McEldowney 1982

Holly McEldowney (1982), then of the B. P. Bishop Museum Department of Anthropology, produced an Ethnographic Background report for the Mauna Kea Summit Region for the Research Corporation of the University of Hawai'i as part of an EIS (Environmental Impact Statement) for a Mauna Kea Science Reserve Master Plan. The data are presented in three sections addressing 1) myths and legends and "oral traditions," 2) land use practices and cultural activities and 3) a study of place names.

McEldowney (1982:A-5) starts by relating a tradition of the goddess Poli'ahu from Haleole's (1863) story of Lā'ieikawai. While McEldowney relates this as a "Hawaiian tradition recorded by S. N. Haleole," Lā'ieikawai has increasingly been recognized as a "romance" that undoubtedly utilized pre-Contact traditions and motifs but was self-consciously more in the nature of a work of imagination than a recordation of traditional legends. Haleole's traditions of Poli'ahu, however, have almost nothing to do with Mauna Kea (although "Lilīnoe" is given as the name of one of Poli'ahu's companions). McEldowney also discusses Westervelt's accounts of Poli'ahu and opines that Westervelt "took the unwarranted license to assign each of the 'goddesses of the snow covered mountains' to specific localities" (McEldowney 1982:A-6). This appears to be the case as popular assignments of the names of deities to specific land-forms are

modern appellations. McEldowney then briefly discusses mentions of Mauna Kea, Poli'ahu, Līlinoe in works by Fornander, Kamakau, Kalākaua and Thrum. She notes the common case (as exemplified in Haleole's Lā'ieikawai and Fornander's Hawai'i Loa legend) of characters and themes inserted into more recent versions of older legends. McEldowney notes that "Otherwise Mauna Kea is mentioned only briefly and rarely as the backdrop to more compelling events, or to characterize the attributes of a figure or an event by analogy" (McEldowney 1982:A-7).

McEldowney points out that: "Several early accounts report that Hawaiians were reluctant to travel or serve as guides on inland journeys, or that they professed no knowledge of these areas, leading to the false impression that these regions constituted a wilderness unknown to the Hawaiian people" (McEldowney 1982:A-7, A-8). This generality is even more pronounced for the summit plateau of Mauna Kea, where almost all early post-Contact visitors made the final ascent to the summit without native guides. The only report of Hawaiians on Mauna Kea prior to the 1870s Boundary Commission accounts is Kamakau's reference to Ka'ahumanu's 1828 visit "to Hawaii to fulfill a vow that she had made to attempt the recovery of the bones of Lilinoe on Mauna Kea..." (Kamakau 1992:285). It is unclear whether Ka'ahumanu or her retainers actually ascended the mountain but: "It is said Ka'ahumanu did not find the bones of Lilinoe...." (Kamakau 1992:285).

McEldowney relates western visitors' accounts of Hawaiians acquiring birds, hardwoods, fine-grained basalt, sandalwood and wild cattle in this region (McEldowney 1982:A-8, A-9). The first specific Hawaiian account of activities on the mountain discussed in the McEldowney study is in the Boundary Commission Testimony of a certain Haiki who asserts: "my parents told me Humuula went to Kaluakaakoi and Poliahu. We used to go there after adzes for Humuula people" (McEldowney 1982:A-10). As McEldowney notes: "Haiki's overall testimony and placement of the boundary was rejected by the commission" (McEldowney 1982:A-10).

Similar to her study of legends, myths and early accounts of land use, McEldowney's accounts of place names also emphasizes the dearth of information, the lack of specificity of that information, and the suspicious nature of the paucity of early data. McEldowney points out that guides and informants were often familiar with land features but traveled from landmark to landmark rather than on trails. She notes that access to the mountain in the second half of the 1800s appeared to utilize ranching establishments (Humu'ula Sheep Station, Umikoa Ranch) and may not have related to pre-Contact approaches (McEldowney 1982). Many Hawaiian place names were noted to be modern.

4.4.6.2 *Kanahele and Kanahele 1997*

Kanahele and Kanahele are native cultural practitioners and authorities on Native Hawaiian customs, beliefs, and practices (Maly 1999:D-18). The cultural assessment was conducted for the proposed realignment of the Saddle Road (Hwy 200). The study discussed the broader cultural impacts addressing the cultural and natural landscape from the summit of Mauna Kea down to the ocean. This is evident in their following conclusions:

The native Hawaiian was a creature of the land and his environment was his environment was his life line. He recognized and practice respect for hierarchy of *hiapo* (first-born child) for man and land alike. The mountain is sacred because it the sacred child of Wākea. It is also the nourishment source for our land. The mountains and the land were genealogically connected to

him through the original ancestor, Wākea and Papa. The mountains or land, water and sky were a necessary part of life cycle. (Kanahele and Kanahele 1997 as cited in May 1999:D-21)

4.4.6.3 Maly 1998

Maly (1998) conducted archival and historical documentary research for Mauna Kea from August 1996 to March 1997 for the Native Lands Institute: Research and Policy Analysis. The study “reported on Native Hawaiian traditions, history culture, practices, and beliefs; and post contact history for the summit and mountain slopes of Mauna Kea” (Maly 1998:1). Maly also mentions that he conducted “limited oral historical interviews” that were not “part of a formal study of Mauna Kea” (Maly 1998:61). Individuals that were interviewed expressed a strong attachment to Mauna Kea’s landscape and those interviewed “feel disheartened about the highly visible presence and impact of the telescopes and development on the summit” (Maly 1998:61).

4.4.6.4 Langlas 1999

Langlas conducted an archaeological inventory as well as cultural assessment for the proposed realignment of the Saddle Road (Hwy 200). As part of the cultural assessment, Langlas interviewed several area present and past residents. Information acquired in the interviews provided details on both pre- and post-Contact land uses, including trails, adze manufacture, bird catching, cattle hunting, and ritual sites.

4.4.6.5 Maly 1999

In 1999 Maly prepared an oral history and consultation study with archival literature research for an update of the Mauna Kea Science Reserve and Hale Pōhaku Complex development plan for Group 70 International. Since the author had previously researched and reported on the same Mauna Kea summit area from August 1996 to May 1998, this study “focused on oral history interviews, limited archival research, and development of an overview of several recent studies which provide important historical documentation of Mauna Kea” (Maly 1999:iii). During the study, 22 individuals were interviewed. Maly also spoke to over 100 people in the course of the study. The general consensus was that the construction of additional observatories was “inappropriate due to their deep respect for Mauna Kea”; two of the individuals hesitated to support additional development; and one individual stated the observatories “provided important knowledge to mankind” and the benefits outweighed the concerns (Maly 1999:25). The basis of the concerns is related to the “cultural attachment” of Native Hawaiians to Mauna Kea. Maly explains that cultural attachment:

...embodies the tangible and intangible values of a culture. It is how a people identify with and personify the environment (both natural and manmade) around them. Cultural attachment is demonstrated in the intimate relationship (developed over generations of experiences) that people of a particular culture share with their landscape – for example, the geographic features, natural phenomena and resources, and traditional sites etc., that make up their surroundings. This attachment to environment bears direct relationship to beliefs, practices, cultural evolution, and identity of a people. In Hawai'i, cultural attachment is manifest in the very core of Hawaiian spirituality and attachment to landscape, the creative forces of nature which gave birth to the islands (e.g., Hawai'i), mountains (e.g., Mauna Kea) and all forms of nature, also gave birth to *na kanaka* (the people),

thus in Hawaiian tradition, island and mankind share the same genealogy. (Maly 1999:27)

4.4.6.6 Paul H. Rosendahl, Ph. D., Inc. (PHRI) 1999

In 1999, Paul H. Rosendahl, Ph.D., Inc. (PHRI) prepared a Cultural Impact Assessment study for the University of Hawai'i Mauna Kea Science Reserve Master Plan Project Area. The basis of the study was "the oral history and consultation study carried out by Cultural Resources Specialist Kepā Maly" [Maly's 1999 study – see above] (PHRI 1999:ii). The document notes that a good faith effort was made to "identify the full range of Native Hawaiian cultural practices, features, and beliefs" associated specifically with the Science Reserve project area. PHRI recommended that "a comprehensive plan for both the short-term and long-term management of the Science Reserve Master Plan project area is vital for the protection and preservation of significant traditional cultural resources."

In Figure 16 shows the three places that have been identified by SHPD as traditional cultural properties and documented in the PHRI study are: 1) Kūkahau'ula, the summit (Site 21438), 2) Līlīnoe (Site 21439), and 3) Lake Waiau (Site 21440). Other traditional places that may qualify include: 1) Pu'u Poli'ahu, 2) Pu'u Mākanaka and Kaupō, 3) Kūka'iau-'Umiko Trail, and 4) Mauna Kea-Humu'ula Trail.

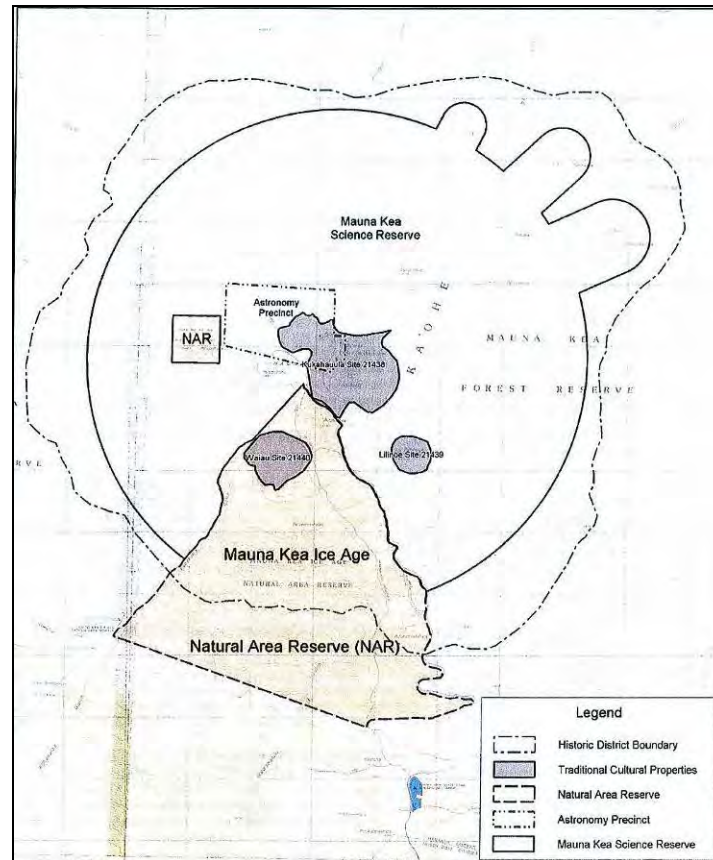


Figure 16. Map showing the three SHPD designated TCPs on the Mauna Kea summit region (adapted from McCoy et al. 2008:2 – 25)

4.4.6.7 Maly and Maly 2005

Maly and Maly (2005) prepared a study for the Office of Mauna Kea Management (OMKM) that:

compiled a detailed collection of archival-historical records, and conducted oral history interview with *kūpuna* and elder *kama'āina*, pertaining to the *ahupua'a* (native land divisions) of Ka'ohē, Humu'ula and neighboring *'āina mauna* (mountain lands) of Mauna Kea, on the island of Hawai'i. (Maly and Maly 2005:v).

The document includes research and interviews that Maly and Maly have been conducting since 1996. Additional research, including translations of Hawaiian documents and oral history interviews were conducted for the study. Compiling historic documentation of the traditions and history of Mauna Kea into a single document was one of the study's primary goals (Maly and Maly 2005:v).

In addition to the interviews, the study cited numerous sources among which are included native accounts translated from Hawaiian language sources, Kingdom and government records, post-Contact visitors' journals, ranching and lease records and narratives from the many scientific expeditions.

The study looked at not solely the summit of Mauna Kea but adapted a broader perspective encompassing the *ahupua'a* of Ka'ohē, Humu'ula and neighboring *'āina mauna* as well and acknowledging Maunakea as a sacred landscape.

As Maly and Maly point out, an additional purpose of this study was to address the native lore associated with traditional knowledge of the heavens. Some of their conclusions in this regard are that:

as is the case in all areas of Hawaiian life, the traditions, customs and practices associated with the *'oihana kilokilo* (astronomy) and *kilo hōkū* (observing and discerning the nature of the stars) were deeply tied to the spiritual beliefs of the Hawaiian people. The stars are physical manifestations of the gods who created the heavens, earth, and humankind, or are body-forms granted to select individuals or beings of nature (Maly and Maly 2005:vi)

Based upon their research, Maly and Maly were able to document 270 Hawaiian names for stars.

The study also discusses the land uses of Maunakea and the traditional knowledge and practices associated with it, including such places and activities as: Maunakea, Pu'u o Kūkahau'ula, Waiiau, Pu'u Poli'ahu and Pu'u Līlinoe, heiau and *ahu*, trails, resource collection sites, shelters, water collection, and bird hunting.

Section 5 Archaeological Research

5.1 Overview

This section reviews relevant previous archaeological research in the Mauna Kea summit region. The single most outstanding aspect of the archaeological record is the high number of shrines to the virtual exclusion of all other types of sites. At least 79 *ahu* (shrine) sites (three that are also lithic workshops) have been documented in the summit region, comprising approximately 83% of known sites in the region. Shrines typically consist of one or more large basalt slabs turned upright and arranged in different formations (Figure 17), sometimes associated with other foundation stones or rock piles (i.e., “cairns”). Several burials or possible burials have been documented in the summit region. A few stone markers and sites of unknown function have also been documented. Overall, the very high proportion of shrines near the summit is noteworthy and unique in comparison to most other places on Hawai'i Island.

Numerous historic properties have been previously documented in the Mauna Kea summit region (Figure 18). There are also a large number of remains present that do not qualify as historic properties. These remains are referred to as “find spots” and are either clearly modern or their age and function is unable to be determined (McCoy et al. 2008:2-1).

In Table 5, five archaeological sites—all *ahu*—have been documented within approximately 1,000 feet, three of these (16171, 16172 and 21200) consist of single uprights; Site 16172 is approximately 250 feet. The other two sites are a pair of cairns with several uprights (16170) and a pair of uprights (16169).



Figure 17. Traditional Hawaiian *ahu* at Keanakāko'i – Mauna Kea adze quarry (Source: Kirch, 1985)

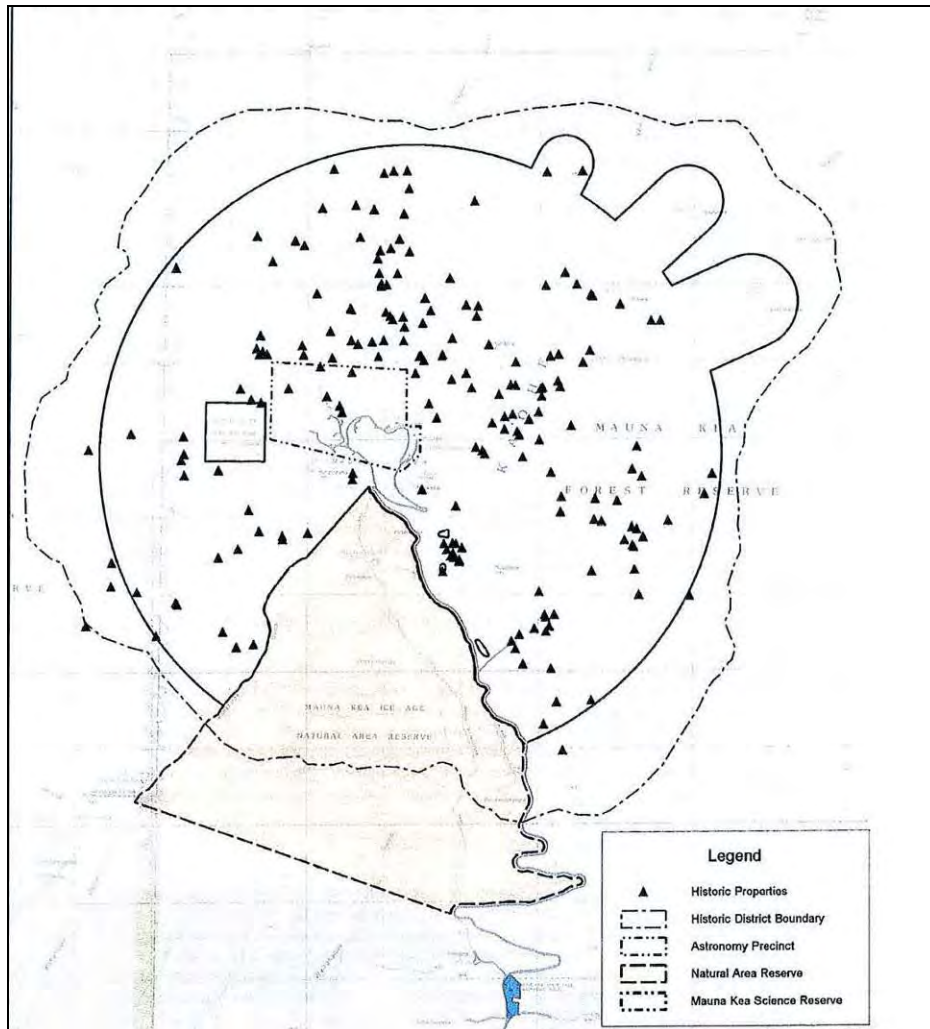


Figure 18. Map showing historic properties in the Mauna Kea summit region (Adapted from McCoy et al. 2008:2 - 16)

5.2 Early Observations and Previous Archaeological Research

Early documentation of archaeological sites in the upper reaches of Mauna Kea was somewhat anecdotal and ad hoc. McEldowney's (1982:A-11) summary of the ethnographic background of the Mauna Kea summit region notes:

Although most accounts speak in general terms, those that specifically locate the presence of human bones, "graves," "burial caves" or mortuary features indicate that burials are "not uncommon" between 7,800 ft and 13,000 ft elevation along the northern and eastern slopes of Mauna Kea (Alexander 1892; Preston 1895:601; Gregory 1921; Aitken 1935:48; Gregory and Wentworth 1937:1720;

Kilmartin 1974:15; Bryan 1927:106; Hamakua Site Records, Dept. Anthro, B.P. Bishop Mus.).

On the first recorded ascent of Mauna Kea in 1823, Rev. Goodrich noted the presence of a pile of stones which he assumed had been constructed by Hawaiians. Goodrich's time on the mountain, however, was extremely brief and his observations about archaeological matters, at least, were quite cursory.

William D. Alexander described a trip up Mauna Kea with a surveying party, and observed:

That same afternoon [July 25, 1892] the surveyors occupied the summit of Lilinoe, a high rocky crater, a mile southeast of the central hills [the "summit"] and a little over 13,000 feet in elevation. Here, as at other places on the plateau, ancient graves are to be found. In olden times it was a common practice of the natives in the surrounding region to carry up the bones of their deceased relatives to the summit plateau for burial. (cited in McCoy 1999)

McCoy discusses a visit in 1975 to the summit of Līlinoe in which he described two adjacent cairns on the eastern rim and comments that: "If the cairns that were recorded in 1975 were in fact the same graves [as described by William D. Alexander in 1892] the remains had been removed sometime prior because no human bone was visible at that time" (McCoy 1999:27). It is also possible that Alexander was in error in his assessment of the function of the cairns.

Jerome Kilmartin (1974) published a brief reminiscence reflecting on his involvement in a 1925 United States Geological Survey project to map the Lake Waiau topographic quadrangle. That 1925 work put him in the summit region for more than five months in 1925. He did not return again until 1971. Kilmartin's 1925 U.S. Geological Survey work was facilitated by the Umikoa Ranch based at approximately 3,500 foot elevation above Kūka'iau in Hāmākua. The team established a base camp at Pu'u Kihe (7,821 feet elevation), where water and forage were available, and a summit camp (Camp 3) of four tents at Lake Waiau.

Kilmartin reported little archaeological detail, but did note that at Pu'u Mākanaka (elevation 12,414 feet):

On the rim I found a partially uncovered grave, eroded by high winds, with an incomplete human skeleton. This was unknown as far as I could discover, to anyone familiar with the area. The name Pu'u Mākanaka means "Hill crowded with many people" and the grave must have been ancient. (Kilmartin 1974:15)

He also notes:

Ancient stone piles, quarries, walls, platforms, and burial caves are sufficient evidence that early Hawaiians were familiar with Mauna Kea's highlands. Stone chips from adze manufacture are found near a cave at 12,360 feet. (Kilmartin 1974:13)

It may also be noted in passing that the U.S. Geological Survey party created archaeological sites of their own (and perhaps many):

...the wind was so strong I thought surely we would be blown away. However the *ahu* that we built did give a little protection after I had made a setup with the plane table only two feet above the ground. (Kilmartin 1974:15)

Kenneth Pike Emory was the first person to have described the distinctive shrine features of Maunakea in a brief, popular piece published in *Paradise of the Pacific* magazine (April 1938). Emory was struck by the “immense quantity of chipped stone” and posited that the piles of debitage were “the largest so far recorded anywhere in the world.” He concluded that the evidence of “chips and rejects” was the result of skilled adze makers and that “they were able to create a stone-tool industry on a scale unequaled in the stone-age because of the superior social organization of the Hawaiian people.” Emory noted similarities of the shrines to a shrine on Maunaloa photographed by the geologist Dr. T. A. Jaggar in 1919 and also to the shrines of Necker Island. Emory posited that in the shrines “each upright stone stood for a separate god” and referred to them as “*‘eho*” (“a collection of stone gods”)—a term used in the Tuamotus as well as Hawai'i to designate an alignment of upright stones.

