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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:TM

CDUA: HA-3626

Acceptance Date: May 18, 2012

180-Day Exp. Date: November 14, 2012

SUSPENSE DATE: 21 Days from stamped date

MEMORANDUM

TO: Gary L. Hooser, Director
Office of Environmental Quality Control

FROM: Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

MAY 22 2012
[Handwritten signature]

SUBJECT: Draft Environmental Assessment (EA) for Conservation District Use Application (CDUA) HA-3626 for a Single Family Residence & Related Improvements Located at Maku`u, Puna, island of Hawai`i, TMK: (3) 1-5-010:032

The Department of Land and Natural Resources has reviewed the draft EA for the subject project, and anticipates a Finding of No Significant Impact (FONSI) determination. Please publish notice of availability for this project in the June 8, 2012 issue of the Environmental Notice. We have enclosed a hard copy and a pdf. copy on CD of the draft EA document. A copy of our acceptance letter and a copy of the applicant's Publication Form are also enclosed. An electronic copy has been forwarded to your Office via e-mail.

Should you wish to provide comments regarding this project, please respond by the suspense date noted above. If no response is received by the suspense date, we will assume there are no comments. Please contact Tiger Mills of our Office of Conservation and Coastal Lands staff at 587-0382 should you have any questions.

Enclosures

**OEQC Publication Form
The Environmental Notice**

Name of Project: Gapp Single-Family Residence in the Conservation District at Maku'u
Applicable Law: Chapter 343, HRS
Type of Document: Draft EA
Island: Hawai'i
District: Puna
TMK: (3rd) 1-5-010:032
Permits Required: County of Hawai'i: Special Management Area Permit or exemption;
Department of Land and Natural Resources, CDUP; grading permit

Name of Applicant:
Address John and Maureen Gapp
City, State, Zip PO Box 1128
Pahoa HI 96778
Contact and Phone Sidney Fuke 808-969-1522
Approving Agency: Office of Coastal and Conservation Lands
Hawai'i State DLNR
Address P.O. Box 621
City, State, Zip Honolulu HI 96809
Contact and Phone Sam Lemmo: 808-587-0377
Consultant Geometrician Associates
Address PO Box 396
City, State, Zip Hilo HI 96721
Contact and Phone Ron Terry 808-969-7090

Project Summary: John and Maureen Gapp (the applicants) seek a Conservation District Use Permit to build a single-family residence and related improvements on a 5.58-acre lot located adjacent to the shoreline at Maku'u. The one-story home will be 5,000 square feet, including the house, garage, pool and cabana/pavilion. The home will be set back 200 feet from the shoreline at 25 feet above sea level. The open cabana will be used for fishing and gardening and will be 60 feet from the shoreline. Other features include an Individual Wastewater System, a driveway, underground utilities, an at-grade covered lanai and open decks, various walkways, small fenced gardens, and landscaping using mostly native or Polynesian species between the home and the shoreline setback line. No modifications within the shoreline setback area are planned. Four burial sites and archaeological sites in the four-acre *mauka* portion of the lot will be preserved in accordance with already accepted preservation and burial treatment plans. Archaeological monitoring will occur during construction. Landclearing and construction would occur over roughly an acre, and produce minor short-term impacts to noise, air and water quality and scenery that would be mitigated by Best Management Practices. Impacts to the island wide-ranging endangered Hawaiian hoary bat and Hawaiian Hawk will be avoided through timing of vegetation removal and/or hawk nest survey.

**Proposed Distribution List for Gapp Single-Family Residence in the Conservation District
at Maku'u Draft EA**

Gary Hooser, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

DLNR INTERNAL: DOCARE/DOFAW/DARS/Engineering/Hawaii District Land Office

Keola Lindsey
Compliance Monitoring Program
Office of Hawaiian Affairs
Keola@oha.org

State Historic Pres. Div.
601 Kamokila Blvd., Rm. 555
Kapolei HI 96707

EPO Manager
Hawai'i State Dept. of Health
P.O. Box 3378
Honolulu HI 96801-3378

Bobby Jean Leithead-Todd, Director
Hawai'i County Planning Dept.
101 Pauahi Street, Suite 3
Hilo HI 96720

Keaau Public Library
16-571 Keaau-Pahoa Road
Keaau HI 96749. Telephone

Nicole Lui
nicolelui38@yahoo.com

Dear Participant:

Thank you for your participation in the Environmental Assessment (EA) process for the subject project. Attached for your records is the Draft EA prepared pursuant to the EIS law (Hawai'i Revised Statutes, Chapter 343) and the EIS rules (Administrative Rules, Title 11, Chapter 200).

Project Name: Gapp Single-Family Residence in the Conservation District at Maku'u

Location: Island: Hawai'i District: Puna
Tax Map Key Number: (3rd) 1-5-010:032

Your comments must be received or postmarked by: **to be determined**

Please send original comments to the:

Consultant: Geometrician Associates
Address: PO Box 396
Hilo HI 96721
Contact: Ron Terry **Phone: 969-7090**

Copies of the comments should be sent to:

Approving: Hawai'i State Department of Land and Natural Resources
Agency:
Address: P.O. Box 621
Honolulu HI 96809
Contact: Sam Lemmo **Phone: 587-0377**

If you no longer need the Draft EA, please recycle it. Thank you for your participation in the Environmental Assessment process.

DRAFT ENVIRONMENTAL ASSESSMENT
GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U

May 2012

TMK (3rd): 1-5-010:032
Maku‘u, Puna, County of Hawai‘i, State of Hawai‘i

APPLICANTS:

John and Maureen Gapp
PO Box 1128
Pahoa HI 96778

**APPROVING
AGENCY:**

State of Hawai‘i
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
1151 Punchbowl Street, Room 131
Honolulu, Hawai‘i 96813

CONSULTANT:

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai‘i 96721

**DRAFT ENVIRONMENTAL ASSESSMENT
GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U**

TMK (3rd): 1-5-010:032
Maku‘u, Puna, County of Hawai‘i, State of Hawai‘i

APPLICANTS:

John and Maureen Gapp
PO Box 1128
Pahoa HI 96778

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1151 Punchbowl Street, Room 131
Honolulu, Hawai‘i 96813

CONSULTANT:

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai‘i 96721

CLASS OF ACTION:

Use of Land in Conservation District

This document is prepared pursuant to:
The Hawai‘i Environmental Protection Act,
Chapter 343, Hawai‘i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai‘i Department of Health Administrative Rules (HAR).

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Gapp Single-Family Residence Environmental Assessment

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**SUMMARY OF PROJECT, ENVIRONMENTAL IMPACTS
AND MITIGATION MEASURES**

John and Maureen Gapp (the applicants) seek a Conservation District Use Permit (CDUP) to build a single-family residence and related improvements on a 5.58-acre lot located adjacent to the shoreline at Maku‘u in the Puna District. The residence is proposed for the Conservation District portion of the property because the dense concentration of archaeological sites in the Agricultural District portion does not afford an area of sufficient size for a residence. The proposed one-story home will be 5,000 square feet, including the house, garage, pool and cabana/pavilion. The home will be set back about 200 feet from the shoreline at an elevation of 25 feet above sea level. The cabana, which will be set back a minimum of 60 feet from the shoreline, will be an open pavilion used as a staging and storage area for gardening and recreational fishing by the owners, including throw nets, poles and tackle. Other features include an Individual Wastewater System, a driveway, underground utilities, an at-grade covered lanai and open decks, various walkways, small fenced gardens, and landscaping using mostly the native or Polynesian species found in the area in the area between the home and the shoreline setback line. No modifications within the shoreline setback area are planned. Four burial sites and archaeological sites in four-acre *mauka* portion of the lot within the State Land Use Agricultural District will be preserved in accordance with already accepted preservation and burial treatment plans.

Landclearing and construction activities would occur over roughly an acre, which would produce minor short-term impacts to noise, air and water quality and scenery. These would be mitigated by Best Management Practices that are expected to be required as conditions of the Conservation District Use Permit and grading permit. The applicants will ensure that their contractor performs all earthwork and grading in conformance with applicable laws, regulations and standards. The project has been fully surveyed for threatened and endangered plants and none are present. Impacts to the island wide-ranging endangered Hawaiian hoary bat and Hawaiian Hawk will be avoided through timing of vegetation removal and/or hawk nest survey. Archaeological and cultural resources have been avoided through inventory, consultation, and treatment plans, and the site layout has situated the structures and roadways in areas that avoid impacts. Completion of archaeological preservation actions will be required during a designated period of time associated with construction of the home. Archaeological monitoring will occur during construction, and in the unlikely event that additional undocumented archaeological resources, including shell, bones, midden deposits, lava tubes, or similar finds, are encountered during construction within the project site, work in the immediate area of the discovery will be halted and the State Historic Preservation Division will be contacted to determine the appropriate actions.

PART 1: PROJECT DESCRIPTION AND E.A. PROCESS

1.1 Project Description and Location

John and Maureen Gapp (the applicants) seek a Conservation District Use Permit (CDUP) to build a single-family residence and related improvements on a 5.58-acre lot at Maku‘u in the Puna District of the Big Island of Hawai‘i (Figure 1a). The property is located between the shoreline and the unpaved Government Beach Road, flanked by similar shoreline lots (Figure 1b). The State Land Use District for the *makai* third of the densely vegetated property (Figure 2), and adjacent properties, is Conservation (Figure 3a). *Mauka* of this coastal portion the property is within the State Land Use Agricultural District. The residence is proposed for the Conservation District portion of the property because the dense concentration of archaeological sites in the Agricultural District portion does not afford an area of sufficient size for a residence.

The proposed one-story home will be 5,000 square feet total, including the house, garage, pool and cabana/pavilion (Figure 3a). The general feel and location of the home is meant to recall a home that Mr. Gapp built in Kalapana Gardens and subsequently lost to the eruption of Kilauea Volcano in 1990. The house will have three bedrooms and three baths, and will be set back about 200 feet from the shoreline at an elevation of 25 feet above sea level. The cabana will be an open pavilion used as a staging area for recreational fishing by the owners, including throw nets, poles and tackle. It will also be a place to store equipment, supplies and materials for restoring native and removing invasive plants in the area between the shoreline setback line and the home. If approved, the cabana will be set back a minimum of 60 feet from the shoreline, the location of which will be determined by a certified shoreline survey. An Individual Wastewater System in compliance with State Department of Health regulations will be built. Electricity and telephone poles and lines are present on Government Beach Road, and these services would be extended through underground conduits along the driveway to service the home. Other features include a driveway, an at-grade covered lanai and open decks, various walkways, small fenced gardens, and landscaping using mostly the native or Polynesian species found in the area in the area between the home and the shoreline setback line (Figure 3b). Albizia trees, fast-growing non-natives that pose a hazard to structures on and adjacent to the property, will be selectively removed. No modifications within the shoreline setback area are planned. Four burial sites and archaeological sites in four-acre *mauka* portion of the lot within the State Land Use Agricultural District will be preserved in accordance with already accepted preservation and burial treatment plans.

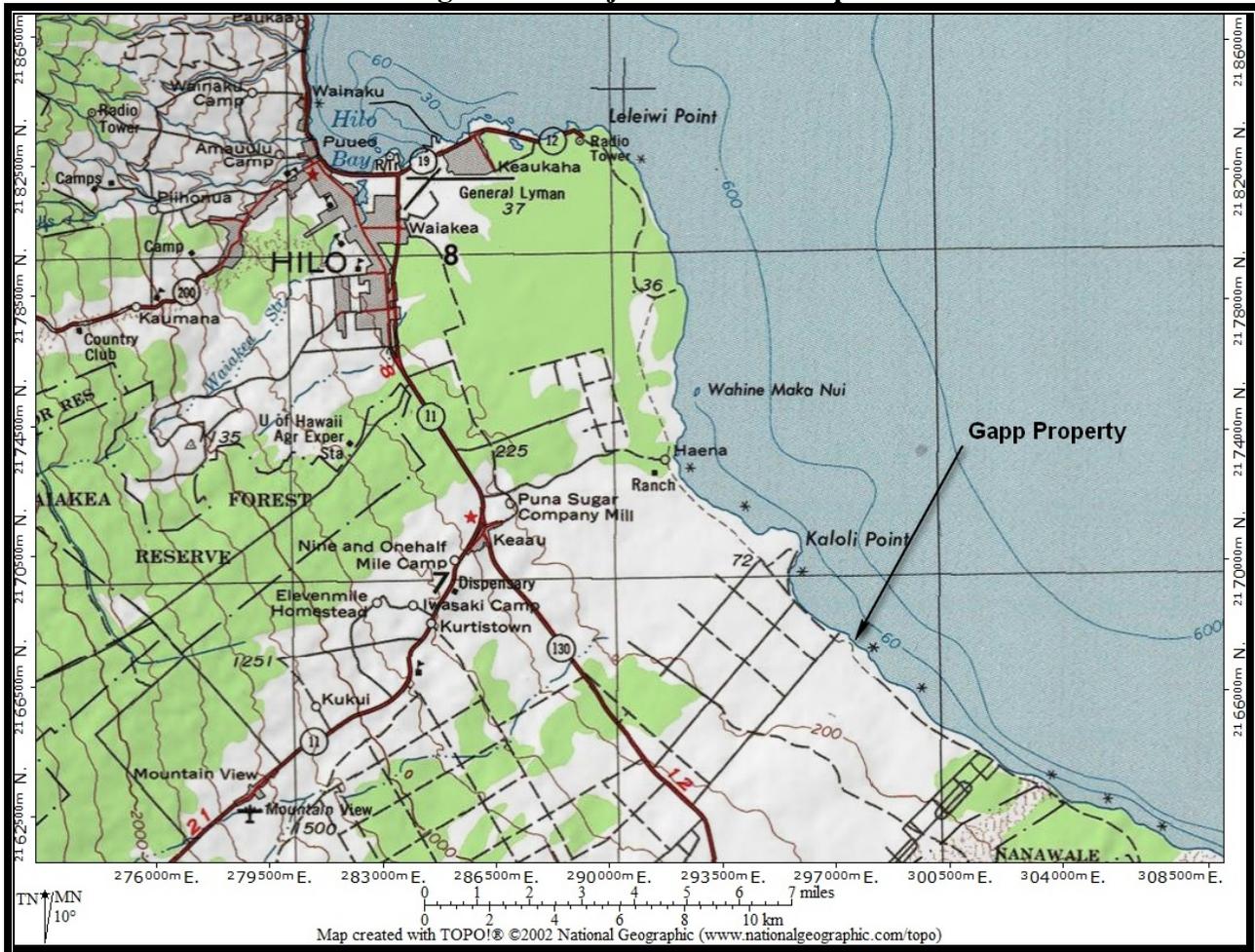
1.2 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact assessment process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the anticipated finding that no significant impacts are expected to occur, based on the preliminary findings for each criterion made by the consultant in consultation with the Hawai‘i State Department of Land and

Gapp Single-Family Residence Environmental Assessment

Natural Resources, the approving agency. If, after considering comments to the Draft EA, DLNR concludes that, as anticipated, no significant impacts would be expected to occur, then the agency will issue a Finding of No Significant Impact (FONSI), and the action will be permitted to proceed. If the agency concludes that significant impacts are expected to occur as a result of the proposed action, then an Environmental Impact Statement (EIS) will be prepared.

Figure 1a Project Location Map



1.3 Public Involvement and Agency Coordination

The following agencies, organizations and individuals have been consulted during the Environmental Assessment Process:

County:

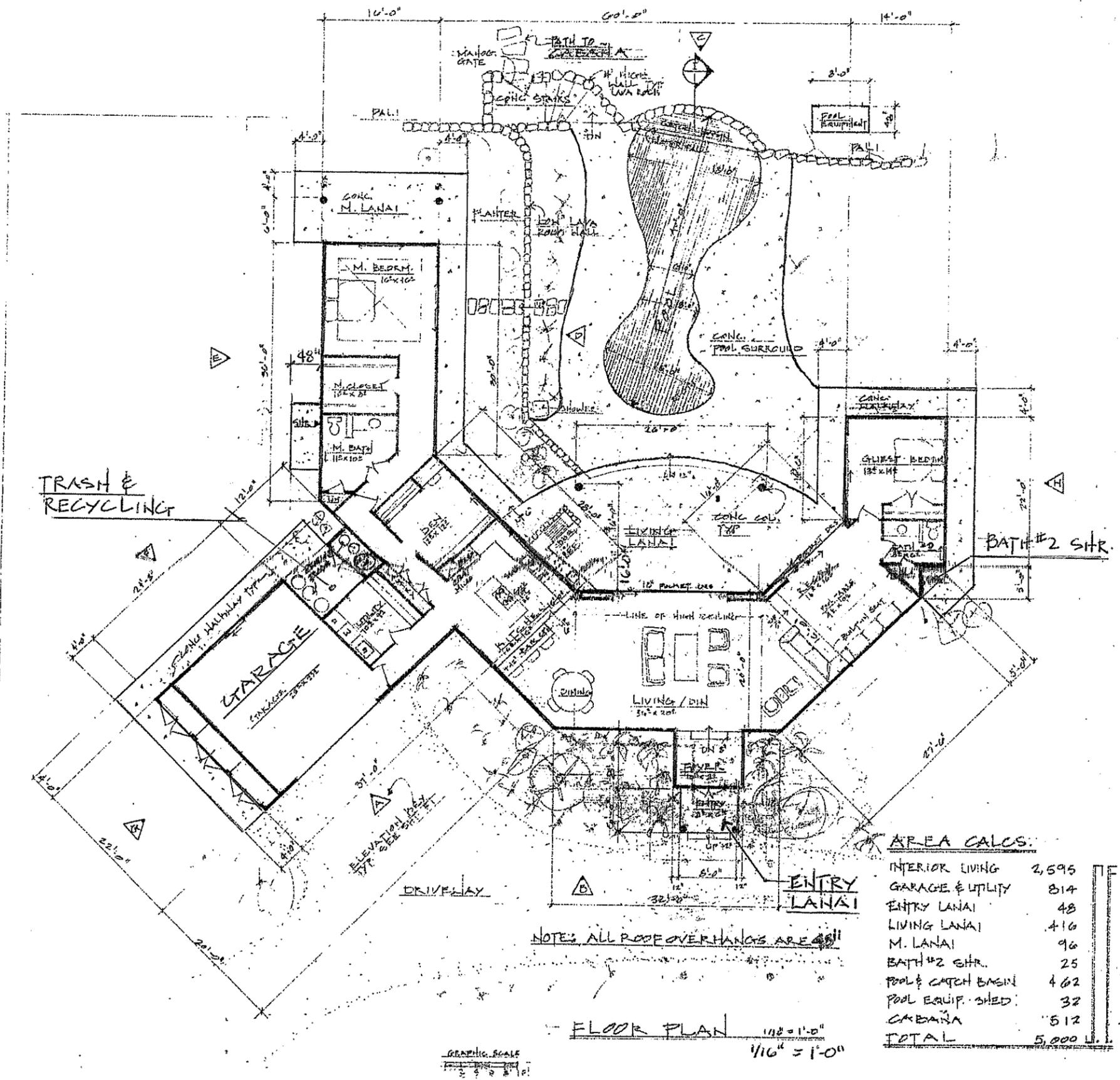
- | | | |
|----------------------------|-------------------|-----------------|
| Planning Department | County Council | Fire Department |
| Department of Public Works | Police Department | |

Figure 2 Project Site Photos

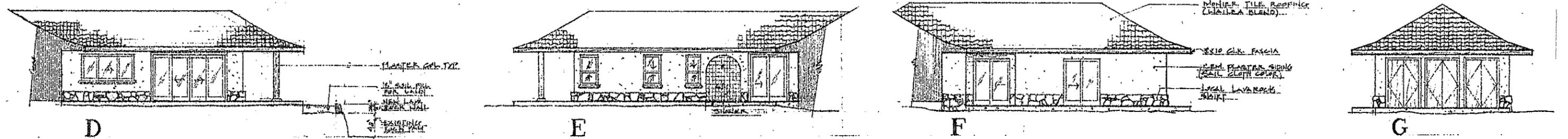
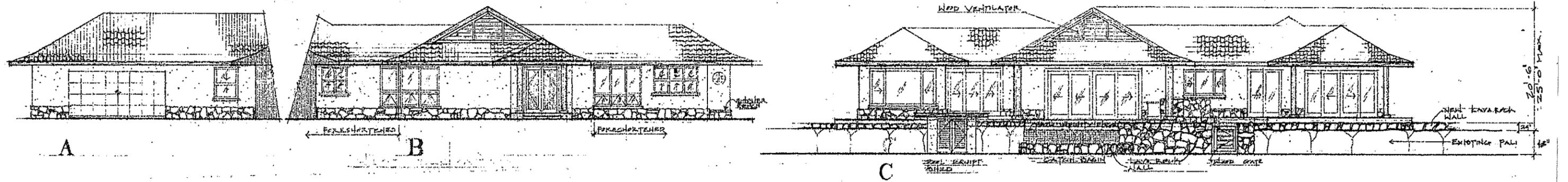


Typical Vegetation on Project Site ▲ ▼ Shoreline in Front of Project Site

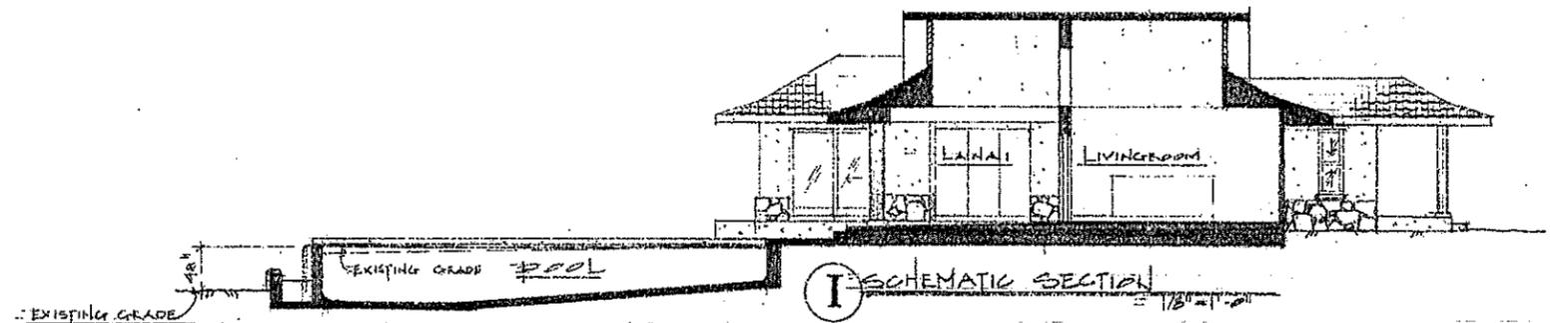
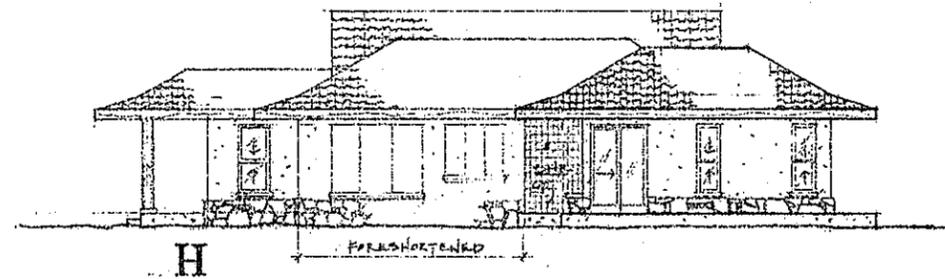




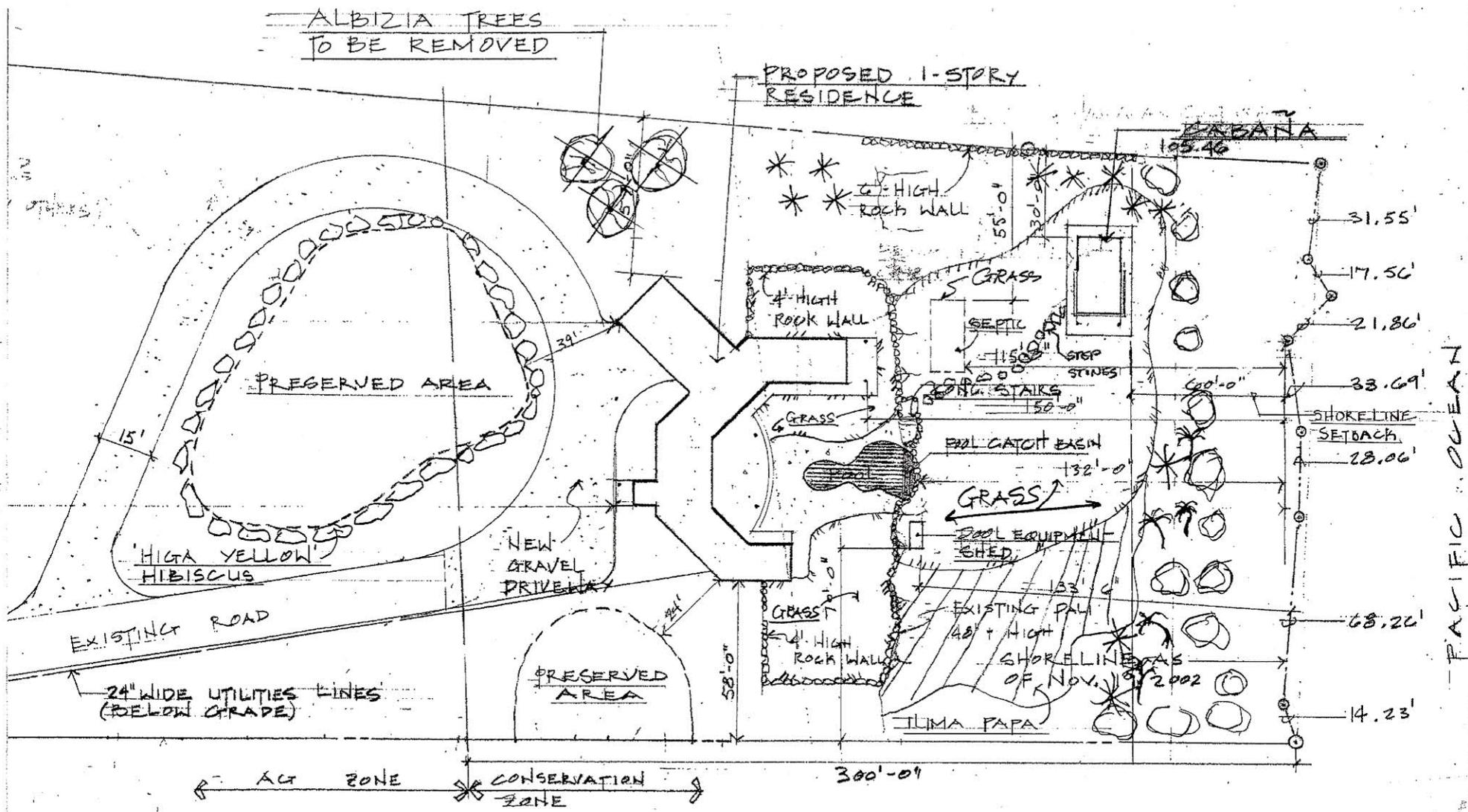
PROPOSED RESIDENCE FOR JOHN & MOREEN GAFF
 B 10.30.11



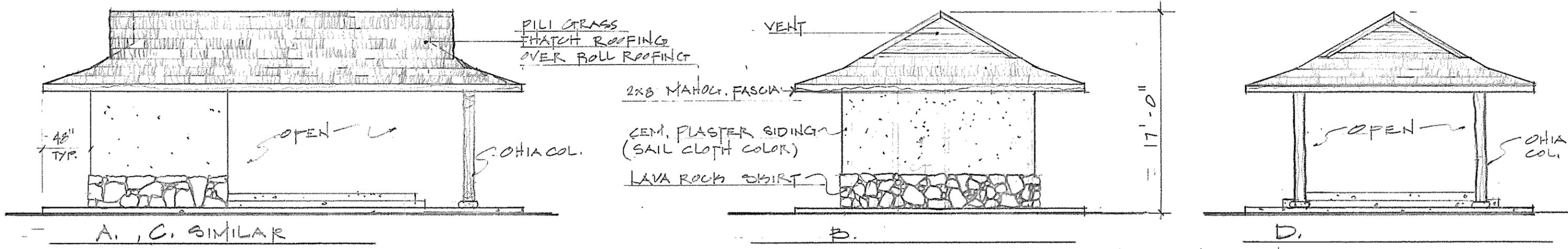
HOUSE EXTERIOR ELEVATIONS VARIOUS



PROPOSED RESIDENCE FOR
 JOHN & MOREEN STAFF
 B 10.30.11

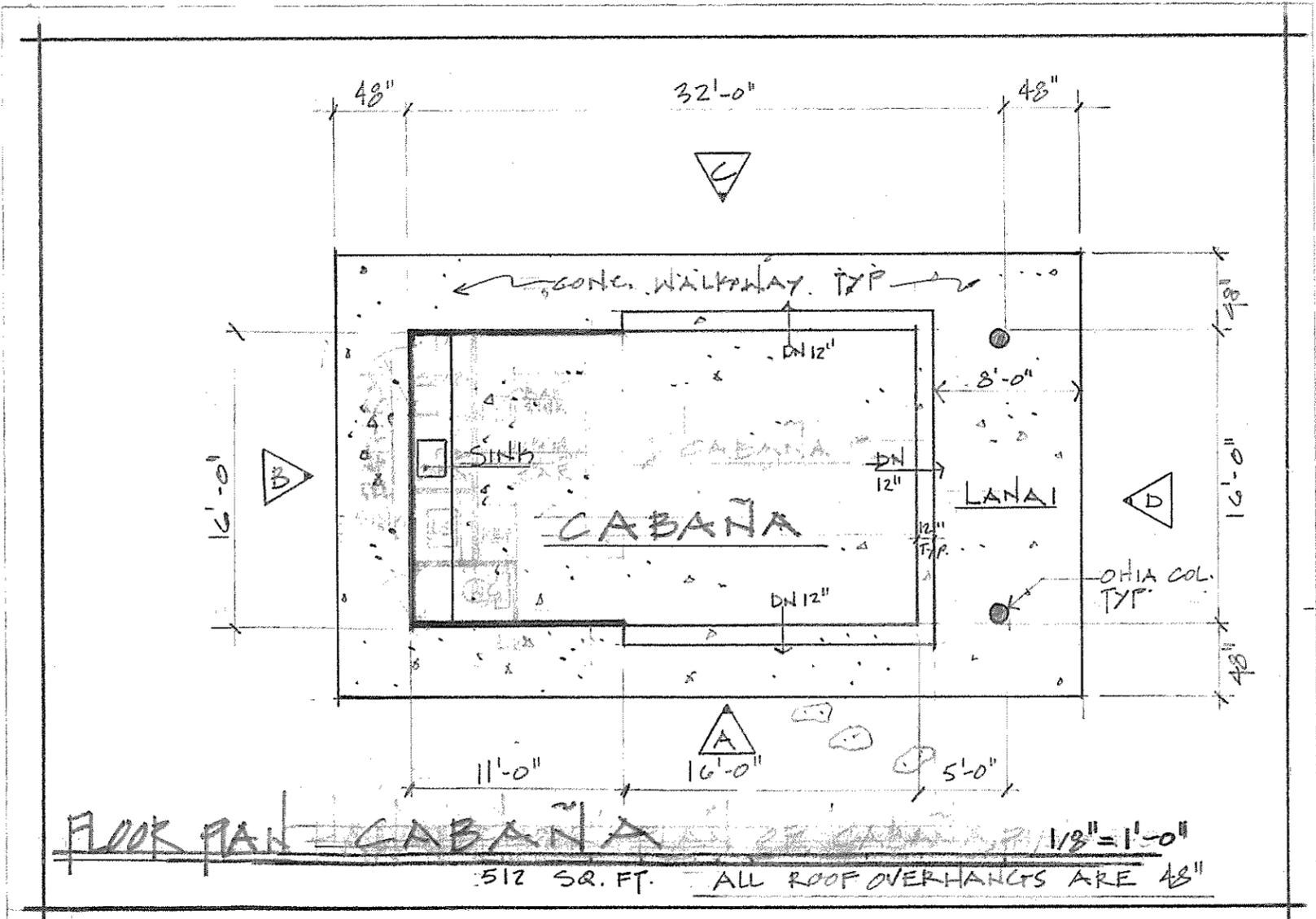


PROPOSED LANDSCAPING PLAN GAPP RESIDENCE
 1" = 40'-0"



EXTERIOR ELEVATIONS - CABAÑA

1/8" = 1'-0"



PROPOSED CABAÑA FOR
JOHN & MOREEN GAFF
 B 10.30.11

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PART 2: ALTERNATIVES

2.1 Proposed Project

The proposed project and its location are described in Section 1.1 above and illustrated in Figures 1-3. The location of the home site, 200 feet from the shoreline, was chosen in order to enjoy coastal breezes and views while avoiding the actual shoreline area along with archaeological sites, especially the burials in the middle of the long-narrow property. As discussed in Section 3.2.2, the Gapps have proactively coordinated with a lineal descendant, who endorsed the decision to locate the home away from the burials closer to the shoreline, so that lineal descendants' visits to the burial area are facilitated and do not require any disturbance of the residents. The proposed home location is thus the most reasonable and culturally and environmentally sensible location on the property.

2.2 No Action

Under the No Action Alternative, the residence would not be built. The lot, which was part of a larger property legally subdivided for eventual residences, would remain unused. Persistent unauthorized marijuana cultivation, illegal camping and trash dumping, including potentially toxic materials and bulky items, could become a problem, as it has in some other vacant land in this area. Inappropriate entry into burial features and other sites important to Hawaiian culture could also occur. This EA considers the No Action Alternative as the baseline by which to compare environmental effects from the project. No other alternative uses for the property are currently desired by the applicants, and thus none are addressed in this EA.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION

The long, narrow 5.58-acre property is located between the shoreline and the unpaved Government Beach Road and is flanked by similar shoreline lots. It is presently vacant and unused and is covered with dense, primarily non-native vegetation except near the shoreline (see Figure 2). At its highest point it is approximately 30 feet above mean sea level.

3.1 Physical Environment

3.1.1 Geology, Soils and Geologic Hazards

Environmental Setting

The property is located on the flank of Kilauea, an active volcano, in the District of Puna, in the *ahupua'a* of Maku'u, on lava flows dated at between 300 and 750 years ago (Wolfe and Morris 1996). Soil in the area is predominately pahoehoe lava flow (rLW) and Opihikao extremely rocky muck (rOPE) (U.S. Soil Conservation Service 1973). Both are highly drained and their soil subclass is VIIIs, which means they have limitations that because of their stony nature preclude their use for commercial crops and restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes. This area receives an average of about 120 inches of rain annually, with a mean annual temperature of approximately 75 degrees Fahrenheit (UH Hilo-Geography 1998:57).

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the U.S. Geological Survey in this area of Puna is Zone 3 on a scale of ascending risk 9 to 1 (Heliker 1990:23). The relatively high hazard risk is because Kilauea is an active volcano. In Zone 3, approximately 1-5 percent of the land area has been covered by lava flows since 1800, but more than 75 percent has been covered in the last 750 years. As such, there is modest risk of lava inundation over short time scales on the subject property.

In terms of seismic risk, the entire Island of Hawai'i is rated Zone 4 Seismic Hazard (*Uniform Building Code, 1997 Edition*, Figure 16-2). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built. The project site does not appear to be subject to subsidence, landslides or other forms of mass wasting.

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the proposed action, as much of Hawai'i Island faces similar volcanic and seismic hazard. The applicants understand the risk and the residence is not imprudent to construct.

3.1.2 Flood Zones and Shoreline Setting

Environmental Setting

Floodplain status for many areas of the island of Hawai‘i has been determined by the Federal Emergency Management Agency (FEMA), which produces the National Flood Insurance Program’s Flood Insurance Rate Maps (FIRM). The map for the project area is 1551661150C, has not been printed. The home building site is classified in Flood Zone X, areas outside the mapped 500-year floodplain, with minimal tsunami inundation.

Impacts and Mitigation Measures

Property near the shoreline is subject to natural coastal processes including erosion and accretion, which can be affected by human actions such as removal of sand or shoreline hardening. Erosion may adversely affect not only a lot owner’s improvements but also State land and waters, along with the recreational and ecosystem values they support. Development of shoreline properties also exposes residents and visitors to increased risk of hazardous high waves and tsunamis.

In the case of this property, the project does not involve any shoreline hardening or use of areas subject to beach processes. Access to the home will be by a driveway from the Government Beach Road at the back of the property. As discussed above, the proposed home would be outside the Flood Zone, at a distance of about 200 feet from the shoreline. The cabana/pavilion will be placed at least 60 feet from the shoreline after it is certified (the applicants propose to contract for and provide a shoreline survey for certification after the proposed home and cabana are approved and then locate them appropriately on the final Site Plan that will be provided to DLNR prior to construction).

The amendments to Title 13, Chapter 5, Hawai‘i Administrative Rules (Conservation District), adopted at the BLNR meeting of August 12, 2011, specify new procedures for determining the shoreline setback. Exhibit 4 of the rules state:

“The shoreline setback line shall be established based on a setback distance from the certified shoreline of 40 feet plus 70 times the average annual coastal erosion rate, based on a coastal erosion study as defined in this chapter. No shoreline setback shall be established for any lot subject to this chapter unless the application for a shoreline setback line includes a shoreline survey certified by the department not more than 12 months prior to submission of the permit application. The shoreline setback line shall be based on the average lot depth (ALD) measured from the current shoreline. For lots with an ALD of two hundred feet or less, the shoreline setback line shall be established based on the ALD of the lot, as provided in Table 1, or based on 40 feet plus 70 times the annual erosion rate. The applicant may choose the lesser of the two methods, but in no case shall the shoreline setback line be calculated to be less than 40 feet. The department may waive the requirement for coastal erosion study based on supportive documentation from the applicant. Such documentation may include, but is not limited to, county or state approved coastal erosion rate data provided through the University of Hawaii, School of Ocean, Earth Science, and Technology, or evidence that the erosion rate is zero.”

Gapp Single-Family Residence Environmental Assessment

A coastal erosion analysis performed for the property by John P. Lockwood, Ph.D., is attached as Appendix 4 and summarized below. The property was inspected on February 26, 2012, when the tide level was +0.1 feet and there were moderate northeast waves and swells.

Because of the relatively young age of the lava flows here, the undisturbed surfaces are marked by surface textures and basaltic glass that serve as good markers for determination of erosion effects. These flows are dense and relatively non-vesicular, and thus are resistant to mechanical erosion. The flows are near horizontal in this area – dipping toward the sea at only about 1-2 degrees, and forming a coastal platform that is partially inundated by highest tides. Because of land subsidence, sea level rise and the fact that the lava flows were relatively thin where they entered the sea, no significant sea cliff has developed along the coast fronting the property. Ocean-facing cliffs were only 1-2 feet above sea level when inspected, and incoming waves flowed gently over pahoehoe surfaces as the tide rose, causing no erosion by normal wave activity.

A 10-12 foot high berm of storm-carried boulders located 75-150 feet inland from the coastal cliff face forms a barrier to storm wave activity, and coincides with the lowest level of coastal vegetation (*hala*, *naupaka*, and coconut palms). Individual boulders thrown inland by storm waves or tsunamis were found up to 50 feet onshore from the vegetation line, but are covered by dense vegetation and are not recent in origin. The degree of rounding of these boulders in the coastal berm indicates that most have been in place for a long time, as they are rounded by wave action, and are not derived by recent erosion of the coastline. Angular boulders (indicative of recent erosion by wave action) constituted only about 3 percent of all boulders.

At the coastal front of the property significant changes in shoreline position (as defined by Boak and Turner (2005) and Hwang, 2005) have been caused primarily by land subsidence and global sea level rise rates, and not by erosion. Inspection of aerial photographs dating back to 1954 revealed no discernible changes in the positions of the sea cliff nor of the vegetation-defined shoreline, but the large photo scales and variable tide positions between photograph pairs could obscure small changes. Determination of global secular sea level rise is complex and highly variable, owing to local and temporal variations, but is estimated at 1 mm/yr over the long term (Fletcher et al 2010 – Chapter 9). Land subsidence in East Hawai'i was estimated at 4.8 mm/yr by Moore (1970), although it is much greater (8-17 mm/yr) 12 miles to the east in the Kapoho area (Hwang 2007). Additionally, catastrophic, sudden tectonic events can cause great local subsidence (Lipman et al 1985) in specific areas. In their description of the hazards facing this area, Fletcher et al (2002) state that the land in this area “sank and was inundated by a locally generated tsunami after a 4.1 earthquake rocked the southeast portion of the island [in 1868].

The fact that Hawaiian petroglyphs and lava flow surface structures and glass survive on the intertidal pahoehoe platform attests to the fact that surface erosion of the pahoehoe is negligible, although marine algae covering some petroglyphs (Figure 4) demonstrate that land subsidence relative to sea level is occurring. Minor lateral erosion does take place by hydraulic ramming of storm waves into sub-horizontal interflow contacts, and have the power to lift massive subangular boulders onto the coastal intertidal platform, but the rarity of such blocks inshore shows this is an infrequent event. In one area fronting the property, angular surfaces on one flow remnant showed that mechanical erosion had occurred at the base

Gapp Single-Family Residence Environmental Assessment

of the coastal boulder berm, but the presence of petroglyphs within three feet of this broken area defined the maximum extent of any erosion as less than three feet in the period since the petroglyphs were made. All petroglyphs observed consist of European-influenced alphabetic characters, of probable mid-nineteenth century age.

As indicated above, the impact of mechanical erosion on the coastal shoreline at the property is negligible, involving occasional mechanical dislocation of lava blocks from coastal sea cliffs during major storm events, without quantifiable effect on shorelines. The combined effect of land subsidence and global sea level rise (likely about 5mm/yr at this site) could, however, substantially impact shoreline positions on these near-horizontal lava flows were it not for the presence of the coastal boulder berm. The position of this berm and the vegetation growing at its crest appear to be form a stable barrier to lateral transgression of rising seas – at least over the short term, or until major tectonic events like 1868 or future major tsunami waves impact the coastal berm.

Stereographic inspection of aerial photographs taken in 1954, 1965, and 1977 and comparison with recent Google Earth views revealed no changes in the position of rocky shorelines, of the coastal boulder berm, nor of the vegetation line during this 58 year period. Scale limitations of the aerial photographs inspected make identification of individual ocean-facing rock outcrops impossible, but it is probable that some individual rocks have been broken from the wave impact zone during this time period, but no measurable overall erosion has taken place.

According to the formula presented in Exhibit 4, the average lot depth for the Gapp property is roughly 1,000 feet. Using the procedures above, and utilizing the maximum setback for a lot with 200 feet or greater average depth, the shoreline setback would be 90 feet. The home has been set back 200 feet from the approximate location of the shoreline, a buffer of an additional 110 feet. The fishing cabana, which depends upon a coastal location for its utility, will be 60 feet from the shoreline, when it is certified.

A scenario of modest sea level rise would likely not substantially affect the integrity or use of the proposed residence (which would be located about 15 feet above sea level) for many decades, if at all. Somewhat larger increases, particularly in a case of sudden onset, could perhaps eventually affect it. If so, this residence would be among thousands, or perhaps tens of thousands, to be affected in what would be the largest disaster to affect the Hawaiian Islands since human settlement. As sea level rise is gradual, there would probably be an opportunity for the owner to consider relocating or scrapping the structure for re-use of its valuable materials should sea level rise sufficiently to endanger the structure. The owner would agree to a CDUP and/or deed condition that would prevent any future request for shoreline hardening to protect the residence, regardless of hardship, and a condition requiring moving or dismantling the home if sea level rise eventually threatens the integrity of the structure.

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3.1.3 Water Quality

The property is adjacent to the sea but the house would be set back 200 feet from the shoreline and no grading activities would occur *makai* of this area (the cabana/pavilion would not require grading). No water features such as streams, springs, or anchialine ponds are found on or near the property.

Land clearing and construction activities would occur on about an acre, including the driveway. After actual grading plans are developed, the applicant and engineer will determine whether the area of disturbance is sufficiently large to require a National Pollutant Discharge Elimination System permit. Grading for the driveway and house lot will include practices to minimize the potential for sedimentation, erosion and pollution of coastal waters. The applicants will ensure that their contractor shall perform all earthwork and grading in conformance with:

- (a) “Storm Drainage Standards,” County of Hawai‘i, October, 1970, and as revised.
- (b) Applicable standards and regulations of Chapter 27, “Flood Control,” of the Hawai‘i County Code.
- (c) Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).
- (d) Applicable standards and regulations of Chapter 10, “Erosion and Sedimentation Control,” of the Hawai‘i County Code.
- (e) Conditions of an NPDES permit, if required, and any additional best management practices required by the Board of Land and Natural Resources.

In addition, as part of construction, the applicants will require that the construction contractor implement the following practices:

- The total amount of land disturbance will be minimized. The construction contractor will be limited to the delineated construction work areas within the lot.
- The contractor will not allow any sediment to leave the site, particularly towards the ocean.
- Construction activities with the potential to produce polluted runoff will not be allowed during unusually heavy rains or storm conditions that might generate storm water runoff.
- Cleared areas will be replanted or otherwise stabilized as soon as possible.

Upon its completion, the home will be similar to dozens of homes on shoreline lots in the area and is not expected to contribute to sedimentation, erosion, and pollution of coastal waters.

3.1.4 Flora and Fauna

Environmental Setting: Flora

Prior to human settlement of Hawai‘i, the natural vegetation of this part of this part of Puna shoreline was mostly coastal forest and strand vegetation, dominated by *naupaka* (*Scaevola taccada*), *hala* (*Pandanus tectorius*), *‘ōhi‘a* (*Metrosideros polymorpha*), *nanea* (*Vigna marina*) and various sedges and coastal herbs

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(Gagne and Cuddihy 1990). The site was systematically inspected for plants on several occasions, first by biologist Julie Leialoha and later by botanist Layne Yoshida. Both reports are included as Appendix 2. Special attention was paid in these surveys and subsequent field visits by the author of this EA to the presence of endangered species, particularly *Ischaemum byrone*, a State and federally listed endangered grass known to grow in the general area.