Wentworth and Powers (1943) carried out geological studies on Mauna Kea in 1939 that noted archaeological sites in the Hopukani and Liloe Springs area. They noted stone walls that they interpreted as a trap to impound wild cattle that frequented the springs and certain older sites:

In the area to the east and up the slope from the springs are numerous small heaps of pre-European stone adz workings. Certain lava caves contain evidence of habitation, suggesting that the springs were frequented by adz workers. The latter not only secured adz material from lava flows in places but carried on a surprising amount of casual prospecting on dense basalt boulders included in the moraines and outwash strewn several thousand feet down the mountain. (Wentworth and Powers 1943:544)

Two tables are provided below detailing both previous archaeological studies of the summit region (Table 4) and documented archaeological sites within the summit region prior to the on-going McCoy and Nees study (Table 5).

Table 4. Archaeological Studies in the Mauna Kea Summit Area

Reference	Nature of Study	Area of Study	Comments
McCoy 1976	“The Mauna Kea Quarry Project: A First Analysis”	Mauna Kea Adze Quarry Complex	--
McCoy 1977a	“Archaeological Investigations at the, Hawaii: Preliminary Results of the 1975-76 Fieldwork”	Mauna Kea Adze Quarry Complex	--
McCoy 1977b	“A Summary of the 1975 Field Investigations”	Mauna Kea Adze Quarry Complex	--

McCoy 1978	Account of the "The B.P. Bishop Museum Mauna Kea Adz Quarry Project."	Mauna Kea Adze Quarry Complex	--
McCoy 1979	Reconnaissance survey	Hale Pōhaku	--
Allen 1981	Adze quarry analysis thesis	Mauna Kea Adze Quarry Complex	--
McCoy 1981	"Stones For the Gods: Ritualism in the Mauna Kea Adz Quarry Industry, Hawaii."	Mauna Kea Adze Quarry Complex	--
Cleghorn 1982	University of Hawai'i Ph.D. dissertation in Anthropology on Mauna Kea Adze Quarry lithics	Mauna Kea Adze Quarry complex in the vicinity of Pu'u Ko'oko'olau	Focuses on technological analysis and experimental tests. Some 534 archaeological site components of 38 designated sites are briefly summarized.
McCoy 1982	Reconnaissance survey	~1,000 acres of the summit and north slope (down to 13,000 ft. elevation)	Documents 22 sites including an open air shelter and 21 shrine sites.
Kam and Ota 1983	Reconnaissance survey	Mauna Kea Observatory Power Line	--
McCoy 1984a	Summary of the 1984 fieldwork	Mauna Kea Summit Region	--
McCoy 1984b	Archaeological reconnaissance	Hopukani, Waihu & Liloe Springs area, west side of Pōhakuloa Gulch between 8,640 and 10,400 ft. elevation	Documents six archaeological sites and a number of find spots (More thorough coverage is presented in McCoy 1986).
McCoy 1985	Reconnaissance survey	~40 acres extending on both sides of the Mauna Kea Observatory Access Way between 9,080 and 9,400 ft. elevation	Preliminary report for Pu'u Kalepeamoia Site documenting five lithic scatters and two shrines used for the manufacture of hammerstones and octopus lure sinkers. Ritual was an integral part of the manufacturing process
Reference	Nature of Study	Area of Study	Comments
Bonk 1986	Reconnaissance survey	HELCO transmission line and substation	--
McCoy 1986	Report on archaeological investigations	Hopukani and Liloe Springs area located on the west side of Pōhakuloa Gulch well southwest of the Mauna Kea summit region	Documents three sites initially discussed in McCoy (1984). Eight radiocarbon dates indicated use from A.D. 1000-1800; camps used for acclimatization and for procuring water, food (primarily birds) and fuel.
Sinoto 1987	Reconnaissance survey	HELCO transmission line and substation	--
Williams 1987	Reconnaissance survey	Mauna Kea Access Way	--

Hammatt and Borthwick 1988	Reconnaissance survey	Two locations: ~15-acre area between 11,560 & 11,840 ft. elevation, west side of present summit road; ~100-acre area, east side of summit road in a saddle between two cinder cones at 12,100-12,225 ft. elevation	4 sites: Sites 11,076 & 11,077 are probable pre-Contact shrines; Site 11,078 is a probable pre-Contact overhang shelter; Site 11,079 included a probable pre-Contact shrine and a probable pre-Contact <i>ahu</i> or cairn with basalt flakes and an adze preform.
Williams 1989	Inventory survey	Mauna Kea Adze Quarry Complex	--
Borthwick and Hammatt 1990	Reconnaissance survey	Two locations (total 2 acres) on summit of Mauna Kea.	No finds – the areas had been “fully graded” for existing telescope facilities.
McCoy 1990	Lithic analysis	Mauna Kea Adz Quarry Complex	--
Robins and Hammatt 1990	Reconnaissance survey	Two locations: 5.1-acre area on Pu'u Hau Oki cinder cone at summit and a 21-acre lot near Hale Pōhaku	No finds at JNLT summit project area which had been largely graded. In Hale Pōhaku area, three lithic scatters described in McCoy (1985) are discussed.
McCoy 1991	Survey and Test Excavations report	Pu'u Kalepeamoia Site	--
Borthwick and Hammatt 1993	Reconnaissance survey	Proposed Gemini Telescope location at ~13,700 ft. elevation on a ridge line north of the summit cone	The entire summit ridge on which the Project area was located had been graded for existing telescope facilities. No finds.
McCoy 1999	Analysis of a site complex (Site 50-10-23-16204) that he had described 24 years earlier	East side of Mauna Kea Access Way between 12,240-12,300 ft. elevation just south of Pu'u Līlinoe	McCoy posits a ritual significance to the site specifically as a location for a rite of passage.
Hammatt and Shideler 2002	Data Recovery report for two lithic scatters	Sites 50-10-23-10,310 and -10,311 located in the Hale Pōhaku area between 9,080 and 9,160 ft. elevation	Documentation of data recovery of sites identified in McCoy (1985) and Robins and Hammatt (1990). Two radiocarbon dates (A.D. 1260-1410 and A.D. 1510-1950 at 95% probability) were both were thought to be problematic. Possible ritual associations with healing and the deity Kanaloa are explored.
Reference	Nature of Study	Area of Study	Comments
McCoy 2005	Monitoring	Septic tank excavations	--
McCoy et al. 2005	Inventory survey	Mauna Kea Science Reserve	--
McCoy and Nees 2006	Inventory survey	Mauna Kea Science Reserve	--

Hammatt 2009a	Archaeological Assessment	Proposed Thirty-Meter-Telescope Observatory (TMT) Project on the northern plateau of the Mauna Kea summit area, within Area E of the Astronomy Precinct of the Mauna Kea Science Reserve	No findings
Hammatt 2009b	Archaeological Assessment	TMT Mid-Level Facility area at approximately 2,800 m (9,200 ft.) elevation on the southern slope of Mauna Kea	No findings
McCoy and Nees (in progress)	Inventory survey	Mauna Kea summit region	In progress

Table 5. Documented Archaeological Sites in the Summit Region

SIHP #	Elevation	Description	Function
11077	12320	Single upright	Shrine
11079	12313	Lithic scatter of adze manufacturing byproducts and 2 associated cairns	“Workshop” and possible shrine
16163	12880	Platform/pavement with 14 uprights	Shrine
16164	13397	3 to 5 uprights on platform and 1 isolated upright	Shrine
16165	13362	Single row of 2 uprights	Shrine
16166	13422	2 rows of uprights, 8 to possibly 9 total	Shrine
16167	13395	Single row of 2 uprights	Shrine
16168	13098	Semi-enclosure with 21 to possibly 25 uprights	Shrine
16169	13210	Single row of 2 uprights	Shrine
16170	13139	2 cairns with 3 to possibly 4 uprights	Shrine
16171	13087	Single upright	Shrine
16172	13218	Single upright	Shrine
16173	13009	7 dispersed uprights	Shrine
16174	13075	Boulder with 1 to possibly 8 uprights on the side	Shrine
16175	NA	5 cairns with 1 upright each	Shrine
16176	13078	Single row of 3 uprights	Shrine
16177	13118	Single row of 3 uprights	Shrine
16178	13236	Single upright	Shrine
16179	13122	Single row of 3 uprights	Shrine
16180	13086	Boulder with 3 uprights	Shrine

SIHP #	Elevation	Description	Function
16181	13401	Single upright	Shrine
16182	13155	3 to 5 uprights	Shrine
16184	13072	Semi-enclosure with 24 uprights	Shrine
16185	13008	Single row of 3 uprights	Shrine
16186	13076	Single row of 2 and possibly 3 uprights	Shrine
16187	12775	Single row of 9 uprights	Shrine
16188	12857	Single upright	Shrine
16189	12902	Single row of 3 and possibly 4 uprights	Shrine
16190	12956	Single row of 10 and off-set uprights	Shrine
16191	12889	Single row of 4 uprights	Shrine
16192	12842	2 sets of uprights, 6 total	Shrine
16193	12843	Single upright	Shrine
16194	12673	Single row of 12 - 14 uprights	Shrine
16195	NA	2 cairns	Possible burial
16196	12953	Single row of 2 uprights	Shrine
16197	12953	Single upright	Shrine
16198	12930	2-tiered platform with 7 uprights	Shrine
16199	12991	1 and possibly 4 uprights	Shrine
16200	12975	Single row of 5 and possibly 6 uprights	Shrine
16201	12990	Single row of 3 uprights	Shrine
16202	13006	Single upright	Shrine
16203	13145	Single row of 2 and possibly 3 uprights and a lithic scatter of adze manufacturing byproducts	Adze "workshop" and shrine
16204	12332	5 shrines, 26 stone-walled enclosures and a lithic scatter of adze manufacturing byproducts	Adze "workshop" and shrine complex
16248	NA	Series of cairns	Burial
18682	12955	Single row of 3 uprights	Shrine
18683	13012	Single row of 2 uprights	Shrine
21197	13052	2 platforms with a total of 5 uprights	Shrine
21198	13043	Single upright	Shrine
21199	12876	Single upright	Shrine
21200	13165	Single upright	Shrine
21201	13087	Single row of 2 uprights	Shrine
21202	13048	Single row of 6 to possibly 7 uprights	Shrine

SIHP #	Elevation	Description	Function
21203	13034	Single row of 2 uprights	Shrine
21204	12925	3 areas of stacked rock	Unknown
21205	13484	Single upright	Shrine
21206	12754	Single upright	Shrine
21207	12787	Single upright	Shrine
21208	12799	1 to 2 uprights on a boulder	Shrine
21209	NA	Cairn on summit	Unknown
21210	12233	Single upright	Shrine
21211	12275	Single row of 2 uprights on a platform and a lithic scatter of adze manufacturing byproducts	Adze "workshop" and shrine
21212	12385	Single row of 2 uprights	Shrine
21213	12249	3 piles of rocks with 1 upright	Shrine
21214	12241	Single row of 5 and possibly 7 uprights	Shrine
21406	NA	Single upright	Shrine
21407	12952	Single row of 2 uprights	Shrine
21408	12913	Single upright	Shrine
21409	12984	Single upright	Shrine
21410	12801	Single row of 5 uprights	Shrine
21411	12815	Cairn	Marker
21412	NA	Cairn	Marker
21413	NA	Cairn	Possible burial
21414	NA	Cairn	Possible burial
21415	13130	Cairn on boulder	Unknown
21416	12792	Cairn	Possible burial
21417	12974	Cairn	Unknown
21418	12889	3 and possibly 4 uprights on top and to the side of a boulder	Shrine
21419	12495	Single upright	Shrine
21420	12152	Enclosure with 11 and possibly 12 uprights and a nearby stone platform	Shrine
21421	12731	2 cairns, one with a possible upright and an isolated upright	Shrine
21422	12847	Single upright	Shrine
21423	NA	Stones on boulder	Marker
21424	12320	4 to 5 uprights on a platform and boulder	Shrine
21425	12523	Single upright	Shrine

SIHP #	Elevation	Description	Function
21426	12568	Single row of 4 uprights	Shrine
21427	12635	Terrace with possible upright	Unknown
21428	12720	Single upright	Shrine
21429	12719	Single upright	Shrine
21430	13111	Single row of 3 uprights	Shrine
21431	12532	Semi-enclosure with 7 to 10 uprights	Shrine
21432	13044	Single row of 2 uprights	Shrine
21433	12579	Single upright	Shrine
21434	12551	8 stones on a boulder	Unknown
21435	12564	Cairn and boulder with 1 upright	Shrine

5.2.1 Traditional Cultural Properties (TCPs)

The SHPD has designated three prominent localities on Mauna Kea as Traditional Cultural Properties (TCPs) due to their cultural significance to the Hawaiian people. Several additional prominent locations in the summit region are also considered culturally significant. Additionally, a large area on the mountain's summit has been determined to be eligible for listing on the National Register of Historic Places as a historic district. Maly (Maly 1998:29) has suggested the entire Mauna Kea summit region down to the 6,000 foot elevation contour be designated a TCP.

5.2.2 Burials and Possible Burials

McCoy (1999) presents a summary discussion of burials and possible burials on Mauna Kea noting that there are numerous traditions of burials at high elevations on Mauna Kea. He begins by presenting the account of Jerome Kilmartin (1974) who in 1925 personally observed human remains on Pu'u Mākanaka. McCoy relates that in 1991 he and others observed human bones within several cairns on the southern rim of Pu'u Mākanaka. He also notes that "several other spatially discrete groups of cairns, each comprised of two to three individual cairns, were found on the southern or eastern rim" (1999:26) [of Pu'u Mākanaka] – suggesting that these may also contain human skeletal remains.

Pu'u Mākanaka is the only documented place in the uplands of Mauna Kea in which human remains have been confirmed—although McCoy makes reference to "the well-known burial center at Kanakaleonui" and also to "a small group of cairns on the eastern rim of Pu'u Waiau that are also believed to be burials" (McCoy 1999).

McCoy (1999:26) then goes on to discuss four "possible burial sites" (16195, 21413, 21414 and 21416). Although no human remains were observed, these were thought to be burials due to the morphological similarity of these cairns to those on Pu'u Mākanaka and Kanakaleonui, their dissimilarity to other cairns (which are more cylindrical), and their presence on the eastern or southern rim of cinder cones.

McCoy clearly suggests that Site 16195, consisting of two adjacent cairns on the eastern rim of Pu'u Līlinoe (recorded by McCoy in 1975), are "possible burials" (1999:27). This conclusion is based on William D. Alexander's 1892 account of "ancient graves" on the summit of Pu'u Līlinoe. McCoy comments that: "If the cairns that were recorded in 1975 were in fact the same graves [as described by William D. Alexander in 1892] the remains had been removed sometime prior because no human bone was visible at that time" (1999:27). It appears that by 1975 these features were no longer graves but may have functioned as graves previously.

McCoy (1999:27) then discusses three possible burial cairn sites (21413, 21414 and 21416) located on the southern and eastern rim of an unnamed cinder cone. This cinder cone is 12,840-foot high and located approximately 1 kilometer northwest of the Mauna Kea Ice Age Natural Area Reserve). McCoy's discussion indicates that these may well be graves on the basis of form and location.

McCoy concludes:

There is good reason to expect that more burials are to be found in the Science Reserve on the tops of cinder cones, either in cairns or in a small rockshelter or overhang. The basis of this prediction is that all of the known and suspected burial sites on the summit plateau are located on the tops of cinder cones and, more particularly, on the southern and eastern sides. No burials have been found on the sides or at the base of a cone, or on a ridgetop amongst any of the shrines. There in fact appears to be a clear separation between burial locations and shrine locations. (1999:28)

His comments have proven to be apt as current in progress work by McCoy and Nees has documented 28 sites designated as burials and possible burials (McCoy et al. 2008).

In striking contrast to the earlier archaeological data is the belief of some contemporary Hawaiians that the summit region of Mauna Kea is something of a burial ground ("There's lot of *kūpuna* been buried up t here..." and several similar concerns at www.mauna-a-wakea.info/maunakea/F4_burials.html). Allied with this line of thinking are rumors of burials disturbed and destroyed by prior observatory developments ("Would bulldozing cemeteries be allowed anywhere else in the world?" www.mauna-a-wakea.info/maunakea/F4_burials.html).

5.2.3 Shrines

In McCoy's analysis of a total of 93 sites identified in the Mauna Kea summit area Science Reserve some 76, or 81.7%, are classified as shrines (and an additional eight shrines are components of adze manufacturing workshop sites) (McCoy 1999:3). McCoy concludes that: "The vast majority of shrines are conspicuously sighted in the landscape, either on a ridgetop, or at a break in the slope, which generally seems to correspond to either a lava flow margin or a change in the slope of a glacial moraine" (1999:6). McCoy notes that "there are no shrines in the Science Reserve located on top of a cinder cone."

As previously noted McCoy noted an unusually high density of shrines located in a narrow 200-foot contour interval band between 12,900 and 13,100-foot elevation on the north side of Mauna Kea that he attributes to a visually preferable location (1982:A-37).

5.2.4 Adze Quarries and Manufacturing Workshops

Based upon McCoy's 1999 summary analysis of site typology, the only quarries were in the extreme southern portion of the Mauna Kea summit area Science Reserve (the Mauna Kea Adze Quarry; SIHP No. 50-10-23-4136). McCoy does describe four adze manufacturing workshops (11079, 16203, 16204 and 21211) defined in part by their location in areas absent of naturally occurring stone-tool quality raw material. All four of these adze manufacturing workshops are on the south face of the mountain on the east side of the main Mauna Kea Observatory Access Way.

5.3 Recent Archaeological Studies in the Vicinity of the Project Area

Nine archaeological investigations (Table 6 and Figure 19) have been conducted in the vicinity of the project area. The majority of these took place in PTA; these took place from the mid-1980s through 2006. Many previous studies have also covered large areas by helicopter survey, which only identifies very large sites. Site types documented at PTA include transportation features (trails and trail markers), occupation sites (lava tubes, blister caves, and overhang shelters), lithic resource sites (e.g., chill glass quarries and workshops), ritual/ceremonial sites (indicated by upright stones), excavated-pit features, historic features (walls, enclosures), and military modifications/impacts.

Table 6. Previous archaeological studies conducted in the vicinity of the proposed project area

Date	Type of Investigation	Reference	Findings
1984	Reconnaissance of five land parcels at PTA	Streck 1984	No new historic properties identified
1993	Survey and testing for the Saddle Road improvement project at PTA	Welch 1993	One historic property identified; Site 50-10-31-14638, lithic scatter with three associated shallow lava tubes, possible temporary shelter
1998	Investigation of two work areas for the Legacy Resource Management Program at PTA	Reinman and Pantaleo 1998	Forty new pre Contact sites were identified attributable to short term habitation, possible bird hunting, quarrying, and transportation
2001	Survey for the proposed Pohakuloa Training Area base camp master plan and Bradshaw Army Airfield improvements	Hammatt et al 2001	Approximately 80 contemporary military structures were identified. None were regarded as significant under historic preservation criteria
2002	Re-survey of 2900 acres south of Saddle Road and east of Redleg Trail; and evaluation of chill glass	Roberts et al. 2004b	The survey identified seven sites, including short term habitation lava tubes, chill glass quarries, and excavated pits, all were determined to be pre Contact

Date	Type of Investigation	Reference	Findings
	quarry complex identified therein. Reconnaissance of portions of TA 5 and 21		
2002	Reconnaissance survey of 8,710 acres for BAX/AALFTR; 24,000 acres for Keamuku Land Purchase; and PTA Trail	Roberts et al. 2004a	Phase I; survey originally identified 24 potential archaeological sites, 15 of which were determined to be sites during Phase II. All 15 sites are pre Contact attributable to habitation, quarrying, possible bird hunting (excavated pits), and transportation (trails)
2003	Reconnaissance of Training Areas 1, 3, and 4	Roberts et al. 2004c	Fifteen new sites identified ten of which are pre Contact and five are attributable to historic ranching. Pre Contact Hawaiian sites attributable to short term habitation (lava tubes), possible bird hunting (excavated pits), quarrying, and transportation (ahu)
2003	Reconnaissance survey for SBCT Go/No Go Maneuver Areas at PTA	Desilets et al. 2005	Fifty sites identified These include 3 modified sinks, 2 fence lines, 3 mounds/mound sets, 2 cairn/cairn sets, 3 rock shelters, 2 caves, 1 lithic scatter, 30 excavated pits and pit complexes, and 4 stonework complexes (walls, enclosures, mounds, modified outcrops etc.). Of these sites, six may be of traditional Hawaiian origin, three appear ranching related, and the remainder is of undetermined cultural affiliation. Traditional Hawaiian sites include a modified sink with pictographs, a lithic scatter, two excavated pit complexes, and two stonework complexes. Historic sites include fence-lines, walls, and stock pens possibly associated with Humu'ula Sheep Station. The remaining forty-one sites may be military in origin but were recorded because they lacked associated military debris.
2003	Phase II archaeological research of proposed	Robins et al.	Phase II; identified 24 sites all classified as pre Contact Hawaiian sites attributable to

Date	Type of Investigation	Reference	Findings
	BAX & AALFTR for SBCT	2006	short term habitation, possible bird hunting, quarrying, and transportation

DRAFT

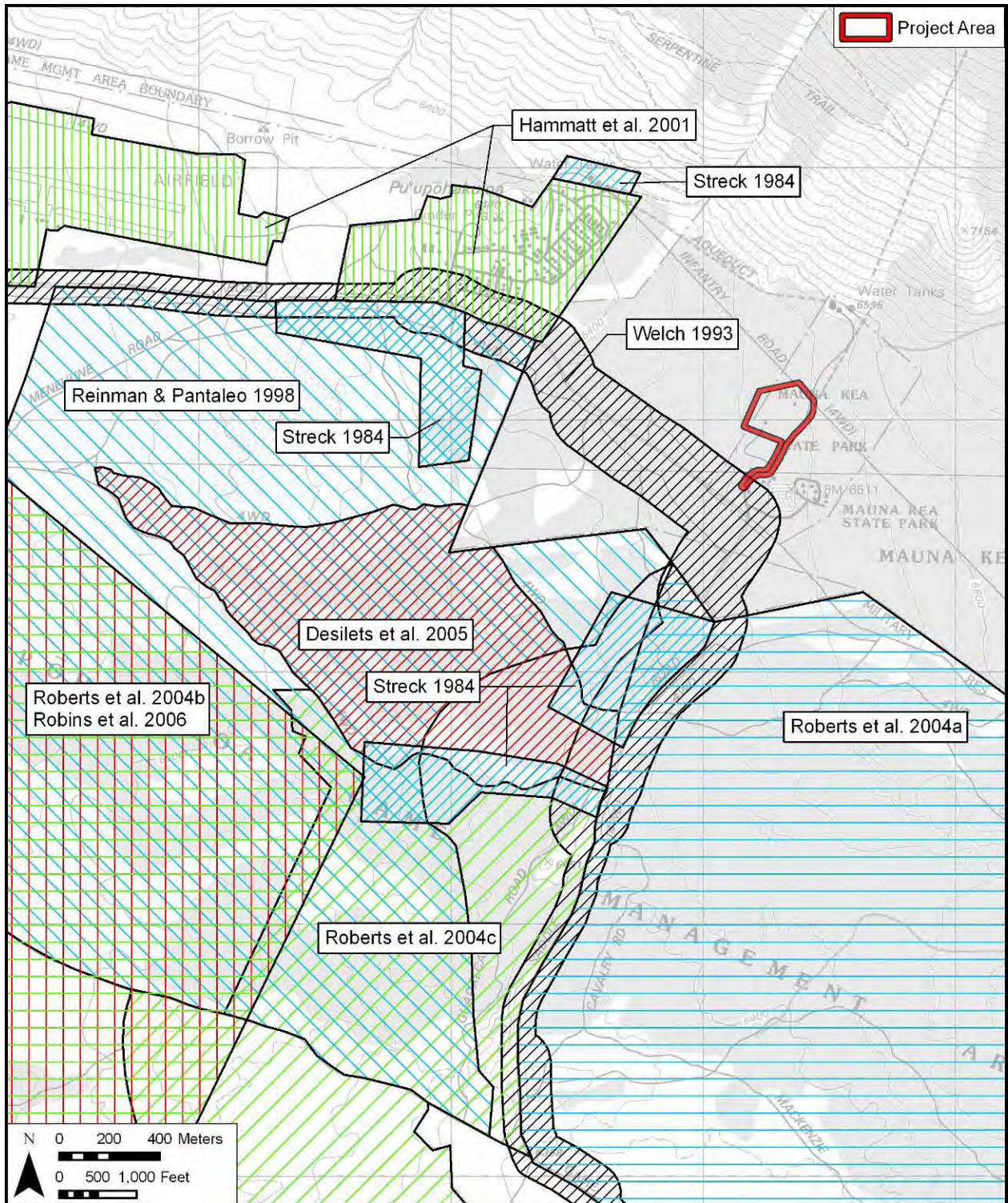


Figure 19. Map of previous archaeological studies in the vicinity of the current proposed project area

5.4 CSH Archaeological Inventory Survey (AIS)

5.4.1 Survey Findings

On November 22, 2011 and January 2, 2012 CSH archaeological inventory survey (AIS) was accomplished and current pedestrian survey provided approximately 100% coverage of the proposed project area. Five historic properties were identified and documented during the survey fieldwork (Table 7 and Figure 20). These include SIHP # 50-10-22-29222, a historic cabin; SIHP # 50-10-22-29223 *nēnē* propagation aviaries; SIHP # 50-10-22-29224, a historic stone enclosure; SIHP # 50-10-22-29225, a possible terrace remnant and alignments; and SIHP # 50-10-22-29226, ranching features including a feed trough and fence lines with gates.

Table 7. Historic Properties documented during the AIS fieldwork

SIHP #	# of Features	Formal Type	Function	Age
SIHP # 50-10-22-29222	1	Cabin	Temporary habitation	Historic
SIHP # 50-10-22-29223	3	Aviary	<i>Nēnē</i> propagation	Historic
SIHP # 50-10-22-29224	1	Enclosure	Animal husbandry	Historic
SIHP # 50-10-22-29225	1	Terrace and alignment	Unknown	Undetermined
SIHP # 50-10-22-29226	1	Cattle feed trough and fence lines	Animal husbandry and range control	Historic

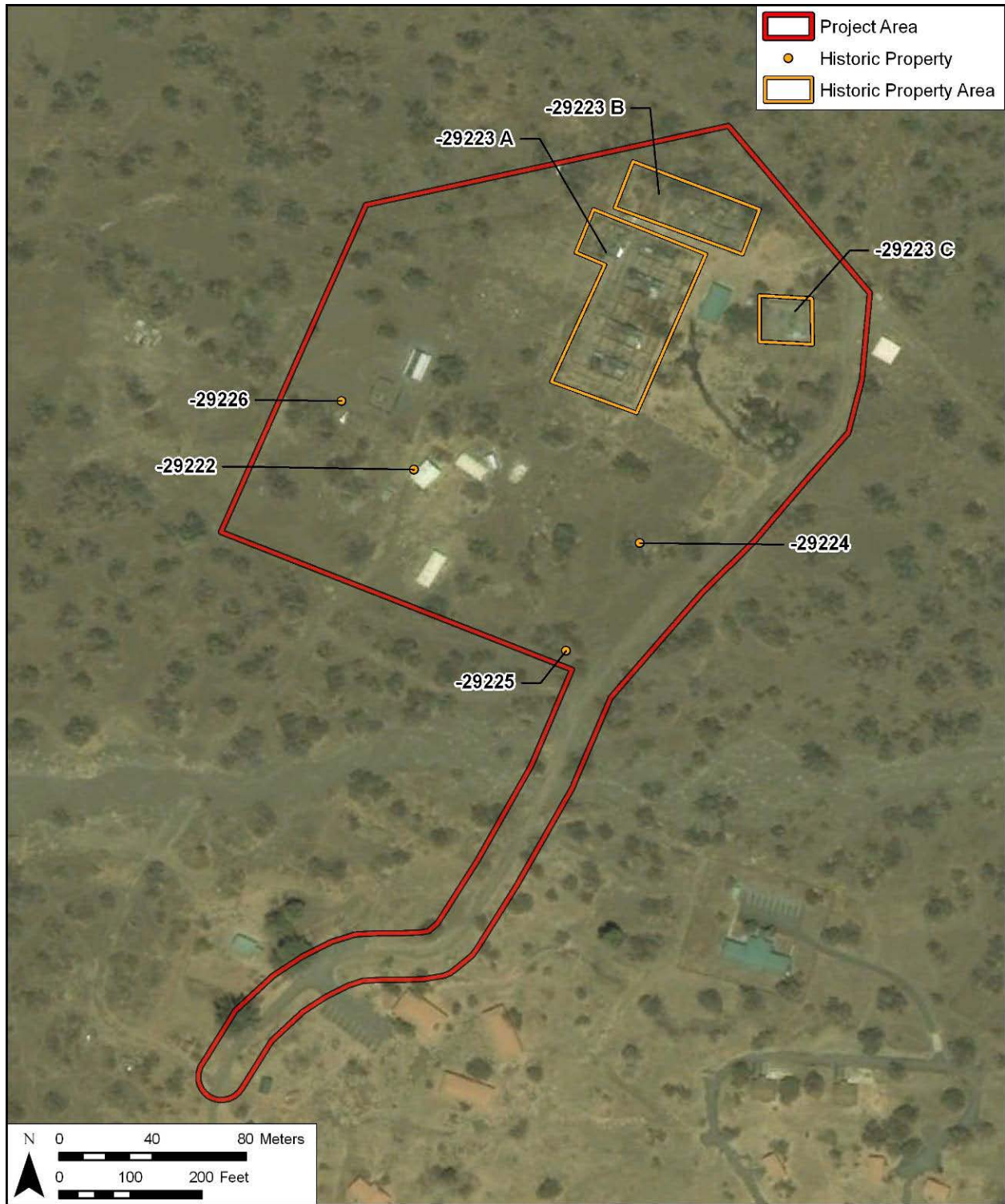


Figure 20. Aerial photo showing the locations of the Historic Properties within the proposed project area (Source: Google Earth 2011)

5.4.2 Test Excavation Findings

Given the good excavation potential at SIHP # 50-10-22-29224, which represents a stone enclosure, a Test Unit (TU-1) was excavated inside the enclosure (Figure 21). A second Test Unit (TU-2) was excavated at SIHP # 50-10-22-29225, which represents a possible terrace and trail segment (Figure 22). The excavations were designed to test for the presence or absence of cultural deposits related to the history of land use within the proposed project area and to determine the potential for the presence of such deposits throughout the entire area of SIHP # 50-10-22-29224 and SIHP # 50-10-22-29225.



Figure 21. Overview of Test Unit 1 prior to excavation facing southwest



Figure 22. Overview of Test Unit 2 prior to excavation facing northeast

5.4.2.1 TU - 1 at SIHP #50-10-22-29224

TU-1 was excavated within the proposed project area. TU-1, a 1.0m² test unit was excavated within the stone enclosure, SIHP # 50-10-22-29224. While all of Stratum II and III were culturally sterile, three artifacts were collected during screening of sediments from Stratum I. These artifacts are presented below in Table 8. The artifacts recovered from TU-1 at SIHP # 50-10-22-29224 all confirm the suspected function of the stone enclosure, given the known history of ranching in and around the project area. The mammal rib bone is that of a juvenile sheep, and the metal chain link fragments at one time were more than likely used to secure the small stone enclosure. In summary, the artifacts subjected to laboratory analysis during the present study all indicate that the project area was used during the early twentieth century for ranching activities.

Table 8. Artifacts Found During Test Excavation at SIHP #50-10-22-29224

Accession	Material Type	Provenience	Attributes	Approximate Dimensions	Age
#001	Bone	CSH 03, TU-1, Stratum I	Non-human rib bone fragment ; likely juvenile sheep	5.9cm x 0.9cm	Unknown
#002	Steel (heavily rusted)	CSH 03, TU-1, Stratum I	Machine-made; Chain link fragment	4.1cm x 0.2cm	20 th century
#003	Steel (heavily rusted)	CSH 03, TU-1, Stratum I	Machine-made; Chain link fragment	3.7cm x 0.2cm	20 th century

5.4.2.2 TU-2 at SIHP #50-10-22-29225

TU-2 was excavated within the proposed project area. TU-2, also a 1.0m² test unit, was excavated to bedrock through a single stratum which contained only modern trash. TU-2 at SIHP # 50-10-22-29225 contained only a modern Styrofoam cup fragment (which was not collected). Upon the termination of excavation it was concluded that the SIHP # 50-10-22-29225 may represent a modern bulldozer push pile or other disturbance, possibly related to installation of the adjacent fence line.

Section 6 Community Consultation

An effort was made to contact and consult with Hawaiian cultural organizations, government agencies, and individuals who might have knowledge of and/or concerns about Hawaiian cultural practices, resources and beliefs related to Ka'ohē Ahupua'a. This effort was made by letter, e-mail, telephone, and in person. The initial outreach effort was started in November 15, 2011. Community consultation was completed in February 9, 2012. In the majority of cases, CSH community letters along with a map and aerial photograph of the proposed project area were mailed with the following text (Appendix D):

At the request of R.M. Towill Corporation, Cultural Surveys Hawai'i Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed Department of Transportation Base yard, behind Mauna Kea State Recreation Area (commonly known as Mauna Kea State Park) in the *ahupua'a* (traditional land division) of Ka'ohē, Hāmākua District, on the Island of Hawai'i, TMK: [3] 4-4-016:003. (Figure 1 thru Figure 4).

The project site is north of Saddle Road and the former Department of Land and Natural Resources (DLNR) *Nēnē* (Hawaiian goose, *Nesochen sandvicensis*) Rearing Facility located in back of the Mauna Kea State Recreation Area, mile marker 34. The site is enclosed by fencing and is approximately 4-acres. The site will be used as a road maintenance facility and will include 1-2 buildings that will house trucks, road equipment, workshop, restroom and lockers, and a small office. Total building about 5,000 plus square feet. In addition, fronting this building, there will be an open area for material storage and equipment parking pad. The roadway to the site is in poor condition and will be paved. The site will be shared with DLNR who operates approximately an acre plant nursery. The site contains many structures left over from the *nēnē* facility which will be demolished. DLNR will receive a new building approximately 700 – 800 square feet, site to be determined. The purpose of this project is to provide a new maintenance facility for crews maintaining the newly acquired Saddle Road.

The purpose of this cultural study is to assess potential impacts to cultural practices as a result of proposed development in the Ka'ohē Ahupua'a. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- **General history and present and past land use of the project area.**
- **Knowledge of cultural sites which may be impacted by future development of the project area - for example, historic sites, archaeological sites, and burials.**
- **Knowledge of traditional gathering practices in the project area, both past and ongoing.**

- **Cultural associations of the project area, such as legends and traditional uses.**
- **Referrals of *kūpuna* or elders and *kama‘āina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupua‘a* lands.**
- **Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.**

6.1 Community Consultation Effort

Several attempts were made by mail, email and telephone to contact individuals, organizations, and agencies apposite to the subject CIA. The summary of consultations is presented in Table 9.

Table 9. Summary of Community Consultation Efforts

Name	Affiliation	Notes
Ailā, William	Hui Mālama I Nā Kūpuna ‘O Hawai‘i Nei	CSH mailed letter and maps on November 15, 2011. CSH emailed letter and maps on November 16, 2011. CSH spoke with Mr. Ailā via telephone on November 16, 2011. Mr. Ailā advised CSH that he is too busy as Chairperson of DLNR to respond to any of CSH’s letters. Mr. Ailā advised CSH to send future letters to Mr. Kīhei Nāhale-A.
Ailā, William	Chairperson, Department of Land and Natural Resources (DLNR)	CSH mailed letter and maps on November 15, 2011. CSH emailed letter and maps on November 16, 2011. CSH spoke with Mr. Ailā via telephone on November 16, 2011. Mr. Ailā responded, “As Chairperson of DLNR, I am too busy with this work to respond to CSH letters anymore. When I do receive these letters, I pass them on to other interested parties.”
Ayau, Halealoha	Hui Mālama I Nā Kūpuna ‘O Hawai‘i Nei	CSH emailed letter and maps on November 16, 2011. CSH sent a second email on December 16, 2011 in which CSH asked Mr. Ayau the following questions: “Are you still the contact for

Name	Affiliation	Notes
		Hui Mālama I Nā Kūpua 'O Hawai'i Nei? If not, then to whom should CSH send their letters to for a response on Cultural Impact Studies in Hawai'i?" CSH received an email response from Mr. Ayau on December 16, 2011 stating, "Yes, here is the Moloka'i address."
Baldwin, Kathy	Director, Environment Hawai'i, Inc.	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Bertlemann, Keali'i	Son of Mr. and Mrs. Clayton Bertlemann/Captain of the voyaging canoe, Makali'i	CSH interview Mr. Bertlemann on February 9, 2012. See full interview in Section 7.
Bertlemann, Pōmai	Voyaging family of the traditional Hawaiian canoe, Makali'i	CSH met with Ms. Bertlemann to discuss a scheduled interview and referred CSH to her brother Keali'i Bertlemann.
Case, Uncle Lloyd	Kupuna	CSH telephoned uncle Lloyd Case on December 15, 2011. An interview was scheduled for February 9, 2012. Uncle Lloyd Case was not able to make this scheduled interview.
Case, Pua	Kumu Hula/Cultural Practitioner	CSH mailed letter and maps on December 13, 2011. CSH received two email responses, first email response on December 13, 2011 in which Kumu Case stated, "My uncle Lloyed Case would be great. I'll let him know and see if he's agreeable and get back to you. Reynolds email on the cc above. I'll look for his number." Second email response on December 15, 2011 stating, "I am thinking that perhaps during the break I could ask Pōmai Bertlemann to get together with CSH. I finish school tomorrow and will have some time to think about it."
Dickson, Maulili	President, Waimea Hawaiian Civic Club	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter

Name	Affiliation	Notes
		and maps on November 16, 2011 and again on December 15, 2011.
Donham, Theresa	Hawai'i Island Archaeologist, State Historic Preservation Division (SHPD)	CSH mailed letter and maps on November 15, 2011. CSH emailed letter and maps on November 16, 2011. CSH received an email response on November 17, 2011 from Ms. Donham stating, "I received your letter in the mail and I presume CSH contacted State Parks, maybe Martha Yent who's in charge of interpretation, about possible impact to the park. Would DOT be accessing the facility from that infantry road or from Saddle Highway and through/around the park? I presume this will be a permanent facility? Do you have contact info for the cultural advisory committee for PTA? They would be good people to contact as they are very familiar with the Kaohe Mauka region. It looks like the "developed" area of the old nene facility is about 400 x 400 feet. The new building and infrastructure will probably be larger, so I assume there will be an archaeological inspection of the unaltered areas inside the overall 4 – 5 acre site. If I think of anything else, will let you know."
Gon, Samuel A. 'Ohukani'ōhi'a, Dr.	Senior Scientist and Cultural Advisor, The Nature Conservancy of Hawai'i (TNC)	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Kamakawioole, Reynolds	Kupuna/Cultural Practitioner	CSH interview Mr. Bertlemann on February 9, 2012. See full interview in Section 7.
Keakealani, Ku'ulei	Cultural Resource Educator, Waimea Middle School	CSH contacted Ms. Keakealani by email on November 15, 2011. CSH received a response on November 16, 2011 in which Ms. Keakealani referred CSH to contact Kumu Hula Pua Case.
Ledig, David	Refuge Manager, Kona Forest Unit, Big Island National Wildlife	CSH mailed letter and maps on November 15, 2011 and again on

Name	Affiliation	Notes
	Refuge Complex	December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Lee, Kimo	Chairperson, Hawai'i Island Burial Council (HIBC)	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Nāmu'o Clyde	Office of Hawaiian Affairs (OHA)	CSH mailed letter and maps on November 15, 2011. CSH received a response letter dated December 6, 2011. See Section 6.2.1 for full letter response.
Nagata, Stephanie	Interim Director, Office of Mauna Kea Management (OMKM)	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Nazara, Cynthia	President, Kona Hawaiian Civic Club	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Pihana, Kimo	Kupuna/Activist/Retired Mauna Kea Park Ranger	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Pisciotta, Kealoha	President, Mauna Kea Anaina Hou	CSH mailed letter and maps on November 15, 2011. CSH emailed letter and maps on November 16, 2011. CSH received two email responses, first email response on November 27, 2011 in which Ms. Pisciotta stated, "I did get the hard copy. The whole Mauna Kea Hui has been really busy working hard and has been under some hard legal deadline pressures—so I think we all are just doing the best we can to keep it all together. I am certain we all want to help with the CIA for the Saddle Road Realignment, CSH is embarking on. I am forwarding to many of the Mauna

Name	Affiliation	Notes
		Kea Hui members so they can respond and/or help forward to key people to help with interviews.” Second email response on December 20, 2011 stating, “I sent the consultation information to: Uncle Clarence Kūkauakahi Ching (he sits on the PTA Cultural Advisory Group—and is very knowledgeable about all of the trails in the area), Paul K. Neves (Kumu Hula and Member of the Royal Order), Pua Case (Kumu Hula) and her husband E. Kalani Flores (he sits on the PTA Cultural Advisory Group too).”
Springer, Hannah	Kahu Kū Mauna	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Terry, Ron	PTA Cultural Advisory Committee	CSH mailed letter and maps on November 15, 2011 and again on December 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on December 15, 2011.
Yent, Martha	Parks Interpretive Program Supervisor, DLNR, Division of State Parks	CSH mailed letter and maps on November 15, 2011. CSH emailed letter and maps on November 16, 2011 and again on March 12, 2012. CSH contacted Ms. Yent via telephone on March 12, 2012 in which Ms. Yent asked CSH to resend an email with CSH letter and maps. On March 12, 2012 CSH received an email response from Ms. Yent stating, “Holly and I both remember receiving your email. Spoke with Holly and she remembers forwarding the report around November last year that she and MaryAnne Maigret prepared in 2007 for the wastewater system at Mauna Kea State Park. However, we’re wondering if you may not have received because of the size of the file [6.5MB]. I’m going to

Name	Affiliation	Notes
		send the file again in a separate email.” CSH received this 2007 report March 12, 2012. See References Cited, Dan Quinn 2007.

6.2 Written Responses

6.2.1 Office of Hawaiian Affairs (OHA) Response Letter

In their response letter dated December 6, 2011 OHA had no substantive comments or referrals to individuals and organizations for the proposed project area (Figure 23).