The Conservation District zone of the property was intensively surveyed on February 19, 2007, by Ms. Leialoha, who found that the overall dominant native species was *hala*. Coconut trees and scattered patches of *naupaka* make up the dominant species closest to the ocean. Though she had encountered the endemic species *Ischaemum byrone* in various parts of the Puna coastline, none were found on the property during the survey. Mr. Yoshida surveyed the entire property on August 21, 2009. He found that it could be divided into four vegetative communities. The largest is the Rose Apple Forest (*Syzygium jambos*), which occupies the *mauka* two-thirds of the property. The second community is the Hala Forest, which occupies most of the remainder of the lot except the shoreline area, which contains a third type consisting of weedy areas and a Coconut Forest. A miscellaneous fourth type has been mechanically cleared in the recent past and exhibits various early successional weeds.

The canopy in the Rose Apple Forest is uniformly 15 to 25 feet tall with 90 percent cover. In addition to rose apple, which occupies about 75 percent of the canopy, other trees including mango (*Mangifera indica*) and cecropia (*Cecropia obtusifolia*) are present. The rose apple trees have been greatly affected by a fungal pathogen that was recently introduced into Hawai'i accidentally. This pathogen has damaged most of the young shoots and as a consequence the trees are denuded and unsightly (Figure 2). Furthermore, the understory is not as shaded as it would be if the trees had healthy foliage and is being rapidly invaded by weeds such as strawberry guava (*Psidium cattleianum*), yellow guava (*Psidium guajava*) and melastoma (*Melastoma* sp.). The most noticeable feature of the herb layer in this community are patches of 'awapuhi (*Zingiber zerumbet*), a Polynesian introduction. Shade tolerant species such as basket grass (*Oplismenus* sp.), thimbleberry (*Rubus rosifolius*) and maile-scented fern (*Phymatosorus grossus*) are also found throughout this community.

The Hala Forest in this area is second-growth but typical of the natural vegetation. Because of the dense layer of *hala* leaves on the ground there are very few plants in the understory, even *hala* seedlings. The *hala* grove is so small that without maintenance it will likely be degraded and eventually overrun by aggressive non-native species already growing along the edge of the grove, such as California grass (*Brachiaria mutica*), maile pilau (*Paederia foetida*), melochia (*Melochia umbellata*), and moonflower (*Ipomoea alba*).

Of relevance in the remaining zones is the shoreline-bordering coconut, which provides scenic interest, useful nuts, and leaves from scattered *hala* trees, and is a reminder of the traditional use of the area. Areas of the property without a dense forest cover were being overrun by a wide variety of herbaceous weeds during the 2007 and 2009 surveys. Such areas also had many seedlings (which are now saplings or trees) of the rapidly growing gunpowder tree (*Trema orientalis*). The herbaceous weeds are rapidly being replaced by non-native shrubs and trees.

No rare, threatened or endangered species were found in any part of the property. Lists of the species detected on the property itself are found in Appendix 2.

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Environmental Setting: Fauna

Typical expected birds, some of which were observed during site visits, include Common Myna (*Acridotheres tristis*), Northern Cardinal (*Cardinalis cardinalis*), Spotted Dove (*Streptopelia chinensis*), Japanese White-eye (*Zosterops japonicus*), and House Finch (*Carpodacus mexicanus*). No native birds were identified during site visits, and it is unlikely that many native forest birds would be expected to use the project site due to its low elevation, alien vegetation and lack of adequate forest resources. Common shorebirds, such as Golden Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*), and Wandering Tattler (*Heteroscelus incanus*), can be observed on the basalt shelf fronting the property, feeding on shoreline resources. They would be unlikely to make much use of the property itself, which is densely vegetated and offers no habitat for them.

As with all of East Hawai'i, several endangered native terrestrial vertebrates may be present in the general area and may overfly, roost, nest, or utilize resources of the property. These include the endangered Hawaiian Hawk (*Buteo solitarius*), the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened Newell's Shearwater (*Puffinus auricularis newelli*).

Other mammals in the project area are all introduced species, including feral cats (*Felis catus*), feral pigs (*Sus scrofa*), small Indian mongooses (*Herpestes a. auro-punctatus*) and various species of rats (*Rattus* spp.). None are of conservation concern and all are deleterious to native flora and fauna.

The coastal and marine fauna and flora are typical of the high-energy coasts of Puna, which are young ecosystems with limited coral growth but a variety of algae, fish and invertebrates. Marine mammals and reptiles, some of them endangered, also visit the Puna coastal waters.

Impacts and Mitigation Measures

Because of the minor nature of the project and the lack of sensitive terrestrial ecosystems and threatened or endangered plant species, construction and use of the single-family residence are not likely to cause adverse biological impacts. The applicants are planning minimal landscaping utilizing mainly the native and Polynesian species found in the area. Although the area planned for the home contains *hala* (most of which has sprouted since bulldozing in the 1970s and more recently), *hala* that will not be disturbed is also abundant in the Coconut Forest in the 40-foot setback area. The location of the house also avoids disruption of the shoreline coconut grove. The precautions for preventing effects to water quality during construction listed above in Sections 3.1.1 and 3.1.6 will reduce adverse impact on aquatic biological resources in coastal waters to negligible levels.

In order to avoid impacts to the endangered but regionally widespread terrestrial vertebrates listed above, the applicants have committed to conditions that are proposed for the CDUP. Specifically, construction will commit to refrain from activities that disturb or remove the vegetation between May 15 and August 15, when Hawaiian hoary bats may be sensitive to disturbance. If landclearing occurs between the months of March and September, inclusive, a pre-construction hawk nest search by a qualified ornithologist using

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standard methods will be conducted. If Hawaiian Hawks are present, no land clearing will be allowed until October, when hawk nestlings will have fledged. Finally, the applicants agree to shield any exterior lighting from shining upward, in conformance with Hawai'i County Code § 14 – 50 et seq., to minimize the potential for disorientation of seabirds.

3.1.4 Air Quality, Noise, and Scenic Resources

Environmental Setting

Air quality in the area is generally excellent, due to its rural nature and minimal degree of human activity, although vog, sulfur dioxide and particulate matter from Kilauea volcano is occasionally blown into this part of Puna. Noise on the site is low, and is derived from natural sources (such as surf and wind) due to the very rural nature of the area.

The area shares the quality of scenic beauty along with most of the Puna coastline. The County of Hawai'i General Plan contains Goals, Policies and Standards intended to preserve areas of natural beauty and scenic vistas from encroachment. The General Plan discusses the black sand beaches and tidal ponds as noted features of natural beauty in Puna, but among specific examples of natural beauty does not identify any features or views within several miles of the property. Coastal views from the Government Beach Road are totally obstructed by 1,000 feet of dense vegetation.

Impacts and Mitigation Measures

The project would not affect air quality or noise levels in any substantial ways. Brief and minor adverse effects would occur during construction. However, there are virtually no sensitive noise receptors in the vicinity, and given the small scale of the project, noise mitigation will likely not be necessary.

Because all grading and construction except enlargement of the driveway would occur hundreds of feet away from the *mauka* and *makai* edges of the property, with dense intervening vegetation on both sides, construction and occupation of the single-family home would have virtually no visual impacts. Inside the property, the attractive design of the home and the landscaping that will replace non-native with native and Polynesian vegetation will enhance the scenic character of the property.

3.1.6 Hazardous Substances, Toxic Waste and Hazardous Conditions

Based on onsite inspection and the lack of any known former use on the property, it appears that the site contains no hazardous or toxic substances and exhibits no other hazardous conditions. In addition to the measures related to water quality detailed in Section 3.1.3, in order to ensure to minimize the possibility for spills of hazardous materials, the applicants propose the following conditions of the CDUP:

- Unused materials and excess fill will be removed and disposed of at an authorized waste disposal site.
- During construction, emergency spill treatment, storage, and disposal of all hazardous materials, will be explicitly required to meet all State and County requirements, and the contractor will be

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asked to adhere to “Good Housekeeping” for all appropriate substances, with the following instructions:

- Onsite storage of the minimum practical quantity of hazardous materials necessary to complete the job;
- Fuel storage and use will be conducted to prevent leaks, spills or fires;
- Products will be kept in their original containers unless unresealable, and original labels and safety data will be retained;
- Disposal of surplus will follow manufacturer’s recommendation and adhere to all regulations;
- Manufacturers’ instructions for proper use and disposal will be strictly followed;
- Regular inspection by contractor to ensure proper use and disposal;
- Onsite vehicles and machinery will be monitored for leaks and receive regular maintenance to minimize leakage;
- Construction materials, petroleum products, wastes, debris, and landscaping substances (herbicides, pesticides, and fertilizers) will be prevented from blowing, falling, flowing, washing or leaching into the ocean
- All spills will be cleaned up immediately after discovery, using proper materials that will be properly disposed of;
- Regardless of size, spills or toxic or hazardous materials will be reported to the appropriate government agency;
- Should spills occur, the spill prevention plan will be adjusted to include measures to prevent spills from re-occurring and for modified clean-up procedures.

3.2 Socioeconomic and Cultural

3.2.1 Land Use, Socioeconomic Characteristics and Recreation

Existing Environment

Because of the gradual occupation of lots developed during widespread land subdivision about fifty years ago, the Puna District where the Gapp property is located has been the Big Island’s fastest-growing district over the last thirty years. Population as measured in the 2010 U.S. Census was 45,326, a 66 percent increase over the 2000 count of 27,232. Despite a lack of basic infrastructure such as paved roads and water in most subdivisions, the relatively inexpensive lots, which typically range in size from one to three acres, have attracted residents from the U.S. mainland and other parts of the State of Hawai‘i seeking more affordable property. The basis of the economy of Puna has evolved from cattle ranching and sugar to diversified agriculture, various services for the growing populations, commuting to Hilo, and tourism, which has been stimulated by being home to Kilauea, one of the world’s most active volcanoes.

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Some of the subdivisions have become essentially bedroom communities for Hilo's workforce, as evidenced by the heavy flow of Hilo-bound traffic during the AM rush hour.

The Gapp property is bordered by the shoreline to the north, by the Government Beach Road to the south, and by unoccupied private properties on the east and west. Across the Government Beach Road is pasture land owned by the Department of Hawaiian Home Lands (DHHL). The property is also very close to Hawaiian Paradise Park, one of the largest and most populous residential/ agricultural subdivisions in Hawai'i, with 9,000-plus lots, and 11,404 residents according to the 2010 census. Like all other areas in Puna, there is a high demand for coastal recreation here. Despite the long coastline, there are few beaches in Puna, and in most location, ocean recreation consists primarily of fishing from the cliffs and enjoying limited bathing in tidepools. The tidepools at Auwae, a few hundred feet to the northwest of the shoreline edge of the property, are frequented by many local residents and the occasional tourist for sunbathing, fishing, *opihi* gathering, dipping in the water, and tidepool viewing. Pedestrian access to the Auwae tidepool area is either along the shoreline from the southeast end of Hawaiian Paradise Park via Ala Heiau Road or via an informal but long used trail on an old jeep road on the private, undeveloped lot directly northwest of the Gapp property (TMK 1-5-010:011). The shoreline in front of the Gapp property (see Figure 2) contains tidepools *makai* of the boulders and is used for fishing and gathering.

Impacts and Mitigation Measures

No adverse socioeconomic impacts are expected to result from the project. The project will have a very small positive economic impact for the County of Hawai'i. The residence and associated improvements will not adversely affect recreation, as access along the coast and the path to the ocean that lie northwest of the property will undergo no changes or restrictions.

3.2.2 Cultural and Historic Resources

An archaeological inventory survey, burial treatment plan, preservation plan and cultural impact assessment have all been prepared for the property. The last three of these reports are presented in Appendices 3a-c (the archaeological inventory survey results are largely contained in the other reports and are thus not repeated) and summarized in the section below, which also includes information from other sources. Research for these studies included primary fieldwork, consultation of archaeological and ethnographical studies, and primary documents including maps and Mahele testimony. Also conducted was consultation of lineal and cultural descendants in the area, including Nicole Lui and Richard Ha. In the interest of readability, the summary below does not include all scholarly references; readers interested in extended discussion and sources may consult Appendices 3a-c.

Historical and Cultural Background

The first inhabitants of Hawai'i were believed to be settlers who had undertaken difficult voyages across the open ocean. For many years, researchers have proposed that early Polynesian settlement voyages between Kahiki (the ancestral homelands of the Hawaiian gods and people) and Hawai'i were underway by A. D. 300 (Kirch 1985), although recent work suggests that Polynesians may not have arrived in Hawai'i until at least A. D. 1000 (Kirch 2010).

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The initial inhabitants of Hawai‘i are believed to have come from the southern Marquesas Islands and settled initially on the windward side, eventually expanding to leeward areas. Early Hawaiian farmers developed new strategies and tools for their new environment (Kirch 1985; Pogue 1978). Societal order was maintained by their traditional philosophies and by the conical clan principle of genealogical seniority (Kirch 1984). Universal Polynesian customs brought from their homeland included the observance of major gods *Kane*, *Ku*, and *Lono*; the *kapu* system of law and order; cities of refuge, various superstitions, and the concepts of *mana* and the *‘aumakua* (Fornander 1969).

The Development Period, believed under Kirch’s new concept to have occurred from A. D. 1100 to 1350, brought an evolution of traditional tools, including a variation of the adze (*ko‘i*), and some new Hawaiian inventions such as the two-piece fishhook and the octopus-lure breadloaf sinker. That was followed by the Expansion Period (A. D. 1350 to 1650) which saw greater social stratification, intensive land modification, and population growth. This period was also the setting for the second major migration to Hawai‘i, this time from Tahiti. Also established during this period was the *ahupua‘a*, a land-use concept that incorporated all of the eco-zones from the mountains to the shore and beyond. The usually wedge-shaped *ahupua‘a* provided a diverse subsistence resource base (Hommon 1986) and added another component to what was already becoming a well-stratified society (Kirch 1985).

Ahupua‘a were ruled by *ali‘i ‘ai ahupua‘a* or lesser chiefs and managed by a *konohiki*. *Ali‘i* and *maka‘ainana*, or commoners, were not confined to the boundaries of *ahupua‘a* as resources were shared when a need was identified. *Ahupua‘a* were further divided into smaller sections such as *‘ili*, *mo‘o‘aina*, *pauku‘aina*, *kihapai*, *koele*, *hakuone* and *kuakua*. The chiefs of these land units have their allegiance to a territorial chief or *mo‘i* (literally translated as king) (Hommon 1986). The project site is located within Maku‘u *Ahupua‘a*, a land unit of the District of Puna, one of six major districts on the island of Hawai‘i.

As population grew during the following centuries so did the reach of inland cultivation in the upland environmental zones and consequent political and social stresses. During the Proto-Historic Period (A. D. 1650-1795), wars reflective of a complex and competitive social environment are evidenced by *heiau* building. During this period, sometime during the reign of Kalaniopu‘u (A. D. 1736-1758), Kamehameha I was born in North Kohala.

As McGregor stated, “Puna is where new land is created and new growth and new life sprout. The new land is sacred, fresh, clean, and untouched. After vegetation begins to grow upon it, it is ready for human use.” (2007:145). In Precontact and early Historic times the people lived in a small number of small settlements along the coast where they subsisted on marine resources and agricultural products. Each of the villages, McEldowney notes:

“...seems to have comprised the same complex of huts, gardens, windbreaking shrubs, and utilized groves, although the form and overall size of each appear to differ. The major differences between this portion of the coast and Hilo occurred in the type of agriculture practiced and structural forms reflecting the uneven nature of the young terrain. Platforms and walls were built to include and abut outcrops, crevices were filled and paved for burials, and the large numbers of loose surface stones were arranged into terraces. To supplement the

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limited and often spotty deposits of soil, mounds were built of gathered soil, mulch, sorted sizes of stones, and in many circumstances, from burnt brush and surrounding the gardens. Although all major cultigens appear to have been present in these gardens, sweet potatoes, ti (*Cordyline terminalis*), noni (*Morinda citrifolia*), and gourds (*Lagenaria siceraria*) seem to have been more conspicuous. Breadfruit, pandanus, and mountain apple (*Eugenia malaccensis*) were the more significant components of the groves that grew in more disjunct patterns than those in Hilo Bay” [1979:17].

Puna was a region famed in legendary history for its associations with the goddess Pele and god Kāne. Because of the relatively young geological history and persistent volcanic activity, the region has a strong association with Pele. However, the connection to Kāne is perhaps more ancient. Kāne, ancestor to both chiefs and commoners, is the god of sunlight, fresh water, verdant growth, and forests. It is said that before Pele migrated to Hawai‘i from Kahiki, Puna was esteemed the most beautiful place in the islands by many. Contributing to that beauty were the groves of fragrant hala and forests of ‘ōhi‘a lehua for which Puna was famous. The inhabitants of Puna were likewise famous for their expertise and skill in *lauhala* weaving.

Traditional life in Hawai‘i took a sharp turn on January 18, 1778 with the arrival of British Capt. James Cook in the islands. On a return trip to Hawai‘i ten months later, with a Maui turmoil still raging, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawai‘i Island. Cook exchanged gifts with Kalaniopu‘u at Kealahou Bay the following January, and Cook left Hawai‘i in February. However, Cook’s ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealahou, setting the stage for his death on the shores of the bay.

During the Proto-Historic Period there was a continuation of the trend toward intensification of agriculture, *ali‘i*-controlled aquaculture, settling of upland areas and development of traditional oral history. The *Ku* cult, *luakini heiau* and the *kapu* system were at their peaks, but the influence of western civilization was being felt in the introduction of trade for profit and a market-system economy. By 1810, the sandalwood trade established by Europeans and Americans twenty years earlier was flourishing. That contributed to the breakdown of the traditional subsistence system as farmers and fishermen were required to toil at logging, which resulted in food shortages and a decline in population.

The rampant sandalwood trade resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of western ways continued with the short-lived whaling industry to the production of sugarcane, which was more lucrative but carried a heavy environmental price.

Following the death of Kamehameha I in 1819, the customary relaxing of *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of ‘aumakua images was allowed to continue.

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In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai‘i scouting communities in which to establish church centers for the growing Calvinist mission. Ellis recorded observations made during this tour in a journal (Ellis 1963). His writings contain descriptions of residences and practices elsewhere in Puna that are applicable to the general study area:

“As we approached the sea, the soil became more generally spread over the surface, and vegetation more luxuriant. About two p.m. we sat down to rest. The natives ran to a spot in the neighbourhood, which had formerly been a plantation, and brought a number of pieces of sugar-cane, with which we quenched our thirst, and then walked on through several plantations of sweet potato belonging to the inhabitants of the coast . . . (Ellis 1963:182-183)

The population in this part of Puna, though somewhat numerous, did not appear to possess the means of subsistence in any great variety or abundance; and we have often been surprised to find desolate coasts more thickly inhabited than some of the fertile tracts in the interior; a circumstance we can only account for, by supposing that the facilities which the former afford for fishing, induce the natives to prefer them as places of abode; for they find that where the coast is low, the adjacent water is usually shallow.

We saw several fowls and a few hogs here, but a tolerable number of dogs, and quantities of dried salt fish, principally albacores and bonitos. This latter article, with their *poē* [*poi*] and sweet potatoes, constitutes nearly the entire support of the inhabitants, not only in this vicinity, but on the sea coasts of the north and south parts of the island.

Besides what is reserved for their own subsistence, they cure large quantities as an article of commerce, which they exchange for the vegetable productions of Hilo and Mamakua [*Hāmākua*], or the *mamake* and other tapas of Ora [*‘Ōla‘a*] and the more fertile districts of Hawaii.

When we passed through Punau [*Pānau*], Leapuki [*Laeapuki*], and Kamomoa [*Kamoamo*], the country began to wear a more agreeable aspect. Groves of coca-nuts ornamented the projecting points of land, clumps of kou-trees appeared in various directions, and the habitations of the natives were also thickly scattered over the coast . . .” (Ellis 1963:190-191).

A year after Ellis’ visit, in 1824, the ABCFM established a base church in Hilo. From that church (Haili), the missionaries traveled to the more remote areas of the Hilo and Puna Districts. David Lyman, who came to Hawai‘i in 1832, and Titus Coan who arrived in 1835, were two of the most influential Congregational missionaries in Puna and Hilo. As part of their duties they compiled census data for the areas within their missions. In 1835, 4,800 individuals were recorded as residing in the district of Puna; the smallest total district population on the island of Hawai‘i. In 1841, Titus Coan recorded that most of the 4,371 recorded residents of Puna, lived near the shore, though there were hundreds of individuals who lived inland. One of the coastal settlement areas was Maku‘u, in the vicinity of the Gapp property.

In 1846, Chester S. Lyman, “a sometime professor” at Yale University visited Hilo, Hawai‘i, staying

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with Titus Coan (Maly 1998). Traveling the almost 100 mile long stretch of the “Diocese” of Mr. Coan, Lyman reported that the district of Puna had somewhere between 3,000 to 4,000 inhabitants (Ibid). Entering Puna from Hilo, and traveling to Kea‘au along the coast, Lyman offered the following observations:

“The groves of Pandanus were very beautiful, and are the principal tree of the region. There is some grass and ferns, and many shrubs; but the soil is very scanty. Potatoes are almost the only vegetable that can be raised, and these seem to flourish well amid heaps of stone where scarcely a particle of soil could be discovered. The natives pick out the stones to the depth often of from 2 to 4 feet, and in the bottom plant the potato—how it can expand in such a place is a wonder.

Nearly all Puna is like this. The people are necessarily poor—a bare subsistence is all they can obtain, and scarcely that. Probably there are not \$10 in money in all Puna, and it is thought that not over one in five hundred has a single cent. The sight of some of these potatoe patches would make a discontented N.E. farmer satisfied with his lot. Yet, I have nowhere seen the people apparently more contented & happy” (Maly 1998:35).

The *Mahele ‘Aina* took place in 1848, placing all land in Hawai‘i into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were “subject to the rights of the native tenants,” or those individuals who lived on the land and worked it for their subsistence and for their chiefs. As a result of the Māhele of 1848, the *ahupua‘a* of Maku‘u was retained as Government Lands, and no *kuleana* parcels were awarded in the *ahupua‘a*. Between 1852 and 1855 portions of the *ahupua‘a* were divided and sold as fee simple Land Grants. The Land Grants were sold to Native tenants who were interested in acquiring the land upon which they lived, or land that they felt they could cultivate. The Gapp property is a portion of Lot 1 of Grant No. 1013 to D.W. Maiau.

In 1848, the Hawaiian Government also conducted a survey of schools on the Island of Hawai‘i. The survey included a school in Maku‘u Ahupua‘a. The location of the Maku‘u school lot is not known from any maps, but interestingly, the 1848 school report lists Maiau, who received Grant No. 1013, as the teacher in Maku‘u. The report lists Maiau’s salary as 12½ cents per day, the number of students taught as 18, and the subjects taught as reading, arithmetic, geography, penmanship, philosophy, science, and religion (Maly 1999:63). The school continued until about 1891, according to reports.

By 1873, the Government Road from Hilo through Puna had been completed to at least Maku‘u (Maly 1999). The road likely followed the route of an older pedestrian trail. Cattle ranching got its start in the area around this time. In 1872, Obed B. Spencer, a rancher, leased the massive Kea‘au Ahupua‘a northwest of Maku‘u Ahupua‘a from Charles Kanaina and Charles R. Bishop, guardians of William C. Lunalilo for a term of ten years beginning September 1, 1873. Spencer then transferred the lease and sold his personal property to J.O. Dominis and R. A. Lyman. In 1874, the two men expanded into additional *ahupua‘a*, including Maku‘u, Hālonā, Keoneopoko Iki, Ka‘ohe, and Pōpōkī for a term of ten years (Maly 1999). After several more transfers, by 1879 J. Elderts and W.H. Shipman’s Kea‘au Ranch included most of the lands between Kea‘au and Kapoho Ahupua‘a (Cahill 1996).

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On February 28th, 1876, the Boundary Commission heard testimony from Palau, a resident of Maku‘u, concerning the boundaries of Waikahekahe Iki Ahupua‘a (along the northwestern boundary of Maku‘u Ahupua‘a). Palau’s statement for the adjacent property provides a fascinating glimpse into the deep knowledge and presumed utility of local botanical and geological features:

“...I was born at Waikahekaheiki Puna, Hawai‘i, at the time of Niaukani o Kalii (ca. 1811) and was grown up when missionaries first came to Hilo. I now live at Makuu the adjoining land. Have always lived on these two lands. I am a kamaaina of Waikahekaheiki. My mother Mau was a kamaaina of the land, and showed me the boundaries. The boundary at the shore between this land and land of Makuu, is at a kaulapa [a ridgeline or point] called Kuwelu [Ku‘uwelo], there is also a mauwae [fissure] there: Thence the boundary runs mauka along the Kaulapa to the end of it, and on across the Govt. road to an ahu Pahoehoe [pāhoehoe rock cairn] near the road; thence mauka to old road to an ahu pohaku [stone cairn] at place called Kaumanumanu, thence mauka across old pahoehoe to the pili place called Kulanapahu. Thence to pili on Hilo side of grove of breadfruit trees at place called Kahoolua. Thence mauka to pili on Hilo side of Puunanaio, a breadfruit tree and old mahina ai [cultivated field]. Thence boundary runs mauka across pahoehoe to place called Papamaihi ani oioina [trail side resting place] on the old road from Kaimu. Thence mauka to Puna side (or Kau side) of where houses used to be at old cultivating ground at place called Wahileolae. The point of woods called Makaohe are on Makuu, and part of pahoehoe. Thence the boundary runs mauka to old road from Kaunamano to Kalae, where I was told Waikahekaheiki ends. This land is bounded makai by the sea. The ancient fishing rights extend way out to sea...” (Volume B:399-400 in Maly 1999:56-57).

In 1877, H.R. Hitchcock, the Inspector General of schools, reported that the schools in Puna had deteriorated from their former good standing owing to the resignation of some of the best teachers (Maly 1999:83). He noted that “the schools in Keauhou and Makuu are both very small, and as they are within three miles of each other, I have told the school agent to unite the two under one teacher, who shall teach two or more hours at each place, daily” (in Maly 1999:83). Hitchcock also described the difficulty students had keeping animals out of their fields (the produce from the fields was used to finance the school’s operation). Typically, to keep the animals out, they had to enclose the school lots with high walls and not include a gateway.

Around this time Henry M. Whitney, editor of the Hawaiian Gazette began publishing promotional guides of Hawai‘i to encourage tourism to the Islands. In 1890 he published an account of travel along the Hilo and Puna coastal road. He observed that at “Makuu, 15 miles from Hilo, there is quite a little settlement” (Whitney in Maly 1999:40). A survey for a new inland road through Puna District was completed in 1891. Prof. W. D. Alexander, the Surveyor General for this Hawaiian Government Survey, included several interesting notes on the terrain, vegetation, and population distribution of Maku‘u Ahupua‘a and neighboring lands in his report on the progress of the survey. He noted the sparse ‘*ohi‘a* forests, the numerous ‘*awa* and banana shrubs, the occasional remaining inhabitant, and the ever-worsening state of the coastal road.

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Land use in the Puna District changed quickly in the late 19th century. By 1900, the new inland highway had been completed. Between 1894 and 1900, W. H. Shipman, who had by that time acquired sole interest in Kea‘au Ahupua‘a and neighboring lands, sold nearly 4,000 acres to various individuals for the cultivation of coffee and in 1899 he leased nearly 4,000 acres to the Ola‘a Sugar Company, Ltd. (Maly 1999). In 1901, 1911, and 1912, A. B. Loebstien and T. Cook surveyed the boundaries of Shipman’s lands. Many of the informants for the surveys were native residents of Kea‘au and Maku‘u. Interestingly, Grant No. 1013, of which the Gapp property is a part, was transferred in the early 1900s to Keanalia Pu‘ukoholā, one of the informants for T. Cook (Maly 1999). Register map No. 2258 (ca. 1903) shows a single house within the boundaries of Grant No. 1013:1 (see Figure 6 of CIA in Appendix 2). The house is located in the southern corner of the grant boundary near the Government Beach Road, outside of the Gapp property. A 1924 Maku‘u U.S.G.S. Quadrangle map shows two different houses within the grant parcel; both are located in the northern corner of the parcel near the coast, outside the Gapp property.

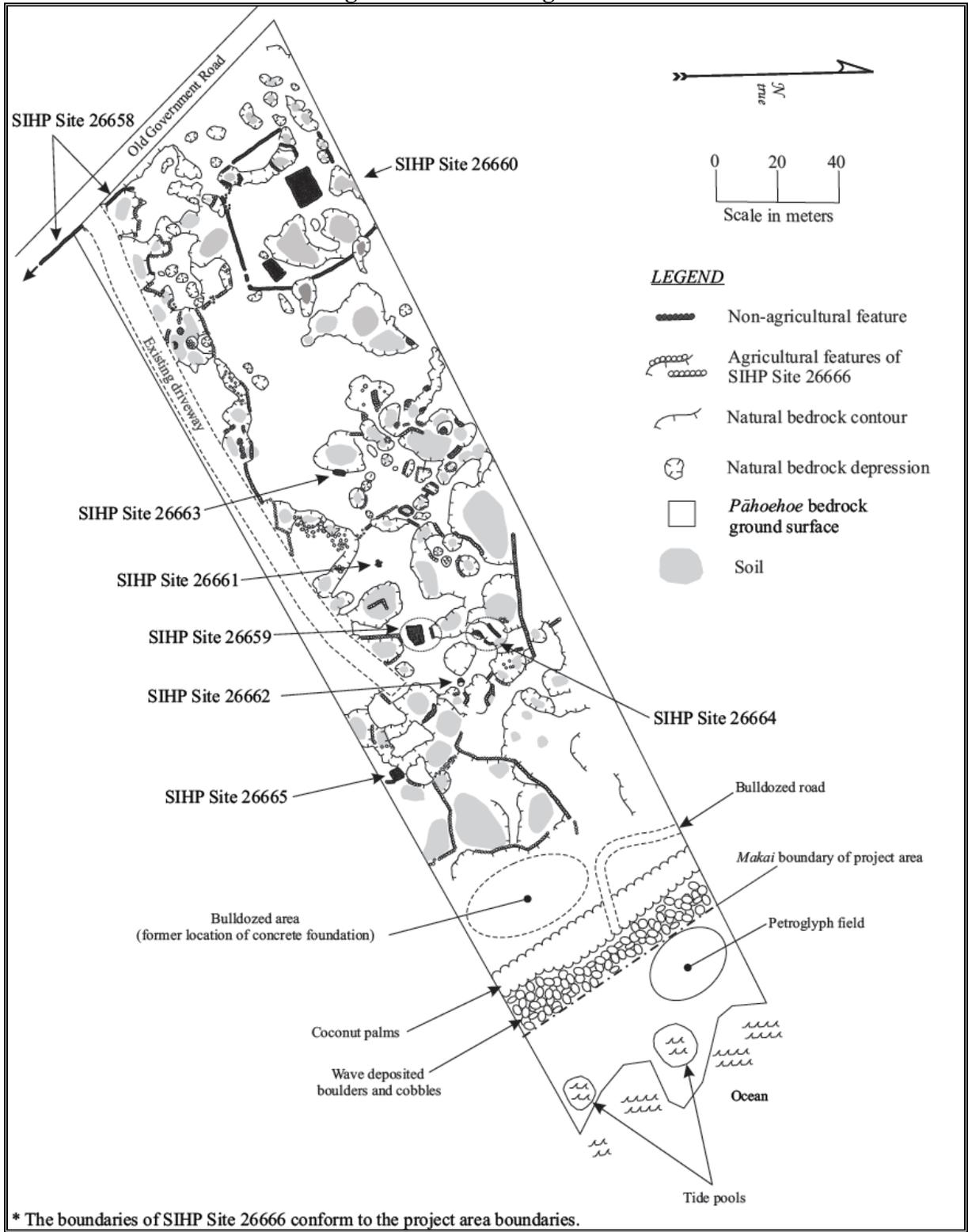
During the early part of the 20th century the Puna District underwent further and even more drastic changes. The native system of agriculture had nearly completely disappeared as a result of the drastic population decline, and ranching, sugarcane, coffee, and lumber became the dominant industries. The Keaau Ranch had begun grazing cattle as early as the 1850s and ranching operations continued to expand during this time. The Olaa and Puna Sugar Companies operated in Puna from 1900 until the 1980s. Beginning in 1900, railroad tracks were laid by the Hawaii Railway Company for hauling sugarcane (and passenger travel) from the fields in lower Puna to the mills in Pahoa and Kea‘au. The railroad passed through Maku‘u Ahupua‘a several miles *mauka* of the shore, stopping at the Maku‘u Station house. The railroad ceased operations in 1946. By 1950, most inhabitants of this part of the Puna coast moved away.

Archaeological Investigations and Resources

As perhaps indicated by the cultural and historical background, the diverse activities on and about the current Gapp property throughout several eras can be expected to have left abundant remains. The property was subject to an archaeological inventory survey conducted by Rechtman Consulting, LLC (Clark et al. (2008), as a result of which, nine archaeological sites containing sixty-seven features were recorded. Table 1 summarizes information about the sites, details of which can be found in Appendices 2a-c. As can be seen in Figure 4, the sites are distributed in most areas of the property except the *makai*-most area.

The two habitation sites (Sites 26659 and 26660) and the modified bedrock hole (Site 26661) are located on a raised linear spine of pahoehoe bedrock that runs from the Government Beach Road to the *makai* portion of project area near the coast. This area is elevated so that it stays dry during times of heavy rain, and it provides the easiest *mauka-makai* pedestrian access across the parcel. The bedrock ground surface is also unsuitable for agriculture, as very little soil is present. The remaining sites and features are

Figure 4 Archaeological Sites



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constructed along the north and south edges of this raised bedrock spine, or within natural, vertical sided depressions in the bedrock. Three of the depressions have overhanging edges that were blocked with walls to conceal Historic Period burials (Sites 26662, 26663, and 26664). Nearly all of the depressions contain at least thin soil, and many have been cleared and modified along their edges for planting purposes.

Table 1 Archaeological Sites

<i>SIHP Site #*</i>	<i>Formal Type</i>	<i>Functional Type</i>	<i>Temporal Association</i>
26658	Core-filled wall	Ranching/boundary	Historic
26659	Enclosure/pavement	Habitation	Historic
26660	Complex	Habitation	Historic
26661	Modified bedrock hole	Water collection/storage	Historic
26662	Concealed overhang	Burial	Historic
26663	Concealed overhang	Burial	Historic
26664	Concealed overhang	Burial	Historic
26665	Platform	Burial	Precontact
26666	Complex	Agriculture	Precontact/Historic

*All SIHP site numbers within the project area are preceded by the state, island, and quad prefix 50-10-45.

Evidence of Historic Period use of the project area is more prevalent at the recorded sites than Precontact Period use. Use of only one recorded site appears to date solely to Precontact times – Site 26665, a burial platform. It is likely however, that Precontact use was just as widespread, but that it was obscured by later Historic use. The features of the agricultural complex (Site 26666) appear to embody the formal attributes of both periods. These features were adapted over time, and new features were built, to suit the changing needs of the residents of this area, such as the need to keep cattle and goats out of agricultural areas. Evidence of Modern use of the project area is also widespread. Numerous plastic grow bags, fertilizer bags, plastic water bottles, and related agricultural items are littered on ground surface within the project area. Modern cultivation and bulldozing within the project area has likely affected some of the recorded features.

The archaeologist performing the inventory survey assessed the two habitation sites and the four burial sites as significant for preservation. The archaeologist’s assessments and recommendations were concurred with by the State Historic Preservation Division. For preservation purposes, the sites were grouped into four preservation areas. Two of the preserve areas are exclusively in the Agricultural District portion of the parcel, one is within the Conservation District portion of the parcel, and one spans both Districts (see Figure 14 in Appendix 3a for map of preservation areas). Follow-up preservation plans (see Appendices 3b-c) were prepared for these six sites by Scientific Consultant Services, Inc.

Impacts and Mitigation for Archaeological Resources

Because of the widespread archaeological sites on this property, which is adjacent to a popular shoreline recreation area and has already experienced degradation of sites through inadvertent and careless grading, trash dumping, and marijuana cultivation, protection of the sites will require implementation of the

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preservation plans and other precautions prior to construction. The presence of full-time residents, if they are mindful of the importance of preserving the sites, can actually assist in preservation through preventing unauthorized use.

The preservation plan for Site 26660 specified interim preservation measures that include setting up orange construction fencing around the site to create a 20-foot buffer zone within which no development activities can take place. Permanent preservation at this site will include delineating the 20-foot buffer with either a gated fence and/or natural landscaping barrier. The burial treatment plan was prepared for Sites 26662, 26663, 26664, and 26665, and was expanded to include the non-burial site 26659. Sites 26662, 26664, and 26659 are all contained within a single preserve area that measures 40 feet by 30 feet, with a 20-foot buffer measured from the outer edges of each site. Sites 26663 and 26665 each have a buffer of 20 feet from their outer edges. In addition to the buffers around the three-foot preservation buffer. Access to the burial sites by formally recognized lineal and/or cultural descendants is to be allowed with prior permission from the landowner.

In addition, both of the preservation plans specify that an archaeological monitor will be present during all earth-moving activities associated with development of the parcel. As a further precaution, in the unlikely event that additional undocumented archaeological resources, including shell, bones, midden deposits, lava tubes, or similar finds, are encountered during construction within the project site, it is recommended that work in the immediate area of the discovery shall be halted and SHPD contacted as outlined in Hawai'i Administrative Rules 13§13-275-12.

In order to ensure that impacts are avoided, it is recommended that full implementation of the preservation plan within a designated period of time, as well as the additional precautions listed above, be required as a condition of the Conservation District Use Permit for the single-family residence.

Other Cultural Resources and Practices

The burials and archaeological sites are significant culturally important resources on the property. The investigations of the property and its history did not reveal any cultural resources or practices aside from these resources. The consulted individuals with ties to and history with the area did not have any information concerning the specific property, but they did have many memories of traditional gathering and fishing on the shoreline with extended family. Fishing and gathering still occur on the shoreline *makai* of the property in an area. While some users are newcomers simply engaging in recreation and/or collecting food, others have deeper ties and are undertaking cultural practices as well. The Gapp property does not contain any springs, *pu'u*, or caves (other than the burial overhangs) that might be important cultural sites. The dense vegetation consists mainly of weedy trees and herbs with no cultural values or associations. However, the coconut grove on the shoreline provides nuts that fall onto the coastal basalt shelf and can continue to be used, and the *hala* adjacent to the shoreline can potentially be utilized.

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Impacts and Mitigation Measures to Other Cultural Resources

The burials and archaeological sites are the most significant cultural resources on the property. Adverse effects can be completely prevented through implementation of the Burial Treatment Plan and archaeological site preservation plan, as well as precautionary measures specified above. The applicants recognize the responsibility to allow visitation by recognized lineal descendants and to perpetually preserve the burial sites. The Gapps have proactively coordinated with lineal descendant Nicole Lui, who endorsed the decision to locate the home closer to the shoreline and away from the burials, so that lineal descendants visits to the burial area are facilitated and do not require any disturbance of the residents of the home (see emails in Appendix 1a). Ms. Lui also requested that the coconut and *hala* areas be somewhat preserved. Shoreline access and the cultural activities this affords will not be affected. The thick grove coconuts and *hala* present in the 40-foot shoreline setback would not be affected.

It is reasonable to conclude, based upon the limited range of resources and the proposed mitigation to all affected resources, that the exercise of native Hawaiian rights related to gathering, access or other customary activities will not be affected, and there will be no adverse effect upon cultural practices or beliefs. This Draft EA was distributed to agencies and groups who might have knowledge in order to confirm this finding.

3.3 Public Roads, Services and Utilities

3.3.1 Roads and Access

Existing Environment, Impacts and Mitigation Measures

The sole access to the project site is from the Government Beach Road, an unimproved, narrow, mostly unpaved public roadway extending from Beach Road in Hawaiian Paradise Park to Papio Street in Hawaiian Shores Recreational Estates to Kapoho (see Figure 1a and 1b).

3.3.2 Public Utilities and Services

Environmental Setting, Impacts and Mitigation Measures

Electricity and telephone poles and lines are present on Government Beach Road, and these services would be extended through underground conduits along the driveway to service the home. Domestic water supply would be through catchment, the most common method used by thousands of properties nearby in Hawaiian Paradise Park. Wastewater would be treated with a septic system in conformance with requirements of the State Department of Health (see Figure 3 for location). No parks, schools or other public facilities are present nearby. Police, fire and emergency medical service are available about ten miles away in Pahoia or Keaau.

There will be no adverse impact to any public or private utilities. The addition of one single-family home will have no measurable adverse impact to or additional demand on public facilities such as schools, police or fire services, or recreational areas. The applicants acknowledge and understand that this lot,

along with others in this part of the Puna District, is remote from emergency services.

3.4 Secondary and Cumulative Impacts

Due to its small scale, the proposed project would not produce any major secondary impacts, such as population changes or effects on public facilities.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. There are a number of single-family homes located on this section of Government Beach Road, and occasionally there are two or more houses under construction. Although the County of Hawai‘i in the past has discussed the possibility of paving and minor widening of the Government Beach Road, at this time there are no plans to do so. The adverse effects of building a single-family residence in this context are very minor and involve temporary disturbances to air quality, noise, traffic and visual quality during construction. It should again be noted that the proposed home is in a somewhat isolated, sparsely populated area, and no accumulation of adverse construction effects would be expected. Other than the precautions for preventing adverse impacts during construction listed above in Sections 3.1.3 and 3.1.6, no special mitigation measures should be required to counteract the small adverse cumulative effect.

3.5 Required Permits and Approvals

County of Hawai‘i:

Special Management Area Permit or Exemption
Plan Approval and Grubbing, Grading, and Building Permits

State of Hawai‘i:

Conservation District Use Permit
National Pollutant Discharge Elimination System Permit (potential)

3.6 Consistency With Government Plans and Policies

3.6.1 Hawai‘i County Land Use Designations and General Plan

The *General Plan* for the County of Hawai‘i is the document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i. The plan was adopted by ordinance in 1989 and revised in 2005. The General Plan’s Land Use Allocation Guide Map designates the subject parcel as Open. The *General Plan* is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai‘i. Below are pertinent sections followed by a discussion of conformance.

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ECONOMIC GOALS

- (a) Provide residents with opportunities to improve their quality of life through economic development that enhances the County's natural and social environments.
- (b) Economic development and improvement shall be in balance with the physical, social, and cultural environments of the island of Hawaii.
- (d) Provide an economic environment that allows new, expanded, or improved economic opportunities that are compatible with the County's cultural, natural, and social environment.

Discussion: The proposed construction and occupation of a single-family home is in balance with the natural, cultural and social environment of the County, would create temporary construction jobs for local residents, and would indirectly boost the economy through construction industry purchases from local suppliers. A multiplier effect takes place when these employees spend their income for food, housing, and other living expenses in the retail sector of the economy. Such activities are in keeping with the overall economic development of the island.

ENVIRONMENTAL QUALITY GOALS

- (a) Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.
- (b) Maintain and, if feasible, improve the existing environmental quality of the island.
- (c) Control pollution.

ENVIRONMENTAL QUALITY POLICIES

- (a) Take positive action to further maintain the quality of the environment.

ENVIRONMENTAL QUALITY STANDARDS

- (a) Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.
- (b) Incorporate environmental quality controls either as standards in appropriate ordinances or as conditions of approval.
- (c) Federal and State environmental regulations shall be adhered to.

Discussion: The proposed construction and occupation of a single-family home would not have a substantial adverse effect on the environment and would not diminish the valuable natural resources of the region. The home and associated improvements would be compatible with the existing rural single-family homes and recreational uses in the area. Pertinent environmental regulations would be followed, including those for mitigation of water quality impacts.

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HISTORIC SITES GOALS

- (a) Protect, restore, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.
- (b) Appropriate access to significant historic sites, buildings, and objects of public interest should be made available.

HISTORIC SITES POLICIES

- (a) Agencies and organizations, either public or private, pursuing knowledge about historic sites should keep the public apprised of projects.
- (b) Amend appropriate ordinances to incorporate the stewardship and protection of historic sites, buildings and objects.
- (c) Require both public and private developers of land to provide historical and archaeological surveys and cultural assessments, where appropriate, prior to the clearing or development of land when there are indications that the land under consideration has historical significance.
- (d) Public access to significant historic sites and objects shall be acquired, where appropriate.

Discussion: The archaeological inventory survey and burial treatment plan have properly documented and mitigated impacts to historic sites and provided fuller protection to a Hawaiian cultural resource.

FLOOD CONTROL AND DRAINAGE GOALS

- (a) Protect human life.
- (b) Prevent damage to man-made improvements.
- (c) Control pollution.
- (d) Prevent damage from inundation.
- (e) Reduce surface water and sediment runoff.
- (f) Maximize soil and water conservation.

FLOOD CONTROL AND DRAINAGE POLICIES

- (a) Enact restrictive land use and building structure regulations in areas vulnerable to severe damage due to the impact of wave action. Only uses that cannot be located elsewhere due to public necessity and character, such as maritime activities and the necessary public facilities and utilities, shall be allowed in these areas.
- (g) Development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works and in compliance with all State and Federal laws.

FLOOD CONTROL AND DRAINAGE STANDARDS

- (a) "Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.
- (b) Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.
- (c) Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).

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- (d) Applicable standards and regulations of Chapter 10, “Erosion and Sedimentation Control,” of the Hawaii County Code.
- (e) Applicable standards and regulations of the Natural Resources Conservation Service and the Soil and Water Conservation Districts.

Discussion: The property is within the Zone X, or areas outside of the 500-year Floodplain as determined by detailed methods in the community flood insurance study, according to the Flood Insurance Rate Maps (FIRM). The project will conform to applicable drainage regulations and policies of the County of Hawai‘i.

NATURAL BEAUTY GOALS

- (a) Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.
- (b) Protect scenic vistas and view planes from becoming obstructed.
- (c) Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

NATURAL BEAUTY POLICIES

- (a) Increase public pedestrian access opportunities to scenic places and vistas.
- (b) Develop and establish view plane regulations to preserve and enhance views of scenic or prominent landscapes from specific locations, and coastal aesthetic values.