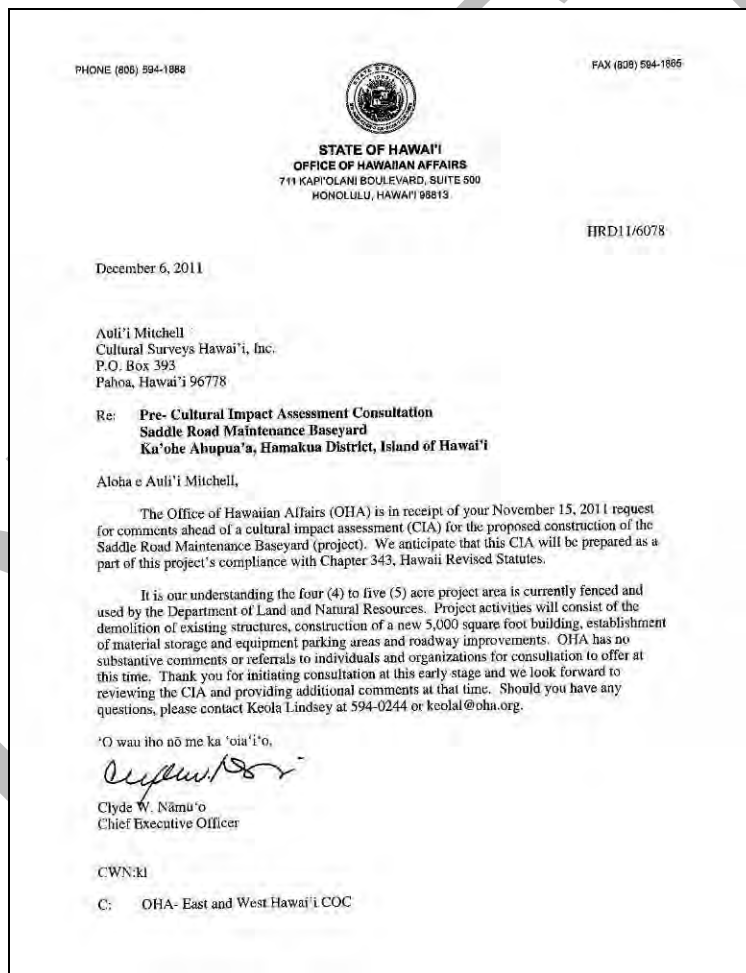


Figure 23. OHA Response Letter dated December 6, 2011

Section 7 Summaries of Kama'āina “Talk Story” Interviews

7.1 Talk Story Interview

Kama'āina and *kūpuna* with knowledge of the proposed Projects and study area participated in “talk story” sessions for this CIA. The approach of CSH to cultural impact studies affords community contacts an opportunity to review transcriptions and/or interview notes and to make any corrections, deletions or additions to the substance of their testimony. CSH employs snowball sampling, an informed consent process and semi-structured interviews (cf. Bernard 2006). CSH attempted to contact 22 individuals for this CIA (see Table 9, above); eight responded; and two participated in talk story interviews. To assist in discussion of natural and cultural resources and any cultural beliefs and practices associated with the Project areas within the larger context of Ka'ōhe Ahupua'a, CSH initiated talk story sessions with questions from the following broad categories: Gathering and Hunting, Ritual and Ceremonial Practices, Freshwater and Marine Resources, Burials, Trails and Cultural and Historic Properties. Presented below are brief backgrounds of participants' “talk story” sessions and their comments and concerns about the proposed project area.

7.2 Acknowledgements

The authors and researchers of this CIA extend our deep appreciation to everyone who took time to speak and share their *mana'o* with CSH in talk story interviews and in brief phone, post or email consultations noted in Table 9; including contacts who opted not to contribute to the current CIA, but nevertheless spent time explaining their position on the proposed Projects. We request that if these interviews are used in future documents, the words of contributors are reproduced accurately and not in any way altered, and that report preparers obtain the express written consent of the interviewees.

7.3 Mr. Reynolds Kamakawiwoole

CSH interviewed '*anakala* (uncle) Reynolds Nakooka Kamakawiwoole 'O Kamehameha I in his Honoka'a *hale* on Pepeeuali 9, 2012. He was born and raised in Haina/Pā'auhau *mauka* on Kekemapa 19, 1947. 'Anakala Reynolds attended Honoka'a High School, continued his education at the community college and thereafter enlisted in the Army. For 32 years, '*anakala* Reynolds was a police officer for the Hawai'i Police Department and has since retired. He is clairvoyant and knowledgeable about Hawaiian cultural resources, beliefs and practices.

When asked about his *mana'o* regarding the summit of Maunakea, '*anakala* Reynolds commented:

The forty to fifty acres where they're going to build, it needs to be really blessed. The four corners of the place needs to be blessed because they're walking on possibly one of the most sacred part of the land. They're facing/building there that's going to be structured above of an open tomb. It's a big tomb there. It's a huge tomb about 35 acres. It's structured like a diamond shape. I'm not too sure how these things works out by 35 acres but it's a diamond shaped tomb that's been there and we have to realize as cultural practitioners if they are to build on

that place. It has to be four sided blessed because it will go like this. The land will shift shape because of the weight. That's why they were reminded not to build on it. Because of what that area is it holds that sacredness. So we have to bless the four corners of this diamond. However that land is made, the diamond has to be placed on there and wherever that diamond is, they need to go there and bless that area with others. You cannot put it until this thing is done like the high priest, a *kahuna*. A *kahuna* steps on the land, a *kahuna* calls and allows this to be done. It's the only way it doesn't shift shape. It'll shift shape and all of a sudden the ground starts going down. It's in the area that the recommendation is that the four corners be blessed.

The people that are going to be involved in this State here is present, ten of them. The ten that are involved of the highest caliber. In other words, from the boss down. The ten, the boss, the construction people, the ten of the highest caliber in each company be there and they have to be blessed along with this land because they are taking the *kuleana* of this place. Doesn't mean these guys in construction is the only ones...that stops it, go through with it and involved in it. It takes that *kuleana*. Now they are saying they are going to be taking care of this sight. Even if they place it on there, they going to have to take care of it. What is important now and is possible it includes some women in this 10 or just going to have the male. Hina and Kū must be in the balance. It's about balance. They have to understand that that's how it's going to be and that's how it will be. All the presents will be made by the Hina and the Kū. Development will be using as many of the present people on this island. Many of the people, the majority 80% to 90% people from this island. Not to be using outsiders because they don't have the *ma'a*, they not *ma'a* to this island. We don't want this thing to be an outside thing stepping into the picture. They have to be *ma'a* because they going hold that *kaona*. Once they step onto this land, they going hold that *kaona*. Any outside *haole* will not be acceptable because it does not resonate through their being, they neva been here. Enough to put on their *mana*. In other words, if they do this thing they have to employ 80% inside because the other rest when they come inside, they only going short term. Yeah know like come inside and I'd like to work long term and do the stuff here. Has to be those people coming in for the short term has to be obviously *haole*. They not *ma'a*. They have to be *ma'a* to be responsible. They responsible for every single act inside there. Every day is construct, clean up. As much time as they build in time they are there to clean up. In other words, they have somebody picking up all this stuff, trash bags everything. Eh, eh, eh, no can, no *'ōpala*. Everything must be done in integrity and *ma'a* to that land and no *'ōpala*. That is the chief thing we say here is no *'ōpala*.

'Anakala Reynolds shares his *mana'o* on traditional land use of this area:

To do traditional land use of the area it was used for not only in the care of the plants and the traditional land area for use in the plants there it was incorporated in ancient times it was a planting area. Because it had such an indication to the

gods that they would plant and they would cover and they would have certain kinds of woods that they would use for, for people to use for their healing because all of it came through there. That place gotta be remembered as such, *lā'au lapa'au* for making small wood carvings, *lomi lomi* sticks different kinds of things for use of woods, utensils, boats, more tools that it was used for anything big, small stuff that could be used specific needs through the practice. And to be used as a facility to teach, instruct there. There were farms in the area to teach, sit down with the *keiki* and teach because it was a society of sharing and love. A lot of love in that area, a lot of love, a lot of *aloha* inside that area. So it gotta be really respected. No can go like dis, no can. They gotta move it to respect of the land and know when they are finished they cannot be like, "Oh, we can go dump the rubbish ova hea." No, no gotta have bins and everything gotta be clean. No can just pile up or leave the things on the side, through away later on, no gotta be really kept clean. That is the *pono* way. This will help us understand how *pono* this place is and facilitate that *pono*-ness. Maybe in their construction assemble a place not going be for them but our people so they can come out there.

Like outside *hale* like a small pavilion an open area where we can gather and come up there to do our practice, to do our faith, to do our sharing. Make a little space for the people, the practitioners to come in and make it available so they can do our practice up there. Knowing what this area is so that we can perpetuate the culture, this is the culture. This is the key, when they construct, they develop it up, they're perpetuating the culture by giving us a place by providing us a site so we can do our culture so that we can teach the culture. We can meditate, we can be there. This will make it a vailable so that along the side of it allow a space, spiritual side to make sure there is a balance, Hina. I don't want them to be too Kū. Balance it off and show where that balance are so part of that diamond is Hina, half of that side is Kū, that thing is balanced in the center. Make that area for them to, have that, it provides them, provides for a clearing and absolute time for those who are working there and all the people, the practitioners can come. I don't know what will happen when they leave, I don't know what going happen when they finish? We want them to leave this place as a gift to the Hawaiian people. A gift to the Hawaiian people to say, "*Mahalo* for doing this for us." We be thankful because you know what with all the time we were working, never have anybody get hurt. The *mana* is strong, it is kept and it is done right, *pono*. From the first time do it r ight. From what I see they have to accepting responsibility on the contractor side knowing what is the procedure, what is the process. And where it also it come available after they leave because they not going sit around, the whole time, they going leave. The existing buildings that are there now not being used we should gain access.

We the people, the Hawaiian people should gain the access, to teach our people the ancient ways. This is the need, this is acceptable that they learn the connection, our connection. It is time for us to teach everyone else, not anywhere else. This is the proper place, this will be used as a cultural tool especially for the

kūpuna before they leave. What a beautiful place for *kūpuna* to share. Talk story. One week here, the next week here and then another *kūpuna* coming here, they going share their information and then boom, boom, boom. They going pick up all this information because they close to the land, close to the mountain. It's the bottom of the mountain. All my information is coming right here and the *kūpuna* is sharing. What happens if we develop this throughout the islands people will come to hear the *kūpuna* to talk up in their mountains and they're okay in sharing that and we invite all the *kūpuna* from all the different islands, all other parts of the world. Come, sign up, you're going to be here this time, you're going to be here this time, you're going to be here this time. All the *kūpuna* show up why, they gotta release, the healing, they gotta heal this. They gotta heal the 200 years. They gotta heal all the parts right here. Then, the rest of the *kūpuna* out there going be come, going come through them. We have to have this occur now because it's time, it's time for all of us to share.

When asked about his work on the summit of Mauna Kea, 'anakala Reynolds replied:

On top of the mountain we'll cover number one because my lineage goes back to being a high priests. The top of the mountain of Mauna Kea is perhaps the most sacred part, Mauna Kea or Mauna A Wākea is the most sacred part in the whole entire world with every single being. So my work up there is to 1) to make the connection to all the families and culturally practice what is necessary to connect myself and others to the universe and to the star families. Of course, the top of Mauna Kea which is but the top of the summit of Mauna Kea is where I feel the essence is of a deity. The presence of that one is what they call Christ presence. I've seen the light at Subaru area I've done the forgiveness work for Subaru. I have done several, several events done at the Solstice and the spring and the winter Equinox at Mauna Kea summit. I've done several, several ceremonies at Kilohana. My relationship to Mauna Kea and all of that land as a result of this work here is that it is very sacred, the presence, I've seen Poli'ahu and I've Līlīnoe. I've seen that presence. I had the opportunity to be supported by Poli'ahu and Līlīnoe with many, many of my activities and know that I've done so much work there at Mauna Kea. I've been one of the *kahu* for the Kahu Ka Mauna advisory board when they first originated, served that so I was on that. I still continue to do ceremonies relating to Mauna Kea and anything to do with what's there is what I see and have vision of. I can see all that in there. Also whatever has to be done I have knowledge of that especially with the ten millimeter, the TMT. Anything to do with that portion, coming down, enclosed the military camp and other places in the area I have knowledge of because I can see what's there.

'Anakala Reynolds shares about the female deities:

The different realms, the realm *kanaka*, the realm *akua*, the relationships with the different gods that whole dynamic of Wākea, Pōhaku'loa, Kūkahau'ula, Mo'oinanea. Līlīnoe, the females are very important up there. The females are

important because they were first. The first in our genealogy in our presence, the first is the actual.

When asked who his mentor was in his spiritual and cultural path small kid time, *'anakala* Reynolds replied:

My grandfather, Charles Moses Kamakawiwoole, was one of the first Hawaiian ministers. He became one of the first Hawaiian ministers, the first Kamakawiwoole. He was *kahu* of Kalemela which is now called the East Hāmākua Protestant Church.

I grew up and my father always connected that I was 12 years old we were forced off the land. That house you see outside there that's the protest my father did. When they talk about people being displaced, they don't know about this place here. We were displaced from our land that we were on. They actually wrongfully took the land and used the land from 1962 -1994. I've always had to keep that in mind. But from then I grew up as a child that wasn't disclosed because I knew there was something different that my father told me that there was something different about me. I looked up in the sky one day when my sister died, sixteen years old. I was outside there. I kept telling my brother, "Look at my sister." My brother knew that there was something different with me. I grew up to be really westernized.

When asked about practitioners, *'anakala* Reynolds commented:

There are many. There are others. There are others and they're quiet. Some of them are *huna* so they would not come up and say. But the practitioners, there are many of this place and from other islands. Other islands, other parts in yeah know in Turtle Island. They're not saying but they are there. And I think there is a lot to say that they are connected to Mauna A Wākea.

'Anakala Reynolds comments on what the youth of today should know about this area:

To perpetuate our knowledge, really to perpetuate our knowledge. Don't think it's separate. Stop thinking it's separate. We need to put a precedence on our priorities and taking on spiritual knowledge first. We came in spiritually first not as warriors. We are connected, we are spiritually first. I think we need to regain our spiritualness. As a Hawaiian, you're okay. "Bruddah, you're a Hawaiian, you have no money but you're okay." Bring back the love. We don't forget that we love each other and sometimes we forget that or we get other things that our eyes focus on. We forget to love each other and forgive. This part to me is to make sure the kids know that we set our priority to know our spirituality and to love each other. We have to share. No hold back. The more we share, the more we understand.

They fear because they not going get where the others going get. They don't know that the wealth that they receive is not from the money, it's from the culture. different today because got other vices to keep their mind going. That to

me is okay to a certain point. But it is time to come back and re-connect with the *kūpuna*. Come connected to *kūpuna*. I always say, "Connect with the *kūpuna*." Because you don't have all that other stuff happening. You listen, my *kupuna* told us to listen. "What did the *kupuna* say? The *kupuna* said this, this and this. Maika'i nō." Because that telling me we are not dependent on other stuff other than our *kūpuna*. Our *kūpuna* our divided and share with us and teaching us that we have it all here. So that's important.

'*Anakala* Reynolds refers back to the proposed TMT on the summit of Maunakea:

It is a costly balance that one, the lesson and the continuous understanding and responsibility of these people to get on there. And there is responsibilities after they are finished. What if they proposed to us, the Hawaiian people, after this thing is completed what would they like to do for the Hawaiian people? That would be my proposal. I would make it so, yeah know, it respects Hawaiian understanding. If they could use that facility areas and when you finish, we like know what we can get from this because you have Kalalau land that is sacred and we want to make sure it continues to have the right to move forward. The developers, develop it, put it towards our family. Give it back.

7.4 Mr. Keali'imaunalaniokakai Bertlemann

Mr. Keali'imaunalaniokakai Analu Bertlemann was born and raised in Waimea, Hawai'i Island. He is the second of five children in his 'ohana. His mother's family, Lindsey, is from Waimea and they have been in Waimea for eight generations. His father's family, Bertlemann, comes from a voyaging family. CSH conducted an interview with Mr. Bertlemann at Kanu O Ka 'Āina Charter School, Hawai'i Island on Peleluali 9, 2012.

When asked about his 'ohana, Mr. Bertlemann commented:

My mother's family is from here in Waimea, my mother is a Lindsey and so my mom was born and raised here. My Lindsey 'ohana has actually been in Waimea for eight generations. So my nieces and nephews, my brothers and sisters children are the eighth generation of the Lindsey's in Waimea. My mother's mother family was also from Waimea. My great grandmother was Pu'u Anahulu and my great grandfather was from Kohala. My mother's mother, well my great grandparents on my mother's side, was John Ahia Liana and my great grandmother was Estella Kamohoali'i Kahinu Liana. They had my grandmother who is Stella Kūkilakila Liana. She married Kimo of James Faye Lindsey and they had my mother who is Adrienne Francine Leimomi Liana Lindsey.

My father is Clayton Norman Bertlemann whose parents were Beatrice George from O'ahu who is originally from Kaua'i whose 'ohana actually came from Ni'ihau. His father was Archibald Kūkapuhili Bertlemann who was born in Ka'ū and then moved to Honolulu, met my grandmother and then had the two oldest boys, my father and my uncle, and then moved to Hilo and then to Waimea.

Mr. Bertlemann shares how the traditional cultural practice of voyaging started in his *'ohana*:

When the cultural renaissance particularly was happening in the 70's with the building of Hōkūle'a, my uncle, my father's younger brother, my uncle Shorty was involved in the building and actually sailing Hōkūle'a to Tahiti on the first voyage. My father would have been involved with that voyage had not had us because we were young then, we were still really small. He ended up sailing in 1985. He was training in the early 80's and then did a long voyage. Hōkūle'a, training with all the crew because that voyage, that first long voyage that he did lasted for two years. And so he would fly back and forth, fly and sail, fly and sail throughout the two years. He did 1985, 1987. He did 1992 and I think that was it with Hōkūle'a voyages because after that he built in Hilo, him and a core group built Makali'i for Hawai'i Island.

But prior to that our *mo'okū'auhau* goes back generations there's some of our *mo'okū'auhau* that come from the navigators that help to accompany to the Hawaiian Islands that people migrated here.

CSH asks Mr. Bertlemann to share about past land and pre-contact uses:

I know my dad used to talk about them, I know Parker Ranch owns some land up in that area somewhere. I'm not sure exactly where in the *ahupua'a* it is. But going up there and roping wild cattle during that time. My father before he was into voyaging, he was actually a cowboy. We have our own ranch named A-4 Ranch.

My dad was a hunter. They hunted in that area. I know my cousin, I have two cousins, one cousin in particular and my cousin's husband or *kāne* who uses that area often. My oldest cousin who is my oldest Bertlemann cousin has been hunting there since he was younger. Hunting to provide food for their family. Hunting rights and practices.

I know in those areas there were trails, many trails to access the Keanakāko'i, which is the adze quarry.

Mr. Bertlemann shares his *mana'o* regarding what traditional cultural practices he is involved in and how that relationship of his home town, Waimea, had at that time:

One would be perpetuating our voyaging culture, our *wa'a* culture. For one, I mentioned Keanakāko'i which is the adze quarry. Our *kūpuna* would go up there to go and get the stone to make the adzes to carve the canoe. I mentioned my dad being involved in an organization that does that. So in 1992, when we wanted to build the traditional canoe, we did everything traditionally with ceremony and chant and so we ended up going to the adze quarry and getting the adzes to build our own canoe. Nā Kalai Wa'a Moku 'O Hawai'i.

Mr. Bertlemann continues to share about how often he goes to Mauna Kea and who he knows goes up to the summit to practice the traditional cultural practices of *ho'omana* of our religion:

It's almost like a catch 22. I love going up as often as I can but I don't go to because the mountain is so sacred and especially the summit area, I don't think our *kūpuna* traversed up there very often and if anybody did, it was high ranking *kahuna* and those people. And so in the past year I've gone three times.

I know Pua Case and Kalani Flores go, have gone and they went there recently. I know that aunty Pua Kanaka'ole and aunty Kekuhi Kanahale have gone, cousins and done these kinds of things up t here. The Royal Order of Kamehameha. Reynolds Kamakawiwoole.

When asked about *nā mea kanu*, what types of plants, insects and animals are in that area including any concerns he has, Mr. Bertlemann replied:

The plants, one I know of from the top of my head *'āweoweo*, *'a'ali'i*, *māmane*. The higher up you go, *hinahina* or *āhinahina*. What else, some *'ōhi'a* probably in some areas. *Pilo* is it *pilo*, no, *naio*. *Koa*, *pūkiawe* also *nēnē*.

Beetle is the only thing that lives up there. The further you come down a little bit off the mountain, all of our native birds. Like *palila*, *'apapane*, *'i'iwi*, *'io*. And the native birds the practice that comes to mind right now the practice of creating the *aha'ula* and *mahiolo*, bird catching.

Ungulates like the sheep, the pig, the goat. That in itself is a contradictory because you talk to the hunters and they'll say, "That's a food source of the pig, the goat, the sheep." Yet at the same time we also know that they are very destructive.