Discussion: The improvements are minor and consistent with traditional uses of the land and will not cause scenic impacts or impede access.

NATURAL RESOURCES AND SHORELINES GOALS

- (a) Protect and conserve the natural resources from undue exploitation, encroachment and damage.
- (b) Provide opportunities for recreational, economic, and educational needs without despoiling or endangering natural resources.
- (c) Protect and promote the prudent use of Hawaii’s unique, fragile, and significant environmental and natural resources.
- (d) Protect rare or endangered species and habitats native to Hawaii.
- (e) Protect and effectively manage Hawaii’s open space, watersheds, shoreline, and natural areas.
- (f) Ensure that alterations to existing land forms, vegetation, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of an earthquake.

NATURAL RESOURCES AND SHORELINES POLICIES

- (a) Require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.

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- (c) Maintain the shoreline for recreational, cultural, educational, and/or scientific uses in a manner that is protective of resources and is of the maximum benefit to the general public.
- (d) Protect the shoreline from the encroachment of man-made improvements and structures.
- (h) Encourage public and private agencies to manage the natural resources in a manner that avoids or minimizes adverse effects on the environment and depletion of energy and natural resources to the fullest extent.
- (p) Encourage the use of native plants for screening and landscaping.
- (r) Ensure public access is provided to the shoreline, public trails and hunting areas, including free public parking where appropriate.
- (u) Ensure that activities authorized or funded by the County do not damage important natural resources.

Discussion: The home would be set back as far as feasible on the lot, about 200 feet from the shoreline (with the cabana/pavilion about 60 feet away), at an elevation of about 15 feet above sea level, and would not affect shoreline resources or be damaged by waves or tides.

3.6.2 Hawai'i County Zoning and Special Management Area

The State Land Use District for the area for the area of the property proposed for the single-family home is Conservation. *Mauka* of this coastal portion the property is within the State Land Use Agricultural District. The entire property is zoned by the County of Hawai'i as within the Agricultural District, minimum lot size of one acre (A-1a), although County zoning does not apply in the Conservation District portion of the property. No aspect of the project appears to be inconsistent with County zoning.

The entire property is within the Special Management Area. Single-family residences may be determined to be an exempt action under the County's Special Management Area (SMA) guidelines. The County of Hawai'i Planning Department requires preparation of an SMA Assessment Application, in which SMA issues are expressly dealt with. A summary of consistency is provided below.

The proposed land use complies with provisions and guidelines contained in Chapter 205A, Hawai'i Revised Statutes (HRS), entitled *Coastal Zone Management*. Single-family residences may be determined to be an exempt action under the County's Special Management Area (SMA) guidelines. The proposed use would be consistent with Chapter 205A because it would not affect public access to recreational areas, historic resources, scenic and open space resources, coastal ecosystems, economic uses, or coastal hazards.

The proposed improvements are not likely to result in any substantial adverse impact on the surrounding environment. The house site is set back from the shoreline and will not restrict any shoreline uses such as hiking, fishing or water sports. Lateral pedestrian use of the shoreline area will not be impacted and there will be no effect on the public's access to or enjoyment of this shoreline area. Furthermore, viewplanes towards the project site will not be adversely impacted in any substantial way, as views from the Government Road are totally blocked by trees. It is expected that the project will not result in any impact on the biological or economic aspects of the coastal ecosystem. The project site is not situated over any natural drainage system or water feature that would flow into the nearby coastal system. The property contains mostly non-native and a few common native plants. No floodplains are present in the area. In

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terms of beach protection, construction is set back from the shoreline and would not affect any beaches nor adversely affect public use and recreation of the shoreline in this area. No impacts on marine resources are likely to occur. Historic sites and cultural uses have been properly assessed.

The Planning Director has been asked to make the determination that the proposed development of a single-family home is not considered a “development” under Special Management Area Rules and Regulations of the County of Hawai‘i, Section 9-4 (10) (B).

3.6.3 Conservation District

The State Land Use District for the *makai* third of this property and adjacent properties is Conservation, as illustrated on Figure 3. Its subzone is Resource, for which, according to Hawai‘i Administrative Rules (HAR) §13-5-15, a single-family residence is an identified use. The portion of the property proposed for use is in the State Land Use Conservation District, Resource subzone. Any proposed use must undergo an examination for its consistency with the goals and rules of this district and subzone. The applicant has concurrently prepared a Conservation District Use Application (CDUA), to which this EA is an appendix. The CDUA includes a detailed evaluation of the consistency of the project with the criteria of the Conservation District permit process. Briefly, the following individual consistency criteria should be noted:

1. The proposed land use is consistent with the purpose of the Conservation District;

The development of the single-family residence is in conformance with the purpose of the Conservation District. The proposed use of the subject property for a single-family residence is an identified use within the Conservation District, requiring a Board Permit for such use. A commitment by the applicants to management of the site will conserve, protect and preserve the natural features on the subject property. The proposed use will not impact the lateral public access or the public’s ability to utilize the coastal resources that front this property. Additionally, due to the careful and limited nature of the proposed development, there would be no significant impacts to the natural or cultural resources of the area.

2. The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur;

The objective of the Resource subzone “...is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas.” This identified use, which conforms to the design standards in 13-5-41, will ensure the sustained use of the natural resources in the project area by mitigating potential impacts as outlined in this document. Single-family residences are an identified use in the Resource subzone under HAR 13-5-24, R-8.

3. The proposed land use complies with provisions and guidelines contained in Chapter 205A, Hawaii Revised Statutes (HRS), entitled "Coastal Zone Management," where applicable;

The proposed land use complies with provisions and guidelines contained in Chapter 205A, Hawai‘i Revised Statutes (HRS), entitled *Coastal Zone Management*, as discussed above in Section 3.6.2.

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4. The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region;

Because of the relatively minor nature of the project and the lack of native terrestrial ecosystems and threatened or endangered plant species, construction and use of the property for a single-family residence is not likely to cause adverse biological impacts. Impacts to the island wide-ranging endangered Hawaiian hoary bat and Hawaiian Hawk will be avoided through timing of vegetation removal and/or hawk nest survey. The applicants are planning to implement modest landscaping of the property, which, in part, is intended to minimize the visual impact of the structure as seen from adjacent public areas. Additionally, the construction of the proposed residence will allow for the management of the property, including preventing illegal dumping and inappropriate entry into the area containing the burial site. No effect on any coastal ecosystem will occur, because of the extensive vegetated area fronting the proposed home site, and the planned precautions for preventing soil runoff during constructions. The proposed action will also have no impact on the public's current access to or use of the shoreline area.

5. The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels;

The proposed use is consistent with single-family residential use in the area. The home will have low-key design of one story with 5,000 square feet total for all features, set back 200 feet from the shoreline in an area that will not be visible to the public. This identified use, which conforms to the design standards in HAR 13-5-41, will ensure the sustained use of the natural resources in the project area by mitigating impacts. The use will not adversely affect the surrounding properties or how these properties are utilized.

6. The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable;

The proposed use of the subject property for a single-family residence and commitment to management of the site will help conserve, protect and preserve the natural features of the area. Although some vegetation, including mostly non-native trees but also *hala* and few coconut trees, will be removed to provide an area for the home, the physical beauty characteristics of the existing lot will be enhanced by landscaping with native species, including *hala*.

7. Subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District;

The proposed action does not involve or depend upon subdivision and will not lead to any increase in intensity of use beyond the requested single-family residence.

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8. *The proposed land use will not be materially detrimental to the public health, safety and welfare.*

The general area is already in use for recreation by the public and the proposed single-family residence will not be detrimental to the public health, safety, and welfare.

PART 4: DETERMINATION, FINDINGS AND REASONS

4.1 Determination

The applicants expect that the State of Hawai‘i, Department of Land and Natural Resources, will determine that the proposed action will not significantly alter the environment, as impacts will be minimal, and that this agency will accordingly issue a Finding of No Significant Impact (FONSI). This determination will be reviewed based on comments to the Draft EA, and the Final EA will present the final determination.

4.2 Findings and Supporting Reasons

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resource would be committed or lost. Common native plants are present but native ecosystems would not be adversely affected. Valuable cultural resources in the form of four burial sites and archaeological sites will be preserved in place with more protection than exists currently. No valuable cultural resources and practices such as coastal access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* No restriction of beneficial uses would occur by residential use on this lot.
3. *The proposed project will not conflict with the State’s long-term environmental policies.* The State’s long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor and basically environmentally benign, and it is thus consistent with all elements of the State’s long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project would not have any substantial effect on the economic or social welfare of the Big Island community or the State of Hawai‘i.
5. *The proposed project does not substantially affect public health in any detrimental way.* The project would not affect public health and safety in any way. Wastewater will be disposed of in conformance with State Department of Health regulations.
6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* The small scale of the proposed project would not produce any major secondary impacts, such as population changes or effects on public facilities.

Gapp Single-Family Residence Environmental Assessment

7. *The proposed project will not involve a substantial degradation of environmental quality.* The project is minor and environmentally benign, and thus it would not contribute to environmental degradation.
8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* Thorough survey has determined that no endangered plant species are present. Other than bats and hawks, island wide-ranging species that will experience no adverse impacts due to mitigation in the form of timing of vegetation removal and/or hawk nest survey, no rare, threatened or endangered species of fauna are known to exist on or near the project site, and none would be affected by any project activities.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The adverse effects of building a single-family residence are very minor and temporary disturbance to traffic, air quality, noise, and visual quality during construction. This area is fairly isolated from other residences, and no accumulation of adverse construction effects would be expected. Other than the precautions for preventing adverse effects during construction listed above, no special mitigation measures should be required to counteract the small adverse cumulative effect.
10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* No substantial effects to air, water, or ambient noise would occur. Brief, temporary effects would occur during construction and would be mitigated.
11. *The project does not affect nor would it likely to be damaged as a result of being located in environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* The proposed home is not located in a flood zone. The project site is about 15 feet above sea level and about 200 feet from the shoreline, outside the area historically affected by tsunamis.
12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic views are located nearby or would be affected in any way. Coastal views from the Government Beach Road are totally obstructed by 1,000 feet of dense vegetation. The attractive design of the home and the landscaping, given the existing context in which the home would not be visible from public vantage points, would not materially degrade the scenery of the project area.
13. *The project will not require substantial energy consumption.* Negligible amounts of energy input would be required for construction.

Gapp Single-Family Residence Environmental Assessment

REFERENCES

- Boak, E. H. and Turner, I. L. 2005. "Shoreline definition and detection – A review." *Journal of Coastal Research* 21:688-703.
- Cahill, E. 1996. *The Shipmans of East Hawai'i*. Honolulu: University of Hawai'i Press.
- Ellis, W. 1963. *Journal of William Ellis*. Honolulu: Advertiser Publishing Co., Ltd.
- Fletcher, C. H., Boyd, R., Neal, W. J., and Tice, V. 2010. *Living on the Shores of Hawaii – Natural Hazards, the Environment, and our Communities*. Honolulu: University of Hawai'i Press.
- Fletcher, C. H., Grossman, E. E., Richmond, B. M. and Gibbs, A. E. 2002. *Atlas of Natural Hazards in the Hawaiian Coastal Zone*. U.S. Geological Survey, Geologic Investigations Series Map I-2761, scale 1:50,000.
- Fornander, A. 1969. *An Account of the Polynesian Race: Its Origin and Migrations*. Tokyo: Charles E. Tuttle Co., Inc.
- Hommon, R. 1986. Social Evolution in Ancient Hawai'i. IN Kirch, P. (editor), *Island Societies: Archaeological Approaches to Evolution and Transformation*:55-88. Cambridge: Cambridge University Press.
- Gagne, W., and L. Cuddihy. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds., *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Handy, E.S.C., and E. Handy (with M.K. Pukui). 1972. *Native Planters in Old Hawai'i*. B.P. Bishop Museum Bulletin 233. Honolulu: Bishop Museum Press.
- Hawai'i County Planning Department. 2008. *Puna Community Development Plan*. Hilo.
- Hawai'i State Department of Business Economic Development and Tourism (DBEDT). 1997. *State of Hawai'i Data Book*. Honolulu.
- Hwang, D. J., 2005. *Hawaii Coastal Zone Mitigation Handbook: Hawaii Coastal Zone Management Program*. DBEDT, State of Hawaii.
- Hwang, D. J. 2007. *Coastal Subsidence at Kapoho, Puna, Island and State of Hawaii*. Private report for Hawaii County Planning Department.
- Kamakau, S.M. 1992. (rev. ed.). "*Ruling Chiefs of Hawaii*." Honolulu: The Kamehameha Schools Press.
- Kirch, P. 1984. *The Evolution of the Polynesian Chiefdoms*. New York: Cambridge University Press.

Gapp Single-Family Residence Environmental Assessment

_____. 1985. *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. Honolulu: University of Hawai'i Press.

Lipman, P. W., Lockwood, J. P., Okamura, R. T., Swanson, D. A., and Yamashita, K. M. 1985. *Ground deformation associated with the 1975 magnitude 7.2 earthquake and resulting changes in activity of Kilauea volcano, Hawaii*. U. S. Geological Survey Professional Paper 1276.

Maly, K. 1998. *PUNA, KA 'ĀINA I KA HIKINA A KA LĀ.* "A Cultural Assessment Study—Archival and Historical Documentary Research and Oral History Interviews for the Ahupua'a of 'Ahalanui, Laepāo 'o, and Oneloa (with Pohoiki), District of Puna, Island of Hawai'i (TMK:1-4-02, por.07,13,73,74,75). Prep. for D. Matsuura, A & O International Corporation; Oneloa Development, Hilo, Hawai'i.

_____. 1999. *The Historic Puna Trail—Government Beach Road (Kea 'au Section): Archival-Historical Documentary Research, Oral History and Consultation Study, and Limited Site Preservation Plan, Ahupua'a of Kea 'au, Puna District, Island of Hawai'i (TMK:1-6-01 various parcels)*. Kumu Pono Associates Report HiAla-17 (011199). Prep. for Na Ala Hele Program, State Division of Forestry and Wildlife.

McEldowney, H. 1979. *Archaeological and Historical Literature Search and Research Design: Lava Flow Control Study. Hilo, Hawai'i*. Department of Anthropology, B.P. Bishop Museum, MS: 050879, Honolulu. Prepared for U.S. Army Engineer Division, Pacific Ocean, Honolulu.

McGregor, D. 2007. *Nā Kua'āina: Living Hawaiian Culture*. Honolulu: University of Hawai'i Press.

Moore, J. G., 1970. "Relationship between subsidence and volcanic load, Hawaii." *Bulletin of Volcanology* 34:562-576.

Moore, J. G. and Fornari, D. J. 1984. "Drowned reefs as indicators of the rate of subsidence of the Island of Hawaii." *Journal of Geology* 92:752-759.

Moore, R. B. and Trusdell, F. A.. 1991. *Geologic Map of the Lower East Rift Zone of Kilauea Volcano, Hawaii*. U. S. Geological Survey Misc. Investigations Series, Map I-2225, Scale:1:24,000.

Pogue, J. 1858 [1978]. *Moolelo Hawaii*. Hale Paipalapala Aupuni, Honolulu (Rev. Ed.).

Pukui, M.K., Elbert, S.H., and E.T. Mookini. 1976. *Place Names of Hawaii*. Honolulu: University of Hawai'i Press.

U.S. Dept. of Commerce, Economics and Statistics Administration, Bureau of the Census, 2011, <http://factfinder.census.gov/>.

University of Hawai'i at Hilo, Dept. of Geography. 1998. *Atlas of Hawai'i*. 3rd ed. Honolulu: University of Hawai'i Press.

Gapp Single-Family Residence Environmental Assessment

Wilkes, C. 1845. *Narrative of the United States Exploring Expedition During the Years 1838-1842, Under the Command of C. Wilkes, U.S.N.*, Volume 4. Philadelphia: Lea and Blanchard.

Wolfe, E.W., and J. Morris. 1996. *Geologic Map of the Island of Hawai'i*. USGS Misc. Investigations Series Map i-2524-A. Washington, D.C.: U.S. Geological Survey.

Wright, T L., Chun, J.Y.F., Esposito, J., Heliker, C., Hodge, J., Lockwood, J. P., and Vogt, S. M.. 1992. *Map showing Lava-flow Hazard Zones, Island of Hawaii*, U.S. Geological Survey, Misc. Field Studies Map MF-2193, 1:250,000.

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ENVIRONMENTAL ASSESSMENT

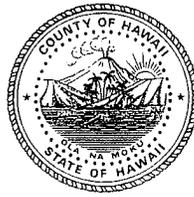
**GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U**

APPENDIX 1a

Comments in Response to Early Consultation/SHPD Letters

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William P. Kenoi
Mayor



Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

County of Hawai'i

POLICE DEPARTMENT

349 Kapiolani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-8865

August 9, 2011

Mr. Ron Terry
Geometrician Associates
P. O. Box 396
Hilo, Hawai'i 96720

Dear Mr. Terry:

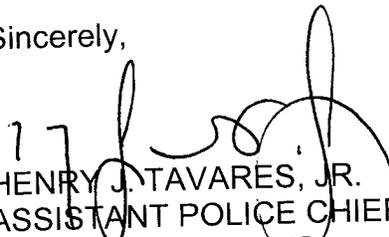
**SUBJECT: CONSULTATION OF PROPOSED SINGLE FAMILY HOME IN
MAKU'U CONSERVATION DISTRICT (TMK 1-5-010:032)**

Staff, upon reviewing the provided documents, does not anticipate any significant impact to traffic and/or public safety concerns. We are, however, not requesting a copy of the EA when it is completed.

Thank you for allowing us the opportunity to comment.

If there are any questions regarding this matter, please contact Captain Samuel Jelsma, Puna District Patrol, at 965-2716.

Sincerely,


HENRY J. TAVARES, JR.
ASSISTANT POLICE CHIEF
AREA I OPERATIONS

SJ:lli

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



WILLIAM J. AILA, JR.
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

GUY H. KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
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CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF:OCCL:DH

Correspondence: HA-12-20

Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

AUG 12 2011

Dear Mr. Terry,

SUBJECT: Consultation for Environmental Assessment for Gapp's Proposed Single Family Residence (SFR), Puna District, Island of Hawaii, Subject Parcel TMK: (3) 1-5-010:032

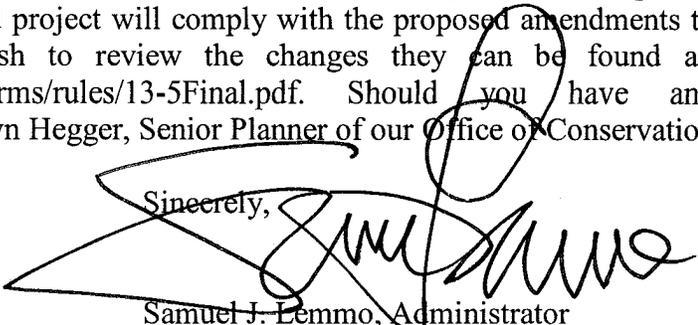
The Department of Land and Natural Resources (DLNR), Office of Conservation and Coastal Lands (OCCL) is in receipt of your letter, dated August 2, 2011, regarding the consultation for the Environmental Assessment for the Gapp's proposed SFR, Puna District, Island of Hawaii, Subject Parcel TMK: (3) 1-5-010:032.

According to your information, your client proposes to construct a one story SFR (three bedrooms, three bathrooms), garage, pool, and cabana. Other features include a driveway, walkways, and a fenced garden.

The OCCL notes the subject parcel is located in the State Land Use (SLU) Conservation District, Resource subzone. The OCCL notes the Department looks forward to the submittal and processing of your Conservation District Use Application (CDUA) and Draft Environmental Assessment (DEA) for the proposed project.

The OCCL notes there are proposed amendments to Chapter 13-5, Hawaii Administrative Rules (HAR) that are scheduled for the August 12, 2011 BLNR meeting. Should the BLNR approve the amendments to Chapter 13-5, HAR, the SFR design standards will change. Therefore, please refer to Exhibit 4 to ensure the proposed project will comply with the proposed amendments to Chapter 13-5, HAR. Should you wish to review the changes they can be found at: <http://hawaii.gov/dlnr/occl/documents-forms/rules/13-5Final.pdf>. Should you have any questions, please feel free to contact Dawn Hegger, Senior Planner of our Office of Conservation and Coastal Lands at 587-0380.

Sincerely,


Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: HDLO/County of Hawaii Planning Department

William P. Kenoi
Mayor



Darryl J. Oliveira
Fire Chief

Glen P. I. Honda
Deputy Fire Chief

County of Hawai'i
HAWAII FIRE DEPARTMENT
25 Aupuni Street • Suite 2501 • Hilo, Hawai'i 96720
(808) 932-2900 • Fax (808) 932-2928

August 22, 2011

Mr. Ron Terry
Geometric Associates, LLC
PO Box 396
Hilo, Hawai'i 96721

SUBJECT: EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENT FOR SINGLE-FAMILY HOME IN THE CONSERVATION DISTRICT AT MAKU'U, PUNA DISTRICT, ISLAND OF HAWAII
TMK: 1-5-010:032

In regards to the above-mentioned early consultation Environmental Assessment, no special environmental impacts or conditions however the Fire Department would require the following, at a minimum:

Fire apparatus access roads shall be in accordance with UFC Section 10.207:

"Fire Apparatus Access Roads

"Sec. 10.207. (a) General. Fire apparatus access roads shall be provided and maintained in accordance with the provisions of this section.

"(b) Where Required. Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access as measured by an unobstructed route around the exterior of the building.

"EXCEPTIONS: 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of this section may be modified.

2. When access roadways cannot be installed due to topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 10.301 (b).



"3. When there are not more than two Group R, Division 3 or Group M Occupancies, the requirements of this section may be modified, provided, in the opinion of the chief, fire-fighting or rescue operations would not be impaired.

"More than one fire apparatus road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

"For high-piled combustible storage, see Section 81.109.

"(c) **Width.** The unobstructed width of a fire apparatus access road shall meet the requirements of the appropriate county jurisdiction.

"(d) **Vertical Clearance.** Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

"EXCEPTION: Upon approval vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance.

"(e) **Permissible Modifications.** Vertical clearances or widths required by this section may be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

"(f) **Surface.** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities." (20 tons)

"(g) **Turning Radius.** The turning radius of a fire apparatus access road shall be as approved by the chief." (45 feet)

"(h) **Turnarounds.** All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus.

"(i) **Bridges.** When a bridge is required to be used as access under this section, it shall be constructed and maintained in accordance with the applicable sections of the Building Code and using designed live loading sufficient to carry the imposed loads of fire apparatus.

"(j) **Grade.** The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief." (15%)

Ron Terry
August 22, 2011
Page 3

"(k) **Obstruction.** The required width of any fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under this section shall be maintained at all times.

"(l) **Signs.** When required by the fire chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both."



DARRYL OLIVEIRA
Fire Chief

GA:lpc



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

In reply, please refer to:
EMD/CWB

08030PJF.11

August 25, 2011

Mr. Ron Terry
Geometrician Associates
P.O. Box 396
Hilo, Hawaii 96721

Dear Mr. Terry:

**SUBJECT: Early Consultation for Environmental Assessment (EA) for
Single-Family Home in the Conservation District at Maku`u
Puna District, Island of Hawaii, Hawaii
TMK: (3) 1-5-010:032**

The Department of Health, Clean Water Branch (CWB), has reviewed the subject document and offers these comments on your project. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at:

<http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf>.

1. Any project and its potential impacts to State waters must meet the following criteria:
 - a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.
 - b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.
 - c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).
2. You may be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for an NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

a. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. This includes areas used for a construction base yard and the storage of any construction related equipment, material, and waste products. An NPDES permit is required before the start of the construction activities.

a. Hydrotesting water.

b. Construction dewatering effluent.

You must submit a separate NOI form for each type of discharge at least 30 calendar days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 calendar days before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at:

<http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html>.

3. For other types of wastewater not listed in Item No. 2 above or wastewater discharging into Class 1 or Class AA waters, an NPDES individual permit will need to be obtained. An application for an NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at <http://hawaii.gov/health/environmental/water/cleanwater/forms/environmental/water/cleanwater/forms/indiv-index.html>.

4. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage is required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of \$25,000 per day per violation.

Mr. Ron Terry
August 25, 2011
Page 3

08030PJF.11

If you have any questions, please visit our website at:
<http://www.hawaii.gov/health/environmental/water/cleanwater/index.html>, or contact the
Engineering Section, CWB, at (808) 586-4309.

Sincerely,

Handwritten signature of Darryl Zumd in cursive, with "TA for" written in smaller letters to the right.

ALEC WONG, P.E., CHIEF
Clean Water Branch

JF:ml

c: DOH-EPO #11-155 [via email only]

Aloha Ron- The Office of Hawaiian Affairs is in receipt of your August 2, 2011 letter seeking comments ahead of a draft environmental assessment (DEA) which will be prepared to support a CDUA for the construction of an SFR on a 5.586 acre property in Maku'u on the Island of Hawai'i. Based on the information within your letter, it is our understanding approximately 4 acres of the property are within the State Land Use Agriculture District and the remaining is in the State Land Use Conservation District.

While we understand that the burial and archaeological sites referenced in your letter are within the Agricultural District, we do look forward to seeing some discussion on the preservation/mitigation plans for these sites discussed and/or referenced in the DEA. We do note that by letter dated April 27, 2009 OHA provided comments to Scientific Consulting Services, Inc., who we understood was preparing a burial treatment and preservation plans for certain sites situated on this tax map key parcel. These may be the plans reference in your letter and we seek confirmation the Burial treatment Plan has been presented to the Hawaii island Burial Council and the preservation plan has been approved by the SHPD.

OHA suggests that native plant species adapted to the area be considered in landscaping designs. The DEA should also include a discussion on how adverse impact to lateral shoreline access will be avoided.

We have no additional comments at this time. We do request that one electronic copy of the DEA be sent to OHA attn: Compliance Monitoring Program when it becomes available.

Please feel free to contact me with any questions.

Thanks, Keola

Keola Lindsey
Office of Hawaiian Affairs
Compliance Monitoring Program
711 Kapiolani Boulevard
Honolulu, Hawaii 96813
keolal@oha.org (email)
(808) 594-0244 (office)

From: Maureen M Gapp <maureen@ilhawaii.net>
To: nicolelui38@yahoo.com
Sent: Monday, September 19, 2011 7:07 AM
Subject: Maureen Gapp

Aloha Nicole, It was so nice to speak with you last week. I met with Ron Terry at the property this weekend. He is doing the environmental assessment of the property. Our plan is to build on the makai side of the property and to leave most of the Mauka area untouched. This would preserve the old Makuu school foundation, the old walls and the two burial sites. Ron mentioned that DLNR could ask us to build on the mauka portion.

The property is primarily zoned agricultural and the area 300 feet up from the shoreline is conservation. We feel it makes more sense to build closer to the ocean in the conservation area so that we can leave all the historically significant areas untouched and the grave sites accessible to the descendants. I would like to ask you for a letter from you on behalf of your ohana stating that you would agree that we build closer to the ocean and not between the grave sites. Ron Terry and I feel that it is important to get input from your family. I have included a copy of the Burial treatment plan for you to look at. Pages 4-5 show the maps of the property and where we would build.

Thank you for any assistance you can give us. Maureen Gapp
My mailing address is PO Box 1128 Pahoia, HI 96778

From: Nicole Lui <nicolelui38@yahoo.com>
Date: Sep 30, 2011
Subject: Re: Letter in agreement to build oceanfront
To: Maureen M Gapp <maureen@ilhawaii.net>

Aloha and To whom it may concern-

I Nicole, on behalf of the Lui Ohana would like to first , thank you and your family for including us in your decision to build closer to the oceanfront. We would only ask that any Lauhala grove or coconut grove that has been there for a long time be somewhat preserved. Coconut groves can come in very handy when you need food, but of course the maintainance can be time consuming. It is our hope that all will be done in a correct and culturally sensitive way, to which we know you will. This is our mana'o (thought). We give our blessing along with the Kupuna of the past. May God bless you and your aina and may our Kupuna watch over you also. Please make their resting place beautiful as well . We cannot wait to see it when the time comes.

Sincerely Yours, The Lui Ohana

MahaloAloha, we plan to clear the area around the lower burial site and actually have the driveway go around it (it's a large area) We will encircle it with ti and remove the rubbish trees to stop any further damage to the area. This will make it so you can visit this area wether or not we are there or not. The upper grave area is easier walking (much flatter) and that area will be left untouched. I'll send photos as we progress, we will also do a blessing of the site before we begin and of course we would want someone from your family to be there. Thank you again for your support. Maureen

On Sat, Nov 5, 2011 at 11:11 PM, Nicole Lui <nicolelui38@yahoo.com> wrote:
glad to help Maureen hope all goes well. I had one question, in the future will we be able to actually visit the burials like without having to worry about getting hurt. I mean I am not asking that you make special pathways or anything just a little safer. It will probably be just me who will come and visit. My parents are getting on in years and it not like we will be there next week so I just thought I put my thought out there. Mahalo Nicole and yes keep me informed please.

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

September 25, 2008

Robert B. Rechtman, Ph.D.
Rechtman Consulting, LLC
HC 1 Box 4149
Keaau, HI 96749-9710

LOG NO: 2008.4261
DOC NO: 0809MD84
Archaeology

Dear Dr. Rechtman:

**SUBJECT: Chapter 6E-42 Historic Preservation Review –
Archaeological Inventory Survey of a 5.586-acre parcel with nine (9) new sites
Maku‘u Ahupua‘a, Puna District, Island of Hawai‘i
TMK: (3) 1-5-010:032**

This letter reviews the aforementioned report which we received on September 23, 2008 (*Clark, Ketner and Rechtman 2008; An Archaeological Inventory Survey of TMK:3-1-5-010:032, Maku‘u Ahupua‘a, Puna District, Island of Hawai‘i; RC-0542*). Nine new sites were documented: Site 50-10-45-26658 (an historic core-filled wall); -26659 (an historic enclosure/pavement); -26660 (an historic habitation complex); -26661 (an historic modified bedrock hole); -26662, -26663 and 26664 (historic probable burials); -26665 (a Precontact probable burial); and -26666 (a Precontact/historical agricultural complex). All are considered significant under criterion “d”, and we concur with this assessment. In addition, the four probable burials are also considered significant under criterion “e” and we concur with this assessment.

We concur with your recommendation that your work documenting three of the sites (50-10-45-26658, -26661 and 26666) is sufficient and no further work is required. We concur with your recommendation that two sites (-26659 and -26660) be preserved, and look forward to reviewing the preservation plan for them. We also look forward to reviewing a burial treatment plan for the four probable burial sites (-26662, -26663, -26664 and -26665).

We accept this archaeological inventory survey as final pursuant to HAR § 13-276. Upon receipt of this letter please submit one paper copy of your report marked “Final” to our Kapolei office along with a CD containing a pdf version of the final report and a copy of this approval letter, marked to the attention of the “Kapolei Library.” Please contact Morgan Davis at (808) 981-2979 if you have any questions or concerns regarding this letter.

Aloha,

A handwritten signature in cursive script that reads "Nancy A. McMahon".

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager
State Historic Preservation Division

300
1010

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

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Engineering
Forestry and Wildlife
Historic Preservation
Kahooolawe Island Reserve Commission
Land
State Parks

May 5, 2009

Robert Spear, Ph.D.
Scientific Consulting Services, Inc.
711 Kapiolani Blvd., Suite 975
Honolulu, Hawaii 96813

LOG NO: 2009.1462
DOC NO: 0905MD02
Archaeology

Dear Dr. Spear:

**SUBJECT: Chapter 6E-42 Historic Preservation Review –
Draft Preservation Plan for a Historic Habitation Enclosure
Maku`u Ahupua`a, Puna District, Island of Hawai`i
TMK: (3) 1-5-010:032 (por.)**

This letter reviews the aforementioned plan, which we received on April 23, 2009 (*Pestana, Dagher and Spear 2009; A Preservation Plan for Site 50-10-45-26660 Located on a 5.59 Acre Parcel in Maku`u Ahupua`a, Puna District, Island of Hawaii [TMK (3) 1-5-010:032]; SCS Project Number 1010-PP-2*). This preservation plan follows an archaeological inventory survey (*Clark, Ketner and Rechtman 2008*) accepted by SHPD in September 2008 (*Log No. 2008.4261, 0809MD84*). A separate burial treatment plan has been prepared and submitted to our Culture and History Branch for review for this same parcel but will be reviewed separately.

Site 50-10-45-26660 is a multi-feature Historic period habitation site which will be permanently preserved with a 20-foot buffer. We approve this recommended treatment. Preservation will be by conservation, not interpretation. Interim protection will include orange construction fencing placed at the outside edge of the approved 20-foot buffer. Permanent protection will include landscape plantings and/or a wall/fence, placed at the edge of the 20-foot buffer. Only hand-held machinery may be used during any work in this 20' buffer. Should construction occur after installation of permanent protection measures, orange construction fencing is to be placed along the outer edge of the fence/wall/landscaping. Any construction utilizing non-handheld machinery during initial ground-altering activities is subject to on-site monitoring by a qualified archaeologist, including a pre-construction meeting. This will be a requirement under the burial treatment plan once it is approved, and may occur at the same time as any other monitoring/meeting required pursuant to it.

This plan is accepted as final pursuant to HAR §13-277. Upon receipt of this letter please submit one paper copy of your report marked "Final" to our Kapolei office along with a CD containing a searchable pdf version of the final report and a copy of this approval letter, marked to the attention of the "Kapolei Library."

If you have questions about this letter please contact Morgan Davis of our Hawaii Island Section at (808) 933-7650.

Aloha,

A handwritten signature in cursive script that reads "Nancy A. McMahon".

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager
State Historic Preservation Division

LINDA LINGLE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

December 17, 2009

Robert L. Spear, Ph. D.
Scientific Consultant Services, Inc.
711 Kapiolani Blvd., Suite 975
Honolulu, Hawaii 96813

LOG NO: 2009.4225
DOC NO: 0912AJ29

Dear Dr. Spear:

Subject: **Chapter 6E-43 Historic Preservation Review –
Burial Treatment Plan - Four Burial Sites (SIHP Sites 26662, 26663, 26664, and 26665)
Ahupua'a of Makuu, Puna District, Island of Hawai'i
TMK (3) 1-5-010: 032**

Thank you for the opportunity to review the Final Burial Treatment Plan (BTP) for the four burial features located on the subject 5.59-acre parcel and entitled, *Burial Site Component of a Preservation Plan for Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 Located on a 5.59-Acre Parcel in Makuu Ahupuaa, Puna District Island of Hawaii [TMK: (3) 1-5-010:032]*, Robert L. Spear, Ph.D., et al., Final November 30, 2009.

Pursuant to Hawai'i Administrative Rules (HAR) 13-300-38 the Hawai'i Island Burial Council (HIBC) voted unanimously and determined to "Preserve the burials place."

The State Historic Preservation Division (SHPD) has consulted with the applicant, the HIBC, and the known lineal and cultural descendants. The SHPD approves of the aforementioned BTP and therefore accepts the plan as final.

If you have any questions feel free to contact Analu Kameeiamoku Josephides, Cultural Historian at 808-933-7652.

Sincerely,

A handwritten signature in cursive script that reads "Phyllis Coochie Cayan".
Phyllis Coochie Cayan
History and Culture Branch Chief

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ENVIRONMENTAL ASSESSMENT

**GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U**

APPENDIX 2
Botanical Reports

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Conservation Area Botanical Survey
TMK: (3) 1-5-010:032
Prepared for John and Maureen Gap
February 21, 2007
by
Julie Leialoha

On February 19, at the request of Maureen Gap, I surveyed plants growing in the conservation zone on their property in the Puna district. The area surveyed encompassed the coastline to the top boundary along Beach Road just southeast of the Hawaiian Paradise Park subdivision.

The entire property including the area within the conservation zone has been altered by prior human activities. Pre-contact vegetation in this area would have been dominated by native coastal dry shrub-land as well as a mix of mesic species. The current make up, consist of a mix of introduced rangeland grasses, non-native annual and perennial herbaceous weed species along with remnants of native and indigenous species found within the conservation area closest to the shoreline. The dominant native species within the conservation area is Hala (*Pandanus tectorius*). Coconut trees and scattered patches of naupaka (*Scaevola sericea*) make up the dominant species closest to the ocean. Though the endemic species *Ischaemum byrone* has been found along the Puna coastline particularly in the Kalapan region, no plants were found on the property during this survey. The upper area of the property is dominated by a closed canopy stand of non-native rose apple intermixed with trumpet trees with very little understory.

The following list of species deals only with plants found within the conservation area of the aforesaid property.

Botanical Survey of TMK: (3) 1-5-010:032
 Prepared for John and Maureen Gap

Native, Indigenous, and Polynesian Introduction

<i>Cocculus trilobus</i>	Huehue	Menispermaceae	Indigenous
<i>Cocos nucifera</i>	Niu, Coconut	Arecaeae	Pol
<i>Cordyline fruticosa</i>	Ti	Agavaceae	Pol
<i>Morinda citrifolia</i>	Noni	Rubiaceae	Pol
<i>Pandanus tectorius</i>	Hala	Pandanaceae	Native
<i>Psilotium nudum</i>	Moa	Psilotaceae	Indigenous
<i>Scaevola sericea</i>	Naupaka	Goodeniaceae	Indigenous
<i>Waltheria indica</i>	Uhaloa	Sterculiaceae	Indigenous
<i>Ipomea pes-caprae</i>	Pohuehue	Convolvulaceae	Indigenous

**Non-Native and
Naturalized**

<i>Antigonon leptopus</i>	Mountain rose	Polygonaceae
<i>Arundina graminifolia</i>	Bamboo orchid	Orchidaceae
<i>Canavalia cathartica</i>	Maunaloa	Fabaceae
<i>Cecropia obtusifolia</i>	Trumpet tree	Cecropiaceae
<i>Chamaecrista nictitans</i>	Partridge pea	Fabaceae
<i>Christella dentata</i>	Pai'ihiha	Thelypteridaceae
<i>Chrysopogon spp.</i>	Bermuda Grass	Poaceae
<i>Clidemia hirta</i>	Koster's curse	Melastomataceae
<i>Coccoloba uvifera</i>	Sea Grape	Polygonaceae
<i>Cynodon dactylon</i>	Bermuda Grass	Poaceae
<i>Desmodium sandwicense</i>	Spanish glover	Fabaceae
<i>Digitaria spp.</i>	Pangola grass	Poaceae
<i>Lanata camara</i>	Lantana	Verbenaceae
<i>Nephrolepis cordifolia</i>	Sword Fern	Nephrolepidaceae
<i>Paederia scandens</i>	Maile Pilau	Rubiaceae
<i>Panicum spp.</i>	Panic grass	Poaceae
<i>Paspalum conjugatum</i>	Hilo grass	Poaceae
<i>Phymatosorus scolopendria</i>	Laua'e	Polypodiaceae
<i>Polygynum spp.</i>	Knotweed	Polygonaceae
<i>Psidium cattleianum</i>	S. Guava	Myrtaceae
<i>Rubus rossifolius</i>	Thimbleberry	Rosaceae
<i>Setaria gracillius</i>	Perennial foxtail	Poaceae
<i>Setaria palmifolia</i>	Palmgrass	Poaceae
<i>Stachytarpheta dichotoma</i>	Ōwī	Verbenaceae
<i>Syzygium jambos</i>	Rose apple	Myrtaceae
<i>Terminalia catappa</i>	False kamani	Combretaceae
<i>Tibouchina urvilleana</i>	Princess flower	Melastomataceae

GAPP PROPERTY VEGETATION SUMMARY:

General Information:

The fieldwork for this report was conducted on Aug. 21, 2009. The study site consists of approximately 5 acres located along the beach road that runs from the Hawaii Paradise Park Subdivision to the Hawaiian Beaches Subdivision; in the area of the study site the road is unpaved but it is maintained and well traveled. The study site is located in the district of Puna and is on the windward side of the Island of Hawaii and is adjacent to the coast.

The study site can be divided into four vegetative communities with the largest being the Rose Apple (*Syzigium jambos*) forest that starts at the beach road and covers approximately 2/3 of the lot. The second vegetative community is dominated by Hala (*Pandanus tectoris*) this community is located between the Rose Apple forest and an area of the lot that has been mechanically cleared. The next vegetative community is comprised of a cleared area that lies between the Rose Apple forest and a Niu (*Cocos nucifera*) grove that borders the ocean side of the study area. The fourth community is located on a trail that has been bulldozed on the south side of the study site.

Vegetative Communities:

The Rose Apple Forest community is dominated by a tree canopy that is uniformly 15 to 25 feet tall and the canopy cover is over 90%. The dominant species in the canopy layer is Rose Apple and this species comprises over 75% of the canopy. Individuals of other tree species such as Mango (*Mangifera indica*) and Cecropia (*Cecropia obtusifolia*) can be observed scattered throughout this community. It should be noted that the Rose Apple trees have been greatly affected by a fungal pathogen that was recently introduced into Hawaii and the pathogen has damaged most of the young shoots and as a consequence the trees are being denuded and the area under the canopy is not as shaded as it would be if the trees had healthy foliage.

The understory of this community is open and is comprised of scattered shrubs such as Waiawe (*Psidium cattleianum*), Guava (*Psidium guajava*) and Melstoma (*Melastoma sp.*). These shrubs are scattered throughout the community and do not form thickets and the secondary canopy has a coverage of less than 30%.

The most noticeable feature of the herb layer in this community are patches of Awapuhi (*Zingiber zerumbet*). Shade tolerant species such as Basket Grass (*Oplismenus sp.*), Thimbleberry (*Rubus rosifolius*) and Maile Scented Fern

(*Pneumtoperis scolopendria*) are also found throughout this community.

The second vegetative community located within the study site is the Hala grove. This vegetative community comprises a small area of the study site but bears discussion for three reasons. The first is that the grove is located within the area of the site that is zoned conservation. The second reason is that this vegetative community is a remnant of a vegetative community that existed prior to the European discovery of Hawaii and the third is that the Hala grove either is very close to or borders the area where the owners are planning to build their house on the lot.

Because of the layer of Hala leaves on the ground, in this community the understory contains very few plants. A result of this is that seedlings and younger Hala plants were not observed in the area. Several younger Hala were noted on the ocean side of the grove but this area appears to be outside the study area.

The size of the Hala grove is so small that it will probably be degraded and overrun by aggressive exotic species that are already growing along the edge of the grove. These exotic species include California Grass (*Brachiaria mutica*), Maile Pilau (*Paederia foetida*), Melochia (*Melochia umbellata*) and Ipomoea (*Ipomoea alba*). These exotic species are already

well established along the edge of the forest and can be observed to be invading the edges of the Hala grove.

The next vegetative community is also located within the conservation zoned area in the study site and is an open area that is dominated by herbaceous species such as Morning Glory (*Ipomoea indica*), California grass and Maile Pilau. This herbaceous ground cover is so dense that shrub and tree species have not been able to establish themselves.

This vegetative community appears to be the result of the mechanical clearing of the area. This vegetative community is probably not yet stable and will change over time due to the process of succession.

The fourth vegetative community is dominated by species that are prolific seeders and grow rapidly. This weedy community has developed in areas where the study site has been mechanically cleared and graded or grubbed. The mechanical clearing has led to a vegetative community that is currently changing.

In areas the community is dominated by seedlings of the rapidly growing Gunpowder Tree (*Trema orientalis*). The vegetation on this trail is dominated by specimens of *Trema* that are uniformly 8 to 10 feet tall. The understory on the trail is poorly developed and much of the ground is devoid of vegetation.

Discussion and Conclusions:

The driveway that will lead to the house site will follow this trail on the south side of the study site. The proposed house site is located in the Rose Apple forest and also in the mechanically cleared area. The footprint of the house site will also border the Hala grove.

The southeast corner of the house site will either come close to or border the Hala grove and if the grove is to be retained as a feature of the final site plan care should be taken to disturb the grove as little as possible during construction.

The vegetative communities found within this study site are for the most part composed of exotic and weedy species and are not noteworthy or significant. The Hala grove, while it is a remnant of a pre-European vegetative community, is too small to be significant and also many better examples of this vegetative type are located throughout the windward side of the island of Hawaii.

The few native species located within the study site are common and have the ability to do well in highly disturbed areas. It is interesting that Ohia (*Metrosideros polymorpha*) was not observed growing in the study site but can be seen in

other areas along the Beach Road and lots neighboring the study site. Several indigenous species that were observed on lots neighboring the site were not listed and they are also common species that are able to grow in disturbed areas.

There were no Rare or Endangered plant species as listed in the Federal or State of Hawaii Registers observed within the study site and the attached list records the Species Name, Plant Family, Common Name, Life Form and Status. The status of the plants are listed as being either Indigenous (Native) or Alien (Exotic).