I think, one is the destruction just to the *'āina* period, the native plants. For me, a lot of times they say, "Oh, there's plenty of that certain plant or get a lot of that plant so it's not endangered." But if you look at Hawai'i as a whole and how small our islands are and in fact those plants grow nowhere else in the world, it seems it will get impacted. So that's one thing for me. My mother and my family were *lei* makers all from here. I do gather my foliage for *lei* making up there. It is different for the *lei* maker or the person practicing the, who knows what the religious practices are because really when you look at it, it's really all the same thing. When we go or when I go, before we gather, especially if I have my younger nieces and nephews with me to teach them that in the environment they in. It is very important. I've taken a couple of them with me before and we ask for the...it is a cultural protocol, it's a religious aspect of our practice.

Mr. Bertlemann talks about the deities and meanings of the *mele*'s he has written that are related to Mauna Kea and Mauna Loa:

I think back in October, September/October I wrote two *mele* actually, in fact, one about Mauna Kea and one about Mauna Loa. And it speaks of, the Mauna Kea one speaks of the deities that dwell on the mountain. Poli'ahu, Līlīnoe, Ka Houpo o

Kāne, then Mo'oinanea, Kūkahau'ula, Pōhakuloa, and Wākea. I know as far as Poli'ahu, I know she only dwells on Mauna Kea. Līlīnoe and Mo'oinanea travel.

When asked about the importance of water from this area, Mr. Bertlemann replied:

What gets to me emotionally, spirit about the mountain is the *wai* accessible, Mauna Kea. When you look at the snow and whether you call the snow Poli'ahu, those are all water forms. Mauna Kea, when you look at how tall and how vast the mountain is, all of these mountains actually, there are great cracks to trap the water. I remember and I really feel now, always watch the mountain after a big snow in the wintertime and there are some streams that flow off the mountain from the very top and you can track it and you can see it flowing down. And then some of them who flow from the top of the mountain and all of a sudden it just disappears and you don't ever see it anymore. The *wai*'s relationship to Wākea and the *wai*'s relationship to Kāne, it's quite an aquifer that mountain.

I was asked a question one time if up here in Waimea we get our water from that mountain. Some people said, "No." Maybe not here close to town, but I know where our ranch is, where our property is, if we needed water that's where the water would come from. I would imagine, if they drill that's probably one way. I know right now what they're doing is trucking the water from Waimea, have it, truck it from Waimea to the military base. To me, get your own water. I don't mean to be like that but if you build something way outside there, then you draw out where you getting your water from. It's not okay to take your water from over here, up there.

The religious cultural practices of today up Maunakea, Mr. Bertlemann commented:

Hula, chanting, *pule*, *hā'awe aku*, giving offering, *ho'okupu*. That's another thing, last year, we haven't done our *hō'ike* yet, to honor our water resources of this area. And our *huaka'i* what we did was we wanted to, all of our 'ohana that wants to take place in this *hō'ike* hopefully sooner than not, to go with us on these *huaka'i*'s that had to do with places of water and water resources. We started our water *huaka'i* to with Mauna Kea the first place we went to. All of the *hula* that we choreographed or dancing about are *hula* that has to do with Mauna Kea and other areas of this side of our island that are important water resources. That's a dance that we are actually doing.

CSH asks *mai he'e nā iwi kūpuna*, any burials up Maunakea, Mr. Bertlemann replied:

Yes, absolutely. It's very possible they are in this area.

Section 8 Cultural Landscape of Project Area

8.1 Overview

Discussions of specific aspects of traditional Hawaiian culture as they may relate to the Project area are presented below. This section examines cultural resources and practices identified within or in proximity to the subject Project area in the broader context of encompassing the vast regional land division of the Ka'ohē Ahupua'a landscape that includes the summit of Mauna Kea and land westward to the summit of Mauna Loa and smaller *ahupua'a* such as Waipunalei, Laupāhoehoe, Kapehu, Welokā, and Maulua nui, which adjoin them on the lower mountain slopes, including a wide range of named environmental zones (*wao*). It also provides a sense of the cultural attachment that Native Hawaiians have for Mauna Kea. As defined above by Maly, "Cultural attachment is demonstrated in the intimate relationship (developed over generations of experiences) that people of a particular culture share with their landscape – for example, the geographic features, natural phenomena and resources, and traditional sites etc., that make up their surroundings. This attachment to environment bears direct relationship to beliefs, practices, cultural evolution, and identity of a people" (Maly 1999:27). Excerpts from "talk story" sessions from past cultural studies and the subject CIA are incorporated throughout this section where applicable.

8.2 Gathering and Hunting Practices

Mauna Kea's unique geographic features and relative isolation have combined to make it a place of special resources that has long attracted Native Hawaiians and other *kama'āina* seeking to partake of its abundance. For example, both traditional and archaeological evidence illustrates that there are numerous *ana* and *lua kā ko'i* (caves and quarries from which stone was harvested for making tools) (see Maly 2005) where Kānaka Maoli have gathered stone for their tools. Perhaps the most renowned of these *wahi pana* is the Mauna Kea Adze Quarry, also known as Ke-ana-kāko'i, "the adze-making cave" (Pukui et al. 1974:103). Recognized on both the State and National Registers of Historic Places, the basalt found between approximately 11,000 and 12,400 feet elevation on Mauna Kea is among the highest quality in the Hawaiian Islands. Measuring some 4,800 acres, the quarry itself is one of the largest of its kind in the world, certainly in Polynesia (also see Kirch 1985: 179-180; Langlas et al. 1999; McEldowney 1982: A8-A9).

Speaking about Keanakāko'i, community contact Mr. Bertlemann noted:

I know in those areas there were trails, many trails to access the Keanakāko'i, which is the adze quarry. One would be perpetuating our voyaging culture, our *wa'a* culture. For one, I mentioned Keanakāko'i which is the adze quarry. Our *kūpuna* would go up there to go and get the stone to make the adzes to carve the canoe. I mentioned my dad being involved in an organization that does that. So in 1992, when we wanted to build the traditional canoe, we did everything traditionally with ceremony and chant and so we ended up going to the adze quarry and getting the adzes to build our own canoe. Nā Kalai Wa'a Moku 'O Hawai'i.

Mr. Bertlemann mentioned before voyaging, his father used to be a cowboy and would go up and rope wild cattle. The name of his 'ohana's ranch is A-4 Ranch located in Waimea, Hawai'i Island. Mr. Bertlemann's two cousins are avid hunters up Mauna Kea since small kid time. He confirmed the cultural practices and rights of hunting to provide for their 'ohana.

Some rock shelters, including one at Hopukani Spring (10,400 foot elevation), the Hopukani Rockshelter (10,160 foot elevation), and an open camp site at Lilo Spring (8,921 foot elevation) bear witness to the traditional use of such camps for procuring water, food (primarily birds) and fuel, besides being used for acclimatization (see McCoy 1986). Bird walls or bird hunting blinds have been documented by Maly and Maly (2005) as existing "in the form of single, double or tri-sided stone walls" which are meant to keep the hunter hidden from the birds (also see McEldowney 1982 and Langlas et al. 1999, for more accounts of bird hunting).

The 'ua'u, "the dark rump petrel, a bird is a high altitude bird that flies hundreds of miles out to sea to feed and then comes back to Mauna Kea to nest... The 'ua'u were reserved for the ali'i to eat and there are many remains found of the 'ua'u. Birds were also caught for their feathers, in particular, the 'ō'ō, whose feathers were valuable (Foster 1893:456). Historically, some cattle hunting and sheep hunting was also conducted, but at lower elevations such as 5,000 feet (Langlas et al. 1999). CIA participant, Mr. Bertlemann, mentioned, "The further you come down a little bit off the mountain, all of our native birds. Like *palila*, *apapane*, *i'iwi*, *io*. And the native birds the practice that comes to mind right now the practice of creating the *aha'ula* and *mahirole*, bird catching."

Because the vegetation at the summit of Mauna Kea is almost non-existent with the exception of small lichens and moss, gathering of plants was not as prevalent as bird-hunting or the use of basalt for tools. The Alpine Scrub Zone, which ends at about 11,300 feet elevation, is the highest major vegetation zone, with the tree line occurring at around 9,000 feet. Plant life is more abundant in this lower 9,000 foot elevation including endemic *māmane* (*Sophora chrysophylla*), *pūkiawe* (*Styphelia tameiameia*) and the endangered endemic 'āhinahina, also known as Mauna Kea silversword (*Argyroxiphium sandwicense*). The gathering of fuel on Mauna Kea (e.g., *māmane*) was noted (McCoy 1986) as was the acquisition of hardwoods and sandalwood in the region (McEldowney 1982: A-8, A-9).

CIA participant 'anakala Reynolds commented on the traditional land use of this area:

To do traditional land use of the area it was used for not only in the care of the plants and the traditional land area for use in the plants there it was incorporated in ancient times it was a planting area. Because it had such an indication to the gods that they would plant and they would cover and they would have certain kinds of woods that they would use for, for people to use for their healing because all of it came through there. That place gotta be remembered as such, *lā'au lapa'au* for making small wood carvings, *lomi lomi* sticks different kinds of things for use of woods, utensils, boats, more tools that it was used for anything big, small stuff that could be used specific needs through the practice.

Mr. Bertlemann commented on the cultural protocol gathering this vegetation and his concerns:

The plants, one I know of from the top of my head 'āweoweo, 'a'ali'i, māmane. The higher up you go, hinahina or āhinahina. What else, some 'ōhi'a probably in some areas. Pilo is it pilo, no, naio. Koa, pūkiawe also nēnē. My mother and my family were lei makers all from here. I do gather my foliage for lei making up there. It is different for the lei maker or the person practicing the, who knows what the religious practices are because really when you look at it, it's really all the same thing. When we go or when I go, before we gather, especially if I have my younger nieces and nephews with me to teach them that in the environment they in. It is very important. I've taken a couple of them with me before and we ask for the...it is a cultural protocol, it's a religious aspect of our practice.

I think, one is the destruction just to the 'āina period, the native plants. For me, a lot of times they say, "Oh, there's plenty of that certain plant or get a lot of that plant so it's not endangered." But if you look at Hawai'i as a whole and how small our islands are and in fact those plants grow nowhere else in the world, it seems it will get impacted.

8.3 Freshwater and Marine Resources

Mauna Kea is the only Hawaiian volcano with distinct evidence of glaciation which contributes to a major aquifer for Hawai'i Island. There are three *pūnāwai* (water spring) on the southerly slopes of Mauna Kea: at an elevation of 8,900 feet amsl, Wāihu is the lowest spring; the second spring is at an elevation of 9,800 feet amsl and the third spring, Kahoupokani (Ka Houpo Kāne) is at an elevation of 10,500 feet amsl. It represents the integrated system of Hawaiian culture where the surrounding environment is connected to people, as evidenced by the mountain's role in providing the life-giving waters known as "Kānekawaiola" due to its ability to stop the rainclouds. Kāne and Kanaloa are said to meet in Mauna Kea, with *wai* (water) from Mauna Kea being collected in the ocean. The mountain is home to the highest permanent lake in the Hawaiian Islands, Lake Waiau, which contains melted glacial water.

Waiau, the permanent lake located within Pu'u Waiau near the summit of Mauna Kea at approximately 13,020 feet elevation, translates as "swirling water," and is associated with the snow goddess Poli'ahu and is guarded by the supernatural water spirit (*mo'o*) known as Mo'oinanea. Queen Emma went to the top of Mauna Kea to bathe in the waters of Waiau. The ceremony was to cleanse in Lake Waiau at the *piko* of the island. The water caught at Lake Waiau is considered pure water of the gods much like the water caught in the *piko* of the *kalo* (taro) leaf and is thought of as being pure, therefore it is used medicinally (Nā Maka o ka 'Āina 2008).

Fresh water could also be gathered not just from the lake but in certain *pūnāwai*. There are *pōhaku* such as Māhoe that collect water. In addition to the water, fossilized ice or ice from the last Ice Age can be obtained by digging two to four feet. Collecting this underground ice and snow is essential for *lā'au lapa'au* (curing medicine).

Mr. Bertlemann comments on the importance of *wai* from this area:

What gets to me emotionally, spirit about the mountain is the *wai* accessible, Mauna Kea. When you look at the snow and whether you call the snow Poli'ahu, those are all water forms. Mauna Kea, when you look at how tall and how vast the mountain is, all of these mountains actually, there are great cracks to trap the water. I remember and I really feel now, always watch the mountain after a big snow in the wintertime and there are some streams that flow off the mountain from the very top and you can track it and you can see it flowing down. And then some of them who flow from the top of the mountain and all of a sudden it just disappears and you don't ever see it anymore. The *wai*'s relationship to Wākea and the *wai*'s relationship to Kāne, it's quite an aquifer that mountain.

I was asked a question one time if up here in Waimea we get our water from that mountain. Some people said, "No." Maybe not here close to town, but I know where our ranch is, where our property is, if we needed water that's where the water would come from. I would imagine, if they drill that's probably one way. I know right now what they're doing is trucking the water from Waimea, have it, truck it from Waimea to the military base. To me, get your own water. I don't mean to be like that but if you build something way outside there, then you draw out where you getting your water from. It's not okay to take your water from over here, up there.

8.4 Trails

There are several trails traversing the Mauna Kea summit region including, from the west, the Waiki'i-Waiiau Trail leading up to Waiiau; from the northwest, the Makahālua-Kemole-Waiiau Trail also leading up to Waiiau; from the northeast, the Mauna Kea-'Umi Koa Trail, leading to and from the Hāmākua area; and, from the south and leading to the Mauna Kea Adze Quarry, the Mauna Kea-Humu'ula Trail. CIA participants, 'anakala Reynolds and Mr. Bertlemann, both confirm the many trails throughout the *ahupua'a* of Ka'ohē.

There are several historical references to the trails of Mauna Kea:

In Fornander's "Story of 'Umi: One of the Most Noted of Hawaiian Kings (*He Mo'olelo no 'Umi: Kekāhi Ali'i Kaulana o ko Hawai'i Nei Pae'āina*)," the ruling chief 'Umi-a-Līloa leads a war party out of Waipi'o, Hāmākua, to attack Hilo using the trail of Poli'ahu:

Up through the mountains of Mauna Kea and right back of Kaūmana, running towards Hilo, was a short cut over the mountains to the trail of Poli'ahu and the well of Poli'ahu at the top of Mauna Kea, the trail leading down to Hilo. It was an old trail for those of Hāmākua, of Kohala and of Waimea to take when going to Hilo. Therefore, preparations were made and the army ascended the Mauna Kea mountain and descended on the upper side of Hilo...(Fornander 1919: Volume IV:224-225)

In his retelling of the Story of 'Umi-a-Līloa (the 16th century ruler of Hawai'i), Kamakau describes the time when 'Umi was mistreated by his in-laws at Hilo, and names a trail and a spring at the summit of Mauna Kea called "Poli'ahu."

As soon as they were released in Hilo, 'Umi and his companions returned to Hamakua and went down to Waipi'o. There he conferred with his chiefs and his father's old war leaders. It was decided to make war on the chiefs of Hilo and to go without delay by way of Mauna Kea. From back of Ka'umana they were to descend to Hilo. It was shorter to go by way of the mountain to the trail of Poli'ahu and Poli'ahu's spring at the top of Mauna Kea, and then down toward Hilo. It was an ancient trail used by those of Hamakua, Kohala, and Waimea to go to Hilo. (Kamakau 1992:16)

Fornander (1919) provides an account of "Famous Men of Early Days (*Po'e Kaulana o ka Wā i Hala*)"; he tells a story of Uma of Pūehuehu, Kohala, who lived in the time of Kamehameha I and has a number of adventures dispatching brigands and muggers as he proceeds from southern Kohala to Kapia to upper Hilo. The account notes that at the time "there was much robbery amongst the people in lonely places (*he nui loa ka pōwā ana o nā kanāka 'oia wā ma nā wahi mehameha*)," and certainly suggests that the trails around the north slope of Maunakea were among such lonely places (Fornander 1919: Volume V:500-501).

W.D. Alexander, Surveyor General, ascended Mauna Kea along the Waimea-Waikī'i trail in 1892. His description of the route is as follows:

A wagon road made by the owners of the Humuula Sheep Ranch leads from Waimea around the western and southern sides of Mauna Kea. On the western side of the mountain it passes through a region which only needs more rainfall to make it a superb grazing country. The ancient forests here, as at Waimea have been nearly exterminated, but a fine grove of mamane trees still survives at the Auwaiakeakua Ranch. The manienie grass is gradually spreading and will in time add immensely to the value of the land. At the half-way station, called Waikīi, water tanks and a rest house have been provided for teamsters.

In 1936, the CCC carried out improvements to the old Mauna Kea-Humu'ula Trail from near the main base of the sheep station at Kalaieha to the summit (Bryan 1938). It was recorded that "the summit road only extended to Hale Pōhaku in 1938" (Bryan 1938:38).

Holly McEldowney's (1982) ethnohistorical report states that guides and informants were often familiar with land features but traveled from landmark to landmark rather than on trails. She notes that access to the mountain in the second half of the 1800s appeared to utilize ranching establishments, such as Humu'ula Sheep Station and Umikoa Ranch; and may not have related to pre-Contact approaches (McEldowney 1982). Many Hawaiian place names were noted to be modern.

The botanical components of the Lei-o-Poli'ahu, including *nohoanu* (native geraniums), *liko* (newly opened leaf), the *mu'o* (leaf bud) of *'ōhi'a*, *pūkiawe* (black eyed Susan) and white *limu* (seaweed), can be found "along the eastern segment of the long trail in the saddle between

Mauna Loa and Mauna Kea that connects Hilo and North Kona” (McDonald and Weissich 2003:72).

8.5 Historic and Cultural Properties

Pōhakuloa, nine archaeological investigations (Table 6 and Figure 19) have been conducted in the vicinity of the project area. The majority of these took place within PTA from the mid-1980s through 2006. Many previous studies have also covered large areas by helicopter survey, which only identifies very large sites. Site types documented at PTA include transportation features (trails and trail markers), occupation sites (lava tubes, blister caves, and overhang shelters), lithic resource sites (e.g., chill glass quarries and workshops), ritual/ceremonial sites (indicated by upright stones), excavated-pit features, historic features (walls, enclosures), and military modifications/impacts.

Mauna Kea, numerous cultural studies have documented a profusion of natural and cultural beliefs, practices, and resources associated with the mountain, resulting in one study calling for the entire Mauna Kea summit down to the 6,000 feet elevation to be classified as a Traditional Cultural Property or TCP (Maly 1998). To date, SHPD has named three places as TCPs, specifically the summit Kūkahau'ula made up of a cluster of cones (Site 21438), Pu'u Līlinoe (Site 21439), and Lake Waiau (Site 21440) (Rosendahl 1999). In addition, the Mauna Kea Adze Quarry, known also as Ke-ana-kāko'i, “the adze-making cave” (Pukui et al. 1974:103), was listed on the National Register of Historic Places in 1969, and the Hawai'i State Register of Historic Places in 1981.

Other *wahi pana* include: Mauna Kea itself, which has several meanings, one being white (*kea*) mountain (*mauna*). It is also known as Mauna a Wākea, the eldest son of Wākea and Papa, ancestors of the Hawaiian race. It is the *piko* of Hawai'i Island, linking the heavens to the land (Maly and Maly 2005: A-3); Pu'u Poli'ahu, named for the snow goddess of Maunakea and literally translated as “Bosom goddess” (Pukui and Elbert 1986); various *heiau* and *ahu*; *ana* and *lua kā ko'i* (caves and quarries used for harvesting stones); *ilina* or burial features, and othes such as trails, shelters and habitation caves. Historical features from the mid-1800s include walls, fence lines and pens, stone and wooden houses, water collection and storage facilities, and other resource collection sites (see Maly and Maly 2005: A-2 to A-4).

In 1997, a *lele* was constructed at Pu'u Kūkahau'ula, which is the summit of Mauna Kea and a place of spiritual worship by Hawaiian cultural practitioners. Translating to “sacrificial altar or stand,” the six-foot-*lele* was constructed by the Royal Order of Kamehameha, “as a place for spiritual ceremonies and as a monument for peace” (Wong 2006:6).

Ahu has been defined as “stone mounds as land markers” and like *heiau*, can also mean “ceremonial sites, shrines, and places where *mele* (chants and offerings were presented)” (Maly and Maly 2005: A-3).

Besides *ahu*, there are shrine sites where the way offerings are placed or rituals held “appear to be intentionally directed away from Mauna Kea,” suggesting astronomical concepts at work (see McCoy 1982). The 22 sites, including an open air shelter and 21 shrine sites, were reported to be between 12,900 to 13,100 feet elevation, implying that these shrines “request for permission to pass over the summit” and that their distribution may relate to “the lower margins

of snow fields” which may well extend to the goddess Poli‘ahu (McCoy 1982: A-37). Heiau have also been specifically built as places to honor deities (Maly and Maly 2005:28-29).

8.6 Burials

The subject of the presence of burials in the Mauna Kea summit region is a topic of considerable disagreement between the scientific, archaeological perspective, on one hand, and Native Hawaiian perspectives, on the other. In short—and the details are presented in full above (see Section 5.2.2), the archaeological evidence until recently was relatively limited concerning confirmed human burials in the summit region. While historical accounts and *mo‘olelo* tell of the presence burials on Mauna Kea (Maly and Maly 2005), archaeological evidence is relatively minimal concerning confirmed human burials in the summit region. Early documentation of archaeological sites in the upper reaches of Mauna Kea was somewhat anecdotal. McEldowney’s summary (1982:A-11) of the ethnographic background of the Mauna Kea summit region notes:

Although most accounts speak in general terms, those that specifically locate the presence of human bones, “graves,” “burial caves” or mortuary features indicate that burials are “not uncommon” between 7,800 ft and 13,000 ft elevation along the northern and eastern slopes of Mauna Kea.