Sept. 20, 2009 Version

Scientific Name	Family	Common Name	Life Form	Status*	
<i>GAPP Property</i>		Fieldwork 8/21/09			
<i>List 9-12</i>	9-13/ 9:00am	9/13 2:30 pm			
<i>9/14 9:30pm</i>	9-16 9=17	9-20 done			
<i>Agave sp.</i>	Agavaceae	Agave	Shrub	A	*
<i>Ageratum conyzoides</i>	Asteraceae	Ageratum	Herb	A	*
<i>Ageratum houstonianum</i>	Asteraceae	Ageratum	Herb	A	*
<i>Alternanthera sp.</i>	Amaranthaceae	Alternanthera	Herb	A	*
<i>Asclepias curassavica</i>	Asclepiadaceae	Bloodflower	Herb	A	*
<i>Blechnum appendiculatum</i>	Blechnaceae	Blechnum	Fern	A	*
<i>Brachiaria mutica</i>	Poaceae	California Grass	Herb	A	*
<i>Buddleia asiatica</i>	Buddleiaceae	Dog Tail	Herb	A	*
<i>Canavalia cathartica</i>	Fabaceae	Maunaloa	Vine	A	*
<i>Cecropia obtusifolia</i>	Cecropiaceae	Trumpet Tree	Tree	A	*
<i>Chamaecrista nictitans</i>	Fabaceae	Partridge Pea	Herb	A	*
<i>Christella parasitica</i>	Thelypteridaceae	Cyclosorus	Fern	A	*
<i>Clidemia hirta</i>	Melastomataceae	Koster's Curse	Herb	A	*
<i>Clusia rosea</i>	Clusiaceae	Autograph Tree	Tree	A	*
<i>Cocos nucifera</i>	Arecaceae	Niu	Tree	A	*
<i>Commelina diffusa</i>	Commelinaceae	Honohono	Herb	A	*
<i>Conyza sp.</i>	Asteraceae	Horseweed	Herb	A	*
<i>Cordyline fruticosa</i>	Agavaceae	Ki	Shrub	A	*
<i>Crotalaria sp.</i>	Fabaceae	Rattlepod	Herb	A	*
<i>Cyperus halpan</i>	Cyperaceae	Cyperus	Herb	A	*

<i>Cyperus sp.</i>	Cyperaceae	Cyperus	<i>Herb</i>	A+	*
<i>Desmodium sandwicense</i>	Fabaceae	Spanish Clover	Herb	A	*
<i>Desmodium triflorum</i>	Fabaceae	Desmodium	Herb	A	*
<i>Digitaria sp.</i>	Poaceae	Digitaria	<i>Herb</i>	A+	*
<i>Dioclea wilsonii</i>	Fabaceae	Dioclea	Vine	I?	*
<i>Dioscorea pentaphylla</i>	Dioscoreaceae	Dioscorea	<i>Vine</i>	A	*
<i>Drymaria cordata</i>	Caryophyllaceae	Pipili	Herb	A	*
<i>Eleusine indica</i>	Poaceae	Wiregrass	Herb	A	*
<i>Emilia sonchifolia</i>	Asteraceae	Flora's Paintbrush	Herb	A	*
<i>Erechtites hieracifolia</i>	Asteraceae	Erechtites	Herb	A	*
<i>Ficus microcarpa</i>	Moraceae	Chinese Banyan	Tree	A	*
<i>Grammitis tenella</i>	Grammitidaceae	Kolokolo	Fern	I	*
<i>Hedychium flavescens</i>	Zingiberaceae	Yellow Ginger	Herb	A	*
<i>Hedyotis corymbosa</i>	Rubiaceae	Hedyotis	<i>Herb</i>	A	*
<i>Hippobroma longiflora</i>	Campanulaceae	Star-of-Bethlehem	Herb	A	*
<i>Hyptis pectinata</i>	Lamiaceae	Comb Hyptis	Herb	A	*
<i>Indigofera suffruticosa</i>	Fabaceae	Indigofera	<i>Herb</i>	A	*
<i>Ipomoea alba</i>	Convolvulaceae	Moon Flower	Vine	A	*
<i>Ipomoea indica</i>	Convolvulaceae	Morning Glory	Vine	I	*
<i>Kyllinga brevifolia</i>	Cyperaceae	Kyllinga	<i>Herb</i>	A	*
<i>Lantana camara</i>	Verbenaceae	Lantana	Shrub	A	*
<i>Ludwigia octovalvis</i>	Onagraceae	Ludwigia	Herb	I?	*
<i>Lygodium japonicum</i>	Schizaeaceae	Japanese Climbing Fern	<i>Fern</i>	A	*
<i>Macaranga mappa</i>	Euphorbiaceae	Bingabing	Shrub	A	*
<i>Macaranga tanarius</i>	Euphorbiaceae	Macaranga	Tree	A	*

<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree	A	*
<i>Melastoma sp.</i>	Melastomataceae	Melastoma	Shrub	A	*
<i>Melinis minutiflora</i>	Poaceae	Molasses Grass	Herb	A	*
<i>Melochia umbellata</i>	Sterculiaceae	Melochia	Tree	A	*
<i>Mimosa pudica</i>	Fabaceae	Sleeping Grass	Herb	A	*
<i>Morinda citrifolia</i>	Rubiaceae	Noni	Shrub	A	*
<i>Nephrolepis exaltata</i>	Nephrolepidaceae	Sword Fern	Fern	I	*
<i>Oplismenus sp.</i>	Poaceae	Oplismenus	Herb	A	*
<i>Oxalis corniculata</i>	Oxalidaceae	Yellow Wood Sorrel	Herb	I?	*
<i>Paederia foetida</i>	Rubiaceae	Maile Pilau	Vine	A	*
<i>Pandanus tectorius</i>	Pandanaceae	Hala	Tree	I	*
<i>Panicum maximum</i>	Poaceae	Guinea Grass	Herb	A	*
<i>Paraserianthes falcataria</i>	Fabaceae	Albizia	Tree	A	*
<i>Paspalum conjugatum</i>	Poaceae	Hilo Grass	Herb	A	*
<i>Paspalum urvillei</i>	Poaceae	Vasey Grass	Herb	A	*
<i>Passiflora edulis</i>	Passifloraceae	Lilikoi	Vine	A	*
<i>Persea americana</i>	Lauraceae	Avocado	Tree	A	*
<i>Phyllanthus debilis</i>	Euphorbiaceae	Niruri	Herb	A	*
<i>Phymatosorus grossus</i>	Polypodiaceae	Maile Scented Fern	Fern	A	*
<i>Pityrogramma calomelanos</i>	Pteridaceae	Silver Fern	Fern	A	*
<i>Plantago major</i>	Plantaginaceae	Common Plantain	Herb	A	*
<i>Pluchea symphytifolia</i>	Asteraceae	Sourbush	Shrub	A	*
<i>Polygala paniculata</i>	Polygalaceae	Milkwort	Herb	A	*
<i>Psidium cattleianum</i>	Myrtaceae	Waiawi	Tree	A	*

<i>Psidium guajava</i>	Myrtaceae	Guava	Tree	A	*
<i>Psilotum nudum</i>	Psilotaceae	Moa	Fern Alley	I	*
<i>Pteris cretica</i>	Pteridaceae	Cretan Brake	Fern	I	*
<i>Pycreus polystachyos</i>	Cyperaceae	Cyperus	Herb	I	*
<i>Rubus rosifolius</i>	Rosaceae	Thimbleberry	Herb	A	*
<i>Sacciolepis indica</i>	Poaceae	Glenwood Grass	Herb	A	*
<i>Samanea saman</i>	Fabaceae	Monkeypod	Tree	A	*
<i>Schizachyrium condensatum</i>	Poaceae	Beardgrass	Herb	A	*
<i>Scleria testacea</i>	Cyperaceae	Scleria	Herb	I	*
<i>Setaria palmifolia</i>	Poaceae	Palmgrass	Herb	A	*
<i>Sida rhombifolia</i>	Malvaceae	Sida	Herb	I?	*
<i>Solanum americanum</i>	Solanaceae	Popolo	Herb	I?	*
<i>Spathoglottis plicata</i>	Orchidaceae	Malayan Ground Orchid	Herb	A	*
<i>Spermacoce sp.</i>	Rubiaceae	Spermacoce	Herb	A	*
<i>Stachytarpheta jamaicensis</i>	Verbenaceae	Stachytarpheta	Herb	A	*
<i>Syzygium jambos</i>	Myrtaceae	Rose Apple	Tree	A	*
<i>Tacca leontopetaloides</i>	Taccaceae	Pia	Herb	A	*
<i>Terminalia catappa</i>	Combretaceae	False Kamani	Tree	A	*
<i>Torenia asiatica</i>	Scrophulariaceae	Olaa Beauty	Herb	A	*
<i>Trema orientalis</i>	Ulmaceae	Gunpowder Tree	Tree	A	*
<i>Vernonia cinerea</i>	Asteraceae	Little Ironweed	Herb	A	*
<i>Zingiber zerumbet</i>	Zingiberaceae	Awapuhi	Herb	A	*

A = alien, E = endemic, I = indigenous, End = Federal and State listed Endangered Species

ENVIRONMENTAL ASSESSMENT

**GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U**

APPENDIX 3

Archaeological and Cultural Impact Assessment Reports

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**A PRESERVATION PLAN FOR
SITE 50-10-45-26660
LOCATED ON A 5.59-ACRE PARCEL
IN MAKU`U AHUPUA`A, PUNA DISTRICT
ISLAND OF HAWAII
[TMK (3) 1-5-010: 032]**

Prepared by:
Elizabeth Pestana, B.A.
Cathleen A. Dagher, B.A.
and
Robert L. Spear, Ph.D.
Revised April 2009

Prepared For:
John Gapp
P.O. Box 1128
Pahoa, Hawaii 96778

ABSTRACT

At the request of the landowner, Mr. John Gapp, Scientific Consultant Services (SCS), Inc. has prepared this Preservation Plan (PP) for Site 50-10-45-26660. The Preservation Plan follows an accepted Archaeological Inventory Survey of approximately 5.59 acres of land in Maku`u Ahupua`a, Puna District, Island of Hawai`i, Hawai`i [TMK: (3) 1-5-010:032] (Clark *et al.* 2008). During the course of the survey nine sites were newly identified. The sites documented include: Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features.

Site 50-10-45-26660, a Historic-era permanent habitation complex, is being preserved at the request of the landowner. Scientific Consultant Services, Inc. (SCS) has prepared this Preservation Plan in consultation with the State Historic Preservation Division (SHPD). This Preservation Plan has been prepared specifically for Site -26660, in advance of the construction of a proposed single family dwelling. This document follows the above-mentioned Clark *et al.* (2008) archaeological inventory survey and focuses specifically on interim and long-term permanent preservation of Site -26660. As Site -26659 is in close proximity to Sites -26662 through -26664, it is included in Preserve Area C, and will be specifically discussed under separate cover in the Burial Treatment Plan. Site 50-10-45-26659 is also being preserved at the landowner's request.

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INTRODUCTION

At the request of Mr. John Gapp, the landowner, Scientific Consultant Services, Inc. (SCS) has prepared this Archaeological Preservation Plan for Site 50-10-45-26660, a Historic-era permanent habitation complex. This site is being preserved at the landowner's request (Clark *et al.* 2008: 113). Site 50-1-45-26660 exists within an approximately 5.59-acre property located in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032] (Figure 1 and 2). This Preservation Plan follows an Archaeological Inventory Survey (Clark *et al.* 2008), and focuses specifically on interim and long-term permanent preservation of Site 50-10-45-26660. This document has been prepared in advance of the construction of a single family dwelling.

During the course of the above-mentioned survey nine sites were newly identified. The sites documented include: Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features (Clark *et al.* 2008). Please note Site -26659 is also being preserved at the landowner's request. As Site -26659 is in close proximity to Sites -26662 through -26664, it is included in Preserve Area C, and will be specifically discussed under separate cover in the Burial Treatment Plan.

This Preservation Plan follows procedures outlined in the Hawai`i Administrative Rules, Title 13: Department of Land and Natural Resources, Subtitle 13: State Historic Preservation Division Rules, Chapter 277: Rules Governing Minimal Requirements for Archaeological Site Preservation and Development (DLNR/SHPD 2003). This Preservation Plan provides standards to ensure proper preservation and a "no adverse effect" in the public's interest (*ibid.*).

Preservation means the mitigation form in which a historic property is preserved, whether through avoidance and protection (conservation) or exhibition (interpretation). There are four steps to preserving a site, the first of which is executed here: preparation of a Preservation Plan. The other steps include review and approval of the Preservation Plan by SHPD prior to preservation work, execution of the Preservation Plan, and verification by SHPD that the plan has been successfully executed.

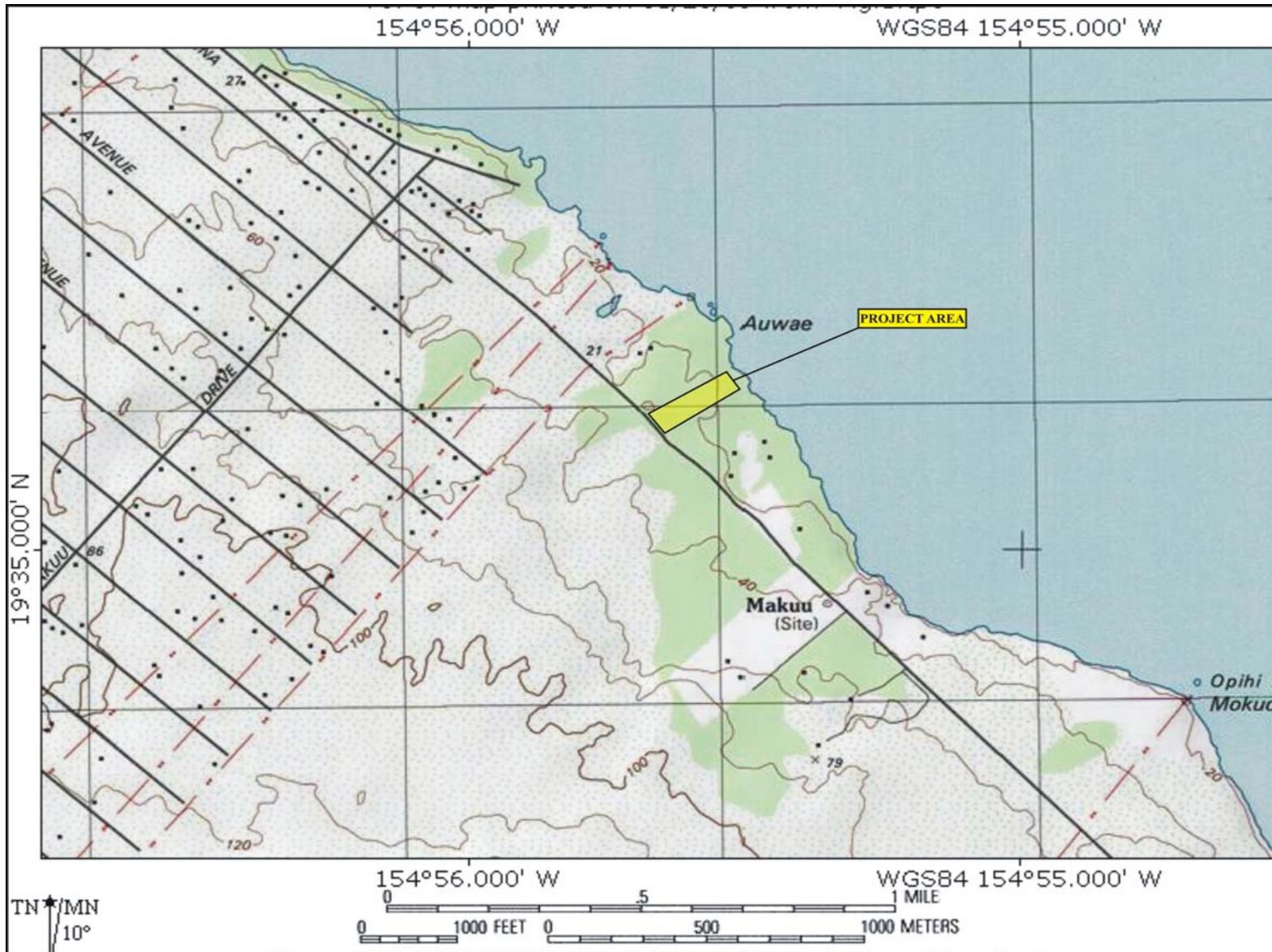


Figure 1: USGS Quadrangle (Pahoa North) Showing Project Area.

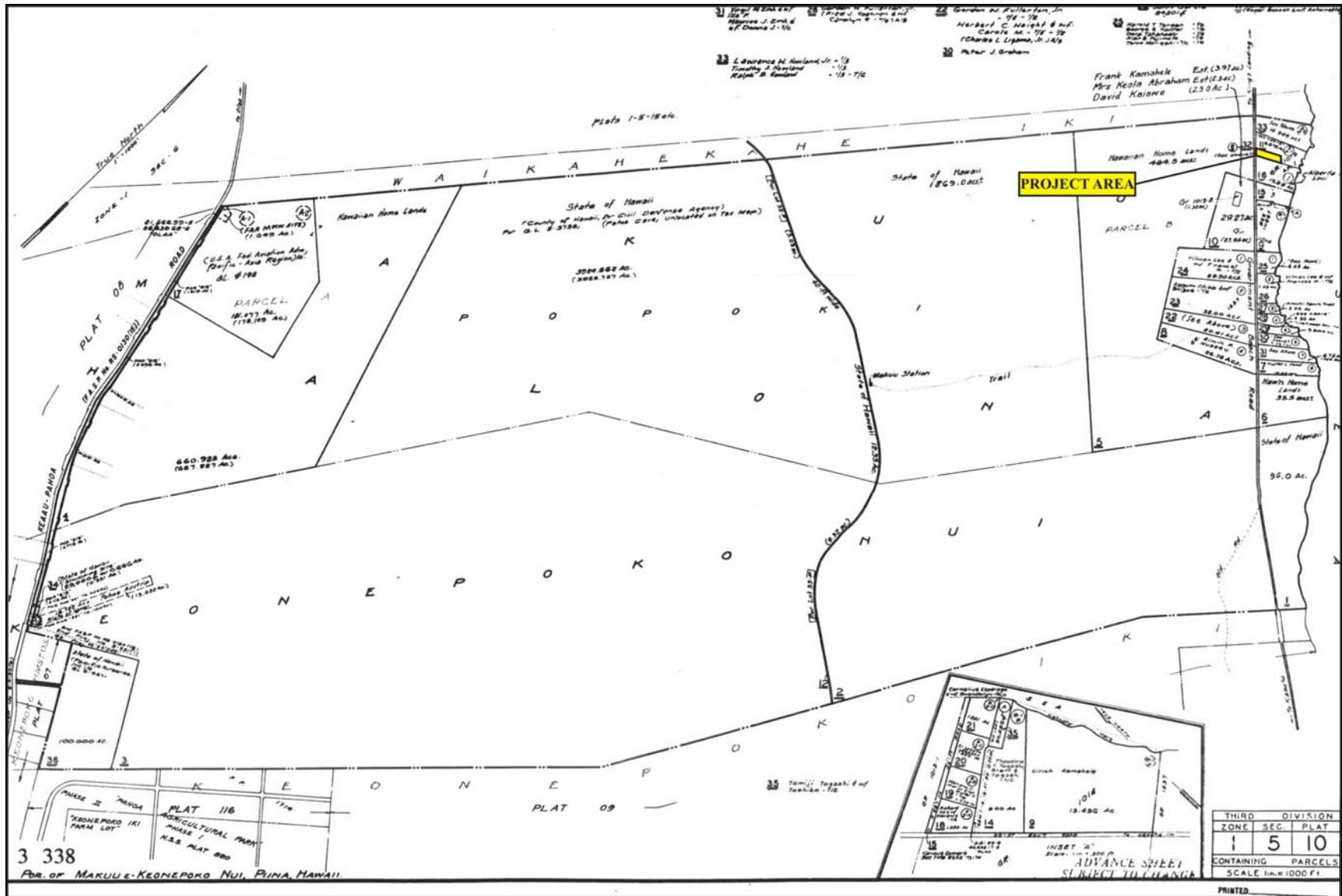


Figure 2: Tax Map Key [TMK: (3) 1-5-010:032] Showing Project Area.

This Preservation Plan provides (1) descriptions of: Site -26660 and its contexts within the subject parcel, (2) previous archaeology at the parcel, (3) preservation procedures for Site -26660, (4) specific methods needed to implement preservation procedures and, (5) verification of the implantation of permanent preservation.

ENVIRONMENTAL SETTING

PROJECT AREA

The project area consists of approximately 5.59-acres of land located just southeast of the Hawaiian Paradise Park Residential Subdivision in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032] (see Figures 1 and 2). The parcel is a long, narrow rectangular shaped tract of land flanked by undeveloped parcels on its north and south sides, by the Old Government Beach Road on its west (*mauka*) edge, and the coastal setback on its east (*makai*) edge at 0 to 40 feet above sea level. Terrain on the parcel gently slopes northeast and is comprised of *pahoehoe* lava flows of the Kilauea Volcano. A majority of the ground surface is exposed coarse bedrock containing pockets of sediment.

SOILS

Soils within the general area of the project parcel are classified as the Opihikao series (rOPE), extremely rocky muck (Sato *et al.* 1973). Muck soils, typically found in native forests or used as pasture, is composed of well-drained, highly acidic, thin organic soils approximately 3 to 10 inches deep overlying *pāhoehoe* bedrock. The muck is rapidly permeable while permeability of the bedrock is very slow, but rapid through cracks in the *pahoehoe*. Runoff is slow and erosion hazard is slight.

VEGETATION

Flora present across the parcel is varied and includes native and non-native species of grasses, bushy plants, and trees. The over story consists of guava (*Psidium guajava*), mango (*Magifera indica*), *hala* (*Pandanus odoratissimus*), rose apple (*Eugenia jambos*), octopus tree (*Shefflera actinophylla*), coconut palm, (*Cocos nucifera*). The under story consists of *ti* (*Cordyline fruticosa*), *laua`e* (*Phymatosorus scolopendria*), beach naupaka (*Scaevola sericea*), ginger (*Zingiberaceae*) and sisal (*Agave Sisalana*), as well as several additional non-native species of grasses, vines, weeds, and ferns (Clark *et al.* 2008). Vegetation in the makai portion of the project area consists of low-lying vines and grasses, and is absent of tall trees, representative of previous mechanical disturbance in that particular area of the parcel (*ibid.*).

CLIMATE

The climate of Hawai'i's Windward coast is generally mild with temperatures ranging anywhere from the 90s, to a minimum in the low 50s at lower elevations throughout the year. Temperatures vary greatest between the two prominent seasons, known to the Hawaiian Islands as the wet and dry seasons. The wet season occurs during the cooler months of November through April, and the dry season occurs during the warmer months of March through September. This range of temperature is exceeded by the daily range in most parts of the island. However, temperatures on Windward coasts exposed to trade wind air off the sea vary the least and are consistently cooler overall (Armstrong 1983).

Rain fall in the region ranges from approximately 60 to 100 inches of rain per year (Clark *et al.* 2008). Frequent rain showers, and low-lying bedrock present across the parcel is causative of standing water, and has consequently created a breeding habitat for mosquitoes in the project area (*ibid.*).

CULTURAL HISTORICAL CONTEXT

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the government, and began the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Once lands were thus made available and private ownership was instituted, the *maka`āinana* (commoners), if they had been made aware of the procedures, were able to claim the plots on which they had been cultivating and living. If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

In 1848, as a result of the *Māhele*, the land of Maku`u ahupua`a had been retained as Government Lands and no LCAs or Kuleana parcels were awarded. Coastal portions of the *Ahupua`a* of Maku`u as well as Pōpōkī, and Hālonā were eventually divided however, and sold as fee simple Land Grants. In 1852, a portion of the current project area became Land Grant No. 1013, Lot 1 and was acquired by D.W. Maiāu (Clark *et al.* 2008).

HISTORICAL CONTEXT

In 1848, a survey of schools conducted by the Hawaiian Government recorded a schoolhouse in Maku`u Ahupua`a, and lists Land Grantee Maiau as the teacher, Maiau's teachers salary, the number of students attending, and the academic curriculum. By 1873 - 1874, the Maku`u school was noted once again in a period report submitted by Puna school, which reported the same information as in the previous report including an N. Kanihoa as the Maku`u school teacher, a J. Elderts as the school supervisor, the schoolhouse as being in good condition, and the birth and deaths known to Maku`u over that period (*ibid.*).

In 1873 construction of the Government Road, likely the route of an old pedestrian trail, from Hilo through Puna had been completed. Around this time cattle ranching had found its start in the area when rancher Obed B. Spencer leased the ahupua`a of Kea`au, just northwest of Maku`u from guardians of William C. Lunalilo, Charles Kanaina and Charles R. Bishop. Spencer's ten year lease was transferred, and his personal property which included "...buildings and improvements...all [the] flocks of cattle running on the land of Keaau aforesaid and on the adjoining lands branded 'OS' or ' ' together with [the] brand 'OS' and also [the] flock of goats and sheep running on the land of Keaau aforesaid and the adjoining lands and also [the] fowls and hogs on the lands...", as stated in the assignment of the lease and Bill of sale, was sold to J.O. Dominis and R.A. Lyman. Dominis and Lyman's newly acquired leased lands reportedly inventoried 300 "OS" branded cattle, and 4,000 goats. Over the course of the following year, the two expanded their ranching endeavors leasing additional lands in neighboring *ahupua`a*, but by 1876 Charles R. Bishop bought Lyman's interest in the *ahupua`a* of Kea`au for \$8,333.00, and in turn assigned the lease to the Hawaiian Agricultural Company in consideration of 120,000.00. In 1877 J.E. Elderts and William H. Shipman in consideration of \$33,000.00 were assigned lease and business interests in Kea`au ahupua`a by the Hawaiian Agricultural Company. Eldert's and Shipman's new partnership in ranching began to prove lucrative, and by 1879 their holdings included the majority of lands between Kea`au and Kapoho *ahupua`a* (*ibid.*).

During this time reports by the Government Schools of the Puna District had noted a deterioration in the standing of the schools of Keahou and Maku`u, due to a decline in the contribution by skilled teachers, and of income generated by the schools fields; owing to the trampling of produce by ranch animals. By 1891 the report noted that the schoolhouse in Maku`u was no longer standing, and that Kea`au school was gone (*ibid.*).

The late 1800s had begun a transformation in land use and tenure in the Puna District. Before 1900 Shipman had sole interest in Kea`au and lands of the neighboring *ahupua`a*. Approximately 4,000 acres of these lands he sold to various buyers for coffee cultivation, and leased another 4,000 acres to the Ola`a Sugar Company, Ltd. By 1900 a new highway been completed and in the early part of the 20th century radical changes in the Puna District had become evident. As ranching, sugarcane, coffee, and lumber became the dominating industries, a decline of population in the area resulted in the near disappearance of Traditional agriculture systems (*ibid.*).

PREVIOUS ARCHAEOLOGY

There have been numerous archaeological investigations in Maku`u, Pōpōkī, and Hālona *ahupua`a*. Among the previous studies, nine were conducted in the *ahupua`a*'s coastal regions near the current project area, and six at locations further inland. For a more thorough discussion of the archaeology conducted in the vicinity of the current project area, please see Clark *et al.* 2008.

Among the earliest of archaeological studies in the vicinity of the project area, was an endeavor by Hudson to survey the archaeological sites from Waipio Valley to the Ka`u District of the East Hawai`i Island coast. In his attempt to survey such a length of coast, the features recorded ranged from shrines to mounds. Hudson didn't document any sites in Maku`u but only alluded to the "...mazes of old walls and occasional inclosures giving evidence of the former population and extensive cultivation of this stretch of coast" between Mokuopihi and Waihakiula (*ibid.*: 16)

In 1990 Barrera conducted the first phase of a three phase archaeological study on [TMK (3) 1-1-10: 033], a 14-acre parcel adjacent the coast, northwest of the current project area. Barrera's Archaeological Inventory Survey recorded six site complexes, all with multiple component features. These sites were documented as SIHP Sites: -14675, -14981, -14982, -14986, -14984, and -14985 and included a broad range of feature types including modified outcrops, depressions, lava blisters, walls, mounds, platforms, enclosures, and terraces. The sites were interpreted as agriculture, habitation, and possible burial dating from pre-Contact to the Historic era (*ibid.*).

In the second phase of the archaeological study of the above parcel, SCS conducted burial testing (Chaffee and Spear 1993) at a mound feature of Barrera's Site -14675, as well as

two platform features and a mound feature at Site -14985. Testing resulted in the documentation of three subsurface burial chambers within the two mound features, and one of the platform features. Two of the three subsurface features contained skeletal remains and grave goods dating to the Historic period. The third, lacking human remains, was interpreted as such based on the features formal characteristics.

Finally, in the parcels third phase of archaeological investigations, Data Recovery was conducted at two enclosures, a terrace, a sealed lava blister, and faced mound features of Site -14675, and at Site-14985 terrace feature (Spear *et al.* 1995). Artifacts from the excavations included modified basalt and volcanic glass, the majority of which were recovered from the terrace feature of Site -14985. Radiocarbon dating yielded an estimated date of 349 to 59 B.P., a 2 sigma calibrated result of A.D. 1660 to 1950. The sites were interpreted as permanent habitation from the late pre-Contact to the late 19th century (*ibid.*).

A reconnaissance survey of a six mile corridor for the proposed Kapoho-Keaukaha Highway route spanning from Waiakahiula Ahupua`a to Kea`au Ahupua`a through the Puna District was conducted in 1974 by Bishop Museum (Ewart and Luscomb). The findings were extensive and consisted of several archeological sites composed of single features, and feature complexes.

Archaeological Inventory Survey conducted on a 38-acre parcel, just *mauka* of old Government Road, south of the current project area documented five sites (Clark *et al.* 2007). The sites identified ranged from pre-Contact to Historic period sites and included a pre-Contact agricultural shrine.

SUMMARY OF ARCHEOLOGICAL INVENTORY SURVEY

In 2008 Rechtman Consulting LLC., conducted Archaeological Inventory Survey of an approximately 5.59-acres property located in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032]. During the course of the survey nine sites, comprised of 67 features, were newly identified (Clark *et al.* 2008) (Figure 3). The sites documented include State Inventory of Historic Properties (SIHP) Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement;-26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a

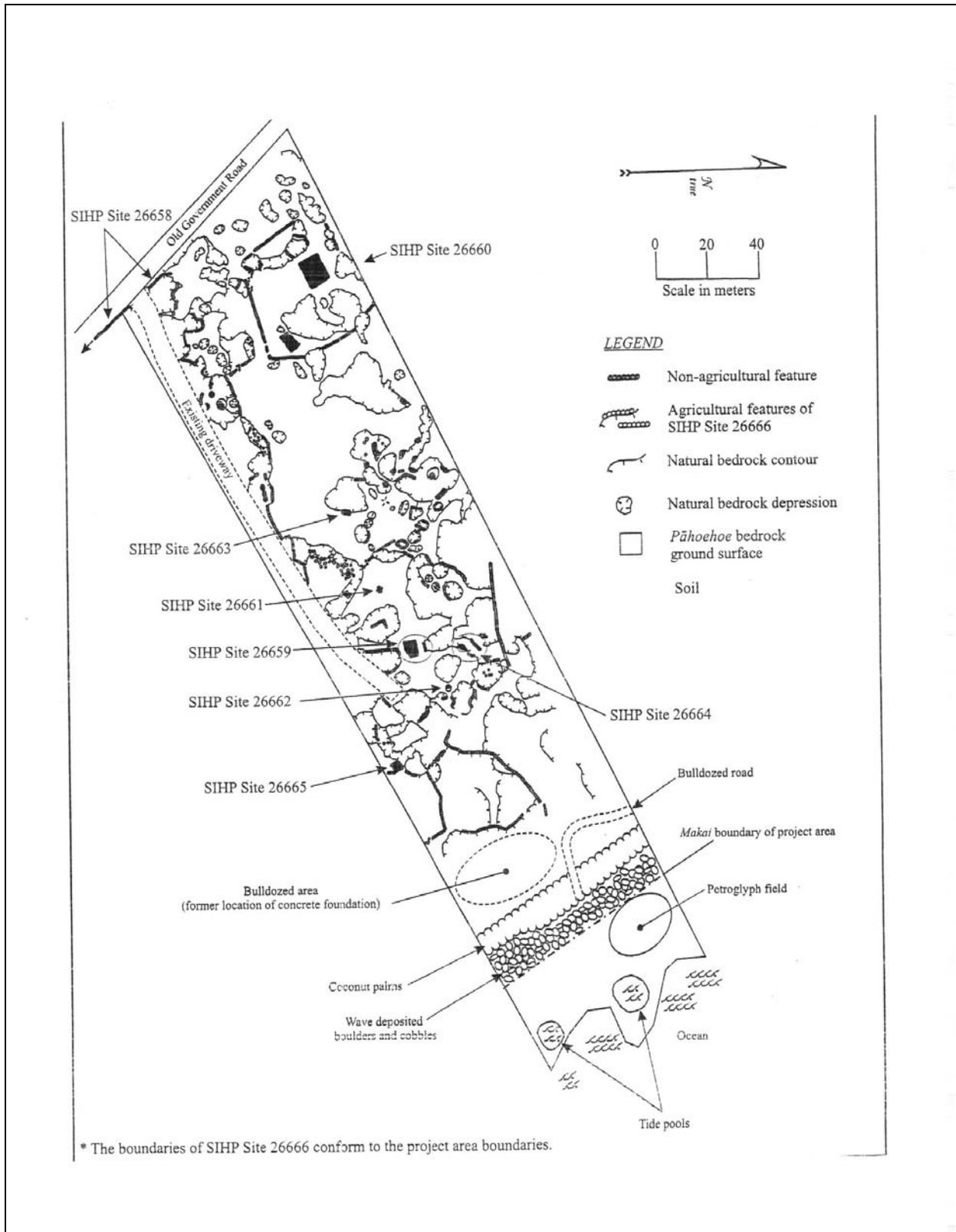


Figure 3: Plan View Map Showing Project Area, Location of Sites 50-10-45-26658 Through -26666 (adapted from Clark *et al.* 2008).

platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features.

All of the sites identified during the survey evaluated for significance according to the established criteria for the Hawai'i State Register of Historic Places §13-275-6. The five criteria are classified as follows:

- Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion B: Site is associated with the lives of persons significant to our past;
- Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction;
- Criterion D: Site has yielded or has the potential to yield information important in prehistory or history; and).
- Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places (State of Hawai'i criteria only).

Sites 50-10-45-26658 through -26666 have been found to be significant under Criterion D, for information content. In addition the burial sites, Sites -26662 through -26665, have been found to be significant under Criteria E, for cultural significance. As stated elsewhere in this document Site 50-10-45-26660 is being preserved at the landowner's request (Clark *et al.* 2008: 113).

SITE SELECTED FOR PRESERVATION

As stated elsewhere in this report, Site 50-10-45-26660 has been interpreted as Historic Period habitation site which is being preserved at the landowner's request (*ibid*). Site 50-10-45-26660 is an enclosed habitation complex consisting of five features including a core filled rock wall enclosure, two modified depressions, a cobble pavement, and a platform (Figure 4). This site is situated on an elevated linear spine of *pāhoehoe* that runs from the old Government

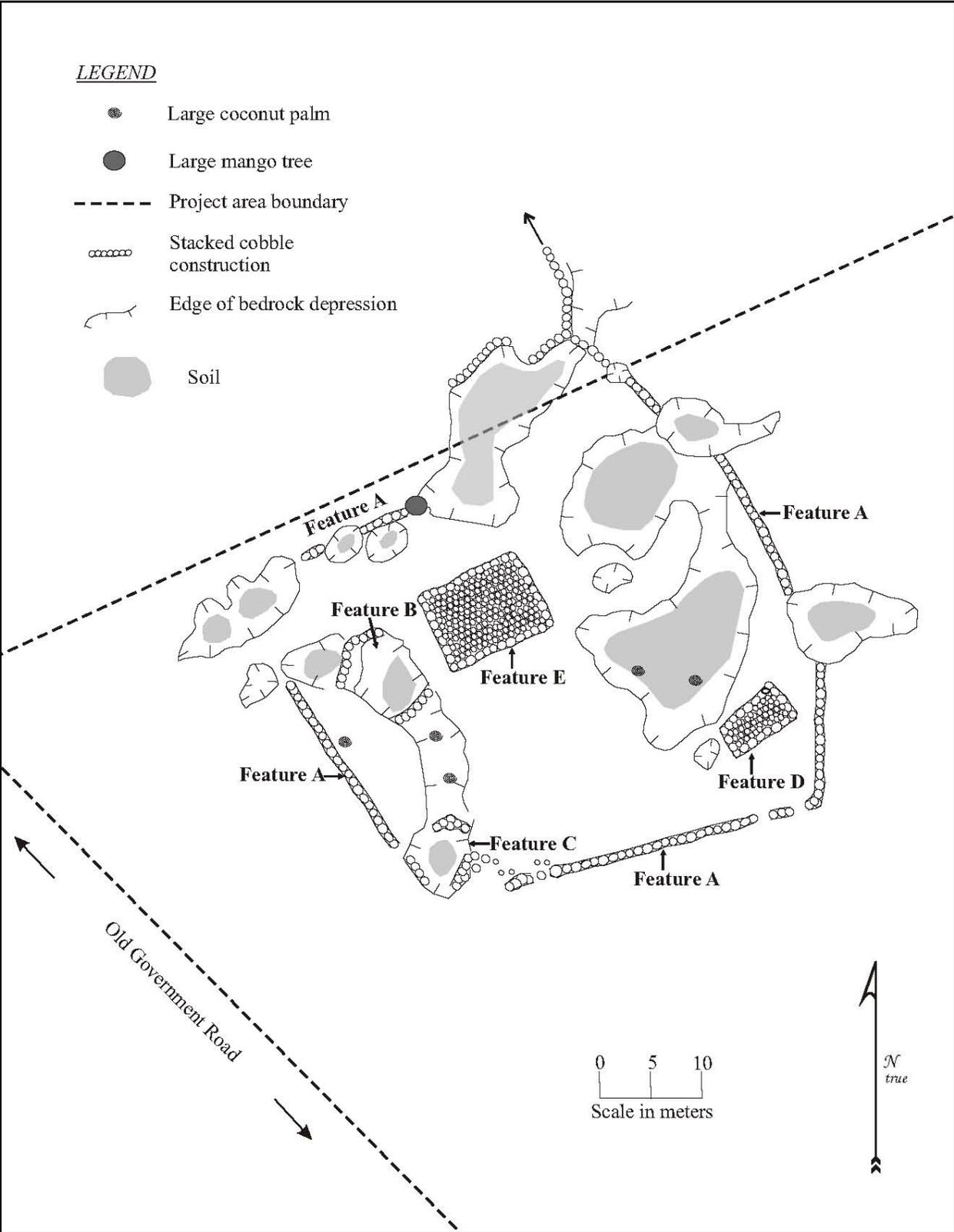


Figure 4: Plan View Map of Site 50-10-45-26660 (adapted from Clark *et al.* 2008).

Road, *makai* toward the coast, which incidentally offers the best pedestrian access *mauka/makai* (west/east) across the parcel. A detailed description of this site and its constituent features are presented below from Clark *et al.* (2008:34 - 51).

SIHP SITE -26660

SIHP Site 26660 is an enclosed complex located in the northwestern portion of the project area, along the northern parcel boundary, approximately 20 meters *makai* of the old Government Road [Figure 3]. The complex occupies a 50 x 50-meter area, and consists of five features including an enclosing wall (Feature A), two modified depressions (Features B and C), a pavement (Feature D), and a platform (Feature E). Feature B-E are all located within an enclosed area created by Feature A [Figure 5]. Sites 50-10-45-26660 has been found to be significant under Criterion D, for information content

Feature A

Feature A is a core-filled rock wall that encloses Site 26660 [see Figure 5]. The wall consists of four sections that combine to form an enclosure around the other features of the site. All four sections stand roughly 0.6 to 1.0 meter in height and are 0.5 to 0.7 meters wide. With the exception of a few areas of collapse, all of the sections are generally in good condition and consist of stacked *pāhoehoe* cobbles standing three to five courses high. The wall does not cross several bedrock depressions that occur naturally within the complex, instead the vertical edges of the depressions act as the wall. At these locations, the stacked wall is built right up to the edge of the depression, discontinued, and then restarted on the opposite side. The eastern wall section of Feature A runs north/south and measures 51.0 meters long. There are two gaps in this section where bedrock depressions are located and the vertical edges act as the wall. The northern most portion of this section continues north out of the project area following the edge of a bedrock outcrop, but also turns west along the edge of a depression forming a portion of the northern wall. The southern wall section runs east/west and measures 32.0 meters long. A waterworn cobble was observed in the middle of this wall section. At the eastern end of the southern section there are two breaks in the wall that appear to be entryways into the site. The breaks are separated by a 2.2 meter long section of core-filled rock wall. The eastern gap measures 2.5 meter wide and the western gap measures 1.0 meter wide. The western wall section runs north/south and measures 25.0 meters long. This section crosses over raised bedrock and runs between two bedrock depressions. These two bedrock depressions create the northwest and southwest corners of the entire enclosed area. The northern wall section runs east/west and measures 13.0 meters long. This section of the wall consists of two segments. There are steep bedrock depressions on either side of the two wall segments as well as in-between them, separating the two. There is a very large and old mango tree present at the *makai* end of the northern wall section.

Feature B

Feature B is a modified depression located 5.0 meters east of Feature A's western wall section, and 2.5 meters west of Feature E, in the northwestern portion of the site [see Figure 5]. The depression measures 7.0 meters by 4.5 meters and is 1.4 meters deep. Cobbles cleared from the central portion of the depression are

piled/loosely stacked along its northern and southern edges to a height of 40 centimeters. It appears that the cobbles were cleared to the edges of the depression to expose the soil beneath them. As a result, the floor of the depression consists primarily of thin soil. A shallow bedrock overhang that measures 0.7 meters tall by 1.4 meters deep is present at the western end of the depression. Three large *Cellana* sp. shells were observed on ground surface within the overhang. Several plastic grow bags were also present within the depression. The *Cellana* sp. shells may have been discarded from the nearby platform (Feature E), or discarded more recently by whomever left the plastic grow bags at the feature.

Feature C

Feature C is a modified depression located in the southwestern corner of the site, approximately 12 meters south of Feature B [see Figure 5]. The depression measures 7.5 meters by 5.8 meters and is 1.4 meters deep. The edges of the depression consist of vertical bedrock with some cobbles piled against the base, and other cobbles stacked along the upper edges to a height even with the exterior ground surface primarily in the northeast corner. The stacking begins roughly 0.4 meters above the floor of the depression and stands up to 1.0 meter tall (three courses). The floor of the depression consists of thin soil. It appears that the cobble modification to the depression was created during the clearing of the floor to expose the soil. Based on the presence of soil at Feature C, it is likely that the depression was used as a household planting area similar to Feature B.

Feature D

Feature D consists of a pavement located in the southeastern corner of Site 26660 [see Figure 5]. The feature measures 7.7 meters long by 4.0 meters wide. It is rectangular in shape, and angled in a northeasterly/southwesterly direction along its long axis. Feature D is constructed on a fairly level bedrock ground surface along the southeastern edge of a large soil-filled, bedrock depression with vertical sides. Two tall coconut palms are growing within the depression that may have been at the site when it was occupied. Several smaller coconuts, from these larger ones, are growing on and around Feature D. The edges of the pavement consist of a single course of large sized cobbles and small sized boulders that stand 10 to 40 centimeters above the surrounding bedrock ground surface. The northwest corner edge of the pavement, where bedrock drops-off into the depression, is slightly taller, consisting of large sized cobbles stacked to a height of 60 centimeters. The level surface of Feature D is neatly paved with medium to large sized cobbles, although rose apple trees growing out of the feature have caused some damage. Two waterworn cobbles are present along the southeastern edge of the pavement, and several modern plastic grow bags were noted to the south of the feature.

Feature E

Feature E is a platform located in the northwestern corner of Site 26660, 2.5 meters east of Feature B [see Figure 5]. The platform is roughly square, measuring 10.5 meters (northwest/southeast) by 9.5 meters (northeast/southwest). It is constructed with medium to large sized cobbles stacked two to four courses high along the exterior edges. The edges stand 40 to 60 centimeters above the surrounding bedrock ground surface along the northwest edge, 55 to 60

centimeters along the northeast edge, 20 to 35 centimeters along the southeast edge, and 30 to 80 centimeters along the southwest edge. The level surface of the platform is paved with small to medium sized cobbles. A possible posthole is present in the southwestern corner of the platform's surface. The hole is circular and lined by large sized cobbles. It measures 50 centimeters in diameter by 30 centimeters deep. Portions of the platform's edges and surface have been disturbed by roots from several large rose apple trees growing on Feature E. A possible entryway to Feature E is located in the center of the northwestern edge. The possible entryway consists of an intermediary step between ground surface and the platform's surface. The step measures 2.4 meters by 0.7 meters. It is cobble paved, but covered by sloping cobble collapse. The step has a definite, single-course, cobble alignment along its northwestern edge, and a probable alignment mixed with collapsed surface cobbles along its southeastern edge. The step stands 25 centimeters above ground surface and 30 centimeters below the platform surface.

...Based on the size and formal attributes of the features, it is likely that Feature E was the primary residence at the complex with Feature D serving an ancillary role. Both of these features probably supported roofed structures. Feature A marks the boundaries of the complex, and likely served as an enclosure, keeping livestock out of the residential area. Features B and C, based on the presence of soil, may have functioned as household planting areas (*ibid.*).

Preservation of the above-described site will take the form of avoidance and protection, also referred to as *conservation*. There are no immediate plans for signage for Site -26660. Site 50-10-45-26660 is located on private land and there are currently no plans for allowing direct public access to this site. However, there could be special provisions accorded Native Hawaiian organizations and any other groups so permitted by the landowner(s) for allowing access to the site for cultural practices, instruction, or research. No additional excavation or research will occur at Site -26660 unless first approved by the landowner(s) and the SHPD.