William D. Alexander described a trip up Mauna Kea with a surveying party, and observed ancient graves:

That same afternoon [July 25, 1892] the surveyors occupied the summit of Lilinoe, a high rocky crater, a mile southeast of the central hills [the “summit”] and a little over 13,000 feet in elevation. Here, as at other places on the plateau, ancient graves are to be found. In olden times it was a common practice of the natives in the surrounding region to carry up the bones of their deceased relatives to the summit plateau for burial. (cited in McCoy 1999)

Prior to 2005, archaeological authorities on Mauna Kea, including Pat McCoy, had documented only one confirmed burial site (with multiple burials) and four possible burial sites in the summit region (McCoy 1991). Pu‘u Mākanaka is the only documented place in the uplands of Mauna Kea in which human remains have been confirmed—although McCoy makes reference to “the well-known burial center at Kanakaleonui” and also to “a small group of cairns on the eastern rim of Pu‘u Waiiau that are also believed to be burials” (McCoy 1999).

However, McCoy (1999:28) also comments:

There is good reason to expect that more burials are to be found in the Science Reserve on the tops of cinder cones, either in cairns or in a small rockshelter or overhang. The basis of this prediction is that all of the known and suspected burial sites on the summit plateau are located on the tops of cinder cones and, more particularly, on the southern and eastern sides. No burials have been found on the sides or at the base of a cone, or on a ridgetop amongst any of the shrines. There in fact appears to be a clear separation between burial locations and shrine locations.

His predictions have been accurate: current in-progress work by McCoy and Nees has documented 28 sites designated as burials and possible burials (McCoy et al. 2008).

Past ethnographic studies about Mauna Kea have noted the presence of burials:

Maly's 1999 archival study included a reference in border testimony to burials within Ka'ohē Ahupua'a:

[Pu'uokihi] it belongs to Kaohe and above that is where people were buried in old times, when people used to make fishhooks from the bones. [Testimony of Kahue, 1880, BCB, Hawai'i, B:444] (Maly 1999:D-4).

When asked about his knowledge of burials and burial practices on Maunakea, *'anakala* Reynolds mentioned:

The forty to fifty acres where they're going to build, it needs to be really blessed. The four corners of the place needs to be blessed because they're walking on possibly one of the most sacred part of the land. They're facing/building there that's going to be structured above of an open tomb. It's a big tomb there. It's a huge tomb about 35 acres. It's structured like a diamond shape. I'm not too sure how these things works out by 35 acres but it's a diamond shaped tomb that's been there and we have to realize as cultural practitioners if they are to build on that place. It has to be four sided blessed because it will go like this. The land will shift shape because of the weight. That's why they were reminded not to build on it. Because of what that area is it holds that sacredness. So we have to bless the four corners of this diamond. However that land is made, the diamond has to be placed on there and wherever that diamond is, they need to go there and bless that area with others. You cannot put it until this thing is done like the high priest, a *kahuna*. A *kahuna* steps on the land, a *kahuna* calls and allows this to be done. It's the only way it doesn't shift shape. It'll shift shape and all of a sudden the ground starts going down. It's in the area that the recommendation is that the four corners be blessed.

Mr. Bertlemann, another CIA participant, confirms that there are many burials in this area of Ka'ohē Ahupua'a.

8.7 Wahi Pana and Mo'olelo

Ka'ohē Ahupua'a is bounded by similar vast *ahupua'a* and districts such as Humu'ula, North Kohala, South Kohala, Keauhou, and Ka'ū. Each of these *wao* were noted resources extending from the sea to the forest lands, and in some instances, to the summits of the mountains. It was these resources that sustained Hawaiian life, culture and spirituality (Maly, 2005). In Hawai'i the very landscape is legendary (*wahi pana*). The project area is associated with a wealth of *mo'olelo* and *mele* about its sacred cultural landscape.

In 1875, Curtis J. Lyons, son of Reverend Lorenzo Lyons, of Waimea and one of the foremost surveyors of the Hawaiian Kingdom, authored a paper on "Hawaiian Land Matters" (Lyons, 1875). In his discussion, he provided readers important references to the rights of native tenants

on the *ahupua'a* of Humu'ula and Ka'ohē. He also discusses their relationship with neighboring mountain lands such as Pi'ihonua, which is situated on the slopes of Mauna Kea:

The ordinary ahupuaa extends from half a mile to a mile into this [forest] belt. Then there are larger ahupuaas which are wider in the open country than others, and on entering the woods expand laterally so as to cut off all the smaller ones, and extend toward the mountain till they emerge to the open interior country; not however to converge to a point at the tops of the respective mountains. Only a rare few reach those elevations, sweeping past the upper ends of all the others, and by virtue of some privilege in bird-catching or some analogous right, taking the whole mountain to themselves...The whole main body of Mauna Kea belongs to one land from Hamakua, viz., Kahoē, to whose owners belonged the sole privilege of capturing the ua'u, a mountain-inhabiting but sea-fishing bird. High up on its eastern flank, however, stretched the already mentioned land of Humu'ula, whose upper limits coincide with those of the mamane, a valuable mountain acacia, and which starting from the shore near Laupahoehoe, extends across the upper ends of all other Hilo lands to the crater of Mokuaweoweo...[Lyons, 1875: 111].

In native lore, Mauna Kea is known as Mauna a Wākea (The Mountain of Wākea), “the first-born mountain son of Wākea and Papa, who were also the progenitors of the Hawaiian race” (Maly and Maly 2005: A-3). It is also the dwelling of snow goddess Poli'ahu who is the rival of Pele (the fire goddess) and the residence of other deities such as Līlinoe and Kūkahau'ula. The mountain represents the *piko* of the Hawai'i Island and is the link of the land to the heavens (Maly and Maly 2005: A-3). Located near the summit at 13,020 feet, Lake Waiau is named after Waiau, the mountain goddess who is one of the attendants to Poli'ahu, said to bathe in its cooling waters. The name “Waiau” translates to “swirling water,” and it is guarded by the powerful *mo'o* Mo'oinanea. Contributors to this CIA such as 'anakala Reynolds emphasized the *mana* (power) of Mauna Kea and its *kapu* space, with Mr. Bertlemann stressing its sacredness.

There is also a wealth of *ōlelo no'eau* describing the ethereal qualities of Maunakea. Two examples are “*Mauna Kea, kuahiwi ku ha'o i ka mālie* (Mauna Kea, standing alone in the calm)” and “*Poli'ahu, ka wahine kapa hau anu o Mauna Kea* (Poli'ahu, the woman who wears the snow mantle of Mauna Kea)” (Pukui 1983:234, 294).

The terrain of the mountain, including the many *pu'u*, is also the subject of traditions and stories. It is said that Pu'u o Kūkahau'ula, the summit cluster of cones named for a form of the god Kū, is where people took the *piko* of their newborn children “to insure long life and safety,” a tradition that is still ongoing (Maly and Maly 2005: A-3). Lake Waiau is also another place where the *piko* of newborns were placed, and from where some people collected the sacred water of Kāne or “*ka wai kapu o Kāne*” for its healing powers (Maly and Maly 2005: A-3).

Pu'u were also named for goddesses, such as Pu'u Poli'ahu, Pu'u Līlinoe, and Pu'u Waiau. Accounts of burials placed in *pu'u* such as Pu'u Mākanaka are also reported (McCoy et al. 2008). In addition, ceremonies that mark life's rites of passage take place in the numerous *heiau* and *ahu* which also double as navigational markers. There are also stories connected to important

heiau like the four sites that 'Umi-a- Līloa constructed to honor Halulu, the god who provided his power (Maly and Maly 2005:28-29).

Community participant, Mr. Bertleemann, talks about the deities and meanings of the *mele*'s he has composed relating to Mauna Kea and Mauna Loa:

I think back in October, September/October I wrote two *mele* actually, in fact, one about Mauna Kea and one about Mauna Loa. And it speaks of, the Mauna Kea one speaks of the deities that dwell on the mountain. Poli'ahu, Līlīnoe, Ka Houpo o Kāne, then Mo'oinanea, Kūkahau'ula, Pōhakuloa, and Wākea. I know as far as Poli'ahu, I know she only dwells on Mauna Kea. Līlīnoe and Mo'oinanea travel.

'Anakala Reynolds shares about the female deities:

The different realms, the realm *kanaka*, the realm *akua*, the relationships with the different gods that whole dynamic of Wākea, Pōhakuloa, Kūkahau'ula, Mo'oinanea, Līlīnoe. The females are very important up there. The females are important because they were first. The first in our genealogy in our presence, the first is the actual.

According to 'anakala Reynolds, ceremonies observing the winter and summer solstices and the equinoxes which he practices on Mauna Kea is sacred:

On top of the mountain we'll cover number one because my lineage goes back to being a high priests. The top of the mountain of Maunakea is perhaps the most sacred part, Maunakea or Mauna A Wākea is the most sacred part in the whole entire world with every single being. So my work up there is to 1) to make the connection to all the families and culturally practice what is necessary to connect myself and others to the universe and to the star families. Of course, the top of Maunakea which is but the top of the summit of Maunakea is where I feel the essence is of a deity. The presence of that one is what they call Christ presence. I've seen the light at Subaru area I've done the forgiveness work for Subaru. I have done several, several events done at the Solstice and the spring and the winter Equinox at Maunakea summit. I've done several, several ceremonies at Kilohana. My relationship to Maunakea and all of that land as a result of this work here is that it is very sacred, the presence, I've seen Poli'ahu and I've Līlīnoe. I've seen that presence. I had the opportunity to be supported by Poli'ahu and Līlīnoe with many, many of my activities and know that I've done so much work there at Maunakea. I've been one of the *kahu* for the Kahu Ka Mauna advisory board when they first originated, served that so I was on that. I still continue to do ceremonies relating to Maunakea and anything to do with what's there is what I see and have vision of. I can see all that in there. Also whatever has to be done I have knowledge of that especially with the ten millimeter, the TMT. Anything to do with that portion, coming down, enclosed the military camp and other places in the area I have knowledge of because I can see what's there.

Trails and springs can also be named after deities, such as the story of 'Umi-a-Līloa (the 16th century ruler of Hawai'i) when 'Umi was mistreated by his in-laws at Hilo, and names a trail and a spring at the summit of Maunakea called "Poli'ahu." According to Kamakau, "It was an ancient trail used by those of Hamakua, Kohala, and Waimea to go to Hilo" (Kamakau 1992:16).

DRAFT

Section 9 Summary and Recommendations

9.1 Results of Background Research

Background research conducted for this proposed project yields the following results:

1. The proposed project area is located adjacent to Mauna Kea State Recreation Area (SRA) in the Saddle Region of the island of Hawai'i at the southern base of Mauna Kea. Elevation at the study area for this project is located at approximately 6,500 feet above sea level (amsl). The climate at the proposed project area is relatively cool and dry by Hawaiian standards; mean annual temperatures range from approximately 50–60°F and minimum temperatures in the winter months regularly plunge into the 30s. It receives between 20 and 30 inches of rain annually and experienced average annual soil temperatures between 50 and 53 degrees Fahrenheit (Sato et al. 1973:37). The surrounding area lacks permanent stream drainages but small amounts of fresh water may be available in the form of springs from surrounding gulches, pools in lava tubes and other subterranean features.
2. Situated at the base of Mauna Kea, the proposed project area is part of a vast area known in Hawaiian traditions as *'Āina Mauna* (mountain land). This area is associated with many important historical figures in Hawai'i including the high chief 'Umi and Kamehameha I. Into the nineteenth century, the Saddle Region remained mostly Crown lands. Cattle, sheep and goats, originally introduced by Vancouver, were let loose to roam the Interior Plateau. Hunting of these feral ungulates was common (Bergin 2004:22-23).
3. The natural vegetation of the proposed project area consists of *māmane* (*Sophora chrysophylla*), mountain *pili* (*Heteropogon contortus*), *'āweoweo* (*Chenopodium oahuense*, same as *'āheahea*), *naiio* (*Myoporum sandwicense*), golden crown beard, and lambsquarters. The entire project area is comprised of Ke'eke'e loamy sand (KTB), 0 to 6% slopes (Sato et al. 1973). There are also small areas that have loose stones on the surface these areas tend to be at the mouths of drainages where coarse material accumulates. Permeability is rapid, runoff is slow, and the hazard of soil blowing is moderate to severe. Roots can penetrate up to a depth of three feet or more (Sato et al. 1973).
4. Located in the *moku* (district) of Hāmākua, Ka'ohē Ahupua'a is a vast regional land division *mauka* to *makai* that includes the summit of Mauna Kea and land westward to the summit of Mauna Loa and smaller *ahupua'a* such as Waipunalei, Laupāhoehoe, Kapehu, Welokā, and Maulua nui, which adjoin them on the lower mountain slopes, including a wide range of named environmental zones (*wao*). Ka'ohē Ahupua'a is bounded by similar vast *ahupua'a* and districts such as Humu'ula, North Kohala, South Kohala, Keauhou, and Ka'ū. Each of these *wao* are noted resources extending from the sea to the forest lands, and in some instances, to the summits of the mountains. It was these resources that sustained Hawaiian life,

- culture and spirituality (Maly, 2005). In Hawai'i the very landscape is legendary (*wahi pana*).
5. The *ahupua'a* of Ka'ohe was government land on which four native claims were made following the Māhele in 1848. Only one *kuleana* claim was awarded in the entire *ahupua'a*. The single awarded claim indicates coffee, arrowroot, banana, and taro were all cultivated in the lands of Ka'ohe. Ka'ohe was also known as a habitat for *uwa'u*, or *'ua'u* (dark-rumped petrel) seabirds that reside in rocky, dry, elevated areas (Foster 1893).
 6. Ka'ohe Ahupua'a is rich in *mo'olelo* (legends), *mele* (songs), *oli* (chants), and *'olelo no'eau* (proverbs, poetical sayings) associated with *akua* (God, male and female deities, spirits) and legendary places (*wahi pana*). Poli'ahu, the snow goddess, and Pele, the volcano goddess, engaged in legendary battles to control Mauna Kea. Pele also had legendary battles with the pig demi-god Kamapua'a on the summit of Mauna Kea. Numerous stories of Wākea and Papa, Poli'ahu, Pōhakuloa, Līlīnoe, Waiau, Kūkahau'ula and Mo'oinanea, to name a few, are written into the landscape.
 7. Mauna Kea is a sacred cultural landscape; symbolic of Wākea (the 'Sky Father' to all Hawaiians), home of Poli'ahu, the goddess of snow and foe of Pele (the fire goddess), and of many other resident deities and supernatural entities (e.g., Līlīnoe, Kūkahau'ula and Mo'oinanea) and the *piko* (umbilical cord) of the island-child, Hawai'i which connects the land to the heavens (Maly and Maly 2005:v); home of Waiau, the highest permanent lake in the Hawaiian Islands; location of the highest and most extensive basalt quarry in all of Polynesia and perhaps the entire world; and numerous trails, *ahu* (stone markers), *heiau* (temple, place of worship) and cinder cone *pu'u* (hill).
 8. While historic accounts and *mo'olelo* tell of the presence of burials on Mauna Kea (Maly and Maly 2005), archaeological evidence until recently, was relatively limited concerning confirmed human burials in the summit region. Prior to 2005, archaeological authorities on Mauna Kea, including Pat McCoy, had documented only one confirmed burial site (with multiple burials) and four possible burial sites in the summit region (McCoy 1991). All of these sites are located on Pu'u Mākanaka. In progress work by McCoy and Nees however, has documented 28 sites designated as burials and possible burials (McCoy et al. 2008).
 9. The Mauna Kea Adze Quarry, also known as Ke-ana-kāko'i, "the adze-making cave" (Pukui et al. 1974:103), is located on the southern slopes of the mountain, at elevations up to 12,400 feet. The site was listed on the National Register of Historic Places in 1969, and the Hawai'i State Register of Historic Places in 1981.
 10. Past studies identify Traditional Cultural Properties (TCPs) on Mauna Kea. Figure 16 shows the three places that have been identified by the SHPD as TCPs and documented in a study done by PHRI (1999) are: (1) Kūkahau'ula, the summit (Site 21438), (2) Līlīnoe (Site 21439) and (3) Lake Waiau (Site 21440). Other traditional places may also qualify. Maly (1998:29) has suggested the entire Mauna Kea summit region down to the 6,000 foot elevation contour be designated a TCP.

9.2 Results of Community Consultation

CSH attempted to contact twenty-two community members (government agency or community organization representatives, or individuals such as cultural and lineal descendants, and cultural practitioners) for the purposes of this CIA. Eight people responded and two *kūpuna* (elders) and/or *kama'āina* (native born) were interviewed for more in-depth contributions. The results of cultural consultations indicate that there are major concerns (and several ancillary ones) regarding potential adverse impacts on cultural and natural resources and associated beliefs and practices as result of the proposed Saddle Road Maintenance Base Yard:

1. Participants expressed their concern with the destruction to the *'āina* and the native plants that grow nowhere else in the world.
2. Participants discussed the association of Mauna Kea to its cultural and spiritual links in *mo'olelo*, *wahi pana*, *mele* and poetical sayings as well as *ōlelo no'eau*.
3. *Kupuna*, *'anakala* Reynolds recommends in the construction, assemble a place for Hawaiian cultural practitioners to practice and perpetuate their culture. For example, an outside *hale* similar to a small pavilion, an open area where cultural practitioners are able to gather, practice and share. *'Anakala* Reynolds states, "Knowing what this area is so that we can perpetuate the culture, this is the culture. This is the key, when they construct, they develop it up and they're perpetuating the culture by giving us a place by providing us a site so we can do our culture so that we can teach the culture."
4. All of the community members interviewed for this study stress that Mauna Kea is a sacred landscape and that any future development activities on/vicinity of the mountain proceed with greater awareness of, and the utmost respect for Hawaiian culture, Hawaiians' spiritual connection to the mountain, and the sanctity of Mauna Kea.

9.3 Recommendations

The findings of this CIA indicate that there is a wealth of Native Hawaiian cultural resources, beliefs and on-going practices associated with Ka'ohē Ahupua'a and the proposed project area. The results of this CIA present a number of possible mitigation measures for the landowner/developer's consideration. The following recommendations are offered as a way to begin to address some of the concerns expressed in Section 7.

1. Construction consideration to the natural resources within the proposed project area.
2. If at any time during construction subsurface features (including lava tubes) or deposits are encountered, CSH recommends that construction activities cease and that SHPD be contacted immediately.
3. CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures." The construction of the DOT Base Yard will involve ground disturbing activities that may include the partial or complete destruction and/or removal of all of

the historic properties identified within the project area. The recommended mitigation measures will reduce the project's potential adverse effect on these significant historic properties.

DRAFT

Section 10 References Cited

Abbott, Isabella A.

1992 1992 *Lā'au Hawai'i, Traditional Hawaiian Uses of Plants*. Bishop Museum Press, Honolulu.

Alexander, William D.

1892 The Ascent of Mauna Kea, Hawaii. *The Hawaiian Gazette* 27:7.

Allen, Melinda S.

1981 *An Analysis of the Mauna Kea Adze Quarry Archaeobotanical Assemblage*. M.A. Thesis, University of Hawai'i-Mānoa, Honolulu.

Athens, J. Stephen and Michael W. Kaschko

1989 *Prehistoric Upland Bird Hunters: Archaeological Inventory Survey and Testing for the MPRC Project Area and the Bobcat Trail Road, Pohakuloa Training Area, Island of Hawai'i*. Prepared for the US Army Engineer District, Pacific Ocean Division by International Archaeological Research Institute, Inc., Honolulu, Hawai'i.

Bayman, James, Jadelyn Moniz Nakamura, Timothy Rieth, and Christine Paraso

2004 "Stone Adze Production and Resource Extraction at Pōhakuloa, Hawai'i Island." *Hawaiian Archaeology* 9:83 – 104.

Beckwith, Martha W. (editor)

1932 *Kepelino's Traditions of Hawaii*. Bernice P. Bishop Museum Bulletin 95, Bishop Museum Press, Honolulu, Hawai'i.

Beckwith, M.

1970 *Hawaiian Mythology*. University of Hawai'i Press, Honolulu.

Bergin, B.

2004 *Loyal to the land: The Legendary Parker Ranch, 750-1950*. University of Hawai'i Press, Honolulu.

Bernard, Russell H.

2006 *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. Fourth Edition. AltaMira Press, Walnut Creek, California.

Bird, Isabella

1964 *Six Months in the Sandwich Islands*. The University of Hawai'i Press, Honolulu, Hawai'i.

Bowser, George

1880 "An Account of the Sugar Plantations and the Principal Stock Ranches on the Hawaiian Islands." *The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide* 1880-1881:401-432. George Bowser & Co., Honolulu.

Brigham, William T.

1909 *Kilauea and Mauna Loa, Volcanoes on the Island of Hawaii*. Memoirs of the Bernice Pauahi Bishop Museum, vol. II, Bishop Museum Press, Honolulu.

Brundage, Lucille

1971 *Aldred W. Carter: Hawai'i Dean of Cattlemen and Notes on Hawaiian Livestock.* Cathay Press Ltd., Hong Kong.