PRESERVATION METHODS

INTERIM PRESERVATION

Short-term preservation measures at Site -26660 will include the delineation of an interim buffer zone of no less than 20.0 feet (6.0 m) (Figure 5). This interim buffer zone will be established from the outer edges of all archaeological features comprising both sites. Prior the start of any construction work within the project area, orange construction fencing will be erected along the interim preservation zone. The construction crew will be instructed about the meaning of the fencing and the significance of the preserve area prior to the commencement of

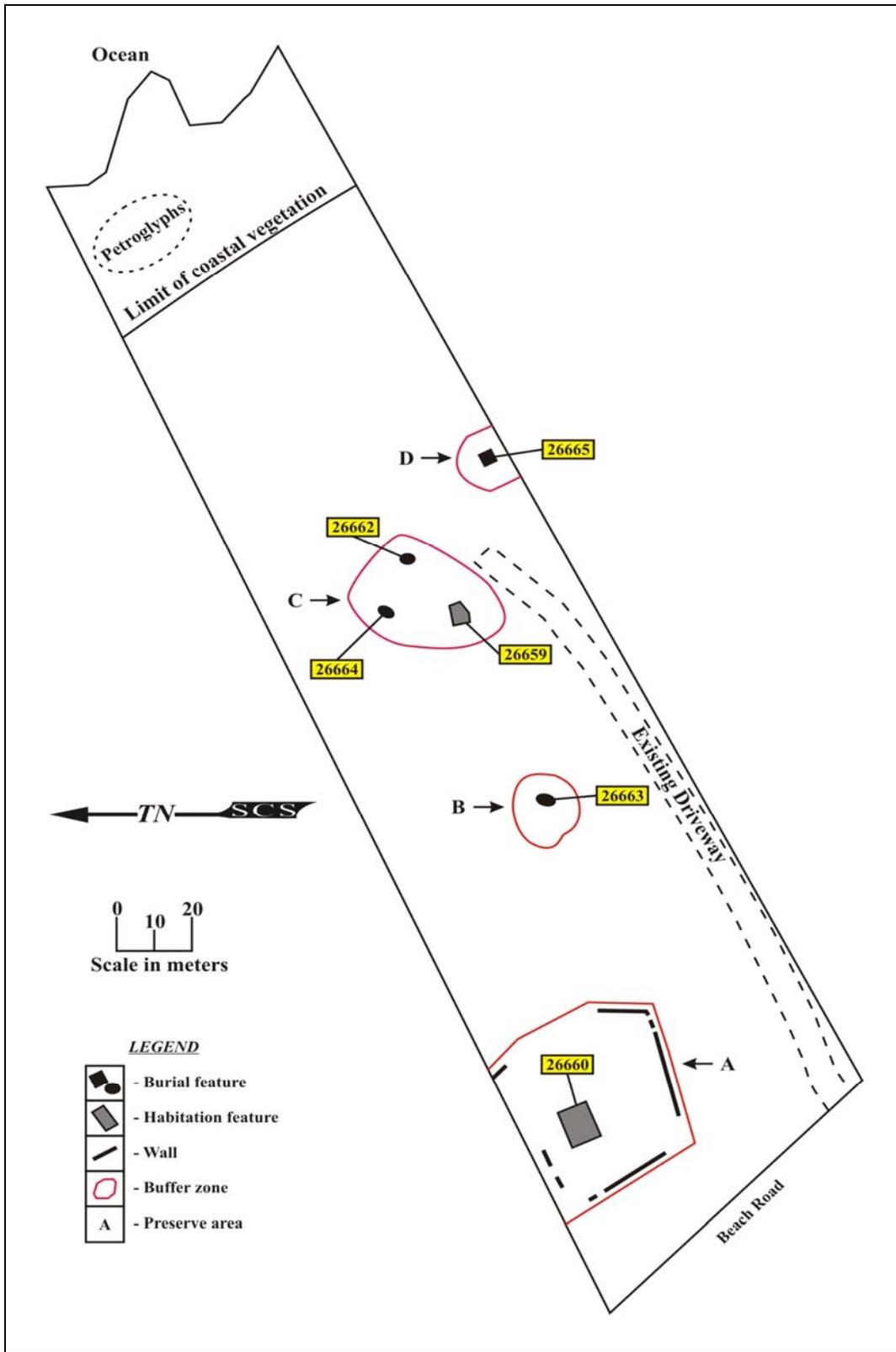


Figure 5: Plan View Map Showing Locations and Permanent Buffer Zones of Preserved for Site 50-10-45 60 (adapted from Clark *et al.* 2008).

the construction work. It is the landowner's responsibility to maintain the site and the orange fence line during all phases of project area construction.

PERMANENT PRESERVATION

Permanent preservation measures at Site -26660 (Preservation Area A) will include the delineation of a permanent buffer zone of no less than 20 feet (6.0 m) (see Figure 5). No construction may occur within the confines of these parameters. The permanent preservation boundary may be marked with a permanent gated fence or natural landscaping barriers that are selected to fit in with the natural topography of the land prior to development (*e.g.*, endemic or Polynesian-introduced vegetation) may be used. If possible, the permanent preservation measures will be constructed of a material consistent with the site's historical context. A fence, gate, or wall may be constructed of natural materials such as local woods and rock. If planting of endemic or Polynesian-introduced vegetation is used, plants will be a minimum of three feet from any archaeological feature to avoid root disturbance. It is the landowner's responsibility to maintain the site.

As stated throughout this document, the preservation and mitigation measures for Sites -26659, -26662, -26663, -26664, and 26665 will be discussed under separate cover in the Burial Treatment Plan.

Interim and long-term preservation procedures are summarized below:

- During all construction phases, at any location on the subject property, an interim preservation boundary will be established by erecting orange, orange plastic construction fencing within a 20 feet (6.0m) perimeter of Site -50-10-45-26660.
- The permanent preservation zone surrounding all features of Site 50-10-45-26660 will be 20 feet (6.0 m). This permanent preservation zone must be measured so that the perimeter is established at least 20 feet (6.0 m) away from any given point of the nearest feature of the site.
- No earth moving or construction will be allowed within the interim or permanent preservation zone, and no equipment may enter these perimeters at any time.
- It is the responsibility of the landowner to ensure that SIHP site locations and interim and permanent preservation zones are surveyed and plotted on a survey map prior to the start of construction activities. Successive maps of the project area will also note the permanent preservation zones.

- The permanent buffer zone encompassing each feature shall be kept free of all structures. Only landscaping may occur within the permanent buffer zone (planting of endemic or Polynesian-introduced species is permitted as part of preservation maintenance). Planting of endemic or Polynesian-introduced vegetation will be a minimum of three feet from any archaeological feature to avoid root disturbance. Clearing of vegetation within the buffer zones and the features themselves will be allowed, although large, free-standing trees and those growing directly against any part of the structure will remain in place. However, any trees growing next to a structure may be cleared to ground level by mechanical means (chainsaw). Round-Up or other similar chemical spray may be used on such things as stumps to clear roots from continually growing in the area; the roots will not be manually pulled out as the roots may disturb existing site architecture.
- All existing stones occurring within the features and buffer zones, whether stacked or not, will be left in place.
- Should storm, earthquake, or other natural or cultural damage occur to the site and its environs, and should this necessitate repairs, the land owner will notify the SHPD of the situation and reach an agreement with the SHPD on how to proceed prior to implementing any alterations to the ground surface, site, or vegetation within the preservation zone.
- Modern debris generated by occupants of the parcel, or debris that may have been blown onto the parcel, may be removed by hand from within preservation easements whenever is deemed necessary by the landowner.
- If the landowner finds that the features or buffer zones have been disturbed in any way, the landowner will immediately notify SHPD. Repairs or stabilization of the damages cannot proceed until approved by SHPD.
- These provisions are made for on-going preservation of the site. This portion of the project area will be preserved, with the preservation perimeter and protocol being binding on successive owners of the lot.

PRESERVATION VERIFICATION

Verification that interim preservation measures are in place will be made by SCS prior to the construction start date. In addition, verification that permanent preservation measures are in place will be made by SCS following completion of the development project. Verification will take the form of a phone call and/or written notification to SHPD by SCS if compliance with archaeological preservation methods is not 100% maintained according to this Preservation Plan.

CONSULTATION

In accordance with HRS § 13-277-3 (4), we have consulted with Charles Young, Chair of the Hawai`i Island Burial Council, Dutchie Saffrey, Puna District Representative of the Hawai`i Island Burial Council, and Lukela Ruddle, Hilo District representative of the Office of Hawaiian Affairs indicating SCS was initiating the consultation process and to inquire if they were aware of any individuals or group who have knowledge pertaining to the history of these sites. The consultation period extended from February 9 to April 9, 2009.

On February 13, 2009, we initiated the consultation process by sending letters to individuals and organizations that may be aware of individuals or other organizations of the Puna District and Hawaiian community who may have knowledge of the history of the project area (Appendix A). These organizations and individuals include: Charles Young, Hawai`i Island Burial Council Chair; Dutchie Saffrey, Hawai`i Island Burial Council Puna District Representative, and Lukela Ruddle, Office of Hawaiian Affairs, Hilo District Representative.

On February 24, 2009, SCS conducted a follow-up telephone call to Mr. Charles Young. Mr. Young indicated he had not received the SCS consultation letter as he had not gone to his Post Office Box. During the telephone conversation with SCS, Mr. Young recommended discussing the mitigation measures with the State Historic Preservation Division (SHPD), Hilo. Based on this recommendation, SCS contacted Ms. Morgan Davis, SHPD Assistant Hawai`i Island Archaeologist via telephone and e-mail regarding the preservation methods at Sites - 26659 and -26660. In addition, Ms. Davis agreed to discuss the above-described preservation measures with Analu Josephides, SHPD Cultural Historian.

On February 26, 2009 we contacted Lukela Ruddle (Office of Hawaiian Affairs, Hilo District Representative) via telephone as a follow-up to our letter. Ms. Ruddle stated she had received the consultation letter and apologized for not responding. During the telephone conversation with SCS Ms. Ruddle requested we send a copy to Kai Markell, Office of Hawaiian Affairs, Honolulu). We complied with Ms. Ruddle's request and sent a consultation letter to Mr. Markell.

We did speak briefly with Dutchie Saffrey via telephone on February 26, 2009, and were able to verify receipt of the consultation letter. Ms. Saffrey also apologized for not responding. However, due to a faulty connection, the call was disconnected and repeated attempts to reach Ms. Saffrey by phone only reached her answering machine. As Ms. Saffrey had indicated in our

brief conversation that she had been having technical difficulties with her phone, SCS left a voice-message on Ms. Saffrey's answering machine with an SCS e-mail address.

On March 4, 2009, Scientific Consultant Services conducted a follow-up telephone call to Kai Markell. Initially, Mr. Markell did not answer and a voicemail was left on his answering machine. In a subsequent telephone call to Mr. Markell the same day, we were able to reach him. During the ensuing conversation, Mr. Markell stated he did not receive a copy of the consultation letter we mailed on February 26, 2009. So, we transmitted the consultation letter and the five associated figures electronically to him on March 4, 2009. He indicated, via e-mail, that he had received the letter and figures.

RECOMMENDATIONS

Due to the presence of human burials identified during Archaeological Inventory Survey of TMK: (3) 1-5-010:032 a program of Archaeological Monitoring is recommended during all construction related ground altering activities conducted on the subject property.

REFERENCES

- Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. University of Hawaii Press, Honolulu.
- Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.
- Clark, M. R., A. Ketner and R. B. Rechtman
2008 *An Archeological Inventory Survey of TMK (3) 1-5-10: 032*. On File at SHPD Hilo, Hawaii.
- Daws, Gavin
1968 *Shoal of Time: A History of the Hawaiian Islands*. University of Hawai'i Press.

DLNR/SHPD
2003 *Chapter 277 Rules Governing Requirements for Archaeological Site Preservation and Development*. State Historic Preservation Division, Kapolei.
- Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press. Honolulu.
- Kelly, Marion
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

1998 A Gunboat Diplomacy, Sandalwood Lust and National Debt. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.
- Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
- Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai'i Press. Honolulu.
- Sato, H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro, Jr.
1973 *Soil Survey of the Island of Hawaii, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington, D.C.: Government Printing Office.

Spear R., D. Chaffee, and A. Dunn

1995 *Data Recovery Excavations at Site 50-10-45-14,675 and Site 50-10-45-14,985, Makuu Aquafarms, Makuu, Puna, Hawai'i Island (TMK: 1-5-10:33)*. Scientific Consultant Services, Inc. Project Number 039-2. Prepared for Dr. Dudley Seto, M.D., Intercontinental Medical Services, Inc.

APPENDIX A: EXAMPLE OF CONSULTATION LETTER
(NO ATTACHMENTS)

February 13, 2009

Rechtman Consulting, LLC recently conducted an Archaeological Inventory Survey of a 5.586 acre property located in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010:032] (Figures 1 and 2). During the course of the survey nine sites were newly identified (Figure 3). The sites documented include: SIHP Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features. For a detailed account of the findings please refer to (Clark *et al.* 2008) An Archaeological Inventory Survey of TMK: 3-1-5-010:032, on file at the State Historic Preservation Office, Hilo.

We are now in the process of preparing a Burial Treatment Plan for the four burial sites, preserving these sites in place for perpetuity, and a Preservation Plan specifically focusing on interim and long-term, permanent for Sites -26659 and -26660. In compliance with the DLNR/SHPD Hawaii Revised Statutes (HRS) §13-277 and §13-300, we are consulting with individuals and groups who may have knowledge of the history of this area. We are writing to you to inquire if there are any contacts, of whom you may be aware, who have knowledge pertaining to the history of these sites.

Thank you in advance for your comments and help. We look forward to hearing from you.

Sincerely,

Cathleen A. Dagher
Senior Archaeologist
Scientific Consultant Services, Inc.

Attachments:

Figure 1: USGS Quadrangle (Kilohana) Map Showing Project Area.
Figure 2: Tax Map Key [TMK: (3) 1-5-010:032] Showing Project Area.
Figure 3: Site Location Map.

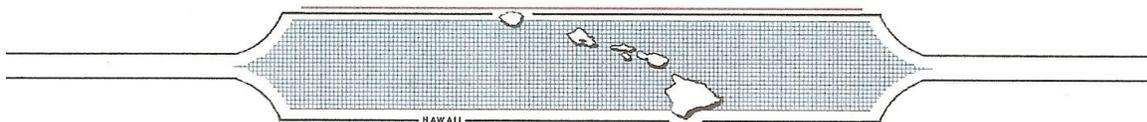
**BURIAL SITE COMPONENT OF A PRESERVATION PLAN FOR SITES
50-10-45-26659, -26662, -26663, -26664, AND -26665
LOCATED ON A 5.59-ACRE PARCEL
IN MAKU`U AHUPUA`A, PUNA DISTRICT
ISLAND OF HAWAII
[TMK: (3) 1-5-010:032]**

Prepared by:
Elizabeth Pestana, B.A.
Cathleen A. Dagher, B.A.
and
Robert L. Spear, Ph.D.

FINAL
November 30, 2009

Prepared For:
John Gapp
P.O. Box 1128
Pahoa, Hawaii 96778

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 975 Honolulu, Hawai'i 96813

ABSTRACT

At the request of the landowner, Mr. John Gapp, Scientific Consultant Services (SCS), Inc. has prepared this Burial Treatment Plan (BTP) for Sites 50-10-45-26659 and 26662 through 50-10-45-26665. The Burial Treatment Plan follows an accepted Archaeological Inventory Survey of approximately 5.59 acres of land in Maku`u Ahupua`a, Puna District, Island of Hawai`i, Hawai`i [TMK: (3) 1-5-010:032] (Clark *et al.* 2008). During the course of the survey nine sites were newly identified. The sites documented include: Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, a Historic habitation complex; -26661, a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features.

Sites 50-10-45-26658 through -26666 have been evaluated for significance according to the established criteria for the Hawai`i State Register of Historic Places §13-275-6. All of the sites have been found to be significant under Criterion D, for information content. In addition the burial sites, Sites -26662 through -2665, have been found to be significant under Criteria E, for cultural significance.

Scientific Consultant Services, Inc. (SCS) has prepared this Burial Treatment Plan in accordance with the rules of the State of Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR)(§13-300 HAR) to discuss the appropriate mitigation methods for Sites -26659 and -26662 through -26665. This Burial Treatment Plan has been prepared for these sites in advance of the construction of a proposed single family dwelling. This document follows the above-mentioned Clark *et al.* (2008) Archaeological Inventory Survey and focuses specifically on interim and long-term permanent preservation for Site -26659 and Sites -26662 through -26665. Site 50-10-45-26659 is being preserved at the landowner's request (Clark *et al.* 2008: 113). As Site -26659 is in close proximity to Sites -26662 through -26664, it is included in Preserve Area C, and is included in the Burial Treatment Plan.

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INTRODUCTION

At the request of Mr. John Gapp, landowner, Rechtman Consulting, LLC., conducted Archaeological Inventory Survey of an approximately 5.59-acres property in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032] (Figures 1 and 2) (Clark *et al.* 2008). During the course of the survey nine sites were newly identified (Figure 3). The sites documented include: SIHP Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features. Subsequently, Mr. Gapp requested Scientific Consultant Services, Inc. (SCS) prepare this Burial Treatment Plan, in consultation with the State Historic Preservation Division (SHPD). This Burial Treatment Plan has been prepared specifically for Site -26659 and Sites -26662 through -26665, in advance of the construction of a proposed single family dwelling (Figure 4). This document follows the above-mentioned Clark *et al.* (2008) Archaeological Inventory Survey and focuses on appropriate mitigation methods for State Inventory of Historic Properties (SIHP) Sites 50-10-45-26662, -26663, -26664, and -26665. As these burial sites were identified during Archaeological Inventory Survey, they are defined as “previously identified” in accordance with the rules of the State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR) (§13-300, HAR). Please note Site -26659 is being preserved at the landowner’s request. As Site -26659 is in close proximity to Sites -26662 through -26664, it is included in Preserve Area C. Thus, Preservation measures for Site -26659 will be specifically discussed in this Burial Treatment Plan.

The purpose of this Burial Treatment Plan is to ensure that State Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 will be preserved in place for perpetuity. This document has been written in accordance with the rules of the State Historic Preservation Division (SHPD), Department of Land and Natural Resources (DLNR) (§13-300, HAR).

ENVIRONMENTAL SETTING

PROJECT AREA

The project area consists of approximately 5.59-acres of land located just southeast of the Hawaiian Paradise Park residential subdivision in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032] (see Figures 1 and 2). The parcel is a long, narrow rectangular shaped tract of land flanked by undeveloped parcels on its north and south sides, by the Old Government Beach Road on its west (*mauka*) edge, and the coastal setback on its east (*makai*)

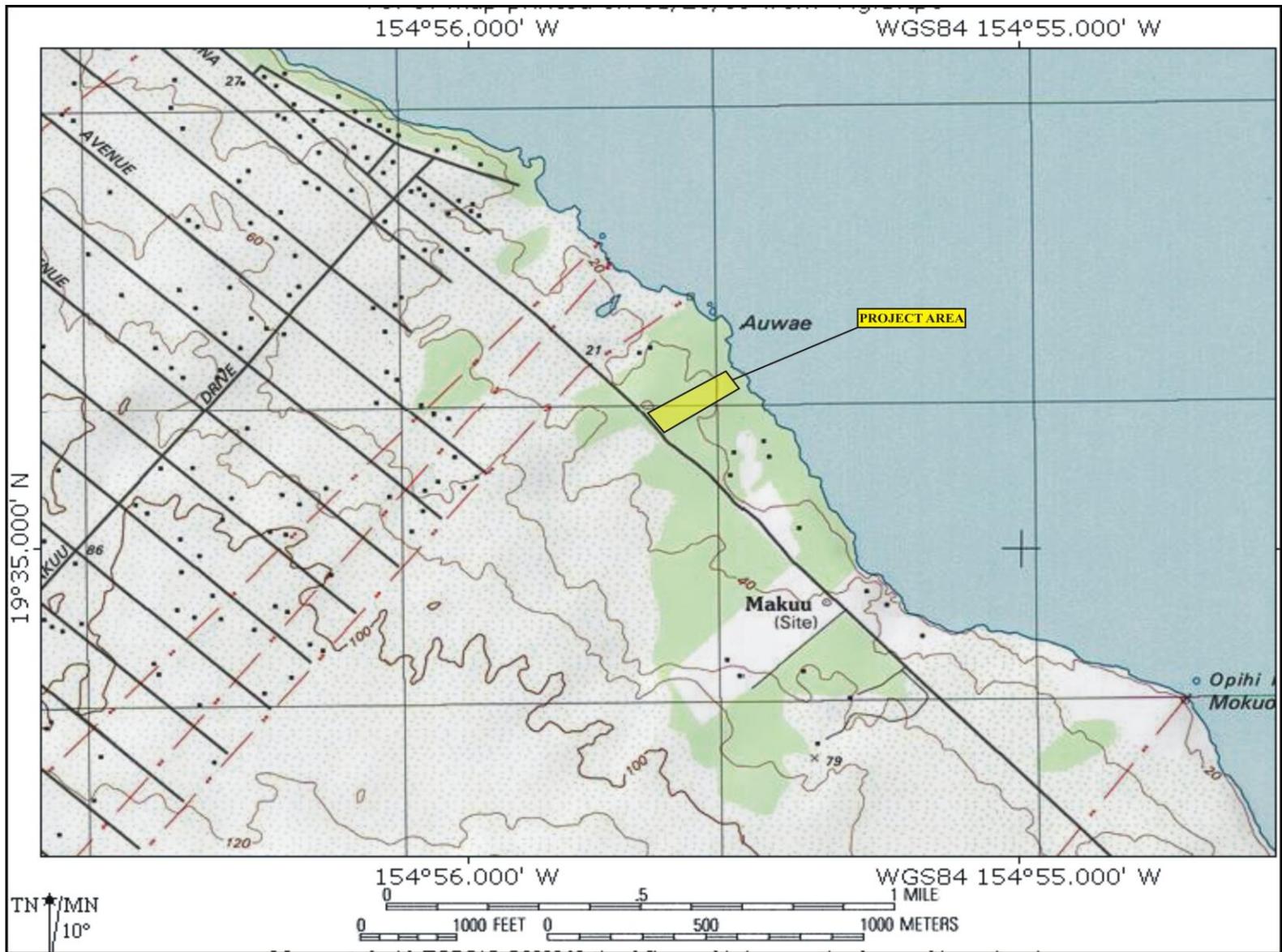


Figure 1: USGS Quadrangle (Pahoa North) Showing Project Area.

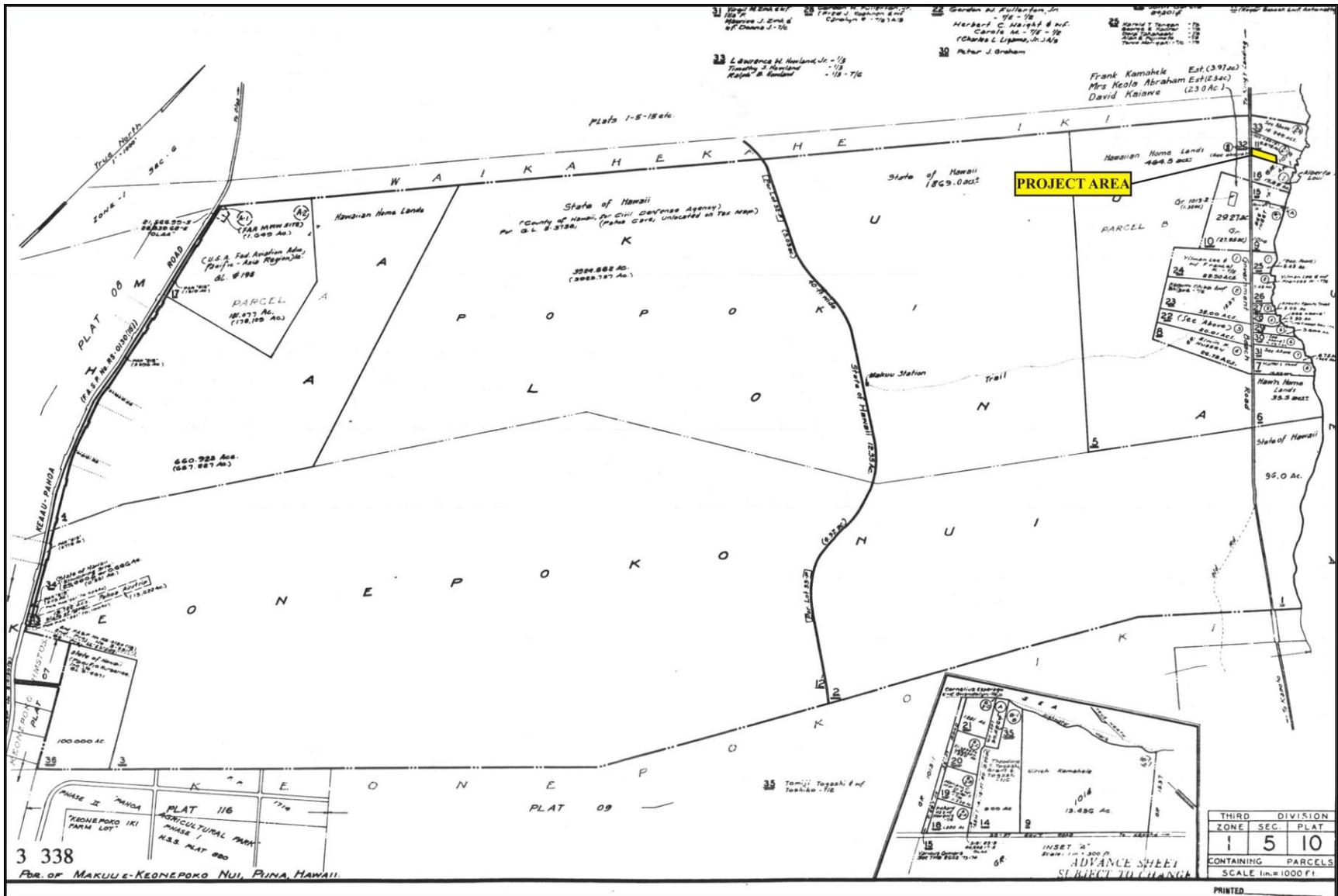


Figure 2: Tax Map Key [TMK: (3) 1-5-010:032] Showing Project Area.

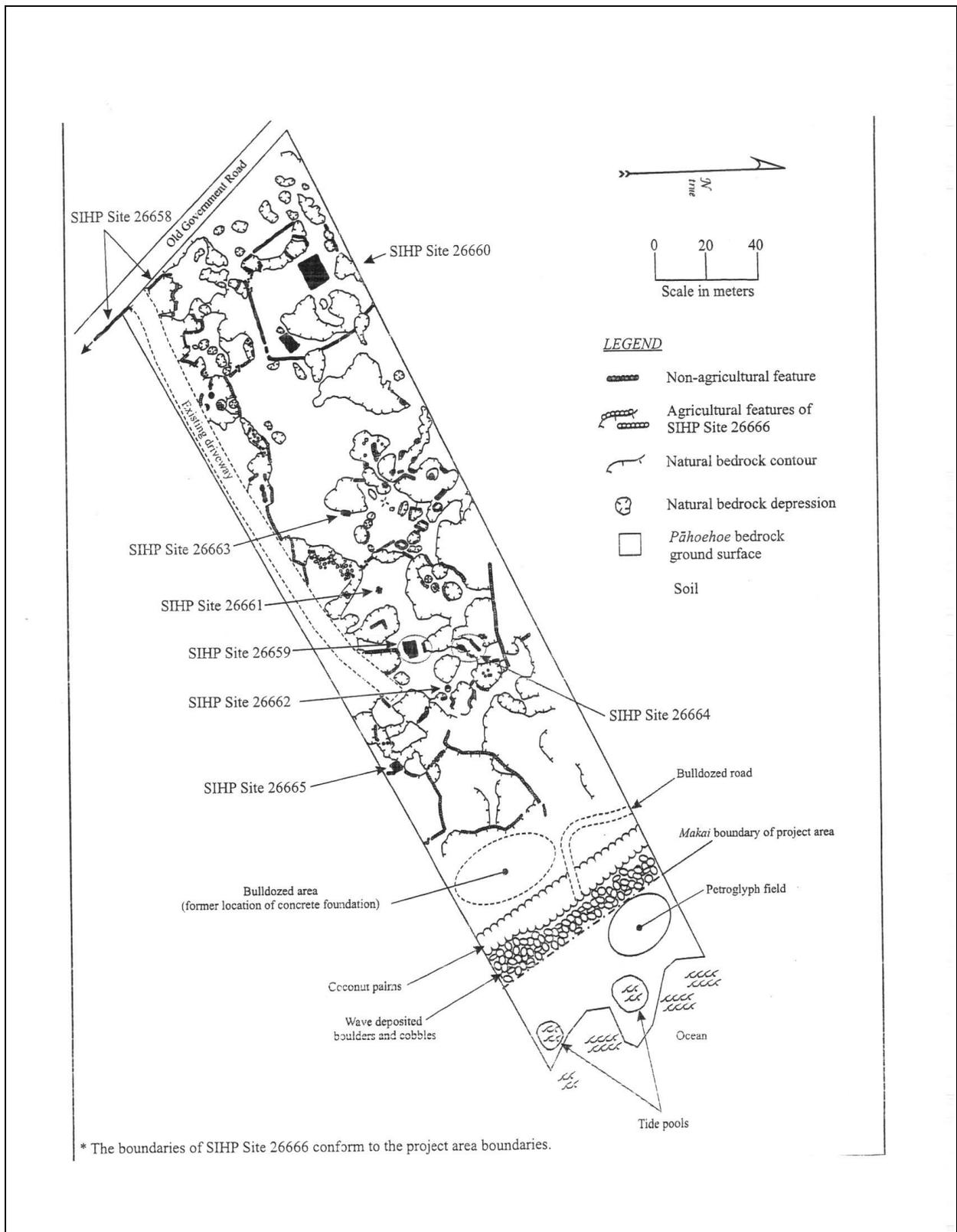


Figure 3: Plan View Map Showing Project Area and Location of Site 50-10-45-26658 through Site 50-10-45-26666 (adapted from Clark *et al.* 2008).

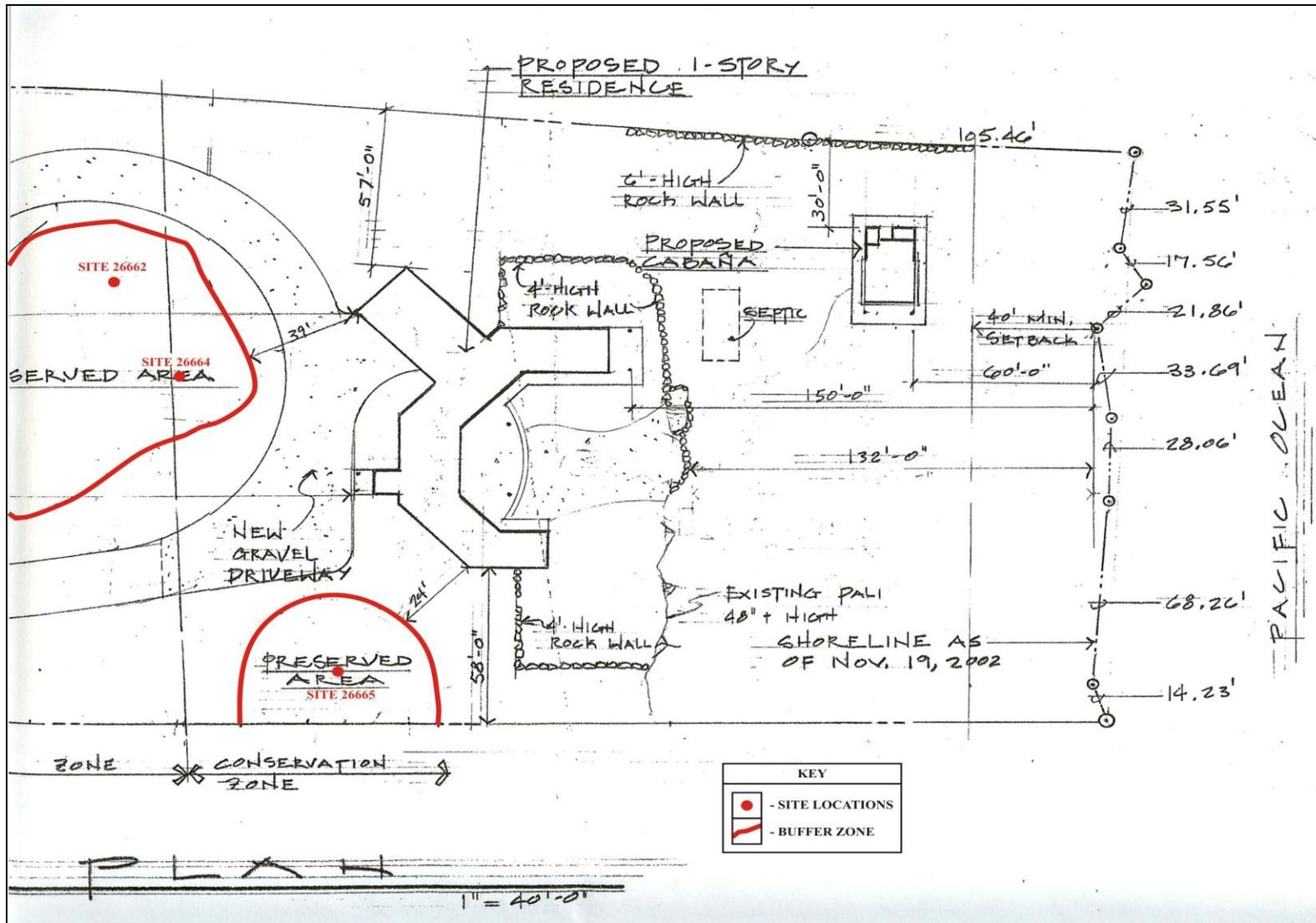


Figure 4: Schematic Plan View Map Showing Locations and Permanent Buffer Zones of Sites 50-10-45-26662, Site 50-10-45-26664, and Site 50-10-45-26665 in relationship to the location of the proposed dwelling (adapted from Clark *et al.* 2008).

edge at 0 to 40 feet above sea level. Terrain on the parcel gently slopes northeast and is comprised of *pahoehoe* lava flows of the Kilauea Volcano. A majority of the ground surface is exposed bedrock containing pockets of sediment.

CULTURAL HISTORICAL CONTEXT

THE MĀHELE

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Kame`eleihiwa 1992:169-70, 176; Kelly 1983:45, 1998:4; Daws 1962:111; Kuykendall 1938 Vol. I: 145). The Māhele of 1847-48 divided Hawaiian lands between the king, the chiefs (*na ali`i*), and the government beginning the process of private ownership of lands. The subsequently awarded parcels were called Land Commission Awards (LCAs). Through the Māhele of 1847-48 and the Kuleana Act of 1850, land was made available for private ownership, and the *maka`āinana* (commoners), if they had been made aware of the procedures, were also able to claim the plots on which they had been cultivating and living. If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

In 1848 as a result of the *Māhele*, the land of Maku`u *ahupua`a* was retained as Government Lands and only five LCAs or Kuleana parcels were claimed (Claim Numbers 09494, 09496, 10139, 10139B, and 11293*H) at inland locations (Waihona.com). Three of the claims (Claim Numbers 09494, 10139B, and 11293*H) were awarded. Claim 09494 was awarded to Kamali`ikapu and was for two `apana, one of which was a house lot in Maku`u *ahupua`a*. The house lot was in Kalele `ili and was inherited from his parents in 1819. Claim 10139B was awarded to Pu`ulau and was for a single `apana in the `ili of Ililoa. The `apana contained four taro fields, six sweet potato fields, two coffee fields, and a sugar cane field. Claim 11293*H was awarded to Isaaka Kaiama and was a single `apana in Maku`u *ahupua`a*.

Coastal portions of the *ahupua`a* of Maku`u, Pōpōkī, and Hālonā were eventually divided and sold as fee simple Land Grants. In 1852, a portion of the current project area became Land Grant No. 1013, Lot 1 and was acquired by D.W. Maiau (Clark *et al.* 2008). D.W. Maiau was the husband of Hanai.

HISTORICAL CONTEXT

In 1848, a survey of schools conducted by the Hawaiian Government recorded a schoolhouse in Maku`u Ahupua`a, and lists Land Grantee Maiau as the teacher, Maiau's teacher's salary, the number of students attending, and the academic curriculum. By 1873 - 1874, the Maku`u school was noted once again in a period report submitted by Puna school, which reported the same information as in the previous report including an N. Kanihoa as the Maku`u school teacher, a J. Elderts as the school supervisor, the schoolhouse as being in good condition, and the birth and deaths known to Maku`u over that period (*ibid.*).

In 1873 construction of the Government Road, likely the route of an old pedestrian trail, from Hilo through Puna had been completed. Around this time cattle ranching had found its start in the area when rancher Obed B. Spencer leased the ahupua`a of Kea`au, just northwest of Maku`u from guardians of William C. Lunalilo, Charles Kanaina and Charles R. Bishop. Spencer's ten year lease was transferred, and his personal property which included "...buildings and improvements...all [the] flocks of cattle running on the land of Keaau aforesaid and on the adjoining lands branded 'OS' or ' ' together with [the] brand 'OS' and also [the] flock of goats and sheep running on the land of Keaau aforesaid and the adjoining lands and also [the] fowls and hogs on the lands...", as stated in the assignment of the lease and Bill of sale, was sold to J.O. Dominis and R.A. Lyman.

Dominis' and Lyman's newly acquired leased lands reportedly inventoried 300 "OS" branded cattle, and 4,000 goats. Over the course of the following year, the two expanded their ranching endeavors leasing additional lands in neighboring *ahupua`a*, but by 1876 Charles R. Bishop bought Lyman's interest in the *ahupua`a* of Kea`au for \$8,333.00, and in turn assigned the lease to the Hawaiian Agricultural Company in consideration of \$120,000.00.

In 1877 J.E. Elderts and William H. Shipman in consideration of \$33,000.00 were assigned lease and business interests in Kea`au ahupua`a by the Hawaiian Agricultural Company. Eldert's and Shipman's new partnership in ranching began to prove lucrative, and by 1879 their holdings included the majority of lands between Kea`au and Kapoho *ahupua`a* (*ibid.*).

During this time reports by the Government Schools of the Puna District had noted a deterioration in the standing of the schools of Keahou and Maku`u, due to a decline in the contribution by skilled teachers, and of income generated by the schools fields; owing to the trampling of produce by ranch animals. By 1891 the report noted that the schoolhouse in Maku`u was no longer standing, and that Kea`au school was gone (*ibid.*).

The late 1800s had begun a transformation in land use and tenure in the Puna District. Before 1900 Shipman had sole interest in Kea`au and lands of the neighboring *ahupua`a*. Approximately 4,000 acres of these lands he sold to various buyers for coffee cultivation, and leased another 4,000 acres to the Ola`a Sugar Company, Ltd. By 1900 a new highway been completed and in the early part of the 20th century radical changes in the Puna District had become evident. As ranching, sugarcane, coffee, and lumber became the dominating industries, a decline of population in the area resulted in the near disappearance of Traditional agriculture systems (*ibid.*).

PREVIOUS ARCHAEOLOGY

There have been numerous archaeological investigations in Maku`u, Pōpōkī, and Hālonā *ahupua`a*. Among the previous studies, nine were conducted in the *ahupua`a*'s coastal regions near the current project area, and six at locations further inland. For a more thorough discussion of the archaeology conducted in the vicinity of the current project area, please see Clark *et al.* 2008.

Among the earliest of archaeological studies in the vicinity of the project area, was an endeavor by Hudson to survey the archaeological sites from Waipio Valley to the Ka`u District of the East Hawai`i Island coast. In his attempt to survey such a length of coast, the features recorded ranged from shrines to mounds. Hudson didn't document any sites in Maku`u but only alluded to the "...mazes of old walls and occasional inclosures giving evidence of the former population and extensive cultivation of this stretch of coast" between Mokuopihi and Waihakiula (*ibid: 16*)

In 1990 Barrera conducted the first phase of a three phase archaeological study on [TMK (3) 1-1-10: 033], a 14-acre parcel adjacent the coast, northwest of the current project area. Barrera's Archaeological Inventory Survey recorded six site complexes, all with multiple component features. These sites were documented as SIHP Sites: -14675, -14981, -14982, -14986, -14984, and -14985 and included a broad range of feature types including modified outcrops, depressions, lava blisters, walls, mounds, platforms, enclosures, and terraces. The sites were interpreted as agriculture, habitation, and possible burial dating from pre-Contact to the Historic era (*ibid.*).

In the second phase of the archaeological study of the above parcel, SCS conducted burial testing (Chaffee and Spear 1993) at a mound feature of Barrera's Site -14675, as well as two platform features and a mound feature at Site -14985. Testing resulted in the documentation of three subsurface burial chambers within the two mound features, and one of the platform features. Two of the three subsurface features contained skeletal remains and grave goods dating to the Historic period. The third, lacking human remains, was interpreted as such based on the features formal characteristics.

Finally, in the parcels third phase of archaeological investigations, Data Recovery was conducted at two enclosures, a terrace, a sealed lava blister, and faced mound features of Site -14675, and at Site-14985 terrace feature (Spear *et al.* 1995). Artifacts from the excavations

included modified basalt and volcanic glass, the majority of which were recovered from the terrace feature of Site -14985. Radiocarbon dating yielded an estimated date of 349 to 59 B.P., a 2 sigma calibrated result of A.D. 1660 to 1950. The sites were interpreted as permanent habitation from the late pre-Contact to the late 19th century (*ibid.*).

A reconnaissance survey of a six mile corridor for the proposed Kapoho-Keaukaha Highway route spanning from Waiakahiula Ahupua`a to Kea`au Ahupua`a through the Puna District was conducted in 1974 by Bishop Museum (Ewart and Luscomb). The findings were extensive and consisted of several archeological sites composed of single features, and feature complexes.

Archaeological Inventory Survey conducted on a 38-acre parcel, just *mauka* of old Government Road, south of the current project area documented five sites (Clark *et al.* 2007). The sites identified ranged from pre-Contact to Historic period sites and included a pre-Contact agricultural shrine

SUMMARY OF ARCHEOLOGICAL INVENTORY SURVEY

Rechtman Consulting LLC., conducted Archaeological Inventory Survey of an approximately 5.59-acres property in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010: 032]. During the course of the survey nine sites, comprised of 67 features, were newly identified (Clark *et al.* 2008) (see Figure 3). The sites documented include SIHP Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features. For a detailed account of the findings please refer to Clark *et al.* (2008).

All of the sites identified during the survey evaluated for significance according to the established criteria for the Hawai`i State Register of Historic Places §13-275-6. The five criteria are classified as follows:

Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history;

- Criterion B: Site is associated with the lives of persons significant to our past;
- Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction;
- Criterion D: Site has yielded or has the potential to yield information important in prehistory or history; and).
- Criterion E: Site has cultural significance to an ethnic group; examples include religious structures, burials, major traditional trails, and traditional cultural places (State of Hawai`i criteria only).

Sites 50-10-45-26658 through -26666 have been found to be significant under Criterion D, for information content. In addition the burial sites, Sites -26662 through -2665, have been found to be significant under Criteria E, for cultural significance. As stated elsewhere in this document Site 50-10-45-26659 is being preserved at the landowner's request (Clark *et al.* 2008: 113).

SITE DESCRIPTIONS

A detailed description of Site 50-10-45-26659 and Sites -50-10-45-26662 through -26665 is provided below from Clark *et al.* (2008: 28-33, 52 -69).

SIHP SITE 50-10-45- 26659

Site 26659 is an enclosure/pavement located in the central portion of the study parcel; approximately 15 meters northwest of the *makai* end of the driveway [see Figure 3]. It is situated at the top of a raised, linear section of bedrock that drops off steeply to the north and south of the feature. The site consists of a level cobble pavement on bedrock with an enclosure constructed on the surface of the pavement. The base pavement of Site 26659 measures 7.0 meters (east/west) by 5.4 meters (north/south). It is a level surface constructed on south-sloping bedrock. The exterior edges of the pavement consist of stacked basalt cobbles standing one to three courses (35-60 centimeters) above the bedrock ground surface. The down-slope (southern) edge of the pavement is taller than the upslope (northern edge). The level surface of the pavement consists of jumbled, small to medium sized cobbles. The surface was likely more neatly paved at some point in the past, but root disturbance from nearby rose apple and mango trees has caused many of the cobbles to shift.

The surface of the southern portion of the pavement is enclosed with stacked rock walls. The enclosed area measures 6.3 meters long by 3.0 to 4.5 meters

wide. The eastern portion of the enclosure is generally in a better state of repair than the western portion, which has collapsed onto the surface of the pavement. The western wall segment measures 3.2 meters long by 1.1 meter wide and stands 30 centimeters above the pavement's surface. The eastern wall measures 2.5 meters long by 1.0 meter wide and stands up to 75 centimeters above the surface of the pavement. The southern wall segment is rough and has mostly collapsed, but in its current condition it measures 5.0 meters long by 0.4 to 1.5 meters wide (due to the collapse its height above the surface of the pavement is difficult to determine). The northern wall segment measures 6.2 meters long by 1.0 meter wide and stands 30 to 65 centimeters above the surface of the pavement. There is a 50-centimeter wide gap in the center of the northern wall that, although somewhat collapsed, appears to be an intentionally constructed entryway to the enclosure from the northern portion of the pavement. The enclosed area may have supported a structure with a roof and walls. The northern portion of the pavement is not enclosed [Figure 4]. It measures 7.0 meters long by 2.0 meters wide, and as mentioned above, has a jumbled surface. The roots of two large rose apple trees have severely impacted the northeastern corner of this portion of the pavement.

A possible posthole was noted in the northwest corner of this area. The posthole is roughly circular, and lined with large sized cobbles. It measures 40 centimeters in diameter by 30 centimeters deep. The posthole may have held a roof support upright. This portion of the feature may have been a covered *lanai* area, and acted as the entryway to the enclosed portion of Site 26659.

A 2.7-meter long by 0.9-meter wide alignment is located 2.0 meters northwest of the northern edge of the pavement. The alignment consists of two courses of stacked cobbles that stand up to 40 centimeters above ground surface to the north. Bedrock slopes away from the base of the alignment to the south to a soil filled depression, but the top of the alignment is even with ground surface to the south. This alignment helps create a level surface between it and the pavement, again suggesting a possible entryway along the northern side of the pavement. Level, unmodified bedrock continues to both the east and the west away from Site 26659, providing the easiest pedestrian access to the site from those directions (*ibid.*). Sites 50-10-45-26659 has been found to be significant under Criterion D, for information content

Sites 50-10-45 -26662 through -26664, a series of Historic concealed overhangs containing burials, and Site 50-10-45-26665, pre-Contact a platform burial, are described in detail below. No items were removed during test-excavations at these sites and all cultural material within the burials will remain with them in perpetuity. Please note the following site descriptions are those provided in Clark *et al.* 2008.