Bryan, Lester W.

1937 "Wild Cattle in Hawaii." *Paradise of the Pacific*, September, Vol. 40:9.

1938 Mauna Kea. *Paradise of the Pacific*. February 1938.

Cleghorn, Paul

1982 *The Mauna Kea Adz Quarry: Technological Analyses and Experimental Tests.* Ph.D. Dissertation, Dept. of Anthropology, University of Hawai'i-Mānoa.

Cordy, Ross

1994 *A Regional Synthesis of Hamakua District: Island of Hawai'i.* Prepared by the Historic Preservation Division Department of Land and Natural Resources, Honolulu, Hawai'i.

2000 *Exalted Sits the Chief. The Ancient History of Hawai'i Island.* Mutual Publishing, Honolulu, Hawai'i.

Desilets, Michael, Alice K. S. Roberts, Amy Buffum and Stephen J. Roberts

2005 *Phase I Archaeological Reconnaissance Survey for SBCT Go/No Go Maneuver Areas at U.S. Army Pohakuloa Training Area, Ka'ohē Ahupua'a, Hamakua District and Pu'uanahulu Ahupua'a, North Kona District, Island of Hawai'i, Hawai'i, (TMKs 3-4-4-16:01 and 3-7-1-04:07).* Prepared for U.S. Army Engineer District, Fort Shafter, Hawai'i, by Garcia and Associates, Kailua, Hawai'i.

Dye, Thomas S.

2005 *Cultural Impacts Assessment, Big Island Country Club, Pu'uanahulu, North Kona, Hawai'i (TMK:(3)7-1-05:various).* T.S. Dye and Colleagues, Archaeologists, Inc., Honolulu, Hawai'i.

Ellis, William

1963 *Journal of William Ellis.* Advertiser Publishing Company, Ltd. Honolulu.

Emory, Kenneth P.

1938 The Adze Makers of Mauna Kea. *Paradise of the Pacific* 50 (4):21-22.

Fornander, Abram

1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore (Volume IV: 160-173) "The Legend of Kila (*He Kaa no Kila*)" Bishop Museum Press Honolulu.

1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore (Volume IV: 178-235) "Story of 'Umi: One of the Most Noted of Hawaiian Kings (*He Mo'olelo no 'Umi: Kekāhi Ali 'i Kaulana o ko Hawai'i Nei Pae 'āina*)."

1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore Volume V: 78-135) "Legend of Kūapāka'a (*He Ka'ao no Kūapāka'a*)."

1919 1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore; Volume V: 314-363) "Tradition of Kamapua'a (*Ka'ao no Kamapua'a*).

- 1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore; Volume V: 486-503) "Famous Men of Early Days (*Po'e Kaulana o ka Wā i Hala*).
- 1919 Fornander Collection of Hawaiian Antiquities and Folk-Lore; Volume V: 522-527 The Flood in Hawaii in the Olden Times (*No Ke Kaiakahinali'i Ma Hawaii Nei*)."
- 1996 *Ancient History of the Hawaiian People to the Time of Kamehameha I*. Mutual Publishing, Honolulu, Hawai'i.
- Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens**
- 1972 *Soil Survey of the Islands of Kaua'i, O'ahu, Maui, Moloka'i and Lāna'i, State of Hawai'i*. U.S. Department of Agriculture, U.S. Government Printing Office, Washington, D.C.
- Foster, Dennis L.**
- 2010 Destinations 2 go website: <http://destination2go.com/kaohē.htm>
- Foster, William**
- 1893 Reports of Decisions Rendered by the Court of the Hawaiian Islands: Criminal, Divorce, Equity, Law, Probate. September, 1889, to December, 1892, Inclusive. Vol. III. Compiled by William Foster. Hawaiian Gazette Co., Honolulu.
- Gazlay's Pacific Monthly**
- 1865 *Cattle – Hunting On Hawaii*. Volume I, No. 4. David M. Gazlay & Co., Printers and Publishers, New York.
- Giffen, Jon G.**
- 2009 *Pu'u Wa'awa'a Biological Assessment, Pu'u Wa'awa'a, North Kona, Hawai'i*. Department of Land and Natural Resources, Division of Forestry and Wildlife, Division of State Parks, Hawai'i.
- Google**
- 1998 *Google Earth*. Electronic satellite imagery, maps, and terrain, <http://www.google.com/earth/index.html>.
- Hammatt, Hallett H.**
- 2009a *Archaeological Assessment for the Thirty-Meter-Telescope (TMT) Project, Mauna Kea, Ka'ohē Ahupua'a, Hāmākua District, Hawai'i Island, TMK: [3] 4-4-015:009 por.* Cultural Surveys Hawai'i, Kailua, Hawai'i.
- 2009b *Archaeological Assessment for the Thirty-Meter-Telescope (TMT) Project Ancillary Facilities, Hale Pōhaku Area, Mauna Kea, Ka'ohē Ahupua'a, Hāmākua District, Hawai'i Island, TMK: [3] 4-4-015:001 por., 012 por.* Cultural Surveys Hawai'i, Kailua, Hawai'i.
- Hammatt, Hallett H., and Douglas Borthwick**
- 1988 *Archaeological Reconnaissance of Two Proposed Antenna Sites for The National Radio Astronomy Observatory, Mauna Kea, Hawai'i*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

Hammatt, Hallett H., and David W. Shideler

- 1991 *Archaeological Assessment and Sensitivity Map of the Pohakuloa Training Area (PTA), Hawai'i Island*. Prepared for Richard Sato and Associates by Cultural Surveys Hawai'i, Inc., Kailua, Hawai'i.

Hammatt, Hallett H., and David W. Shideler

- 2001 *Archaeological Inventory Survey for the proposed Pohakuloa Training Area Base Camp Master Plan and Bradshaw Army Airfield Improvements* Prepared for Townscape, Inc.
- 2002 *Data Recovery Report for Two Archaeological Lithic Scatters, Sites 50-10-23 - 10,310 and 50-10-23-10,311 at the Pu'u Kalepeamoia Complex, Hale Pōhaku, Ka'ōhe Ahupua'a, Mauna Kea, Hawai'i Island (TMK 4-4-15:12)*. Cultural Surveys Hawai'i, Kailua, Hawai'i.

Handy, E. S. C., E. G. Handy with Mary Kawena Pukui

- 1972 *Native Planters in Old Hawaii, Their Life, Lore, and Environment*. Bishop Museum Bulletin 233. Bishop Museum Press.

Henke, L. A.

- 1929 *A Survey of Livestock in Hawaii*. University of Hawai'i Research Publication No. 65, University of Hawai'i.

Henshaw, Henry W.

- 1902 *Birds Of The Hawaiian Islands: Being A Complete List Of The Birds Of The Hawaiian Possessions*. Thos. G. Thrum, Honolulu, Hawai'i.

Hitchcock, Charles H.

- 1911 *Hawaii and its Volcanoes*. The Hawaiian Gazette, Co., Honolulu.

Juvik, Sonia P., and James O. Juvik

- 1998 *Atlas of Hawai'i*, 3rd edition. University of Hawai'i Press, Honolulu.

Ka'āhele Hawai'i

- 1999 *Ka Mo'omeheu o Hawai'i, Hawaiian Culture*. Poliahu, Goddess of Mauna Kea. http://www.kaahelehawaii.com/pages/culture_Poliahu.htm.

Kalākaua, David

- 1888 *Legends and Myths of Hawaii, The Fables and Folk-lore of a Strange People*. (With Glen Grant). Mutual Publishing, Honolulu.

Kamakau, Samuel M.

- 1961 *Ruling Chiefs of Hawaii*. Kamehameha Schools Press, Honolulu, Hawai'i.
- 1992 *Ruling Chiefs of Hawaii (Revised Edition)*. Originally published in 1961. Kamehameha Schools Press, Honolulu, Hawai'i.

Kanahele, Pualani K. and Edward L. H. Kanahele

- 1997 *A Social Impact Assessment Indigenous Hawaiian Cultural Values of the Proposed Saddle Road Alignments*. Hilo, Hawai'i.

Kilmartin, Jerome O.

1974 Na Mea O Mauna Kea (Things About Mauna Kea). *Explorers Journal* 52 (1):12-16.

Kimura, Larry

2009 *Why is Maunakea spelled as on word?* Ka Wai Ola Newspaper, November, 2008. Vol. 25 No. 11, Office of Hawaiian Affairs, Honolulu.

Kirch, Patrick V.

1985 *Feathered Gods and Fishhooks, An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawai'i Press, Honolulu.

Kuykendall, R. S.

1968 *The Hawaiian Kingdom: 1778-1854, Foundation and Transformation Vol. I*. The University Press of Hawaii, Honolulu.

Landgraf, Kapulani

2003 *Nā Wahi Kapu o Maui*. 'Ai Pōhaku Press, Honolulu.

Langlas, Charles

1999 Archaeological, Historical and Traditional Cultural Property Assessment for the Hawai'i Defense Access Road A-AD-6(1) and Saddle Road (SR200) Project.

Lyons, C. J.

1875 Land Matters in Hawaii. *The Islander* 1(19):111.

Macdonald, Gordon A., Agatin T. Abbott and Frank L. Peterson

1983 *Volcanoes in the Sea*. 2nd edition. University of Hawai'i Press, Honolulu.

Malo, David

1951 *Hawaiian Antiquities*. Bernice P. Bishop Museum Special Publication 2 (2nd edition), Bishop Museum Press, Honolulu, Hawai'i.

Maly, Kepā

1998 *Mauna Kea – Kuahiwi Ku Ha'o i ka Malie, A Report on Archival and Historical Documentary Research, Ahupua'a of Humu'ula, Ka'ohe, Districts of Hilo and Hamakua, Island of Hawai'i*. Kumu Pono Associates and Native Lands Institute.

1999 *Mauna Kea Science Reserve and Hale Pōhaku Complex Development Plan Update: Oral History and Consultation Study, and Archival Literature Research, Ahupua'a of Ka'ohe (Hāmākua District) and Humu'ula (Hilo District), Island of Hawai'i*. Kumu Pono Associates.

2004 *"Humu'ula a me Pi'ihonua: he mau 'Āina Lei Ali'i ma ka 'Āina Mauna o Hawai'i; Humu'ula and Pi'ihonua" (Lands that Adorn the Chiefs on the Mountain Lands of Hawai'i): A Collection of Native Traditions, Historical Accounts, and Oral History Interviews*. Kumu Pono Associates, Hilo, Hawai'i.

Maly, Kepā and Onaona Maly

2002 *"He Wahi Mo'olelo no ka 'Āina a me nā 'Ohana o Waiki'i ma Waikōloa (Kalana o Waimea, Kohala), a me ka 'Āina Mauna" (A Collection of Traditions and Historical Accounts of the Lands and Families of Waiki'i at Waikōloa [Waimea*

- Region, South Kohala], and the Mountain Lands, Island of Hawai'i).* Kumu Pono Associates, Hilo, Hawai'i.
- 2004 *He Mo'olelo 'Āina: A Cultural Study of the Pu'u Maka'ala Natural Area Reserve Districts of Hilo and Puna, Island of Hawai'i.* Prepared for Lisa Hadway, Natural Area Specialist, Department of Land and Natural Resources-Natural Area Reserves by Kumu Pono Associates, Hilo, Hawai'i.
- 2005 "Mauna Kea-Ka Piko Kaulana O Ka 'Āina" (*Mauna Kea-The Famous Summit Of The Land*). *A Collection of Native Traditions, Historical Accounts, and Oral History Interviews for: Mauna Kea, the Lands of Ka'ohē, Humu'ula and the 'Āina Mauna on the Island of Hawai'i.* Prepared for The Office of Mauna Kea Management (University of Hawai'i-Hilo) by Kumu Pono Associates, Hilo, Hawai'i.

Mays, Nicholas, and Catherine Pope

- 1995 Rigour and qualitative research. *British Medical Journal* 311:109–112.

McCoy, Patrick

- 1976 The Mauna Kea Quarry Project: A First Analysis. *Proceedings of the First Conference in Natural Sciences* (Hawaii Volcanoes National Park), pp. 135-142.
- 1977a "Archaeological Investigations at the Mauna Kea Adz Quarry Complex, Hawaii: Preliminary Results of the 1975-76 Fieldwork." Paper presented at the 42nd Annual Meeting of the Society for American Archaeology, New Orleans.
- 1977b The Mauna Kea Adz Quarry Project: A Summary of the 1975 Field Investigations. *Journal of the Polynesian Society* 86 (2):233-244.
- 1978 "The B.P. Bishop Museum Mauna Kea Adze Quarry Project." Ms. in Dept. Anthropology, Bishop Museum, Honolulu.
- 1981 "Stones for the Gods: Ritualism in the Mauna Kea Adz Quarry Industry, Hawaii." Paper presented at the 46th Annual Meeting for the Society for American Archaeology, San Diego.
- 1982 *Archaeological Reconnaissance Survey in Cultural Resources, Reconnaissance of the Mauna Kea Summit Region.* Prepared for Group 70, Dept. of Anthropology, Bishop Museum, Honolulu.
- 1984a *Mauna Kea Summit Region Survey: A Summary of the 1984 Fieldwork.* Bishop Museum Manuscript on File at the State Historic Preservation Division, Kapolei, Hawai'i.
- 1984b *Archaeological Reconnaissance of Hopukani, Waihu and Liloe Springs, Mauna Kea, Hawai'i.* Dept. of Anthropology, Bishop Museum, Honolulu.
- 1985 *Preliminary Archaeological Survey of the Pu'u Kalepeamoā Site, Mauna Kea, Hawaii.* Prepared for MCM Planning, Dept. of Anthropology, Bishop Museum, Honolulu.
- 1986 *Archaeological Investigations in the Hopukani, and Liloe Springs Area of the Mauna Kea Adze Quarry, Hawai'i: A Data Summary Report.* Mountain Archaeology Research Corporation and Bishop Museum, Honolulu.

- 1990 "Subsistence in a 'Non-Subsistence' Environment: Factors of Production in a Hawaiian Alpine Desert Adze Quarry," in Papers from a Symposium at the XV Pacific Science Congress, Dunedin, New Zealand 1983, edited by D. E. Yen and J.M.J. Nummery, ANU, Canberra.
- 1991 *Survey and Test Excavations of the Pu'u Kalepeamoia Site, Mauna Kea, Hawai'i*. Mountain Archaeology Research Corporation Report for IJH Manoa Facilities Planning and Management Office.
- 1999 Hawaiian Archaeology: Neither Here Nor There: A Rite of Passage Site on the Eastern Fringes of the Mauna Kea Adze Quarry. *Hawaii Hawaiian Archaeology* Volume 7, Society for Hawaiian Archaeology, Honolulu.
- McCoy, Patrick, Sara Collins, and Steve Clark**
- 2008 *Preliminary Draft Report: Cultural Resource Management Plan for the University of Hawai'i Management Areas on Mauna Kea, Ka'ohē Hamakua, Island of Hawai'i TMK (3) 4-4-012, 015*. Pacific Island Consulting Services, Inc, Honolulu.
- McDonald, Gordon A., Agatin T. Abbott and Frank L. Peterson**
- 1983 *Volcanoes in the Sea: The Geology of Hawaii*. University of Hawai'i Press, Honolulu. Second Edition.
- McEldowney, P. Holly**
- 1982 *Ethnographic Background of the Mauna Kea Summit Region in Cultural Resources Reconnaissance of the Mauna Kea Summit Region*. Prepared for Group 70, Dept. of Anthropology, Bishop Museum, Honolulu.
- McDonald, Marie A. and Paul R. Weissich**
- 2003 *Nā Lei Makamae*. University of Hawai'i Press, Honolulu.
- Meyer, Manulani Aluli**
- 2004 *Ho'oulu: our time of becoming: Hawaiian epistemology and early writings*. 'Ai Pōhaku Press, Native Books, Honolulu, Hawai'i. First edition 2003; Second printing 2004.
- Nā Maka o ka 'Āina**
- 2008 Burials on Mauna Kea. http://www.mauna-awakea.info/maunakea/F4_burials.html.
- McCoy, Patrick C.**
- 1984 *Archaeological Reconnaissance of Hopukani, Waihu, and Liloē Springs, Mauna Kea, Hawai'i*, Ms. 102584. Department of Anthropology, Bishop Museum Press, Honolulu, Hawai'i.
- 1999 Hawaiian Archaeology: Neither Here Nor There: A Rite of Passage Site on the Eastern Fringes of the Mauna Kea Adze Quarry. *Hawaii Hawaiian Archaeology* Volume 7, Society for Hawaiian Archaeology, Honolulu.
- McCoy, Patrick, Sara Collins and Steve Clark**
- 2008 *Preliminary Draft Report: Cultural Resource Management Plan for the University of Hawai'i Management Areas on Mauna Kea, Ka'ohē Hamakua,*

Island of Hawai'i TMK (3) 4-4-012, 015. Pacific Island Consulting Services, Inc, Honolulu.

McEldowney, Holly

1982 *Ethnographic Background of the Mauna Kea Summit Region in Cultural Resources Reconnaissance of the Mauna Kea Summit Region.* Prepared for Group 70, Dept. of Anthropology, Bishop Museum, Honolulu.

Nā Maka O Ka 'Āina

2008 2008 Burials on Mauna Kea.
http://www.mauna-a-wakea.info/maunakea/F4_burials.html.

Nēnē News

1996 *Ah Fat Lee Father Goose.* Volume 1, Issue 2. Published by Nēnē O Moloka'i, Kaunakakai, Hawai'i.

Pukui, Mary K., Samuel H. Elbert, and Esther Mookini

1974 *Place Names of Hawai'i.* University of Hawai'i Press, Honolulu.

Pukui, Mary Kawena

1983 *'Ōlelo No'eau: Hawaiian Proverbs and Poetical Sayings.* Bishop Museum Special Publication No. 71, Bishop Museum Press, Honolulu.

Pukui, Mary Kawena and Samuel H. Elbert

1986 *Hawaiian Dictionary.* Second Edition, University of Hawai'i Press, Honolulu.

Quinn, Dan

2007 Memorandum dated April 30, 2007. *§6E-8, HRS, Compliance – Request for Determination of “No Historic Properties Affected,” Wastewater System Improvements, Mauna Kea State Recreation Area Ka'ohē, Hamakua, Hawai'i TMK: (3) 4-4-014: 003 (por.).*

Reinman, Fred M. and Jeffrey Pantaleo

1998 *Archaeological Investigations of Two Work for the Legacy Resource Management Program of Pōhakuloa Training Area, Hawai'i Island, Hawai'i.* Garcia and Associates, Honolulu, Hawai'i.

Roberts, Alice K. S., Jennifer J. Robins, and Amy Buffum

2004a *Archaeological Surveys of Proposed Training Area for the Stryker Brigade Combat Team, US Army, Pohakuloa Training Area, Island of Hawai'i, Hawai'i.* Garcia and Associates, Kailua, Hawai'i.

Roberts, Alice K. S., Amy Buffman, Rachel Davies, and Scott Williams

2004b *Archaeological Survey of Training Areas 5 and 21 and Eligibility Evaluations for Chill Glass Quarry Sites in the Vicinity of Redleg Trail (Range 10), Us. Army Pohakuloa Training Area, Island of Hawaii, Hawaii.* Garcia and Associates, Kailua, Hawai'i.

Roberts, Alice K. S., Stephan Roberts, and Michael Desilets

2004c *Archaeological Survey of Training Areas 1, 3, and 4, US. Army Pohakuloa Training Area, Island of Hawai'i, Hawai'i.* Garcia and Associates, Kailua, Hawai'i.

Robins, Jennifer J., and Ana L. Gonzalez

2006 *Final Phase II Archaeological Research of Proposed Battle Area Complex (BAX) & Anti-Armor Live Fire and Training Range (AALFTR) Training Areas for Stryker Brigade Combat Team (SBCT), U.S. Army Pōhakuloa Training Area, Hawai'i Island, Hawai'i (TMK 3-4-4-16:1)*. Garcia and Associates, Kailua, Hawai'i.

Rosendahl, Paul H. Ph. D., Inc. (PHRI)

1999 *Cultural Impact Assessment Study: Native Hawaiian Cultural Practices, Features, and Beliefs Associated with the University of Hawai'i Mauna Kea Science Reserve Master Plan Project Area*. PHRI, Inc., Hilo, Hawai'i.

Sato, H., Warren Ikeda, Robert Paeth, Richard Smythe and Minoru Takehiro, Jr.

1973 *Soil Survey of the Island of Hawai'i*. U.S. Department of Agriculture and Univ. of Hawaii Agricultural Experiment Station, Honolulu, Hawai'i.

Shapiro, Lisa and Paul L. Cleghorn

1998 *Final Archaeological Investigations of Two Work Areas for The Legacy Resource Management Program at Pohakuloa Training Area, Hawai'i Island, Hawaii*. BioSystems Analysis, Inc., Kailua, Hawai'i.

Shaw, Robert B., and Michael Castillo

1997 *Plant Communities of Pohakuloa Training Area, Hawaii*. Center for Ecological Management of Military Lands, Fort Collins, Colorado.

Streck, Charles F., Jr.

1984 *Archaeological Reconnaissance Site Survey of Five Land Parcels at PTA, Island of Hawaii*. Dept. of the Army Headquarters United States Army Support Command, Fort Shafter, Hawai'i.

Summers, C. C.