SIHP SITE 50-10-45- 26662

Site 50-10-45-26662 is a concealed bedrock overhang located in the east-central portion of the project area, 20 meters northeast of Site -26659. The site consists of a wall constructed along the edge of a natural bedrock depression that blocks and

conceals an overhang. The roughly oval depression measures 3.2 meters by 2.0 meters by 1.0 to 1.4 meters deep. It has vertical bedrock edges and thin soil at its base. The overhang and wall are located along the *mauka* (southwestern) edge of the depression. The wall is constructed of medium to large sized cobbles and boulders that are stacked five courses high. The wall measures 3.25 meters long by 0.6 to 0.8 meters wide and stands 1.25 meters tall from the floor of the depression to the bedrock at the top of the overhang. A large rose apple tree is growing on top of the wall, and its roots extend down into the feature. A 1.3-meter long portion of the wall at the southeast end is constructed under overhanging bedrock. Small voids between the cobbles of the wall allowed for glimpses into a chamber created by a bedrock overhang behind it. A smaller bedrock depression (1.0 meter long by 0.5 meters wide by 1.25 meters deep), located 1.0 meter to the west of the larger one, also had some cobbles loosely stacked/piled along its southeastern edge that appeared to block another opening to the same overhang. In an attempt to access the overhang chamber, a 1 x 1 meter test unit (TU-2) was excavated on top of the central portion of the wall along the south edge of the bedrock depression. Excavation of TU-2 began with removal of the wall cobbles and boulders to a depth of 1.0 meter, which was adequate to allow fieldworkers to access to the overhang chamber. The concealed chamber measured 2.5 meters long (northwest/southeast) by 1.6 meters deep, and had interior floor to ceiling heights that ranged from 0.7 to 1.2 meters. The floor of the chamber consisted of black (10YR 2/1) muck; some exposed bedrock, tree roots, and scattered cobbles from interior wall collapse.

Three Historic artifacts were discovered within the wall construction during the removal of the cobbles: a hard rubber ovoid object, a metal disc, and a metal buckle assembly. The hard rubber object measures 6 x 4 centimeters. It has two small holes and the inscription "Horn's Standard Fig. 9" on its flat side. The metal disc is round and flat, measures 4.5 centimeters in diameter, and is shiny on one side and rusted on the other. The metal buckle assembly measures 10 centimeters long by 4 centimeters wide, and was riveted to allow for rotational movement and adjustment. Together these objects appear to represent elements of a hernia truss that may have been manufactured by Horn and Bro., W. H. prior to the turn of the 20th century. An internet search found an 1892 catalogue listing for Horn and Bro., W. H. that contained reference to Horn's standard hard rubber, leather covered and elastic trusses. This listing is contained in the Ottis Historical Archives of the National Museum of Health and Medicine ([HTTP://nmhm.washingtondc.museum](http://nmhm.washingtondc.museum)).

Several more Historic artifacts including a branding iron, two ceramic bottles, and an ornate metal latch attached milled wood were discovered on the floor of the overhang chamber. The first of these artifacts is a salt glazed gin jug manufactured by Blankenheym and Nolet of Holland. The bottle has a broken "ear" handle, but is otherwise intact. It is burnt sienna in color and embossed with the "Blankenheym & Nolet" maker's mark on the body. The jug measures 30 centimeters tall by 11.5 centimeters wide at its round base. It was discovered on

the floor of the southwestern portion of the overhang. A second jug, nearly identical to the first, was discovered within the northern portion of the overhang. This jug is completely intact, and it has the marking “2 KAN” inscribed within a circle on its shoulder. It also measures 30 centimeters tall by 11.5 centimeters wide at its round base. Bottles of this type were typically manufactured between 1850 and 1920 for gin. The majority of the jugs originated in Holland, but some were also produced in Germany. It was not uncommon for these jugs to be reused over time for the storage of other liquids such as fresh-water or homemade spirits.

The third artifact discovered within the overhang was an ornate, metal latch attached to a piece of decomposing, milled wood. It was discovered on the northwestern portion of the floor within the overhang. The latch is made in two pieces of a gold colored metal with intricate scroll work. The first piece is thin and flat and attached to the wood. It measures 6 centimeters long by 3 centimeters wide. The second piece protrudes from the center of the first at a right angle. It measures 3 centimeters by 3.5 centimeters, and has a round stem that attaches to the first piece. Although currently stuck in place, it appears as though this second piece used to turn. It was likely part of a latch on a wooden box or coffin.

The last artifact, discovered in the southwestern portion of the overhang against the bedrock edge, was a branding iron of the type used to brand cattle. The branding iron is manufactured of wrought iron. It has an overall length of 60 centimeters with an attached ring at one end and the brand at the other end. The ring, presumably to hang the iron for storage, measures 4.5 centimeters in diameter. The brand itself measures 9.5 centimeters wide at the base by 13.0 centimeters tall. It is in the shape of a stylized “P”.

Based on the concealed nature of the overhang and the presence of personal items within it, Site 26662 is interpreted as a late nineteenth century grave, with the burial either located in the soil of the overhang floor or the remains having since disintegrated. Following discovery of the items within the concealed chamber, and to limit further disturbance to this presumed burial feature, excavation of TU-2 ceased, the items were returned to their discovered locations, and the concealing wall was rebuilt as close to its original specifications as possible. Site 26662 is nearly identical in appearance to Sites 26663 and 26664 within the current project area, which also contained Historic Period items and were interpreted as burial features (Clark *et al.* 2008: 52, 57).

SIHP SITE 50-10-45- 26663

Site 50-10-45-26663 is a concealed bedrock overhang located in the east-central portion of the project area 32 meters west of Site 26661. The site consists of a stacked wall constructed along the edge of a natural bedrock depression that blocks and conceals an overhang. The wall and overhang are situated along the northern (*makai*) edge of a large, natural depression in the bedrock ground surface. The irregularly shaped depression measures 15 meters in diameter and is by 1.5 to 2.0 meters deep. It has vertical bedrock edges and thin soil at its base.

The wall is constructed of medium to large sized cobbles and boulders that are stacked four to five courses high along the edge of the depression.

It is slightly curved, measuring 3.5 meters long by 0.5 meters wide by 1.0 to 1.2 meters tall. The northeastern end of the wall (0.8 meters long) is constructed beneath a shallow bedrock overhang. A 1.2 meter wide area between the wall and the exposed bedrock edge of the depression has been filled with cobbles. The surface of the fill is 20 centimeters below the top of the wall and 30 to 40 centimeters below ground surface outside the depression. It is covered with organic debris and thin soil. A large mango tree is growing at the southwestern end of the wall within the depression. The formal attributes of Site -26663 closely resembled those of Sites -26662 and -26664. For this reason, to test for the possibility of a concealed chamber and the presence of human skeletal remains, a 1 x 1 meter test unit (TU-5) was excavated at the northeastern end of the site into the fill material along the southeastern edge of the wall. Excavation of TU-5 began with the removal of the architectural layer (Layer I) of surface and wall cobbles adjacent to the bedrock edge. In order to preserve the structural integrity of the feature, the outward facing (northwest) edge of the wall was left intact. The architectural layer consisted of medium to large sized cobbles and a single small boulder. No soil was present within the layer, only decaying organic debris on the surface of the unit. At a depth of 125 centimeters below the surface of the unit a void was discovered along the southeastern edge of the feature that revealed the presence of a single sheet of flat-laid, corrugated iron roofing on ground surface between the interior edge of the wall and the bedrock edge of the overhang. The corrugated roofing material could not be lifted or removed without destroying of the entire feature. Based on previous, similar discoveries at other locales on the Island of Hawai'i (Clark and Rechtman 2003, 2004), along with the findings at Sites 26662 and 26664 within the current project area, it was strongly suspected that the corrugated iron covered a Historic burial. At this point, for this reason, excavation of TU-5 ceased, and the feature was rebuilt as close to its original specifications as possible. With the exception of the corrugated iron, no other cultural material was observed during the excavation of TU-5.

SIHP SITE 50-10-45- 26664

Site 50-10-45-26664 is a concealed bedrock overhang located in the east-central portion of the project area 18 meters north of Site 26659. The site consists of a stacked wall constructed along the southwestern edge of a large, natural bedrock depression that blocks and conceals an overhang. The wall, which measures 3.5 meters long, is largely collapsed along its exterior edge. The northeastern end retains some intact, vertical stacking of large sized cobbles that stands five courses (1.2 meters) tall. This section of the wall is approximately 0.7 meters wide, and it retains some level cobble fill (roughly 0.7 meters wide) between it and the bedrock edge of the depression. The remainder of the wall, although it was once likely stacked, slopes downward to the west from the upper edge of the bedrock depression to ground surface within. In this collapsed state the wall measures 1.7 meters wide. The collapsed cobbles revealed the presence of the concealed bedrock overhang to the southeast of the wall. Voids between the

cobbles allow for glimpses of a chamber within. By temporarily moving two cobbles on top of the southwest end of the wall, fieldworkers were able view the interior of the chamber, but not access it. From that vantage point the presence of a single sheet of corrugated iron roofing laid flat on ground surface, between the interior edge of the wall and the bedrock edge of the overhang, was noted, along with what appeared to be a metal handle of some sort, and possibly a long bone from an adult human. These items could not be reached without further rock removal at the feature, so they were left untouched and unexamined. Instead, the two cobbles moved from the top of the wall were replaced and arranged to better conceal the opening. It was noted, however, that the interior edge of the wall concealing the overhang was neatly stacked.

Based on previous, similar discoveries at other locales on the Island of Hawai'i (Clark and Rechtman 2003, 2004), the findings at Sites 26662 and 26663 within the current project area, and the presence of what appeared to be human skeletal remains within the concealed overhang at Site 26664, it is strongly suspected that the corrugated iron covers a Historic burial. Site 26664 is very similar in appearance to both Sites 26662 and 26663. One difference between this site and the other two sites, is that two wall sections constructed nearby appear designed to define and protect the burial area. This is likely due to the location of Site 26664 within a larger, less well defined depression than the other two burial sites. At sites 26662 and 26663 the vertical walls of the depressions would have acted as natural barriers to intruders, but at Site 26664 the vertical bedrock only protects the site along its eastern and southern edges, and a portion of its northern edge. A free-standing wall is present to the west of the concealed overhang, blocking access from that side, and cobbles stacked against bedrock are present to the northeast of the concealed overhang, helping to control access from the northern end of the site.

The wall to the west of the concealed overhang is located 4.5 meters distant. It is stacked and core-filled, standing 0.7 to 0.8 meters (three to four courses) tall by 0.5 to 0.7 meters wide. The wall runs northeast/southwest for nearly 8.0 meters. The area between this wall and the concealed overhang consists of cobble and boulder rubble. Ground surface to the west of this wall consists of thin soil that has collected within the large bedrock depression. A few large rose apple trees are growing on top of this wall.

The wall to the northeast of the concealed overhang is stacked on and against the bedrock edge of the natural depression. This wall measures 3.0 meters long by 0.5 to 0.6 meters wide. It follows the northeast/southwest running edge of the depression, and stands 0.6 to 1.3 meters above ground surface within the depression, but its top is level with ground surface outside the depression. The wall is constructed across (blocking) an area of somewhat gently sloping bedrock that would have allowed for the easiest access to the concealed overhang area from that direction (Clark *et al* 2008: 61, 67).

SIHP 50-10-45-26665

Site 50-10-45-26665 is a platform located in the southeastern portion of the project area along the southern property boundary. The platform, which is roughly rectangular, measures 3.1 meters by 3.5 meters and is stacked 1.0 to 1.1 meters on the east side. The eastern edge is composed of medium to large sized cobbles stacked five to six courses high. A single large boulder is present in the north corner of this wall. At the southern corner, the face of the platform bends around to the southeast and begins to climb a natural bedrock ridge. The height of the stacking decreases to 60 centimeters with cobbles stacked two to three courses high. A single course cobble alignment runs to the southeast away from the south corner of the platform for approximately 3.8 meters following a natural bedrock contour. The western portion of the south side of the platform is not stacked as high due to a natural rise in the bedrock. The southwest corner consists of a single course of cobbles standing 40 centimeters in height. Two large rose apple trees are growing on bedrock along this edge, and their roots have slightly impacted the feature. The west side of the platform is similar to the east. It consists of medium to large sized cobbles stacked five to six courses (up to 1.4 meters) high. The northwest face of the platform stands 80 to 90 centimeters in height and consists of three courses of large cobbles and boulders. Another large rose apple tree is growing on top of this edge, and its roots have also impacted the feature. The surface of the platform is level and paved with small to medium sized cobbles covered by organic debris.

To test for buried cultural deposits, and to aid in feature interpretation, a 1 x 1 meter test unit (TU-6) was excavated in the central portion of the platform's surface. The surface of the unit consisted of leaf litter, moss, and ferns covering the level cobble paving. Excavation of TU-6 revealed an architectural layer (Layer I) composed of small cobbles near the surface and larger cobbles beneath. Several waterworn cobbles were also noted in the construction. The size of the cobbles in Layer I generally increased with depth. At a depth of 70 centimeters beneath the surface of the unit what appeared to be bedrock was observed in the north, south, and west walls of the unit, but the architectural layer continued in the center of the unit. At a depth 180 centimeters beneath the surface of the unit, a large boulder was encountered within TU-6 that could not be removed without further excavation at Site 26665. The boulder appeared to be blocking a lava blister that measured 30 centimeters tall from floor to ceiling and ran to the southwest toward the raised bedrock along that side of Site 26665. The floor of the blister consisted of dark reddish brown (5YR 3/2) silt and the ceiling of *pāhoehoe* bedrock. The soil was also present beneath the boulder.

At this point, due to the presence of the boulder (to remove the boulder would have required opening up one or two more test units, and in the process nearly completely destroyed Site 26665), excavation of TU-6 ceased. A profile drawing was prepared and the unit was photographed. All material excavated from Site 26665 was then returned to the unit as close to its original specifications as possible. No cultural material was recovered during the excavation of TU-6.

However, based on the formal attributes of the platform (neatly stacked, tall edges with a paved surface), the lack of habitation debris at the site, the presence of numerous waterworn cobbles within the architectural layer and the boulder blocking the blister at the base of TU-6, it is strongly suspected that Site 26665 was constructed as a burial monument during Precontact times. It is likely that human remains were interred within a natural lava blister at the location of Site 26665, that the blister opening was then blocked with a boulder, and the platform was constructed over the interment (Clark *et al.* 2008:68, 69).

BURIAL TREATMENT AND PRESERVATION

The following text provides interim and permanent preservation measures for Sites 50-10-45-26659, -26662, -26663, -26664, and -26665. As discussed elsewhere in this document, Site -26659 is being preserved at the landowner's request. As Site -26659 is in close proximity to Sites -26662 through -26664, it is included in Preserve Area C. Thus, Preservation measures for Site -26659 will be specifically discussed in this Burial Treatment Plan.

INTERIM PROTECTION

Short-term preservation measures at Sites -26659, -26662, -26663, -26664, and -26665 will include the delineation of an interim buffer zone of no less than 20.0 feet (6.0 m) (Figure 5).

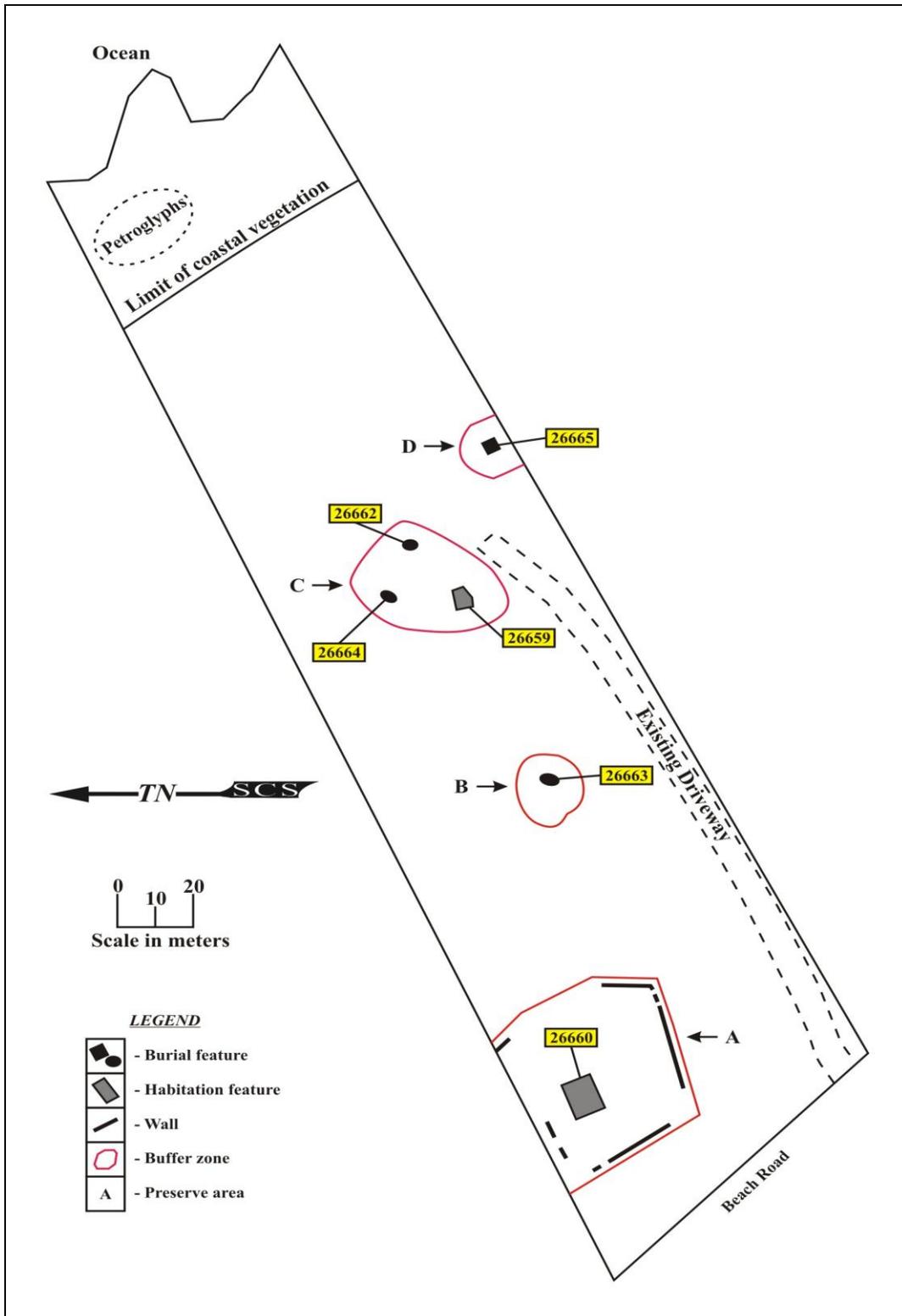


Figure 5: Plan View Map Showing Locations and Permanent Buffer Zones of Sites 50-10-45-26659, 50-10-45-26662, 50-10-45-26663, 50-10-45-26664, and 50-10-45-26665 (adapted from Clark *et al.* 2008).

This interim buffer zone will be established from the outer edges of all archaeological features comprising Sites -26663 (Preservation Area B), -26665 (Preservation Area D), and the perimeters of Preservation Area C (see Figure 5). Prior to the start of any construction work within the project area, orange construction fencing will be erected along the interim preservation zones of Sites -26663, -26665, and the perimeters of Preservation Area C (see Figure 5). The landowner will place an informative sign in a prominent position along the orange fence line stating that graves are present and to keep out. The construction crew will be instructed about the meaning of the fencing and the significance of the preserve area prior to the start of the construction work. It is the landowner's responsibility to maintain the site and the orange fence line during all phases of project area construction.

PROPOSED TREATMENT AND PRESERVATION

It is proposed herein, and described further below, that the above-described sites will be preserved in place.

PERMANENT PRESERVATION MEASURES

The habitation structure at Site 50-10-45-26659 and the human remains identified at Sites 50-10-45-26662, -26663, -26664, and -26665, Maku`u Ahupua`a, Puna District, Hawai`i will be preserved in place. The locations of Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 have been plotted with a hand-held Global Positioning System (see Figure 3). At the landowner's request and given the close proximity of these sites, Site -26659 will be preserved together with the burials at sites -26662, and -26664 within the confines of a single preservation area (Preservation Area C) measuring approximately 40 meters (north-south) by 30 meters (east-west) which will include a 20 foot buffer from the outer edges of each of the sites (see Figure 5). This information will be on file with the Department of Land and Natural Resources Bureau of Conveyances. Based on a discussion with the State Historic Preservation Division, a 20.0 foot (6.0 m) protective buffer has been established around the perimeters of Sites 50-10-45-26663 and -26665, to protect them from future disturbance (see Figure 4). In addition to the preservation buffer zone, an additional 10 foot "no build zone" has been established for Site -26659 and Sites -26662 through -26665. The "no build zone" shall extend an additional 10.0 feet from the exterior boundary of the established preservation zone of Sites -26663 and -26665 and for Preserve Area C. Thus, no structures, pools, overhangs, etc. may be built within 10 feet of the permanent buffer of Sites -26659, -26662, -26663, -26664, and -26665.

Ti plants (no trees) and a rock wall shall be placed on the ground surface to delineate the outer boundary (buffer) of the preservation areas. No disturbance to the ground surface, excepting manual planting (or hand tools) and maintenance of shallow rooted native plants (ti plants), shall occur within the aforementioned protective buffers (see Appendix C for property botanical study). The Lui family (recognized cultural descendants) expressed that the rock wall will be sufficient to delineate the buffer around the burials, and the ti plants will be appropriate. The preservation and mitigation measures for Site 50-10-45-26660 were prepared under separate cover in (Pestana, Dagher, and Spear 2009) *A Preservation Plan for Site 50-10-45-26660, Located On A 5.59-Acre Parcel In Maku`u Ahupua`a, Puna District Island of Hawai`i [TMK: (3) 1-5-010: 032]*. The preservation plan was approved by SHPD (May 5, 2009).

Signs shall be placed in prominent places at Preservation Area B, Preservation Area C, and Preservation Area D. The signs will read in Hawaiian language and English “Mai ka hikina a ka lā i Kumukahi a ka welona a ka lā i Lehua. E ho‘omaha me ka maluhia.” “From the sunrise at Kumukahi to the sunset at Lehua. Rest in Peace.” The Lui family (recognized cultural descendants) believe that the text will be appropriate and sufficient to denote the presence of burials.

The following additional measures will be carried out to provide the maximum preservation and conservation within the context of the proposed construction activities:

1. All *in situ* burials (Sites -26662 through -26665) and Site -26659 have been preserved in place. Site 50-10-45-26659 and Burial Sites -26662, -26663, -26664, and -26665 have been permanently protected by the above-described protective buffers. Sites 50-10-45-26662, -26663, -26664, and -26665 occur far removed from any infrastructure and are protected by shoreline set back rules.
2. If any subsurface work is required during additional construction or maintenance on the property, no excavations will be allowed to proceed until orange construction fencing has been erected along the periphery of the established buffer zones around Sites 50-10-45-26663 and -26665 and Sites -26659, -26662, -26664, and -26659, which are being collectively preserved in Preserve Area C, as described above. The locations of Sites 50-10-45-26659 and -26662 through -26665 have been verified through GPS and professional survey, and are noted on all construction maps for the property. This provision is binding for any excavations on the parcels in the future.
3. Landscaping with native Ti plants shall occur around Sites 50-10-45-26659, 26662, -26663, -26664, and -26665 (Appendix C). Ti plants, and no trees, deeply rooted, or invasive plants will be allowed on the burial features or within 10 feet of Sites 50-10-45-26659, -26662, -26663, -26664, and -26665.

4. Interim and long-term preservation will ensure that the integrity and context of Sites -26659, 26662, -26663, -26664, and -26665 are preserved. Demarcations of the locations of Sites 50-10-45-26659, 26662, -26663, -26664, and -26665 have been duly recorded by the client's surveyors (see Figure 5).
5. No heavy equipment or other construction-related machines or materials will be allowed to be moved or stored within 50 feet of Sites -26659 and -26662 through -26665. The above-mentioned sites shall not be used as staging and/or storage areas.
6. Should storm surge, earthquake, or other natural or cultural damage occur to Sites -26659 and -26662 through -26665 and their environs, and should this necessitate repairs, the landowner or their representative will notify SHPD of the situation and reach an agreement with the SHPD on how to proceed prior to implementing any alterations to the ground surface, sites, or adjacent vegetation.
7. Modern debris that might be blown onto the Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 may be removed by hand whenever is deemed necessary by the landowner or their representatives. The grounds must be checked on a regular basis to clear any debris from the sites.
8. If the landowner or their representatives find that Site -26659, the burial areas, or the burial structure has been disturbed in any way, they are to immediately notify the SHPD. Repairs or stabilization of any damage to the sites cannot proceed until directed to do so by the SHPD.
9. This document shall be made part of the binding agreement for the aforementioned property on which Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 occur. Any final construction plans, and all future construction plans, must incorporate this plan to maintain preservation of these sites.
10. A provision is made for on-going preservation of Sites 50-10-45-26659, -26662, -26663, -26664, and -26665, with the preservation provisions being binding on successive owners of the parcel.
11. This document shall be made part of the binding title agreement for the land parcel known as TMK: (3) 1-5-010: 032 and this document will be listed with the property deed as an encumbrance. This document shall also be registered with a map that has metes and bounds descriptions of the burial locations and the burial structure. This map will be registered with the State of Hawai'i Bureau of Conveyances within 60 days of receipt of written approval of this plan by DLNR-SHPD. Once Sites 50-10-45-26659, -26662, -26663, -26664, and -26665 have been registered with the Bureau, copies of the official document shall be submitted to SHPD and the Hawai'i Island Burial Council.

ACCESS AND LOT OWNER DEEDS

Access to all burial locations will be made available to lineal and cultural descendants seven days a week by contacting the land owner. Parking is available along Beach Road. All of the burial sites can be accessed from the driveway which passes very near to them. The lot owner will be made aware that access to burial locations is required per the agreements set forth in this Burial Treatment Plan. Any disputes over who has access to the burial areas will be handled in consultation with the HIBC, SHPD, and the land owner and its successors and assigns.

PRESERVATION VERIFICATION

Verification that interim preservation measures are in place will be made by SCS prior to the construction start date. In addition, verification that permanent preservation measures are in place will be made by SCS following completion of the development project. Verification will take the form of written notification to SHPD by SCS.

CONSULTATION

In accordance with HRS § 13-300, we have consulted with Charles Young, Chair of the Hawai`i Island Burial Council, Dutchie Saffrey, Puna District Representative of the Hawai`i Island Burial Council, and Lukela Ruddle, Hilo District representative of the Office of Hawaiian Affairs indicating SCS was initiating the consultation process and to inquire if they were aware of any individuals or group who have knowledge pertaining to the history of these sites. The consultation period extended from February 9 to April 9, 2009.

On February 13, 2009, we initiated the consultation process by sending letters to individuals and organizations that may be aware of individuals or other organizations of the Puna District and Hawaiian community who may have knowledge of the history of the project area (Appendix A). These organizations and individuals include: Charles Young, Hawai`i Island Burial Council Chair; Dutchie Saffrey, Hawai`i Island Burial Council Puna District Representative, and Lukela Ruddle, Office of Hawaiian Affairs, Hilo District Representative.

On February 24, 2009, SCS conducted a follow-up telephone call to Mr. Charles Young. Mr. Young indicated he had not received the consultation letter as he had not gone to the Post Office box. During the telephone conversation with SCS, Mr. Young recommended discussing the mitigation measures with the State Historic Preservation Division (SHPD), Hilo.

Based on this recommendation, SCS contacted Ms. Morgan Davis, SHPD Assistant Hawai`i Island Archaeologist via telephone and e-mail regarding the preservation methods at Sites -26662 through -26665. During this conversation indicated the Ms. Davis indicated the Hawai`i Island Burial Council has been requesting an additional 10 foot “no build zone” be established, in addition to the established 20 foot buffer zone of the burial sites. The “no build zone will extend an additional 10.0 feet from the exterior boundary of the established preservation zones. In addition, Ms. Davis agreed to discuss the above-described preservation measures with Analu Josephides, SHPD Cultural Historian.

On February 26, 2009 we contacted Lukela Ruddle (Office of Hawaiian Affairs, Hilo District Representative) via telephone as a follow-up to our letter. Ms. Ruddle had received the letter and apologized for not responding. During the telephone conversation with SCS Ms. Ruddle requested we send a copy to Kai Markell, Office of Hawaiian Affairs, Honolulu. We complied with Ms. Ruddle’s request and sent a consultation letter to Mr. Markell.

We did speak briefly with Dutchie Saffrey via telephone, on February 26, 2009, and were able to verify receipt of the consultation letter. Ms. Saffrey also apologized for not responding. However, due to a faulty connection, the call was disconnected and repeated attempts to reach Ms. Saffrey by phone only reached her answering machine. As Ms. Saffrey had indicated in our brief conversation that she had been having technical difficulties with her phone, SCS left a voice-message on Ms. Saffrey's answering machine with an SCS e-mail address.

On March 4, 2009, Scientific Consultant Services conducted a follow-up telephone call to Kai Markell. Initially, Mr. Markell did not answer and a voicemail was left on his answering machine. In a subsequent telephone call to Mr. Markell the same day, we were able to reach him. During the ensuing conversation, Mr. Markell stated he did not receive a copy of the consultation letter we mailed on February 26, 2009. So, we transmitted the consultation letter and the five associated figures electronically to him on March 4, 2009. He indicated, via e-mail, that he had received the letter and figures.

In addition, Scientific Consultant Services posted a notice pertaining to the findings of the four burials requesting comment and participation from any recognized lineal or cultural descendants. The item was published in both the *Honolulu Advertiser* (February 22, 25, and 26, 2009), *Hawaii Tribune-Herald* (February 22, 25, and 26, 2009) newspapers (Appendix B). A one-month (30 day) period was maintained to provide an opportunity for descendants (lineal and/or cultural) to the newspaper notices to come forward. There were no responses for the posted notices.

On October 27, 2009 SHPD recognized cultural descendant Ms. Nicole Lui, her father Joe, and her mother Agnes visited the property and met with SCS and the land owner. Ms. Lui had been given a copy of the BTP prior to coming to the property. Ms. Lui and her parents viewed the burial sites and discussed the preservation treatments. They expressed that the measures presented in this version of the BTP are acceptable.

RECOMMENDATIONS

Due to the presence of human burials identified during Archaeological Inventory Survey of TMK: (3) 1-5-010:032 a program of Archaeological Monitoring is recommended during all construction related ground altering activities conducted on the subject property.

REFERENCES

- Armstrong, R.W. (Editor)
1983 *Atlas of Hawaii*, 2nd Edition. University of Hawaii Press, Honolulu.
- Chinen, Jon
1961 Original Land Titles in Hawaii. Copyright 1961 Jon Jitsuzo Chinen. Library of Congress Catalogue Card No. 61-17314.
- Clark, Matthew R., Amy L Ketner and Robert B. Rechtman
2008 *An Archeological Inventory Survey of TMK (3) 1-5-10: 032*. On File at SHPD Hilo, Hawaii.
- Daws, Gavin
1968 *Shoal of Time: A History of the Hawaiian Islands*. University of Hawai'i Press. Honolulu
- DLNR/SHPD
2003 *Chapter 300 Rules of Practice and Procedure* Relating to Burial Sites and Human Remains. State Historic Preservation Division, Kapolei.
- Kame`eleihiwa, Lilikalā
1992 *Native Land and Foreign Desires: Pehea La E Pono Ai?* Bishop Museum Press. Honolulu.
- Kelly, Marion
1983 *Nā Māla o Kona: Gardens of Kona*. Dept. of Anthropology Report Series 83-2. Bishop Museum. Honolulu.

1998 A Gunboat Diplomacy, Sandalwood Lust and National Debt. In *Ka Wai Ola o OHA*, Vol. 15, No. 4, April 1998.
- Kirch, Patrick
1985 *Feathered Gods and Fishhooks: An Introduction to Hawaiian Archaeology and Prehistory*. University of Hawaii Press, Honolulu.
- Kuykendall, R.S.
1938 *The Hawaiian Kingdom*. Vol. 1. University of Hawai'i Press. Honolulu.
- Sato, H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro, Jr.
1973 *Soil Survey of the Island of Hawaii, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington, D.C.: Government Printing Office.

Spear R., D. Chaffee, and A. Dunn

1995 *Data Recovery Excavations at Site 50-10-45-14,675 and Site 50-10-45-14,985, Makuu Aquafarms, Makuu, Puna, Hawai'i Island (TMK: 1-5-10:33)*. Scientific Consultant Services, Inc. Project Number 039-2. Prepared for Dr. Dudley Seto, M.D., Intercontinental Medical Services, Inc.

APPENDIX A: EXAMPLE OF CONSULTATION LETTER
(NO ATTACHMENTS)

February 13, 2009

Rechtman Consulting, LLC recently conducted an Archaeological Inventory Survey of a 5.586 acre property located in Maku`u Ahupua`a, Puna District, Island of Hawai`i [TMK: (3) 1-5-010:032] (Figures 1 and 2). During the course of the survey nine sites were newly identified (Figure 3). The sites documented include: SIHP Sites 50-10-45-26658, a Historic ranching (core-filled) wall; -26659, a Historic habitation enclosure/pavement; -26660, Historic habitation complex; -26661 a Historic modified bedrock hole used for water catchment; Sites -26662 through -26664, consist of a series of Historic concealed overhangs containing burials; -26665, pre-Contact a platform burial; and -26666, a pre-Contact/Historic agricultural complex comprised of 55 features. For a detailed account of the findings please refer to (Clark *et al.* 2008) An Archaeological Inventory Survey of TMK: 3-1-5-010:032, on file at the State Historic Preservation Office, Hilo.

We are now in the process of preparing a Burial Treatment Plan for the four burial sites, preserving these sites in place for perpetuity, and a Preservation Plan specifically focusing on interim and long-term, permanent for Sites -26659 and -26660. In compliance with the DLNR/SHPD Hawaii Revised Statutes (HAR) §13-277 and §13-300, we are consulting with individuals and groups who may have knowledge of the history of this area. We are writing to you to inquire if there are any contacts, of whom you may be aware, who have knowledge pertaining to the history of these sites.

Thank you in advance for your comments and help. We look forward to hearing from you.

Sincerely,

Cathleen A. Dagher
Senior Archaeologist
Scientific Consultant Services, Inc.

Attachments:

Figure 1: USGS Quadrangle (Kilohana) Map Showing Project Area.
Figure 2: Tax Map Key [TMK: (3) 1-5-010:032] Showing Project Area.
Figure 3: Site Location Map.

APPENDIX B: LEGAL NOTICE

AFFIDAVIT OF PUBLICATION

1011

State of Hawaii)
) SS:
County of Hawaii)

LEILANI K. R. HIGAKI

, being first

duly sworn, deposes and says:

1. That she is the BUSINESS MANAGER of HAWAII TRIBUNE-HERALD, a newspaper published in the City of HILO, State of Hawaii.

2. That the "PUBLIC NOTICE...human remains...located in Maku'u Ahupua'a, Puna District, Island of Hawai'i, Hawai'i...etc.,"

of which a clipping from the newspaper as published is attached hereto, was published in said newspaper on the following date(s)

February 22, 25, 26, 2009

, (etc.)

297713

Signature of Leilani K. R. Higaki

Subscribed and sworn to before me this 6th day of March, 2009

Signature of Sharon H. P. Ogata

SHARON H. P. OGATA
Notary Public, Third Circuit, State of Hawaii
My commission expires October 1, 2012

Page(s): 1

PUBLIC NOTICE
Notice is hereby given that human remains were documented during Archaeological Inventory Survey of a property located in Maku'u Ahupua'a, Puna District, Island of Hawai'i, Hawai'i [TMK (3)1-5-010:032]. The parcel is a portion of former Grant No. 1013, issued to D. W. Maiau in 1852. Three of the unmarked burial sites are presumed to date to the Historic Period and one site is presumed to contain Traditional Native Hawaiian remains. Proper treatment shall occur in accordance with Chapter 6E, Revised Statutes, Section 43.5 regarding unmarked grave sites. The final disposition of the burials shall be made by the State Historic Preservation Division - Burial Sites Program in consultation with the Hawai'i Island Burial Council. Interested persons please respond within 30 days of this notice to discuss appropriate treatment of these remains. Individuals responding must be able to adequately demonstrate lineal and/or cultural connection to the burials on the above referenced parcel in Maku'u, Puna, Hawai'i. Contact: Theresa Donham, DLNR-SHPD/ (808) 933-7650/ 40 Pe'okela Street, Hilo, Hawai'i, 96720; Holly McEldowney, DLNR-Division of State Parks/ (808) 587-0287/1151 Punchbowl Street, Room 310 Honolulu, Hawai'i 96813; Michael Dega, Scientific Consultant Services, Inc./ (808) 597-1182/ 711 Kapiolani Blvd, Ste. 975/ Honolulu, HI 96813; and/or Robert Spear, Scientific Consultant Services, Inc./ 711 Kapiolani Blvd, Ste. 975/ Honolulu, HI 96813 (808) 597-1182. (297713 Hawaii Tribune-Herald: February 22, 25, 26, 2009)

IN THE MATTER OF
BURIAL NOTICE

1011.

BURIAL NOTICE

Notice is hereby given that human remains were documented during Archaeological Inventory Survey of a property located in Maku'u Ahupua'a, Puna District, Island of Hawai'i, Hawai'i [TMK: (3)1-5-010-032]. The parcel is a portion of former Grant No. 1013, issued to D. W. Maiau in 1852.

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STATE OF HAWAII
City and County of Honolulu

AFFIDAVIT OF PUBLICATION

ss.

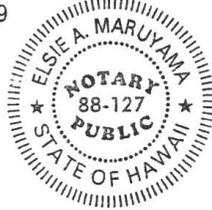
Valerie I Yanagihara being duly sworn deposes and says that she is a clerk, duly authorized to execute this affidavit of THE HONOLULU ADVERTISER, a division of GANNETT PACIFIC CORPORATION, that said newspaper is a newspaper of general circulation in the State of Hawaii, and that the attached notice is a true notice as was published in the aforereferenced newspaper as follows

- 02/22/2009 The Honolulu Advertiser
- 02/25/2009 The Honolulu Advertiser
- 02/26/2009 The Honolulu Advertiser

and that affiant is not a party to or in any way interested in the above entitled matter.

[Handwritten Signature]

Subscribed and sworn to before me this 26th day of February A.D. 2009



Elsie A. Maruyama
Notary Public of the First Judicial Circuit
State of Hawaii, my commission expires: 3/7/2012

NOTARY PUBLIC CERTIFICATION

Elsie A. Maruyama First Judicial Circuit

Document Description: Affidavit of Publication

No. of Pages: 1 Date of Doc. 2/26/2009

Elsie A. Maruyama 2/26/2009
Notary Signature Date



NO KA ILINA • BURIAL NOTICE

Maku'u Ahupua'a

Notice is hereby given that human remains were documented during Archaeological Inventory Survey of a property located in Maku'u Ahupua'a, Puna District, Island of Hawai'i, Hawai'i [TMK: (3)1-5-010:032]. The parcel is a portion of former Grant No. 1013, issued to D.W. Maiau in 1852.

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Cultural Impact Assessment for Proposed Development Activities on TMK 3-1-5-010:032

Maku‘u Ahupua‘a
Puna District
Island of Hawai‘i



DRAFT VERSION

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March 2011

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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

Cultural Impact Assessment for Proposed Development Activities on TMK 3-1-5-010:032

Maku‘u Ahupua‘a
Puna District
Island of Hawai‘i

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INTRODUCTION

At the request of John and Maureen Gapp (landowners), Rechtman Consulting, LLC has prepared this cultural impact assessment to accompany an Environmental Assessment and a Conservation District Use Application associated with proposed development activities on TMK: (3)-1-5-010:032 in Maku'u Ahupua'a, Puna, Hawai'i. (Figures 1 and 2). This 5.586-acre parcel is located southeast of the Hawaiian Paradise Park subdivision between the old Government Road and the coast at elevations ranging from 0 to 40 feet above sea level. The parcel is long and narrow and contains both state zoned Agricultural District and Conservation District designations. The parcel is bounded along its *makai* edge by the coastal set back, along both its long edges by undeveloped parcels, and along its *mauka* edge by the old Government Road. Terrain within the project area slopes gently to the northeast and consists of *pāhoehoe* lava flows that originated from Kilauea Volcano 450 to 700 years ago (Wolfe and Morris 1996). This area typically receives 60 to 100 inches of rain per year (Jurvik and Jurvik 1998:57). Standing water is present in low-lying bedrock areas over much of the parcel. A driveway exists along the southern boundary of the parcel leading northeast from the old Government Road for approximately 190 meters to the central portion of the property (Figure 3).

Vegetation consists of an over story of guava (*Psidium guajava*), mango (*Mangifera indica*), *hala* (*Pandanus odoratissimus*), rose apple (*Eugenia jambos*), octopus trees (*Shefflera actinophylla*), and coconut palms (*Cocos nucifera*), with an under story of ti (*Cordyline fruticosa*), *laua'e* (*Phymatosorus scolopendria*), beach *naupaka* (*Scaevola sericea*), ginger (*Zingiberaceae*) and sisal (*Agave Sisalana*), along with various other non-native grasses, vines, weeds, and ferns (Figure 4). According to the landowner, an old concrete foundation was removed from the *makai* portion of the project area approximately five years ago. Vegetation in this area is indicative of mechanical land clearing, and consists of low lying, vines and grasses with no tall trees present. A 4WD road leads from the neighboring parcel to the west to this cleared area. The 4WD road is currently blocked to vehicular access at the Old Government Road.

The current study parcel was subject to an archaeological inventory survey conducted by Rechtman Consulting, LLC (Clark et al. (2008), as a result of which, nine archaeological sites containing sixty-seven features were recorded. Of those sites, two habitation sites were recommended for preservation as were four burial sites. For preservation purposes, the sites were grouped into four preservation areas, two of the preserve areas are exclusively in the Agricultural District portion of the parcel, one is within the Conservation District portion of the parcel, and one spans both Districts. Follow-up preservation plans were prepared for these six sites by Scientific Consultant Services, Inc. (Pestana et al. 2009a, 2009b). The current assessment study has been prepared pursuant to Act 50, approved by the Governor on April 26, 2000; and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawai'i, on November 19, 1997. Below is a description of the proposed development activities, a detailed cultural and historical background, and a presentation of prior studies; all of which combine to provide the physical and cultural setting and context. A summary of consultation is provided, followed by a discussion of potential cultural impacts and the appropriate actions and strategies to mitigate any potential impacts.

PROPOSED DEVELOPMENT ACTIVITIES

The landowner proposes to construct a one-story single-family dwelling, swimming pool, and shoreward cabana within the Conservation District portion of the parcel (Figure 5). The project would also include minor landscaping using mostly native or Polynesian species that are found in the area, as well as driveway improvements, and a septic system. The Agricultural District portion of the parcel will be left large as is.

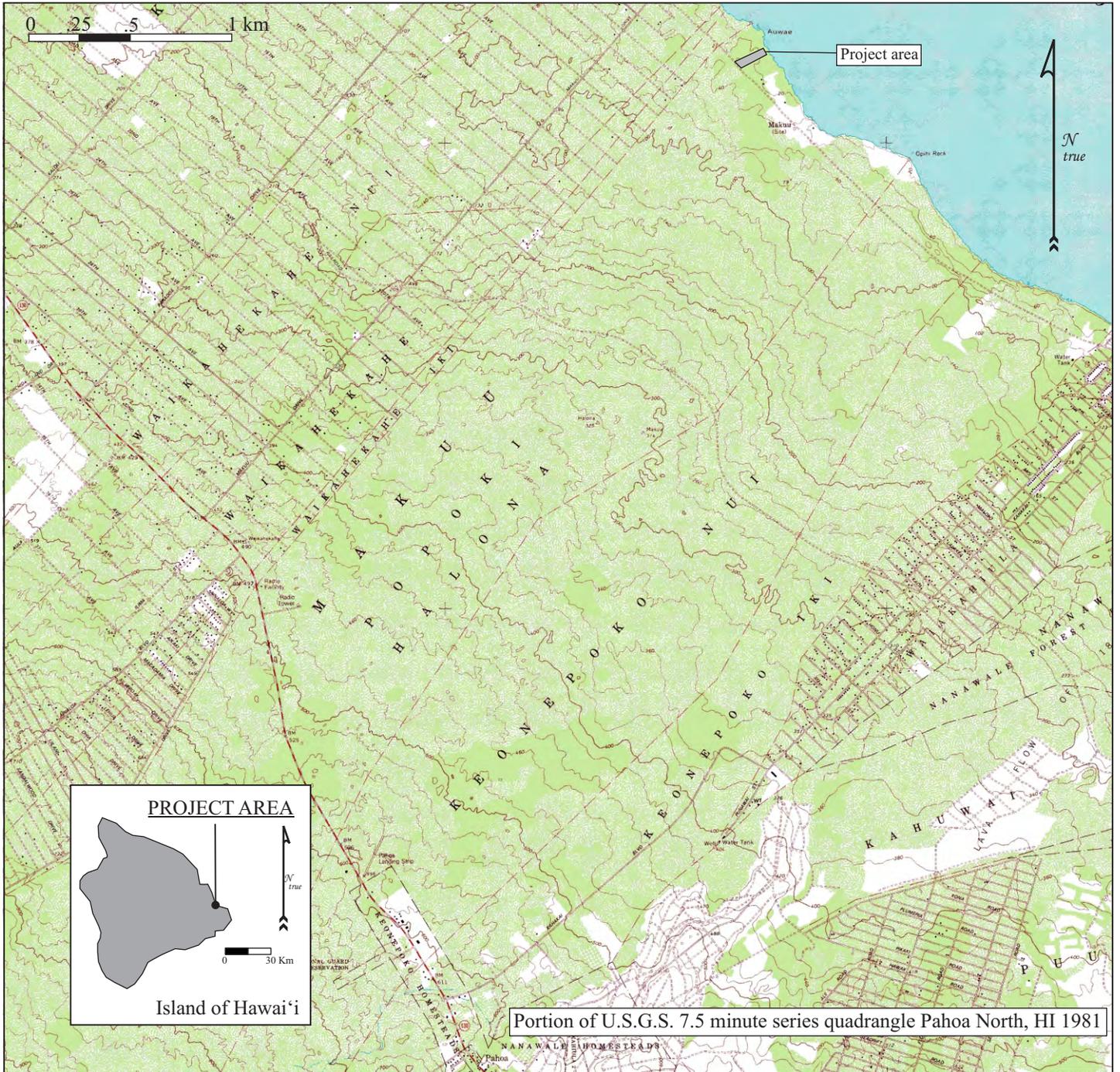


Figure 1. Project area location.