1999 *Material Culture: The J. S. Emerson Collection of Hawaiian Artifacts*. Bishop Museum Press, Honolulu, Hawai'i.

Thrum, Thomas G.

1922 IN, Lorrin Andrews *A Dictionary of the Hawaiian Language*, pages 625 – 674. Prepared Under the Direction of the Board of Commissioners of Public Archives of the Territory of Hawai'i, Honolulu, Hawai'i.

Ulukau

2003 *The Hawaiian Electronic Library*. Electronic library, <http://www.ulukau.org>.

Waihona 'Āina

2000 *The Māhele Database*. Electronic document, <https://www.waihona.com>, accessed May 5, 2005.

Welch, David

1993 *Archaeological Survey and Testing for the Saddle Road Improvement Project, Pohakuloa Area, Hawai'i Island, Hawaii*. National Technical Information Service, Washington D.C.

Wellmon, Bud

1973 "Frontier Traders and Pioneer Cattlemen: A Hawaiian Perspective." *Hawaiian Journal of History*, Vol. 7:48-54.

Wentworth, Chester K., and William F. Powers

1943 Glacial Springs on the Island of Hawaii. *Journal of Geology* 51 (8):542-547.

Westervelt, William D.

1915 *Legends of Gods and Ghosts: (Hawaiian Mythology)*/Collected and Translated from the Hawaiian by W. D. Westervelt. Geo. H. Ellis Co., Boston.

Wilkes, Charles

1970 (1845) *Narrative of the United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842*. Volume IV. Lea and Blanchard, Philadelphia, Pennsylvania.

Williams, Scott S. (ed.)

2002b *Final Report. Archaeological Reconnaissance Survey U.S. Army Pohakuloa Training Army (PTA) for the U.S. Army Garrison, Hawaii, Ecosystem Management Program, Hawai'i Island, Hawai'i*. Ogden Environmental and Energy Services Co., Inc., Honolulu.

Wolfe, E. W. and J. Morris

1996 Geologic Map of the Island of Hawaii: U.S. Geological Survey Map I2524, 1:100,000.

Wong, Sterling Kini

2006 Shrines Desecrated: Sacred structures quickly repaired after attacks at 'Iolani Palace and atop Mauna Kea. Ka Wai Ola Newspaper March 2006, Office of Hawaiian Affairs (Internet: www.oha.org/pdf/kwo06/0603/6.pdf).

Ziegler, Alan C.

2002 *Hawaiian Natural History, Ecology, and Evolution*. University of Hawai'i Press, Honolulu.

Appendix A Glossary

To highlight the various and complex meanings of Hawaiian words, the complete translations from Pukui and Elbert (1986) are used unless otherwise noted. In some cases, alternate translations may resonate stronger with Hawaiians today; these are placed prior to the Pukui and Elbert (1986) translations and marked with “(common).”

Diacritical markings used in the Hawaiian words are the *‘okina* and the *kahakō*. The *‘okina*, or glottal stop, is only found between two vowels or at the beginning of a word that starts with a vowel. A break in speech is created between the sounds of the two vowels. The pronunciation of the *‘okina* is similar to saying “oh-oh.” The *‘okina* is written as a backwards apostrophe. The *kahakō* is only found above a vowel. It stresses or elongates a vowel sound from one beat to two beats. The *kahakō* is written as a line above a vowel.

Hawaiian Word	English Translation
‘aha‘ula	Council of chiefs. Literal meaning, regal meeting
ahu	Alter, shrine, cairne
ahupua‘a	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap (ahu) of stones surmounted by an image of a pig (pua‘a), or because a pig or other tribute was laid on the altar as tax to the chief
‘āina	Land, earth
‘āina mauna	Mountain land
akamai loa ia i ka lua	Expert of bone breaking
akua	God, goddess, spirit, ghost; divine, supernatural, godly
ala hele	Pathway, route, road, way to go, itinerary, trail, highway, means of transportation
alaka‘i	To lead, guide, direct; leader, guide, director
ali‘i	Chief, chiefess, officer, ruler, monarch, peer, headman, noble, aristocrat, king, queen, commander
aloha	Love, affection, compassion, mercy, sympathy, kindness; greeting, regards
ana	(3) Cave, grotto, cavern
‘anakala	Uncle
āpana	Piece, slice, portion, fragment, section, segment, installment, part, land parcel, lot, district, sector, ward, precinct
‘e‘epa	Extraordinary, incomprehensible, abnormal, deceitful, peculiar, as

	persons with miraculous powers; such persons.
‘eho	Stone pile, especially as used to mark land boundaries; stone image; heap of stones under water
hale	House, building, institution, lodge, station, hall; to have a house
haole	White person, American, Englishman, Caucasian; any foreigner
hau	(2) Cool, iced; ice, frost, dew, snow
heiau	Pre-Christian place of worship, shrine; some heiau were elaborately constructed stone platforms, others simple earth terraces. Many are preserved today
hiapo	First-born child; first born, oldest
hoa‘āina	Tenant, caretaker
hō‘ike	To show, exhibit
hōlua	Sled, especially the ancient sled used on grassy slopes; the sled course
hoa‘āina	Tenant, caretaker, as on a kuleana
ho‘okupu	To cause growth, to sprout
ho‘omana	(b) To worship, religion
huaka‘i	Trip, voyage, journey, mission, procession, parade
hula	To dance the hula
huna	(2) Hidden secret; hidden
i‘a kōpī	Salted beef
‘ili	Land section, next in importance to ahupua‘a and usually a subdivision of an ahupua‘a
ilina	Grave, tomb, sepulcher, cemetery, mausoleum, plot in a cemetery
iwi kūpuna	Ancestral bone remains (common)
kahili	Feather standar, symbolic of royalty; segment of a rainbow standing like a shaft (also a sign of royalty); to brush, sweep, switch.
kahu	Honored attendant; pastor, minister
kahuna	Priest, sorcerer, magician, wizard, minister, expert in any profession. Kāhuna—plural of kahuna
kalana	Division of land smaller than a moku or district; county
kama‘āina	Native-born, one born in a place, host; native plant; acquainted, familiar, Lit., land child
kanaka	Human being, man, person; laborer, servant; Hawaiian

kāne	Male, husband, male sweetheart, man; brother-in-law of a woman; male, masculine; to be a husband or brother-in-law of a woman
kaona	Hidden meaning, as in Hawaiian poetry
kapa	Tapa, as made from wauke or māmaki bark; formerly clothes of any kind or bedclothes; quilt.
kapu	Taboo, prohibition; prohibited; sacredness
kauhale	Group of houses comprising a Hawaiian home, formerly consisting of men's eating house, women's eating house, sleeping house, cook house, canoe house, etc.
kea	White, clear
keiki alualu	Premature child
kilo hōkū	Astrologer, astronomer, astronomy; to observe and study the stars
ko'i	Axe, adze
kona	Leeward sides of the Hawaiian Islands; leeward
kōnane	(2) Ancient game resembling checkers, played with pebbles placed in even lines on a stone or wood board called papa kōnane.
konohiki	Headman of an ahupua'a land division under the chief
kōpī	To sprinkle, as salt, sand; to salt, as fish or meat
kua'i lolo	Butchering
kuleana	Right, privilege, concern, responsibility, title, business, property, estate, portion, jurisdiction, authority, liability, interest, claim, ownership, tenure, affair, province
kupua	Demigod or culture hero, especially a super-natural being possessing several forms
kupuna	Grandparent, ancestor, relative or close friend of the grandparent's generation, grandaunt, granduncle. Kūpuna—plural of kupuna
lā'au lapa'au	Medicine. Literal meaning curing medicine
lei	Lei, garland, wreath; necklace of flowers, leaves, shells, ivory, feathers, or paper given as a symbol of affection
liko	Leaf bud; newly opened leaf; to bud; to put forth leaves
limu	A general name for all kinds of plants living under water, both fresh and salt, also algae growing in any damp place in the air, as on the ground, on rocks, and on other plants; also mosses, liverworts, lichens
lio kauō	Horse drawn cart.
lo'i	Irrigated terrace, especially for taro, but also for rice; paddy
lo'i kalo	Irrigated taro terrace

loko i'a	Fishpond (common)
lua kāko'i	Quarries
mā	(2) Part. Following names of persons. And company and others and wife and husband and associates
ma'a	Accustomed, used to, knowing thoroughly, habituated, familiar, experienced; to adapt; custom, habit
mahalo	Thanks, gratitude; to thank
mahele	Portion, division, section, zone, lot, piece, quota, installment, bureau, department, precinct, category, scene or act in a play
mahirole	Feather helmet, helmet; to wear a helmet
makai	Ocean
makana	Gift, present
mana'o	Thought, idea, belief, opinion, theory, thesis, intention, meaning, suggestion, mind, desire, want; to think, estimate, anticipate, expect
mauka	Inland
mele	Song, anthem, or chant of any kind; poem, poetry; to sing, chant
moku	District, island, islet, section
moku o loko	A district (as Kona), not an island
mokupuni	Island
mo'o	Lizard, reptile of any kind, dragon, serpent; water spirit
mo'okū'auhau	Genealogical succession, pedigree
mo'olelo	Story, tale, myth, history, tradition, literature, legend, journal, log, yarn, fable, essay, chronicle, record, article; minutes, as of a meeting. (From mo'o 'ōlelo, succession of talk; all stories were oral, not written)
mu'o	Leaf bud; to bud, of a leaf; soft tip of aerial pandanus root; younger branch of a family
nā	Plural definite article. Nā lani, the chiefs
'ohana	Family, relative, kin group; related
'oihana kilokilo	Astronomy
'ōlelo no'eau	Proverb, wise saying, traditional saying
oli	Chant that was not danced to, especially with prolonged phrases chanted in one breath, often with a trill at the end of each phrase; to chant thus
'ōlohe	(2) Skilled, especially in lua fighting, so called perhaps because

	the beards of lua fighters were plucked and their bodies greased; bones of hairless men were desired for fish hooks because such men were thought stronger; also said of hula experts; skilled figher
‘ōpala	Trash, rubbish, refuse, litter, waste matter, junk, garbage, muck; littered; riff-raff
pāhoehoe	Smooth, unbroken type of lava, contrasting with ‘a‘ā; to turn into pāhoehoe lava
pali	Cliff, precipice, steep hill or slope suitable for olonā or wauke; full of cliffs; to be a cliff
paniolo	Cowboy
piko	Naval, naval string, umbilical cord
pipi kauō	Ox drawn cart
pipi miko	Salted beef
pōhaku	Rock, stone, mineral, tablet; sinker; thunder; rocky; stony
pōhaku eho manu	Stones put inside dressed birds in cooking
poi	Poi, the Hawaiian staff of life, made from cooked taro corms, or rarely breadfruit, pounded and thinned with water
pule	Prayer, magic spell, incantation, blessing, grace, church service, church; to pray, worship, say grace, ask a blessing, cast a spell
pūnāwai	Water spring
pu‘u	Any kind of a protuberance from a pimple (pu‘u) to a hill: hill, peak, cone, hump, mound, bulge, heap, pile, portion, bulk, mass, quantity, clot, bunch, knob; heaped, piled, lumped, bulging; pregnant; to pucker
uwahi pō	Darkening smoke
‘u‘uku loa	Very small stature
wa‘a	Canoe, rough-hewn canoe, canoeman, paddlers; a chant in praise of a chief's canoe
wahine	Woman, lady, wife; sister-in-law, female cousin-in-law of a man; queen ins a deck of cards; womanliness, female, femininity; feminine
wahi pana	Legendary place
wai	Water, liquid or liquor of any kind other than sea water, juice, sap, honey; liquids discharged from the body, as blood, semen; color, dye, pattern; to flow, like water, flui
wao	A general term for inland region usually forested but not precipitous and often uninhabited

Appendix B Common and Scientific Names for Plants and Animals

Common Names		Scientific Names		Source
Hawaiian	Other	Genus	Species	
‘a‘ali‘i		<i>Dodonaea</i>	All species	Pukui and Elbert 1986
‘āhinahina	Silversword	<i>Argyroxiphium</i>	<i>sandwicensis</i>	Pukui and Elbert 1986
‘ākepa	Hawaiian honey creeper	<i>Loxops</i>	<i>coccinea</i>	Pukui and Elbert 1986
‘akialoa	Hawaiian honey creeper	<i>Hemignathus</i>	<i>obscurus</i>	Pukui and Elbert 1986
‘akoko	Also ēkoko, koko, kōkōmālei	<i>Euphorbia</i>	*spp.	Pukui and Elbert 1986
‘alalā	Hawaiian crow	<i>Corvus</i>	<i>tropicus</i>	Pukui and Elbert 1986
‘amakihi	Hawaiian honey creeper	<i>Loxops</i>	<i>virens</i>	Pukui and Elbert 1986
‘apapane	Hawaiian honey creeper	<i>Himatione</i>	<i>sanguinea</i>	Pukui and Elbert 1986
‘awa	Kava	<i>Peper</i>	<i>methysticum</i>	Pukui and Elbert 1986
‘āweoweo	Same as ‘āheahea	<i>Chenopodium</i>	<i>oahuense</i>	Pukui and Elbert 1986
‘elepaio	Flycatcher (subspecies on Hawai‘i Island, Kaua‘i and O‘ahu)	<i>Chasiempis</i>	<i>sandwichensis</i> <i>sandwichensis</i> (Hawai‘i Island)	Pukui and Elbert 1986
‘iliahi	Hawaiian sandalwood	<i>Santalum</i>	*spp.	Pukui and Elbert 1986
‘i‘iwi	Scarlet Hawaiian honey creeper	<i>Vestiaria</i>	<i>coccinea</i>	Pukui and Elbert 1986

Common Names		Scientific Name		Source
Hawaiian	Other	Genus	Species	
‘io	Hawaiian hawk	<i>Buteo</i>	<i>solitaries</i>	Pukui and Elbert 1986
‘iwa	Frigate or man-of-war bird	<i>Fregata</i>	<i>minor palmerstoni</i>	Pukui and Elbert 1986
kalo	Taro	<i>Colocasia esculenta</i>	<i>esculenta</i>	Pukui and Elbert 1986
koa	The largest of native forest trees	<i>Acacia</i>	<i>koa</i>	Pukui and Elbert 1986
kōlea	Pacific golden plover	<i>Pluvialis</i>	<i>dominica</i>	Pukui and Elbert 1986
māmane	Native leguminous tree	<i>Sophora</i>	<i>chrysophylla</i>	Pukui and Elbert 1986
mamo	Black Hawaiian honey creeper	<i>Drepanis</i>	<i>pacifica</i>	Pukui and Elbert 1986
mānienie	Bermuda grass	<i>Cynodon</i>	<i>dactylon</i>	Pukui and Elbert 1986
mānienie‘ula (same as pi‘ipi‘i)	Grass	<i>Chrysopogon</i>	<i>aciculatus</i>	Pukui and Elbert 1986
moho	Hawaiian rail	<i>Pennula</i>	<i>sandwichensis</i>	Pukui and Elbert 1986
naio	Bastard sandlewood	<i>Myoporum</i>	<i>sandwicense</i>	Pukui and Elbert 1986
nēnē	Hawaiian goose	<i>Nesochen</i>	<i>sandvicensis</i>	Pukui and Elbert 1986
nohoanu	Native geraniums	<i>Geranium</i>	*spp.	Pukui and Elbert 1986
‘ōhelo	A small native shrub in the cranberry family	<i>Vaccinium</i>	<i>reticulatum</i>	Pukui and Elbert 1986
‘ōhi‘a lehua		<i>Metrosideros</i>	<i>macropus</i>	Pukui and Elbert 1986
‘ō‘ō	Black honey eater	<i>Moho</i>	<i>nobilis</i>	Pukui and Elbert 1986

Common Names		Scientific Name		Source
Hawaiian	Other	Genus	Species	
‘ō‘ū	Finch-like Hawaiian honey creeper	<i>Psittirostra</i>	<i>Psittacea</i>	Pukui and Elbert 1986
palila	Hawaiian honey creeper	<i>Psittirostra</i>	<i>bailleui</i>	Pukui and Elbert 1986
pili	Grass	<i>Heteropogon</i>	<i>contortus</i>	Pukui and Elbert 1986
pōpolo	Black nightshade	<i>Solanum</i>	<i>nigrum</i>	Pukui and Elbert 1986
pueo	Hawaiian short eared owl	<i>Asio</i>	<i>flammeus sandwichensis</i>	Pukui and Elbert 1986
pūkiawe	Black-eyed Susan	<i>Abrus</i>	<i>precatorius</i>	Pukui and Elbert 1986
‘ua‘u	Dark-rumped petrel	<i>Pterodroma</i>	<i>Phaeopygia sandwichensis</i>	Pukui and Elbert 1986
wauke	Paper mulberry	<i>Broussonetia</i>	<i>papyrifera</i>	Pukui and Elbert 1986

* spp. = multiple species

Appendix C Authorization and Release

Cultural Surveys Hawai'i, Inc.
Archaeological and Cultural Impact Studies
Hallett H. Hammatt, Ph.D., President



P.O. Box 1114 Kailua, Hawai'i 96734 Ph: (808) 262-9972 Fax: (808) 262-4950
Job code: KAOHE 3 amitchell @culturalsurvevs.com www.culturalsurvevs.com

AUTHORIZATION AND RELEASE FORM

Cultural Surveys Hawai'i (CSH) appreciates the generosity of the *kāpuna* and *kama'āina* who are sharing their knowledge of cultural and historic places, experiences of past and present cultural practices. At the request of R. M. Towill Corporation, Cultural Surveys Hawai'i (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed Saddle Road Maintenance Base Yard, Ka'ohē Ahupua'a.

We understand our responsibility in respecting the wishes and concerns of the interviewees participating in our study. Here are the procedures we promise to follow:

1. The interview will not be tape-recorded without your knowledge and explicit permission.
2. You will have the opportunity to review the written transcript or notes of our interview with you. At that time you may make any additions, deletions or corrections you wish.
3. You will be given a copy of the interview transcript or notes for your records.
4. You will be given a copy of this release form for your records.

For your protection, we need your written confirmation that:

1. You consent to the use of the complete transcript and/or interview quotes for reports on cultural sites and practices, historic documentation, and/or academic purposes.
2. You agree that the interview shall be made available to the public.

I, _____, agree to the procedures outlined above and, by my
(Please print your name here)
signature, give my consent and release for this interview and/or photograph to be used as specified.

(Signature)

(Date)

Appendix D CSH Community Contact Letter

Cultural Surveys Hawai'i, Inc.
Archaeological and Cultural Impact Studies
Hallett H. Hammatt, Ph.D., President



P.O. Box 393 Pāheā, Hawai'i 96778 Ph: (808) 965-6478 Fax: (808) 965-6582
Job code: KAOHE 3 amitchell@culturalsurveys.com

November 15, 2011

Aloha mai kāua,

At the request of R.M. Towill Corporation, Cultural Surveys Hawai'i Inc. (CSH) is conducting a Cultural Impact Assessment (CIA) for the proposed Department of Transportation Base yard, behind Mauna Kea State Recreation Area, mile marker 34. The site is enclosed by fencing and is approximately 4-acres. The site will be used as a road maintenance facility and will include 1-2 buildings that will house trucks, road equipment, workshop, restroom and lockers, and a small office. Total building about 5,000 plus square feet. In addition, fronting this building, there will be an open area for material storage and equipment parking pad. The roadway to the site is in poor condition and will be paved. The site will be shared with DLNR who operates approximately an acre plant nursery. The site contains many structures left over from the *nēnē* facility which will be demolished. DLNR will receive a new building approximately 700 – 800 square feet, site to be determined. The purpose of this project is to provide a new maintenance facility for crews maintaining the newly acquired Saddle Road.

The project site is north of Saddle Road and the former Department of Land and Natural Resources (DLNR) *Nēnē* (Hawaiian goose, *Nesochen sandvicensis*) Rearing Facility located in back of the Mauna Kea State Recreation Area, mile marker 34. The site is enclosed by fencing and is approximately 4-acres. The site will be used as a road maintenance facility and will include 1-2 buildings that will house trucks, road equipment, workshop, restroom and lockers, and a small office. Total building about 5,000 plus square feet. In addition, fronting this building, there will be an open area for material storage and equipment parking pad. The roadway to the site is in poor condition and will be paved. The site will be shared with DLNR who operates approximately an acre plant nursery. The site contains many structures left over from the *nēnē* facility which will be demolished. DLNR will receive a new building approximately 700 – 800 square feet, site to be determined. The purpose of this project is to provide a new maintenance facility for crews maintaining the newly acquired Saddle Road.

The purpose of this cultural study is to assess potential impacts to cultural practices as a result of proposed development in the Ka'ohē Ahupua'a. We are seeking your *kōkua* and guidance regarding the following aspects of our study:

- General history and present and past land use of the project area.
- Knowledge of cultural sites which may be impacted by future development of the project area - for example, historic sites, archaeological sites, and burials.
- Knowledge of traditional gathering practices in the project area, both past and ongoing.
- Cultural associations of the project area, such as legends and traditional uses.
- Referrals of *kūpuna* or elders and *kama'āina* who might be willing to share their cultural knowledge of the project area and the surrounding *ahupua'a* lands.
- Any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the project area.

I invite you to contact me, Aulii Mitchell at (808) 965-6478 or send me an e-mail at amitchell@culturalsurveys.com if you have any information you would like to share.

ʻO wau iho no,
Aulii Mitchell
Director
Cultural Surveys Hawai'i
Hawai'i Office