Figure 3. Grubbed driveway along the southern boundary of the parcel.



Figure 4. Typical vegetation on the parcel.

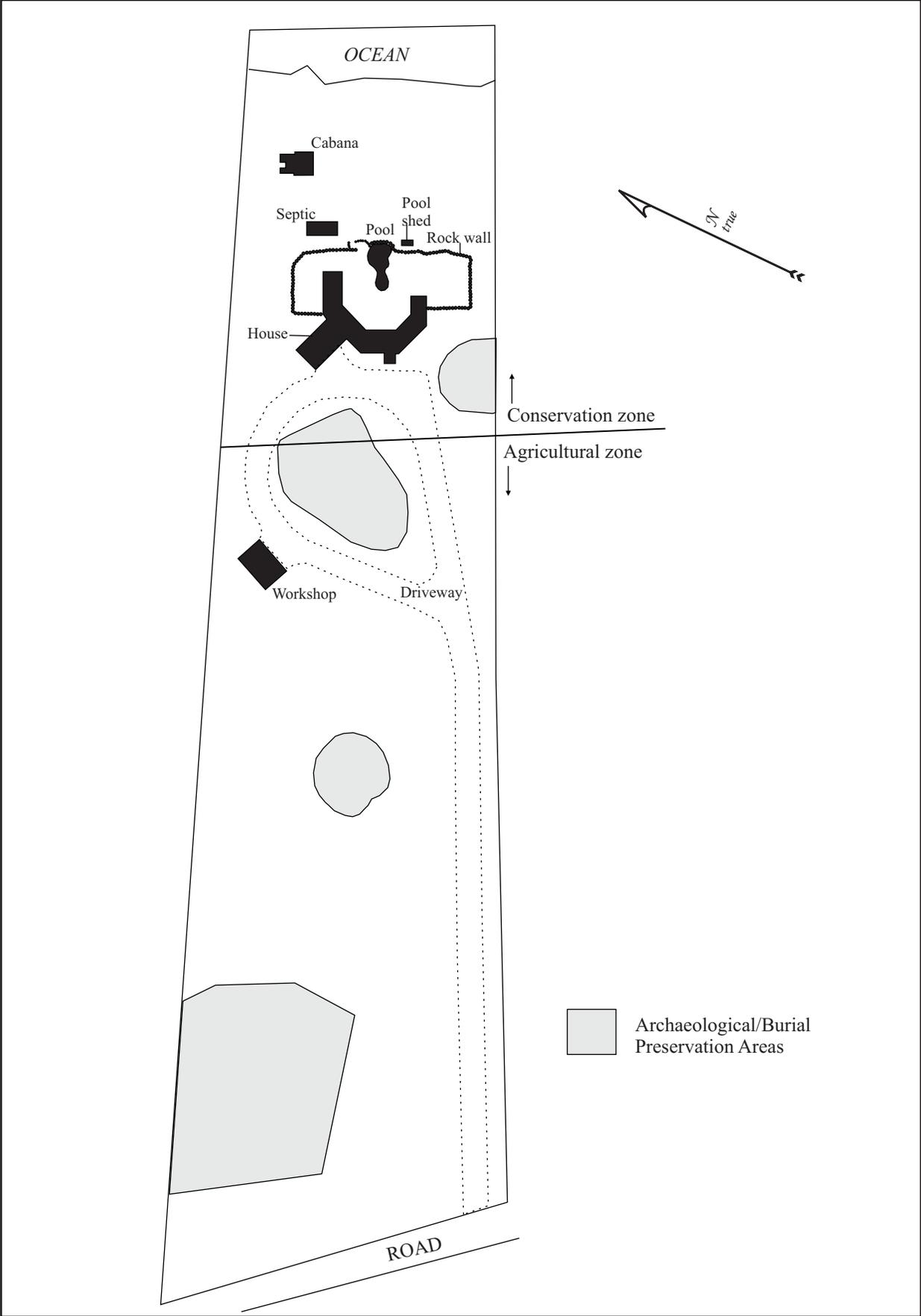


Figure 5. Proposed development plan.

CULTURE-HISTORICAL BACKGROUND

Archaeologists and historians describe the inhabiting of Hawai‘i in the context of settlement that resulted from voyages taken across the open ocean. For many years, researchers have proposed that early Polynesian settlement voyages between Kahiki (the ancestral homelands of the Hawaiian gods and people) and Hawai‘i were underway by A.D. 300, with long distance voyages occurring fairly regularly through at least the thirteenth century. However, as Kirch (2010) has recently argued, there is no archaeological evidence to support settlement of the Hawaiian Islands prior to about A.D. 1000. It has been generally reported that the sources of the early Hawaiian population—the Hawaiian Kahiki—were the Marquesas and Society Islands (Cordy 2000; Emory in Tatar 1982:16-18).

Whatever the timing, following initial settlement, communities were clustered along the watered, windward (*ko‘olau*) shores of the Hawaiian Islands. Along the *ko‘olau* shores, streams flowed and rainfall was abundant, and agricultural production became established. The *ko‘olau* region also offered sheltered bays from which deep sea fisheries could be easily accessed, and near shore fisheries, enriched by nutrients carried in the fresh water, could be maintained in fishponds and coastal waters. It was around these bays that clusters of houses where families lived could be found (McEldowney 1979:15). In these early times, Hawai‘i’s inhabitants were primarily engaged in subsistence level agriculture and fishing (Handy et al. 1972:287).

Within a few generations after initial settlement, (by about A.D. 1200) the population began expanding to the *kona* (leeward side) and more remote regions of the island (Cordy 2000:130). In Kona, communities were initially established along sheltered bays with access to fresh water and rich marine resources. The primary “chiefly” centers were established at several locations—the Kailua (Kaiakeakua) vicinity, Kahalu‘u-Keauhou, Ka‘awaloa-Kealakekua, and Hōnaunau. The communities shared extended familial relations, and there was an occupational focus on the collection of marine resources. By the fourteenth century, inland elevations to around the 3,000-foot level were being turned into a complex and rich system of dryland agricultural fields (today referred to as the Kona Field System). By the fifteenth century, residency in the uplands was becoming permanent, and there was an increasing separation of the chiefly class from the common people. In the sixteenth century the population stabilized and the *ahupua‘a* land management system was established as a socioeconomic unit (see Ellis 1963; Handy et al. 1972; Kamakau 1961; Kelly 1983; and Tomonari-Tuggle 1985).

Over the generations, the ancient Hawaiians developed a sophisticated system of land and resources management. By the time ‘Umi-a-Līloa rose to rule the island of Hawai‘i in ca. 1525, the island (*moku-puni*) was divided into six districts or *moku-o-loko* (cf. Fornander 1973–Vol. II:100-102). Puna was one of these districts, and like the other large districts on Hawai‘i, was subdivided into *‘okana* or *kalana*. The *moku-o-loko* and *‘okana* or *kalana* were further divided into manageable units of land that were tended to by the *maka‘āinana* (people of the land) (cf. Malo 1951:63-67). Of all the land divisions, perhaps the most significant management unit was the *ahupua‘a*. *Ahupua‘a* are subdivisions of land that were usually marked by an altar with an image or representation of a pig placed upon it (thus the name *ahu-pua‘a* or pig altar). In their configuration, the *ahupua‘a* may be compared to wedge-shaped pieces of land that radiate out from the center of the island, extending to the ocean fisheries fronting the land unit. Their boundaries are generally defined by topography and geological features such as *pu‘u* (hills), ridges, gullies, valleys, craters, or areas of a particular vegetation growth.

The *ahupua‘a* were also divided into smaller individual parcels of land (such as the *‘ili*, *kō‘ele*, *māla*, and *kīhāpai*, etc.), generally oriented in a *mauka-makai* direction, and often marked by stone alignments (*kuaiwi*). In these smaller land parcels the native tenants tended fields and cultivated crops necessary to sustain their families, and the chiefly communities with which they were associated. As long as sufficient tribute was offered and *kapu* (restrictions) were observed, the common people, who lived in a given *ahupua‘a* had access to most of the resources from mountain slopes to the ocean. These access rights were almost uniformly tied to residency on a particular land, and earned as a result of taking responsibility for stewardship of the natural environment, and supplying the needs of the *ali‘i* (see Kamakau 1961:372-377 and Malo 1951:63-67).

Entire *ahupua'a*, or portions of the land were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to an *ali'i-'ai-ahupua'a* (chief who controlled the *ahupua'a* resources). The *ali'i-'ai-ahupua'a* in turn answered to an *ali'i 'ai moku* (chief who claimed the abundance of the entire district). Thus, *ahupua'a* resources supported not only the *maka'āinana* and *'ohana* who lived on the land, but also contributed to the support of the royal community of regional and/or island kingdoms. This form of district subdividing was integral to Hawaiian life and was the product of strictly adhered to resources management planning. In this system, the land provided fruits and vegetables and some meat in the diet, and the ocean provided a wealth of protein resources.

The current project area is located within the Puna District's Maku'u Ahupua'a. Barrère (1959) summarizes the Precontact geopolitics of the Puna District as follows:

Puna, as a political unit, played an insignificant part in shaping the course of history of Hawaii Island. Unlike the other districts of Hawaii, no great family arose upon whose support one or another of the chiefs seeking power had to depend for his success. Puna lands were desirable, and were eagerly sought, but their control did not rest upon conquering Puna itself, but rather upon control of the adjacent districts, Kau and Hilo. (Barrère 1959:15)

Despite the perceived lack of importance with respect to the emerging political history of Hawaiian leadership, Puna was a region famed in legendary history for its associations with the goddess Pele and god Kāne (Maly 1998). Because of the relatively young geological history and persistent volcanic activity the region's association with Pele has been a strong one. However, the association with Kāne is perhaps more ancient. Kāne, ancestor to both chiefs and commoners, is the god of sunlight, fresh water, verdant growth, and forests (Pukui 1983). It is said that before Pele migrated to Hawai'i from Kahiki, there was "no place in the islands . . . more beautiful than Puna" (Pukui 1983:11). Contributing to that beauty were the groves of fragrant *hala* and forests of *'ōhi'a lehua* for which Puna was famous:

Puna pāia 'ala i ka hala (Puna, with walls fragrant with pandanus blossoms).
Puna, Hawai'i, is a place of *hala* and *lehua* forests. In olden days the people would stick the bracts of *hala* into the thatching of their houses to bring some of the fragrance indoors. (Pukui 1983:301)

The inhabitants of Puna were likewise famous for their expertise and skill in *lauhala* weaving. In Precontact and early Historic times the people lived in small settlements along the coast where they subsisted on marine resources and agricultural products. According to McEldowney (1979), six villages were present along the coast between Hilo and Cape Kumakahi (Kea'au or Haena, Maku'u, Waiakahiula, Honolulu, Kahuwai, and Kula or Koa'e). The current project area is located in the vicinity of Maku'u Village (the U.S.G.S. 7.5 min series quadrangle of Paho North, HI shows the approximate location of the village, labeled 'MAKUU Site'; see Figure 1). Each of the villages, McEldowney notes:

...seems to have comprised the same complex of huts, gardens, windbreaking shrubs, and utilized groves, although the form and overall size of each appear to differ. The major differences between this portion of the coast and Hilo occurred in the type of agriculture practiced and structural forms reflecting the uneven nature of the young terrain. Platforms and walls were built to include and abut outcrops, crevices were filled and paved for burials, and the large numbers of loose surface stones were arranged into terraces. To supplement the limited and often spotty deposits of soil, mounds were built of gathered soil, mulch, sorted sizes of stones, and in many circumstances, from burnt brush and surrounding the gardens. Although all major cultigens appear to have been present in these gardens, sweet potatoes, ti (*Cordyline terminalis*), noni (*Morinda citrifolia*), and gourds (*Lagenaria siceraria*) seem to have been more conspicuous. Breadfruit, pandanus, and mountain apple (*Eugenia malaccensis*) were the more significant components of the groves that grew in more disjunct patterns than those in Hilo Bay. [1979:17]

Captain James Cook landed in the Hawaiian Islands on January 18, 1778. Ten months later, on a return trip to Hawaiian waters, Kamehameha visited Cook on board the *Resolution* off the East coast of Maui while Kalaniopu'u (Hawai'i chief) was at war with Kahekili (Maui chief) (Kamakau 1992). The following January [1779], Cook and Kalaniopu'u met in Kealahou Bay and exchanged gifts. In February, Cook set sail; however, a severe storm damaged a mast and they had to return to Kealahou. Cook's return occurred at an inopportune time, and this misfortune cost him his life (Kuykendall and Day 1976).

Around A.D. 1780 Kalani'ōpu'u proclaimed that his son Kiwalao would be his successor, and he gave the guardianship of the war god Kū'kā'ilimoku to Kamehameha. Kamehameha and a few other chiefs were concerned about their land claims, which Kiwalao did not seem to honor, so after usurping Kiwalao's authority with a sacrificial ritual, Kamehameha retreated to his district of Kohala. While in Kohala, Kamehameha farmed the land, growing taro and sweet potatoes (Handy and Handy 1972). After Kalani'ōpu'u died in A.D. 1782 civil war broke out: Kiwalao was killed. The wars between Maui and Hawai'i continued until A.D. 1795 (Kuykendall and Day 1976; Handy and Handy 1972).

In A.D. 1790 two American vessels, the *Eleanora* and *Fair American*, were in Hawaiian waters. Following an altercation between his crew and natives, the Captain of the *Eleanora* massacred more than 100 natives at Olowalu [Maui], then sailed away leaving one of its crew, John Young, on land. The other vessel, the *Fair American*, was captured and its crew killed except for one member, Isaac Davis. Kamehameha observed this but did not participate, although he did prevent Young and Davis from leaving. He also kept the vessel as part of his fleet. Young eventually became governor of the island of Hawai'i. By 1796 Kamehameha had conquered all the island kingdoms except Kaua'i. It wasn't until 1810, when Kaumuali'i of Kauai gave his allegiance to Kamehameha, that the Hawaiian Islands were unified under one ruler (Kuykendall and Day 1976).

Demographic trends during this period indicate population reduction in some areas, due to war and disease, yet increases in others, with relatively little change in material culture. However, there was a continued trend toward craft and status specialization, intensification of agriculture, *ali'i* controlled aquaculture, upland residential sites, and the enhancement of traditional oral history. The Kū cult, *luakini heiau*, and the *kapu* system were at their peaks, although western influence was already altering the cultural fabric of the Islands (Kirch 1985; Kent 1983). Foreigners had introduced the concept of trade for profit, and by the time Kamehameha I had conquered O'ahu, Maui and Moloka'i, in 1795, Hawai'i saw the beginnings of a market system economy (Kent 1983). This marked the end of an era of uniquely Hawaiian culture.

Hawai'i's culture and economy continued to change drastically as capitalism and industry established a firm foothold. The sandalwood (*Santalum ellipticum*) trade, established by Euro-Americans in 1790 and turned into a viable commercial enterprise by 1805 (Oliver 1961), was flourishing by 1810. This added to the breakdown of the traditional subsistence system, as farmers and fishermen were ordered to spend most of their time logging, resulting in food shortages and famine that led to a population decline. Kamehameha did manage to maintain some control over the trade (Kuykendall and Day 1976; Kent 1983).

Kamehameha I died on May 8, 1819 at Kamakahonu in Kailua-Kona, and once again the culture of Hawai'i was to change radically. Following the death of a prominent chief, it was customary to remove all of the regular *kapu* that maintained social order and the separation of men and women and elite and commoner. Thus, following Kamehameha's death a period of '*ai noa* (free eating) was observed along with the relaxation of other traditional *kapu*. It was for the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history traditional customs saw a change:

The death of Kamehameha was the first step in the ending of the tabus; the second was the modifying of the mourning ceremonies; the third, the ending of the tabu of the chief; the fourth, the ending of carrying the tabu chiefs in the arms and feeding them; the fifth, the ruling chief's decision to introduce free eating ('*ainoa*) after the death of Kamehameha; the sixth, the cooperation of his aunts, Ka-ahu-manu and Ka-heihei-malie; the seventh, the joint action of the chiefs in eating together at the suggestion of the ruling chief, so that free eating became an established fact and the credit of establishing the custom went to the ruling chief. This custom was not so much of an innovation as might be supposed. In old days the period of mourning at the death of a ruling chief who had been greatly beloved was a time of license. The women were allowed to enter the heiau, to eat bananas, coconuts, and pork, and to climb over the sacred places. You will find record of this in the history of Ka-ula-hea-nui-o-ka-

moku, in that of Ku-ali'i, and in most of the histories of ancient rulers. Free eating followed the death of the ruling chief; after the period of mourning was over the new ruler placed the land under a new tabu following old lines. (Kamakau 1992:222)

Immediately upon the death of Kamehameha I, Liholiho (his son and to be successor) was sent away to Kawaihae to keep him safe from the impurities of Kamakahonu brought about from the death of Kamehameha. After purification ceremonies Liholiho returned to Kamakahonu:

Then Liholiho on this first night of his arrival ate some of the tabu dog meat free only to the chiefesses; he entered the *lauhala* house free only to them; whatever he desired he reached out for; everything was supplied, even those things generally to be found only in a tabu house. The people saw the men drinking rum with the women *kahu* and smoking tobacco, and thought it was to mark the ending of the tabu of a chief. The chiefs saw with satisfaction the ending of the chief's tabu and the freeing of the eating tabu. The *kahu* said to the chief, "Make eating free over the whole kingdom from Hawaii to Oahu and let it be extended to Kauai!" and Liholiho consented. Then pork to be eaten free was taken to the country districts and given to commoners, both men and women, and free eating was introduced all over the group. Messengers were sent to Maui, Molokai, Oahu and all the way to Kauai, Ka-umu-ali'i consented to the free eating and it was accepted on Kauai. (Kamakau 1992: 225)

When Liholiho, Kamehameha II, ate the *kapu* dog meat, entered the *lauhala* house and did whatever he desired it was still during a time when he had not reinstated the eating *kapu* but others appear to have thought otherwise. With an indefinite period of free-eating and the lack of the reinstatement of other *kapu* extending from Hawai'i to Kauai, and the arrival of the Christian missionaries shortly thereafter, the traditional religion had been officially replaced by Christianity within a year following the death of Kamehameha I (see Kame'eiehiwa (1992) for an alternative explanation suggesting an intentioned overthrow of the '*ai kapu*).

"*Ali'i Nui* received their political power from Kū; therefore, an *Ali'i* must be religious and proclaim the '*Aikapu* upon his ascent to the office of *Mō'i*. If he did not his people would reject him as irreligious and other *Ali'i Nui* would be tempted to usurp his position." (Kame'eiehiwa 1992:39). Liholiho's cousin, Kekuaokalani, caretaker of the war god Kū'kā'ilimoku, was one such *Ali'i Nui* and he revolted. However, by December of 1819 the revolution was quelled. Kamehameha II sent edicts throughout the kingdom renouncing the ancient state religion, ordering the destruction of the *heiau* images, and ordering that the *heiau* structures be destroyed or abandoned and left to deteriorate. He did, however, allow the personal family religion, the '*aumakua* worship, to continue (Oliver 1961; Kamakau 1992).

In October of 1819, seventeen Protestant missionaries set sail from Boston to Hawai'i. They arrived in Kailua-Kona on March 30, 1820 to a society with a religious void to fill. Many of the *ali'i*, who were already exposed to western material culture, welcomed the opportunity to become educated in a western style and adopt their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government.

In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai'i seeking out communities in which to establish church centers for the growing Calvinist mission. Ellis recorded observations made during this tour in a journal (Ellis 1963). His writings contain descriptions of residences and practices that are applicable to the general study area:

The population in this part of Puna, though somewhat numerous, did not appear to possess the means of subsistence in any great variety or abundance; and we have often been surprised to find desolate coasts more thickly inhabited than some of the fertile tracts in the interior; a circumstance we can only account for, by supposing that the facilities which the former afford for fishing, induce the natives to prefer them as places of abode; for they find that where the coast is low, the adjacent water is usually shallow.

We saw several fowls and a few hogs here, but a tolerable number of dogs, and quantities of dried salt fish, principally albacores and bonitos. This latter article, with their *poë* [*poi*] and sweet potatoes, constitutes nearly the entire support of the inhabitants, not only in this vicinity, but on the sea coasts of the north and south parts of the island.

Besides what is reserved for their own subsistence, they cure large quantities as an article of commerce, which they exchange for the vegetable productions of Hilo and Mamakua [Hāmākua], or the *mamake* and other tapas of Ora [‘Ōla‘a] and the more fertile districts of Hawaii. (Ellis 1963:190-191)

During this period, the sandalwood trade was wreaking havoc on the commoners, who were weakening with the heavy production, exposure, and famine just to fill the coffers of the *ali‘i* who were no longer under any traditional constraints (Oliver 1961; Kuykendall and Day 1976). On a stopover in the Kohala District of Hawai‘i Island Ellis observed:

Before daylight on the 22nd, we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku, by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts. (Ellis 1984:397)

The lack of control of the sandalwood trade was to soon lead to the first Hawaiian national debt as promissory notes and levies were initiated by American traders and enforced by American warships (Oliver 1961). As Osorio explains, it was foreign economic interests originally promoted by the Hawaiian League and their “bayonet constitution” that ultimately infiltrated beliefs, ideas, and institutions; and as he put it, “literally and figuratively dismembered the *lāhui* (the people) from their traditions, their land and ultimately their government” (2002:5). Indeed, the Hawaiian culture was well on its way towards Western assimilation, although not without resistance (Silva 2004), as industry in Hawai‘i went from the sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar industry.

One year after Ellis’ tour, the ABCFM established a base church in Hilo. From that church (Hāili), the missionaries traveled to the more remote areas of the Hilo and Puna Districts. David Lyman who came to Hawai‘i in 1832, and Titus Coan who arrived in 1835 were two of the most influential Congregational missionaries in Puna and Hilo. As part of their duties they compiled census data for the areas within their missions. In 1835, 4,800 individuals were recorded as residing in the district of Puna (Schmitt 1973); the smallest total district Population on the island of Hawai‘i. In 1841, Titus Coan recorded that most of the 4,371 recorded residents of Puna, lived near the shore, though there were hundreds of individuals who lived inland (Holmes 1985). One of the coastal settlement areas was Maku‘u, in the vicinity of the current project area.

In 1846, Chester S. Lyman, “a sometime professor” at Yale University visited Hilo, Hawai‘i, and stayed with Titus Coan (Maly 1998). Traveling the almost 100 mile long stretch of the “Diocese” of Mr. Coan, Lyman reported that the district of Puna had somewhere between 3,000-4,000 inhabitants (Maly 1998). Entering Puna from Hilo, and traveling to Kea‘au along the coast, Lyman offered the following observations:

...The groves of Pandanus were very beautiful, and are the principal tree of the region. There is some grass and ferns, and many shrubs; but the soil is very scanty. Potatoes are almost the only vegetable that can be raised, and these seem to flourish well amid heaps of stone where scarcely a particle of soil could be discovered. The natives pick out the stones to the depth often of from 2 to 4 feet, and in the bottom plant the potato—how it can expand in such a place is a wonder.

Nearly all Puna is like this. The people are necessarily poor—a bare subsistence is all they can obtain, and scarcely that. Probably there are not \$10 in money in all Puna, and it is thought that not over one in five hundred has a single cent. The sight of some of these potatoe patches would make a discontented N.E. farmer satisfied with his lot. Yet, I have nowhere seen the people apparently more contented & happy. (Maly 1998:35)

By the middle of the nineteenth century the ever-growing population of Westerners forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership, and the *Māhele* became the vehicle for determining ownership of native lands. The *Māhele* defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *konohiki*. As a result of the *Māhele*, all land in the Kingdom of Hawai‘i came to be placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) Konohiki Lands (Chinen 1958:vii, Chinen 1961:13). The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission (Chinen 1961:13).

During the *Māhele* all lands were placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. All three types of land were subject to the rights of the native tenants therein. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai‘i to legally set the boundaries of all the *ahupua‘a* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of which had also been claimants for *kuleana* during the *Māhele*. This information was collected primarily between A.D. 1873 and 1885 and was usually given in Hawaiian and transcribed in English as they occurred. Boundary descriptions were not collected for all *ahupua‘a*.

As a result of the *Māhele* of 1848, the *ahupua‘a* of Maku‘u was retained as Government Lands, and no *kuleana* parcels were awarded in the *ahupua‘a* (Charvet-Pond and Rosendahl 1993:C-2). Between 1852 and 1855 portions of the *ahupua‘a* were divided and sold as fee simple Land Grants. The Land Grants were sold to Native tenants who were interested in acquiring the land upon which they lived, or land that they felt they could cultivate (Maly 1999:64). Three Land Grants were sold in the coastal portion of Maku‘u, Pōpōkī, and Hālonā *ahupua‘a*; Grant No. 1013 to D. W. Maiau in 1852, Grant No. 1014 to Kea in 1852, and Grant No. 1537 to Kapohano(a) in 1855 (Figure 6). The current project area is a portion of Lot 1 of Grant No. 1013 (Figure 7). Maiau also received a second lot (Lot 2) as part of Grant No. 1013, which is located within the boundaries of Grant No.1014 to Kea (Figure 8). Kepā Maly translated the boundary description of Grant No. 1013 with a note that the surveyor (Thos. Cook) mistakenly described the northern boundary of Maiau’s land as being along Keonepoko Ahupua‘a instead of Waikahekahe Iki Ahupua‘a. The boundaries of the grant parcel are described as follows:

Lot 1.

This lot begins at the shore, at the boundary wall of Keonepoko [Waikahekahe Iki], and proceeds South 56 ½ West 19.17 chains to the government road; then along the South 52 ½ East 25.10 chains to the land of Kea; then proceeding along the boundary of Kea North 53 ½ East 14.00 chains to the shore; than along the shore to the place of commencement. There are 38 17/20 acres in this parcel

Lot 2.

This lot begins at a kukui tree and proceeds along the land of kea...Bounded on all sides by Kea, containing 6/10th of an acre [Maly 1999:66].

In 1848, the Hawaiian Government also conducted a survey of schools on the Island of Hawai‘i. The survey included a school in Maku‘u Ahupua‘a. The location of the Maku‘u school lot is not shown on any of the cartographic resources reviewed during the inventory survey (Clark et al. 2008), but interestingly, the 1848 school report lists Maiau, who received Grant No. 1013, as the teacher in Maku‘u. The report lists Maiau’s salary as 12½ cents per day, the number of students taught as 18, and the subjects taught as reading, arithmetic, geography, penmanship, philosophy, science, and religion (Maly 1999:63). The Puna school report for the period spanning October, 1873 to January, 1874 lists N. Kanihoa as the teacher at the school in Maku‘u. Kanihoa received a daily salary of 50 cents for teaching 18 students. The schoolhouse is listed as being in good condition, and the school supervisor at the time, J. Elderts, reported two deaths and no births in Maku‘u over that period (Maly 1999:79).

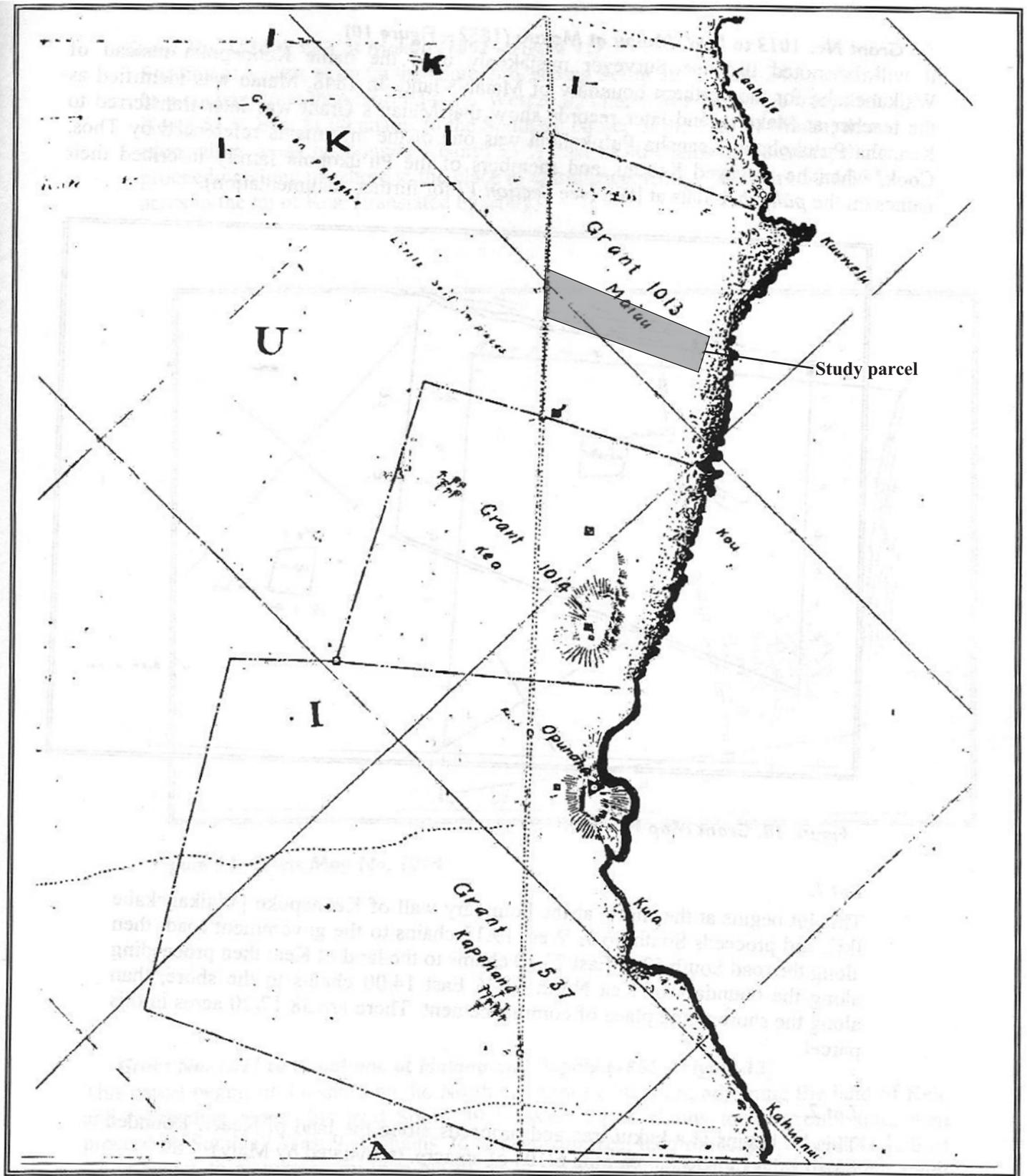


Figure 6. Portion of 1903 Register map No. 2258 showing land grants and the current study parcel.

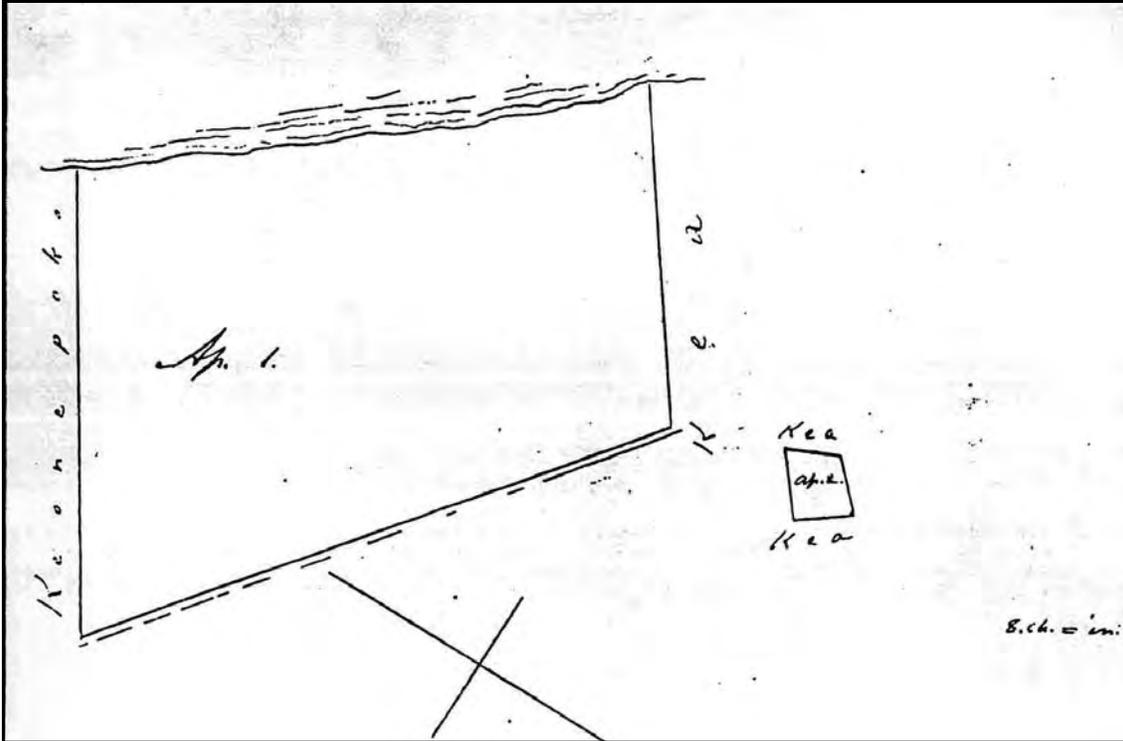


Figure 7. Map of Grant No. 1013 to Maiau (from Maly 1999:67).

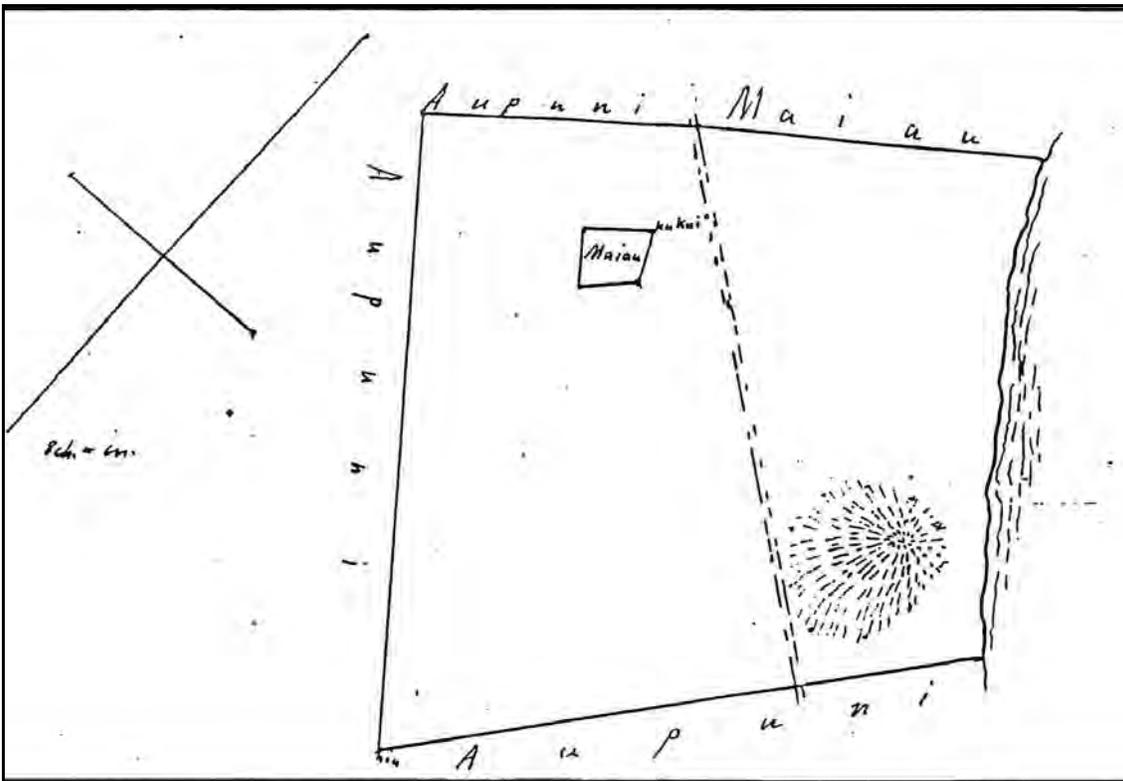


Figure 8. Map of Grant No. 1014 to Kea (from Maly 1999:68).

By 1873, the Government Road from Hilo through Puna had been completed to at least Maku'u (Maly 1999). The road likely followed the route of an older pedestrian trail (Lass 1997). An 1873 petition states that "He [J.W. Kumahoa as Road Supervisor of Puna] made the road at Makuu", and that "it was a very treacherous place before, but through his work is good at this time" (Maly 1999:78). Cattle ranching got its start in the area around this time. In 1872, Obed B. Spencer, a rancher, leased Kea'au Ahupua'a (to the northwest of Maku'u Ahupua'a; see Figure 1) from Charles Kanaina and Charles R. Bishop, guardians of William C. Lunalilo for a term of ten years beginning September 1, 1873. Spencer then transferred the lease and sold his personal property to J.O. Dominis and R. A. Lyman. The assignment of lease and bill of sale stated that:

The lease of the Land known as Keaau in the District of Puna, Island of Hawai'i and all other leases held by me in the District of Puna aforesaid together with all buildings and improvements to me belonging upon the said lands, and also all my flock of cattle running on the land of Keaau aforesaid and on the adjoining lands branded "OS" or " " or " " together with my brand "OS" and also my flock of goats and sheep running on the land of Keaau aforesaid and the adjoining lands and also my fowls and hogs on the lands aforesaid. And also the following horses [names 10 horses; also lists two foals, four mules, seven donkeys] ...Also a lot of lumber and shingles, a table and potatoes growing...(Bureau of conveyances; Lib. 37:488-489; in Maly 1999:78)

Lyman and Dominis subsequently reported that the number of cattle branded "OS" on the leased lands was 300, and the number of goats was 4,000 (Maly 1999:78). In 1874, the two men also formalized a ten-year lease for Waikahekahe Iki Ahupua'a (located between the *ahupua'a* of Kea'au and Maku'u), extended the lease of Kea'au Ahupua'a for a term of 25 years, and leased Maku'u, Hālonā, Keoneopoko Iki, Ka'ōhe, and Pōpōkī *ahupua'a* for a term of ten years (Maly 1999). By 1876, however, Lyman sold his interest in the *ahupua'a* of Kea'au to Charles R. Bishop for \$8,333.00, who in turn, in consideration of \$120,000.00, assigned the lease to the Hawaiian Agricultural Company (Maly 1999:83). In September of 1877, the Hawaiian Agricultural Company, in consideration of \$33,000.00, assigned lease and business interests in Kea'au Ahupua'a to J. E. Elderts and William H. Shipman (Maly 1999:84). By 1879 Elderts and Shipman's Kea'au Ranch included most of the lands between Kea'au and Kapoho *ahupua'a* (Cahill 1996).

On February 28th, 1876, the Boundary Commission heard testimony from Palau, a resident of Maku'u, concerning the boundaries of Waikahekahe Iki Ahupua'a (along the northwestern boundary of Maku'u Ahupua'a). Palau stated:

...I was born at Waikahekaheiki Puna, Hawai'i, at the time of *Niaukani o Kalii* (ca. 1811) and was grown up when missionaries first came to Hilo. I now live at Makuu the adjoining land. Have always lived on these two lands. I am a *kamaaina* of Waikahekaheiki. My mother Mau was a *kamaaina* of the land, and showed me the boundaries. The boundary at the shore between this land and land of Makuu, is at a *kaulapa* [a ridgeline or point] called Kuwelu [Ku'uwelo], there is also a *mauwae* [fissure] there: Thence the boundary runs *mauka* along the Kaulapa to the end of it, and on across the Govt. road to an *ahu Pahoehoe* [*pāhoehoe* rock cairn] near the road; thence *mauka* to old road to an *ahu pohaku* [stone cairn] at place called Kaumanumanu, thence *mauka* across old *pahoehoe* to the *pili* place called Kulanapahu. Thence to *pili* on Hilo side of grove of breadfruit trees at place called Kahoolua. Thence *mauka* to *pili* on Hilo side of Puunanaio, a breadfruit tree and old *mahina ai* [cultivated field]. Thence boundary runs *mauka* across *pahoehoe* to place called Papamaihi an *oioina* [trail side resting place] on the old road from Kaimu. Thence *mauka* to Puna side (or Kau side) of where houses used to be at old cultivating ground at place called Wahileolae. The point of woods called Makaohe are on Makuu, and part of *pahoehoe*. Thence the boundary runs *mauka* to old road from Kaunamano to Kalae, where I was told Waikahekaheiki ends. This land is bounded *makai* by the sea. The ancient fishing rights extend way out to sea... (Volume B:399-400 in Maly 1999:56-57)

In 1877, H.R. Hitchcock, the Inspector General of schools, reported that the schools in Puna had deteriorated slightly from their former good standing owing to the resignation of some of the best teachers (Maly 1999:83). He noted that, “the schools in Keauhou and Makuu are both very small, and as they are within three miles of each other, I have told the school agent to unite the two under one teacher, who shall teach two or more hours at each place, daily” (in Maly 1999:83). Hitchcock also described the difficulty students had keeping animals out of their fields (the produce from the fields was used to finance the school’s operation). Typically, to keep the animals out, they had to enclose the school lots with high walls and not include a gateway. Hitchcock wrote:

Puna is a district overrun by cattle, goats and hogs, which regard not stone walls, and patiently wait until the crops begin to be valuable, then appropriate them largely to their own use. This has a depressing effect upon the little workers, who add cubits to the height of the walls, until it becomes a matter of peril to the inspector to climb over them in order to enter the school house...(State Archives — Board of Education Series 262, Hawaii reports — 1877: 1 & 2; in Maly 1999:83-84)

In an 1891 report on the Government Schools of the Puna District, Abraham Kekino was listed as the teacher of nine students at the school in Maku‘u (Maly 1999:102). The report also noted, however, that there was no longer a schoolhouse at Maku‘u, and that the school at Kea‘au was gone, but that the Ola‘a school was a good building and S. Kaulupali was the teacher.

Around this time Henry M. Whitney, editor of the Hawaiian Gazette began publishing promotional guides of Hawai‘i to encourage tourism to the Islands. In 1890 he published an account of travel along the Hilo and Puna coastal road. He observed that at “Makuu, 15 miles from Hilo, there is quite a little settlement” (Whitney in Maly 1999:40). A survey for a new inland road through Puna District was completed in 1891. Prof. W. D. Alexander, the Surveyor General for this Hawaiian Government Survey, included several interesting notes on the terrain, vegetation, and population distribution of Maku‘u Ahupua‘a and neighboring lands in his report on the progress of the survey. The following are excerpts are from Prof. Alexander’s report:

...the general elevation being 475 feet, distance from the sea coast being 6 mile. This stretch of seven miles, lying over large tracts of smooth solid lava, of the kind marked with rope like lines and concentric folds, and covered with thin Ohia woods, is remarkably easy to travel over, and for the progress of the bullock cart would afford no difficulty even now. The extensive forests of Maku‘u and Halona Gov’t lands, distant one and one-half miles above the road line, filled with an exuberant mass of shrubbery , in which the presence of bananas, *Ki* [ti], Yam, *Awa* can be easily distinguished, and the growths of young Sandal wood, which seem to thrive and find support in the fissures which intersect the surface are features which would make the near approach desirable.

...there is nothing to enjoin, from constructing feeders to the main road, at available points, making use, where possible of the numerous trails built and used in ancient time, by the natives, for access to these localities, their old planting grounds.

...The first settlement met with after leaving Hilo by the sea coast road, is at Keaau, a distant 10 miles where there are less than a dozen inhabitants; the next is at Makuu, distant 14 miles where there are a few more, after which there is occasionally a stray hut or two, until Halepuaa and Koaie are reached, 21 miles from Hilo, at which place there is quite a village...A good many of those living along the lower road have their cultivating patches in the interior.

...over the barest fields there is found a stunted growth of trees and a sprinkling of verdure, struggling for recognition and growing in the many crevices and cavities in the lava, while it is true that efforts at cultivation are made here and there these seem to succeed only in the holes made among the stones or diminutive patches of earth scattered here and there...

...Nearly all of the food consumed by the residents of this District is raised in the interior belt to which access is had by ancient paths or trails leading from the sea coast...The finest sweet potatoes are raised in places that look more like banks of cobble stones...

...The old sea coast road cannot be kept in repair with the means now at its disposal and its condition each year is becoming more unsafe and ruinous, there is but little travel over it; it has been shewn [shown] that there is little land capable of cultivation or development either side of it and whatever travel there is now would soon be entirely diverted to the upper road...(in Maly 1999:105-107)

By the late 1800s land use in the Puna District was changing. By 1900, the new highway was completed. Between 1894 and 1900, W. H. Shipman, who had by that time acquired sole interest in Kea'au Ahupua'a and neighboring lands, sold nearly 4,000 acres to various individuals for the cultivation of coffee and in 1899 he leased nearly 4,000 acres to the Ola'a Sugar Company, Ltd. (Maly 1999). In 1901, 1911, and 1912, A. B. Loebstien and Theos. Cook surveyed the boundaries of Shipman's lands. Many of the informants for the surveys were native residents of Kea'au and Maku'u. Interestingly, in the early 1900s, Grant No. 1013, of which the current project area is a part, was transferred to Keanalia Pu'ukoholā, one of the informants for Thos. Cook (Maly 1999). Register map No. 2258 (ca. 1903) shows a single house within the boundaries of Grant No. 1013:1 (see Figure 6). The house is located in the southern corner of the grant boundary near the Old Government Road, outside of the current project area. A 1924 Maku'u U.S.G.S. Quadrangle shows two different houses within the grant parcel, both are located in the northern corner of the parcel near the coast, also outside the current project area (Figure 9).

During the early part of the 20th century the Puna District underwent drastic changes. The native system of agricultural had nearly completely disappeared as a result the drastic population decline (Yent and Ota 1982), and ranching, sugarcane, coffee, and lumber became the dominant industries. The Keaau Ranch had begun grazing cattle as early as the 1850s and ranching operations continued to expand during this time (Maly 1999:42). The Olaa and Puna Sugar Companies operated in Puna from 1900 until the 1980s (Dorrance and Morgan 2000). Beginning in 1900, railroad tracks were laid by the Hawai'i Railway Company for hauling sugarcane (and passenger travel) from the fields in lower Puna to the mills in Pahoa and Kea'au (Clark et al. 2001). The railroad passed through Maku'u Ahupua'a *mauka* of the current project area, stopping at the Maku'u Station house (see Figure 9). The railroad ceased operations in 1946.

By 1930, W. H. Shipman had initiated Land Court proceeding (Land Court Application 1053) to record the boundaries of Kea'au Ahupua'a. Of general interest in the proceedings were the condition of trails crossing the land and their ownership. A 1933 map of trails in Kea'au Waikahekahe Nui and Waikahekahe Iki shows the trails in question (Figure 10). Two sworn affidavits from native residents of the area accompanied the land court application.

One of the native residents was David Malo, who was born in 1852 at Maku'u, where he lived until 1870 when his father died. In his affidavit he states, among other things, that:

...The people living in Olaa were tenants at will while under Queen Emma. My father was the Queen's Konohiki. The people that were living in Keaau paid money for living on the land. Only tenants were allowed to go on the land.

...The only main trail or main Public Highway that was used by everybody at that time is the trail that starts from about 12 miles Olaa, and goes down to Waipahoehoe, and on to Makuu till it meets the King Highway.

There were many other trails running down to the King Highway and the beach, some of them were made by cowboys for driving cattles, and some of them were made by cows.

...At Waikahekahe there was a village. The children of that village went to school at Makuu...(in Maly 1999:122-123)

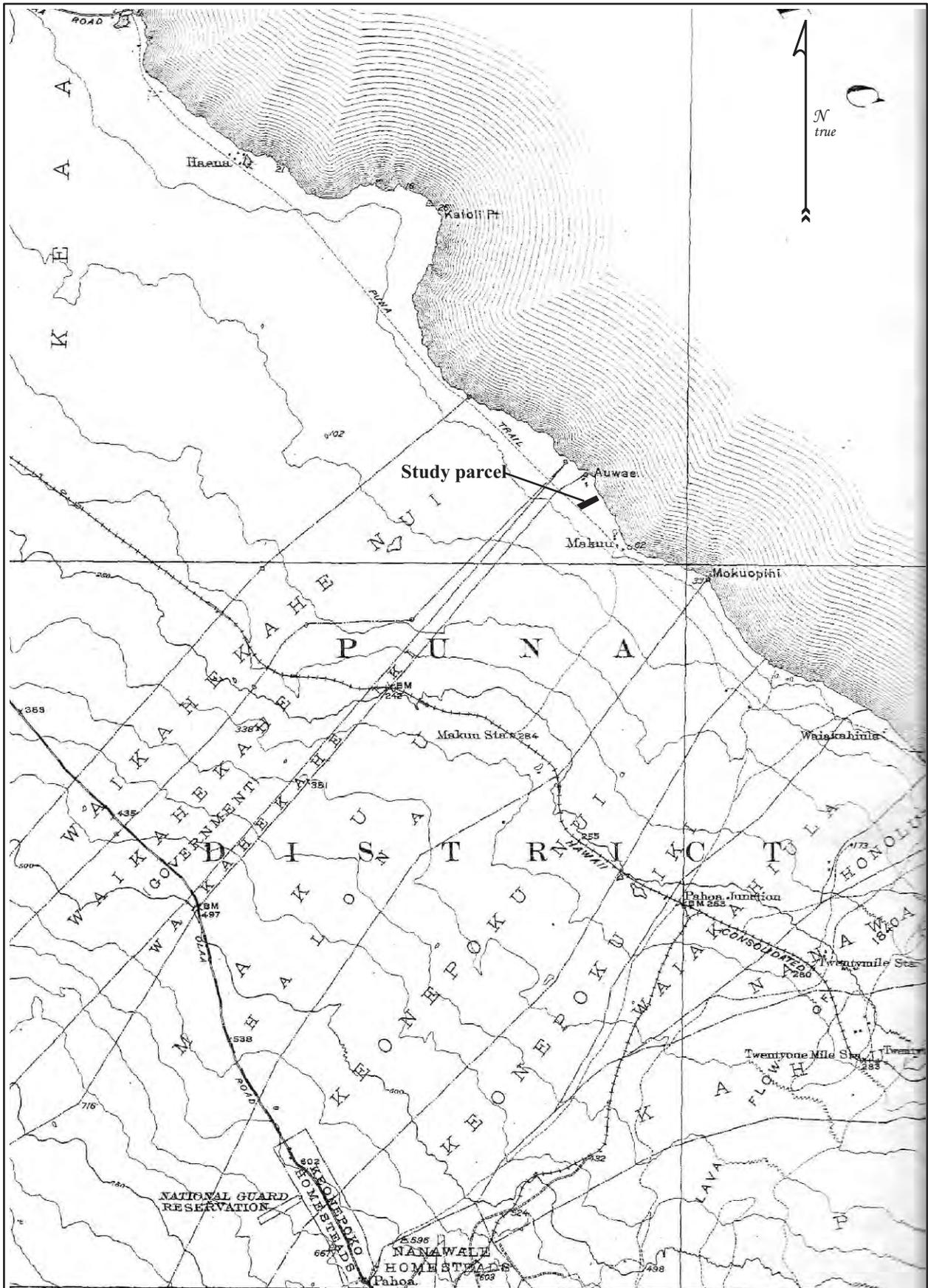


Figure 9. Portion of a 1924 U.S.G.S. Makuu Quadrangle, showing the current study parcel.

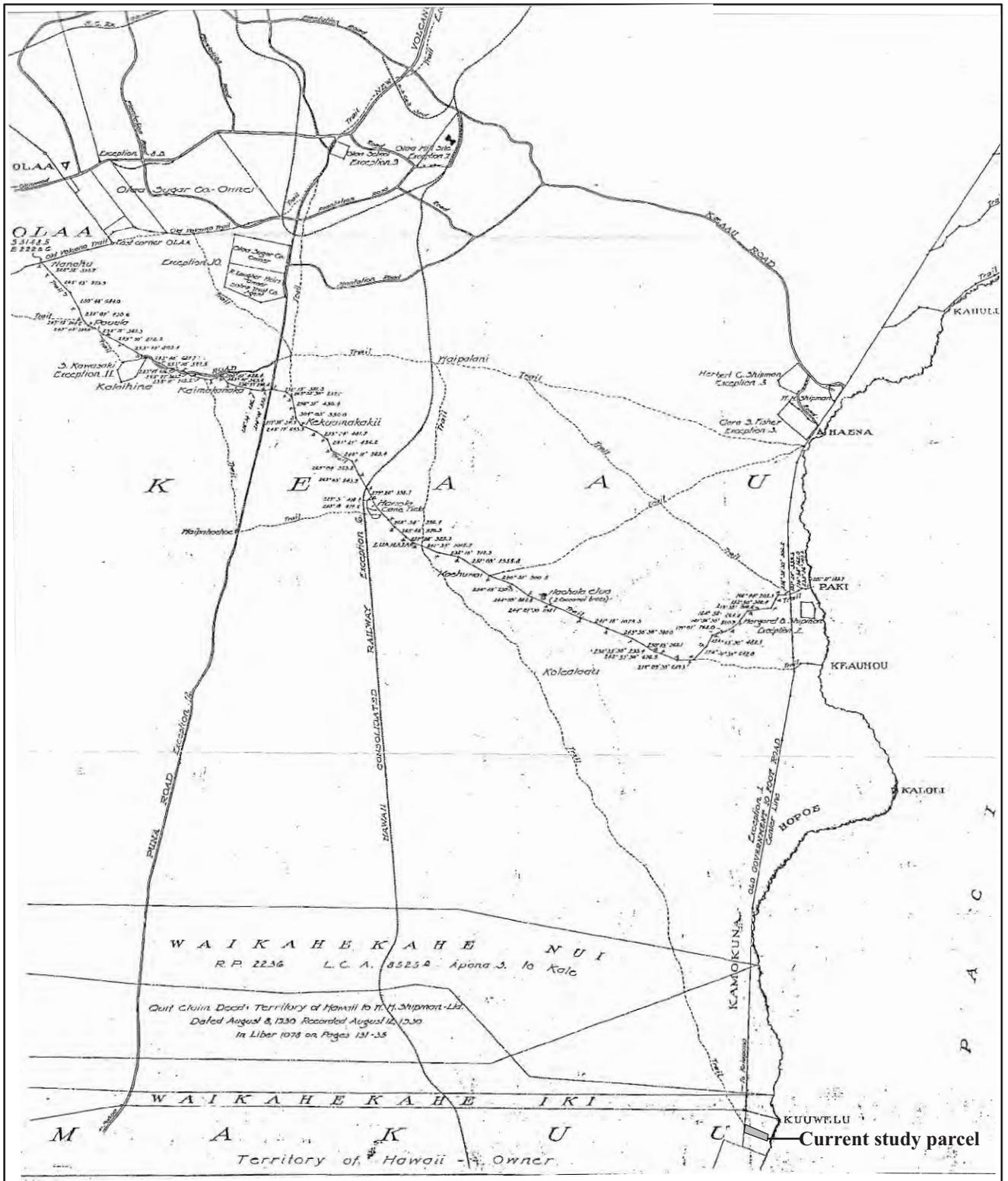


Figure 10. Portion of 1933 County of Hawai'i map showing trails of Kea'au, Waikahekahe Nui, and Waikahekahe Iki ahupua'a (from Maly 1999).

The other native resident was Keoki Mai, who was born at Pākī in Kea‘au Ahupua‘a in 1868. In his affidavit he states that:

...The trail or road from Olaa to Makuu is the main road upon which the *kamaaina* and strangers traveled from Makuu to the old Volcano Road, and from Olaa to Makuu. This is the main road which David Malo had described. ...The trail that goes to Makuu I had gone over that road till I reached Waikahekahe, at the Ahua where the gate is now on the King Highway.

Another road or trail starts from the school house at 9 miles, Olaa, and goes down to the school house at Makuu. There are piles of stone along this road. This road was made at the direction of Mr. Shipman. The road which David Malo has described, running from 12 miles Olaa, down to Makuu and meets the King Highway, is the main road or trail that was used by everybody...(in Maly 1999:123-124)

The trail discussed as the main trail or road by both David Malo and Keoki Mai is shown on Figure 10 running east (diagonally) across Kea‘au, Waikahekahe Nui, and Waikahekahe Nui *ahupua‘a* to the old Government Road near the *mauka* boundary of the current study parcel. The trail has two different points of commencement; one that runs from Olaa School (at the 9th mile along the Volcano Road) and then on to Maku‘u, and one that runs from 12th mile to Waipahoe (along the Puna Road), and then on to Maku‘u.

PRIOR STUDIES

Several prior studies (archaeological and cultural) have been conducted within Maku‘u, Pōpōkī, and Hālonā *ahupua‘a* (Table 1 and Figure 11). Many of these previous studies were conducted in the coastal portions of the *ahupua‘a* in the immediate vicinity of the current project area (Barrera 1990; Chaffee and Spear 1993; Charvet-Pond and Rosendahl 1993; Clark et al. 2007; Clark et al. 2008; Ewart and Luscomb 1974; Hudson 1932; Komori and Peterson 1987; Rosendahl 1989; Spear et al. 1995) (see Table 1). The Ewart and Luscomb (1974) study and the Clark et al. 2008 included the current project area or portions thereof. In addition to the coastal studies, six other studies have been conducted at more inland locations within the *ahupua‘a* (Bordner 1977; Conte et al. 1994; Desilets and Rechtman 2004; McEldowney and Stone 1991; Rechtman 2003; Yent 1983) (see Table 1). A discussion of the findings for the current project area follow below and the reader is directed to the Clark et al. (2008) inventory survey for a more thorough discussion of the archaeological studies surrounding the current project area. Subsequent to the archaeological inventory performed by Rechtman Consulting, LLC (Clark et al. (2008), a preservation plan (Pestana et al. 2009a) and a burial treatment plan (Pestana et al. 2009b) were prepared for the current project area and are also discussed below.

Table 1. Previous studies in Maku‘u, Pōpōkī, and Hālonā *ahupua‘a*.

<i>Author/Date</i>	<i>Type of Study</i>	<i>Ahupua‘a</i>
Hudson 1932	Archaeological Survey	Various
Ewart and Luscomb 1974	Reconnaissance Survey	Various
Bordner 1977	Reconnaissance Survey	Maku‘u
Yent 1983	Archaeological Survey	Maku‘u
Komori and Peterson 1987	Cultural and Biological Resource Survey	Various
Rosendahl 1989	Field Inspection	Maku‘u, Hālonā, Pōpōkī
Barrera 1990	Inventory Survey	Maku‘u
McEldowney and Stone 1991	Archaeological/Environmental Survey	Various
Chaffee and Spear 1993	Burial Testing	Maku‘u
Charvet-Pond and Rosendahl 1993	Inventory Survey	Maku‘u, Hālonā, Pōpōkī
Conte et al. 1994	Inventory Survey	Maku‘u, Hālonā, Pōpōkī
Spear et al. 1995	Data Recovery	Maku‘u
Rechtman 2003	Archaeological Assessment	Maku‘u, Hālonā
Desilets and Rechtman 2004	Inventory Survey	Maku‘u, Hālonā, Pōpōkī
Clark et al. 2007	Inventory Survey	Pōpōkī
Clark et al. 2008	Inventory Survey	Maku‘u
Pestana et al. 2009a	Preservation Plan	Maku‘u
Pestana et al. 2009b	Burial Treatment Plan	Maku‘u

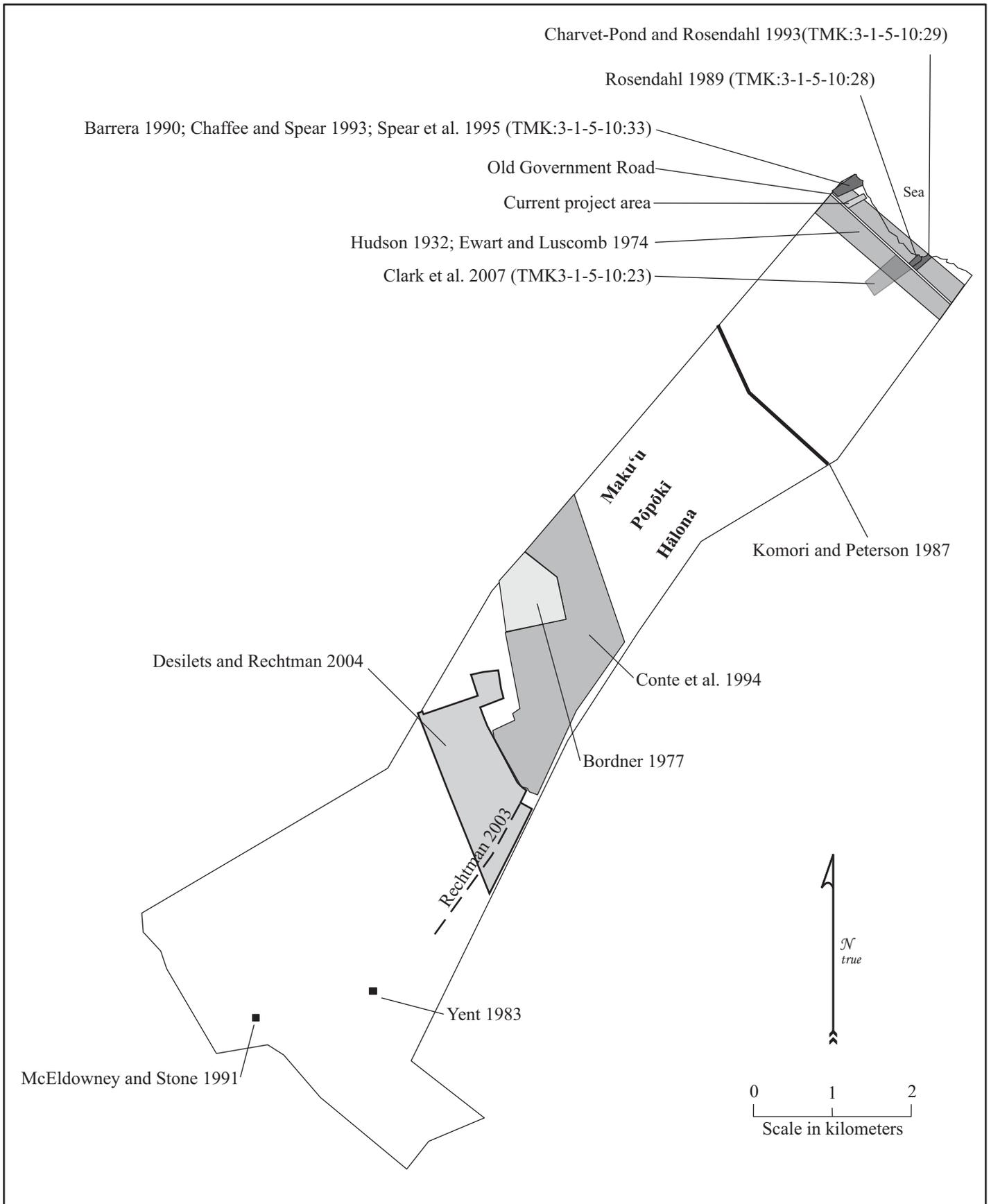


Figure 11. Distribution of prior studies in the vicinity of the current study parcel.

Ewart and Luscomb (1974) of the B. P. Bishop Museum conducted a six-mile long archaeological reconnaissance survey of a proposed Kapoho-Keaukaha Highway route through the District of Puna from Waiakahiula Ahupua'a to Kea'au Ahupua'a. The survey area consisted of a 2,000-foot wide corridor that generally followed the route of the old Government Road which passes along the *mauka* boundary of the current project area (see Figure 10). Ewart and Luscomb (1974) briefly recorded the locations and types of numerous archaeological sites, consisting of either single features or feature complexes, in the vicinity of the current project area (Figure 11). The identified feature types included walls, mounds, petroglyphs, trails, platforms, enclosures, and modified depressions that were variously interpreted as being used for habitation, burial, agriculture, and ranching. Eight sites were located in the immediate vicinity of the current study parcel including: a large feature complex (Ha-A3-10) that is partially within the current project area; two other feature complexes (Ha-A3-7 and Ha-A3-19) located to the southeast; two burial platforms (Ha-A3-17) also located to the southeast, that are discussed as the final resting place of the original recipients of Grant No. 1013; a large feature complex located across the Government Road (Ha-A3-18); two petroglyph fields (Ha-A3-24 [SIHP Site 4222] and Ha-A3-25) located at the coast near the current project area; and a wall (A3-14) located along the old Government Road southeast of the current project area. The descriptions of each of these sites follow below and their locations are shown in Figure 12.

Ha-A3-7

This complex includes several walls, faced areas, a mound with an upright stone, and a rock-lined well. The area has several springs, and both the well and a faced depression, or pond, presently contain water. The pond area was made recently using a bulldozer to enlarge a natural well. Mr. Tomiji Togashi constructed a wall behind the pond and modified others in the same area. A rock-lined well is the only feature that has not been modified. In general, because of the extensive and recent modification of the area, these features are of negligible archaeological value.

Ha-A3-10

This is a large complex measuring c. 250 by 100 m, with fragments of trails, several enclosures, and a variety of other features. Large, faced, flat areas may have been agricultural terraces. Collapsed lava domes have been enlarged and faced to form natural wells or protected agricultural areas. Platforms suggest house sites and would make interesting excavation features. This appears to be an extensive agricultural-habitation complex with excellent possibilities for continued research.

Ha-A3-14

A stacked wall c. 250 m long parallels the Government Trail approximately 2 m makai of it. The wall varies in height from 0.5 to 1.5 m and in width from 0.5 to 1 m. There are occasional breaks in the wall but other than that, it is in fair to good condition.

According to Mr. Kamahele, this is a kuleana wall associated with the Kamahele Mahele Grant. There is actually a complex of free-standing walls in the area which probably represent kuleana walls and could possibly be useful in ethno-historic land-tenure studies.

Ha-A3-17

These features are the graves of people who lived on the land now owned by Mr. Kamahele. The most recent burial in the area was Mr. Kamahele's maternal grandmother who died sometime before 1920. Buried in a row with her are six other individuals who represent people to whom the Mahele Grant no. 1013 was given. Covering these graves is a low platform measuring 9 by 2.7 m, and 0.30 m high.

Immediately to the northeast of the low platform is a larger platform measuring 5 by 5 m and c. 1.3 m high. According to Mr. Kamahele, this is the older of the platforms. The numbers and identities of those buried in this feature are unknown to Mr. Kamahele. Because of the nature of this site, no further work is deemed necessary at the present time.

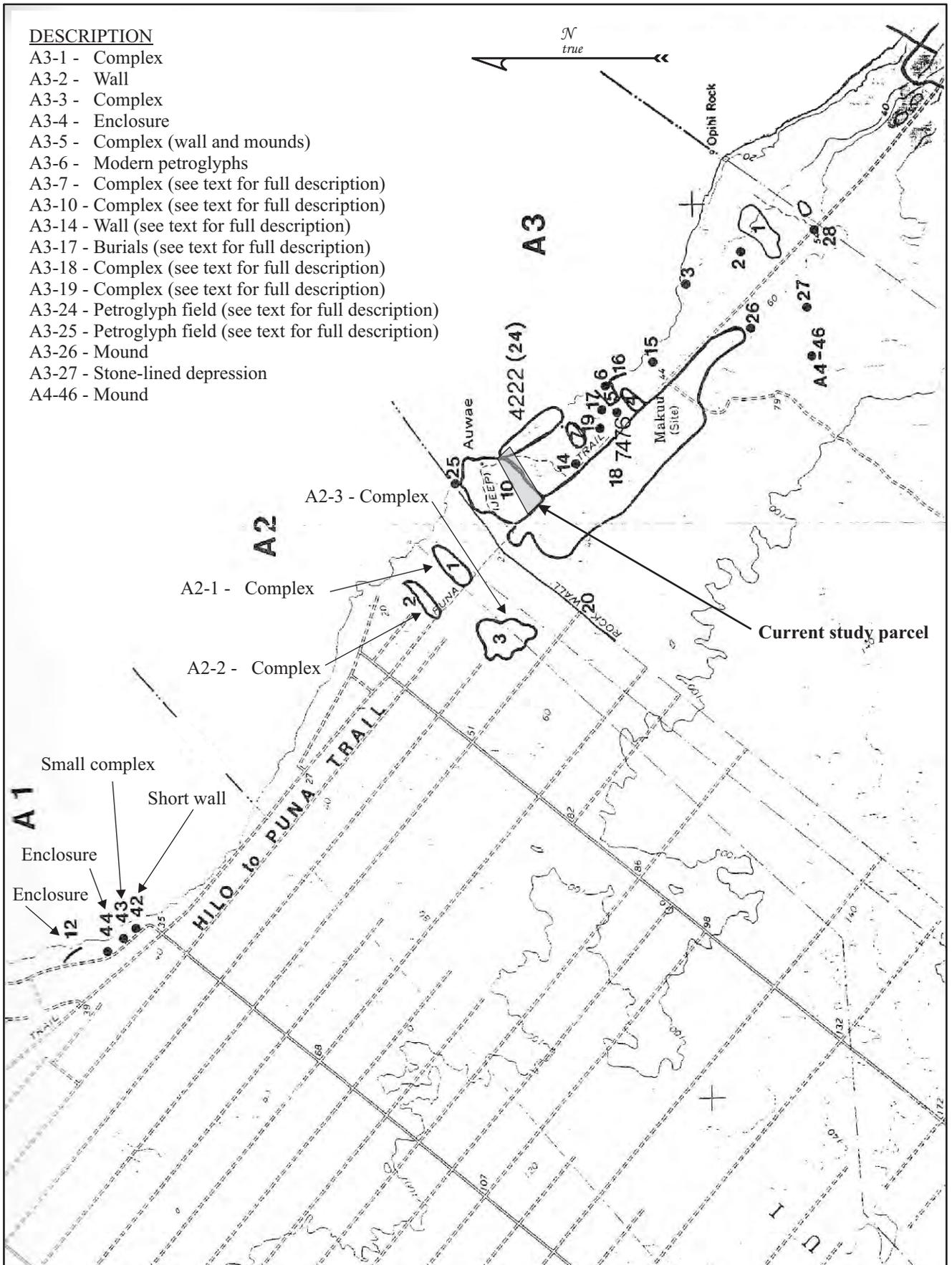


Figure 12. Ewart and Luscomb (1974) site location map showing current study parcel (annotated with A3 site descriptions).

Ha-A3-18

Site Ha-A3-18 is composed of numerous walls, enclosures, mounds, depressions, and platforms. This area does not appear to contain any nucleated settlement but rather represents dense, dispersed settlements—one or two platforms and surrounding agricultural features (faced depressions, low mounds, faced, small gullies, and enclosures of various sorts). This area presents good research possibilities as a large and extensive complex with little disturbance, although there are certainly some historic features in it.

Ha-A3-19

This site consists of platforms and walls. Mr. Kamahale in December 1973 said that an enclosure here was similar to an enclosure of Site Ha-A3-10. Geographically these areas are in close proximity and originally it may have been a continuous complex. This area is of moderate value archaeologically.

Ha-A3-24

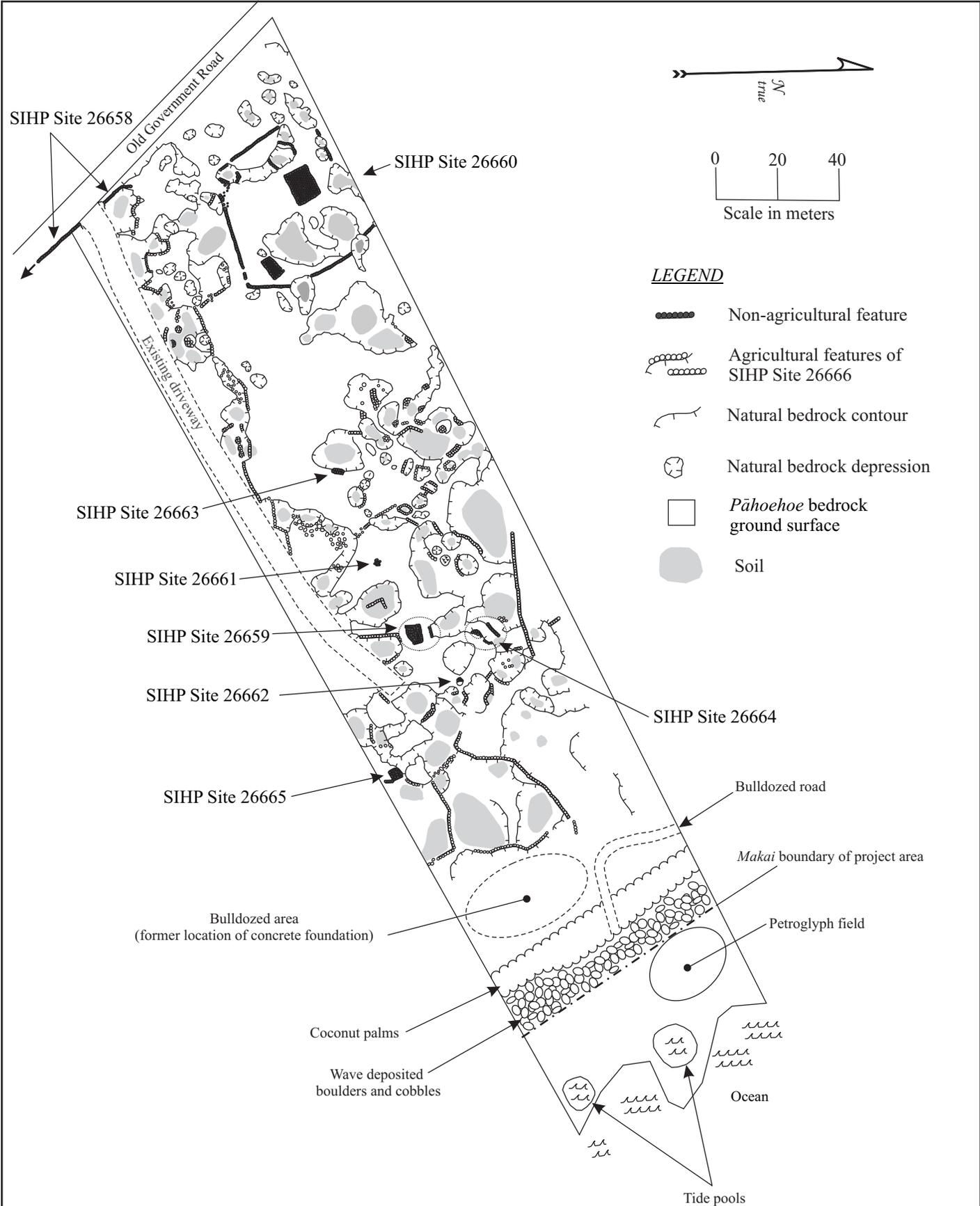
This field (not mapped because of time limitations) is located on a pahoehoe flat, approximately 5 m makai of a large breakwater formed by bulldozing beach boulders. During the construction of this breakwater Mr. Togashi noticed the field, which had been covered by large waterworn boulders. This site may be the same found by Hudson [n.d. :308] and may possibly be the Makuu petroglyph field, no. 4222 of the Statewide Inventory. Designs noticed included stick-type human figures and angular geometric designs. These petroglyphs probably predate western contact and every attempt should therefore be made to protect them as a remnant of Hawaiian culture.

Ha-A3-25

These petroglyphs are located 200 m east of Makuu-Waikahekahe ahupua'a wall on the coast at high tide line. They were found on a flat pahoehoe flow measuring 20 meters across. This field is composed of isolated letters, words, and a konane board which may be the same one mentioned by Hudson [n.d. :308]. The letters S, J, and Z appearing in these petroglyphs are unusual and may suggest that at least portions of the field are recent (20th century). [Ewart and Luscomb 1974:27-30]

Ewart and Luscomb (1974) include in their report, notes of a July 4, 1956 interview conducted by Mrs. Violet Hansen with Mrs. Mary Ann Kamahale (age 70), a member of a Hawaiian family who were the only residents of Maku'u at that time (living on Grant No. 1014; see Figure 2). Mrs. Kamahale related that she knew of a *heiau* on Grant 1013:2, located south of the current study parcel, across the Old Government Road, within the boundaries of Grant No. 1014. Ewart and Luscomb (1974:51) write, however, that they could not substantiate this claim.

In 2008, Rechtman Consulting, LLC performed an archaeological inventory survey of the current project area (Clark et al. 2008). As a result of that survey, nine archaeological sites containing sixty-seven features were recorded within the boundaries of the current study parcel (Table 2). The sites included a core-filled wall along the old Government Road (Site 26658), an enclosure/pavement used for Historic habitation purposes (Site 26659), a Historic habitation complex (Site 26660) containing five features including an enclosing wall (Feature A), two modified depressions (Features B and C), a pavement (Feature D), and a platform (Feature E), a modified bedrock hole used for water collection and storage (Site 26661), three concealed bedrock overhangs containing Historic burials (Sites 26662, 26663, and 26664), a Precontact burial within a platform (Site 26665), and a large agricultural complex (Site 26666) that spans the entire project area and contains fifty-five distinct features. Six test units were excavated at five of the recorded sites. The locations of each of the sites, relative to the project area boundaries, are shown on Figure 13.



* The boundaries of SIHP Site 26666 conform to the project area boundaries.

Figure 13. Archaeological sites recorded during the inventory survey of TMK:3-1-5-010:032.

Table 2. Archaeological sites recorded on the current study parcel (Clark et al. 2008).

<i>SIHP Site #*</i>	<i>Formal Type</i>	<i>Functional Type</i>	<i>Temporal Association</i>
26658	Core-filled wall	Ranching/boundary	Historic
26659	Enclosure/pavement	Habitation	Historic
26660	Complex	Habitation	Historic
26661	Modified bedrock hole	Water collection/storage	Historic
26662	Concealed overhang	Burial	Historic
26663	Concealed overhang	Burial	Historic
26664	Concealed overhang	Burial	Historic
26665	Platform	Burial	Precontact
26666	Complex	Agriculture	Precontact/Historic

*All SIHP site numbers within the project area are preceded by the state, island, and quad prefix 50-10-45.

The two habitation sites (Sites 26659 and 26660) and the modified bedrock hole (Site 26661) are located on a raised linear spine of *pāhoehoe* bedrock that runs from the old Government Road to the *makai* portion of project area near the coast. This area is elevated so that it stays dry during times of heavy rain, and it provides the easiest *mauka/makai* pedestrian access across the parcel. The bedrock ground surface is also unsuitable for agriculture, as very little soil is present. The remaining sites and features are constructed along the north and south edges of this raised bedrock spine, or within natural, vertical sided depressions in the bedrock. Three of the depressions have overhanging edges that were blocked with walls to conceal Historic Period burials (Sites 26662, 26663, and 26664). Nearly all of the depressions contain at least thin soil, and many have been cleared and modified along their edges for planting purposes.

Evidence of Historic Period use of the project area is more prevalent at the recorded sites than Precontact Period use. Use of only one recorded site appears to date solely to Precontact times—Site 26665, a burial platform. It is likely however, that Precontact use was just as widespread, but that it was obscured by later Historic use. The features of the agricultural complex (Site 26666) appear to embody the formal attributes of both periods. These features were adapted over time, and new features were built, to suit the changing needs of the residents of this area, such as the need to keep cattle and goats out of agricultural areas. Evidence of Modern use of the project area is also widespread. Numerous plastic grow bags, fertilizer bags, plastic water bottles, and related agricultural items are littered on ground surface within the project area. Modern cultivation within the project area has likely affected some of the recorded features. Mechanical earthmoving, for the construction of the driveway and the removal of a concrete house foundation near the coast, has also negatively impacted the archaeological landscape.

In addition to the recorded archaeological sites, the presence of a petroglyph field was noted on the coastal shelf *makai* of the project area (see Figure 13). This is likely the same field recorded by Ewart and Luscomb (1974) as Site Ha-A3-25 (see above). It is covered by water at high tide, but exposed at low tide. Several names and a *papamū* are present within the field. Readable names included: KAALOKAI'I, KEKIEI, KAAI, KAUH...?, KEOWAOWA A, ZAI, and POAHI. At least three springs appear to surface within small tide pools to the southeast of the petroglyph field, also *makai* of the current project area.

In 2009, Scientific Consulting Services, Inc. prepared an archaeological sites preservation plan (Pestana et al. 2009a) and a burial treatment plan (Pestana et al 2009b) for the current project area. The archaeological sites preservation plan was prepared for Site 26660 and specified interim preservation measures that include setting up orange construction fencing around the site to create a 20 foot buffer zone within which no development activities can take place. Permanent preservation at this site will include delineated the 20 foot buffer with either a gated fence and/or natural landscaping barrier. The burial treatment plan was prepared for Sites 26662, 26663, 26664, and 26665; and also included the non-burial site 26659. Sites 26662, 26664, and 26659 are all contained within a single preserve area that measures 40 feet x 30 feet, with a 20 foot buffer measured from the outer edges of each site. Sites 26663 and 26665 each have a buffer of 20 feet from their outer edges. In addition to the buffers around the three burial preserve areas, there is also a “no build” zone extending 10 feet from the perimeter of the 20 foot preservation buffer. Access to the burial sites by formally recognized lineal and/or cultural descendants is by prior permission from the landowner. Both of the preservation plans specify that an archaeological monitor will be present during all earth-moving activities associated with development of the parcel. Figure 14 shows the preservation buffers around the site areas.

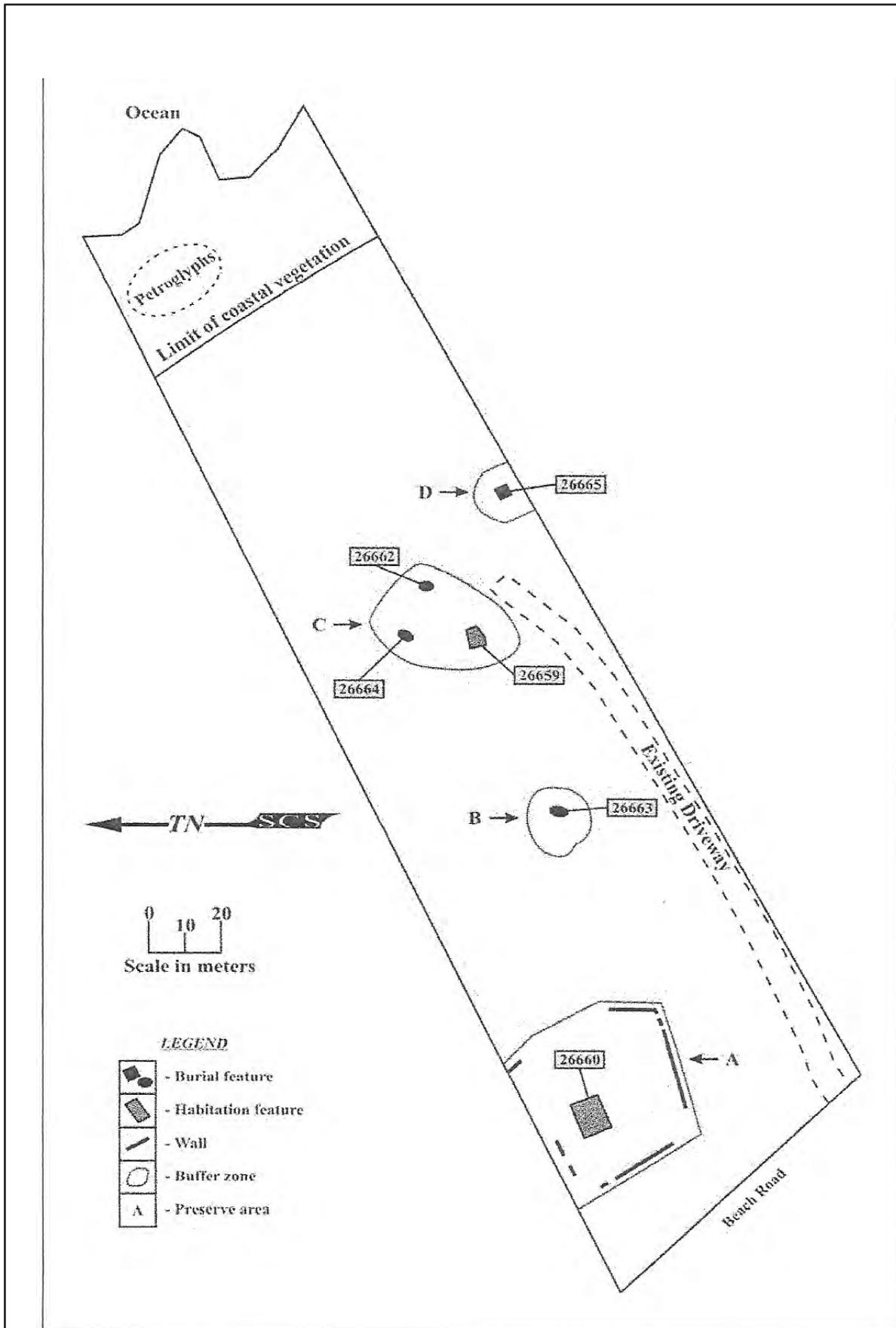


Figure 14. Map of project area showing preservation buffers (after Pestana et al. 2009a).

CONSULTATION

When assessing potential cultural impacts to resources, practices, and beliefs; input gathered from community members with genealogical ties and/or long-standing residency relationships to the study area is vital. It is precisely to these individuals for whom meaning and value are ascribed to traditional resources and practices. Community members may also retain traditional knowledge and beliefs unavailable elsewhere in the historical or cultural record of a place. As part of the current assessment the following individuals/organizations were contacted: Nicole Lui (Recognized descendant with respect to the burial treatment process), Jimmy Medeiros (Recognized descendant with respect to the burial treatment process), Richard Ha (genealogically connected to the area), and Melani Dominguez (genealogically connected to the area).

During the burial treatment planning process that was previously undertaken for the parcel, The Hawai'i Island Burial Council formally recognized Raymond Lui, Nicole Lui, and Jimmy Medeiros as cultural descendants based on their genealogical ties to individuals once resident in Maku'u Ahupua'a. In a phone conversation with Nicole she explained that her immediate family (including her father Raymond) never resided in the area and thus had no knowledge of any *wahi pana* or cultural practices associated with the study parcel. Nicole did indicate that as long as the preservation measures in the burial treatment plan were followed, she had no objections to the development plan. Several attempts (via telephone and email) were made to contact Jimmy Medeiros, but none were successful.

Richard Ha was contacted by telephone. Mr. Ha's genealogy links him to the Kamahale 'ohana; his grandmother's brother was Ulrich Kamahale. As Mr. Ha relates in his online blog, "Everyone knew him (Ulrich) as Uncle Sonny, as if there was only one 'Uncle Sonny' in all of Hawai'i." In this same online blog, Mr. Ha prepared a four-part story about his life experiences at Maku'u. Excerpt from these stories are presented to highlight life in the Maku'u area during the middle twentieth century.

My extended Kamahale family came from Maku'u. When we were small kids, Pop would take us in his '51 Chevy to visit.

He would turn left just past the heart of Pahoa town, where the barbershop is today. We drove down that road until he hit the railroad tracks, and then turned left on the old railroad grade back toward Hilo. A few miles down the railroad grading was the old Maku'u station. It was an old wooden shack with bench seats, as I recall. That is where the train stopped in the old days. A road wound around the pahoehoe lava flow all the way down the beach to Maku'u. That was before there were the Paradise Park or Hawaiian Beaches subdivisions.

We did not know there was a district called Maku'u; we thought the family compound was named Maku'u. Of the 20-acre property, maybe 10 acres consisted of a kipuka where the soil was ten feet deep. The 10 acres on the Hilo side were typical pahoehoe lava. The property had a long oceanfront with a coconut grove running the length of the oceanfront. It was maybe 30 trees deep and 50 feet tall.

The old-style, two-story house sat on the edge of a slope just behind the coconut grove. If I recall correctly, it had a red roof and green walls. Instead of concrete blocks as supports for the posts, they used big rocks from down the beach.

There was no telephone, no electricity and no running water. So when we arrived it was a special occasion. We kids never, ever got as welcome a reception as we got whenever we went to Maku'u.

And the person happiest to see us small kids was tutu lady Meleana. She was my grandma Leihulu's mom. She was a tiny, gentle woman, maybe 100 pounds, but very much the matriarch of the family. She spoke very little English but it was never an issue. We communicated just fine.

We could not wait to go down the beach. Once she took us kids to catch 'ohua—baby manini. She used a net with coconut leaves as handles that she used to herd the fish into the net. I don't recall how she dried it, but I remember how we used to stick our hands in a jar to eat one at a time. They were good.

She would get a few 'opihi and a few haukeuke and we spent a lot of time poking around looking at this sea creature and that.

Between the ocean in the front and the taro patch, ulu trees, bananas and pig pen in the back, there was no problem about food. I know how Hawaiians could be self-sufficient because I saw it in action.

The house was full of rolls of stripped lauhala leaves. There were several lauhala trees and one was a variegated type. I don't recall if it was used for lauhala mats but it dominated the road to the house.

There were lauhala mats all over the place, four and five thick. There was a redwood water tank, and the kitchen water pipe had a Bull Durham bag on the spout as a water filter.

When asked about the proposed development Mr. Ha indicated that if the landowner adhered to the Conservation District rules and the treatment plans for the archaeological and burial sites that development of the proposed single-family residence would be fine.

An informal consultation was conducted with Melani Dominguez at her home in Kea'au. This individual has strong genealogical ties to the area having descended from Hawaiians residing in Maku'u dating from *Māhele* times, and likely Precontact times. Melani's personal recollection of the current study area extends back to the late 1970s, when she was a small girl. Melani has recollections of picking *limu* and fishing with her grandmother Theresa Kamahale down at their property on TMKs:3-1-5-10:009 and 010; Grant 1014, located southeast of the current study parcel. She also remembered hearing about a *menehune* trail that meandered through their property *mauka/makai*. When asked how she felt about the construction of the single-family dwelling on the current study parcel, Melani indicated that she would feel alright about the proposed development as long as no cultural sites are impacted.

POTENTIAL CULTURAL IMPACTS

The Office of Environmental Quality Control (OEQC) guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are natural features of the landscape and historic sites, including traditional cultural properties. A working definition of traditional cultural property is:

“Traditional cultural property” means any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community’s history and contribute to maintaining the ethnic community’s cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. “Traditional” as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. “Cultural” refers to the beliefs, practices, lifeways, and social institutions of a given community. The use of the term “Property” defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, they must have some kind of boundary; and are subject to the same kind of evaluation as any other historic resource, with one very important exception. By definition, the significance of traditional cultural properties should be determined by the community that values them.

It is however with the definition of “Property” wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often times cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa‘akai O Ka‘āina v. Land Use Commission* court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigation actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

It is recognized that the shoreline is and has been used for both recreational and subsistence purposes (see consultation section above), and that such practices could be considered to be of a traditional cultural nature. While no specific activities were identified for the shoreline fronting the study parcel, strict adherence to shoreline setbacks will ensure that the proposed development of the parcel will not affect existing shoreline access, and thus there will be no impact on any potential shoreline-related traditional practices. Likewise, based on the archival research or oral consultations, there were no traditional cultural practices identified specific to the current study parcel. There are however several cultural resources (former residential and burial sites) that have been documented (Clark et al. 2008) to exist within the boundary of the current study parcel.

To mitigate potential impacts to the identified archaeological and burial sites, the DLNR-SHPD approved archaeological sites preservation plan (Pestana et al. 2009a) and burial treatment plan (Pestana et al. 2009b) will be implemented prior to the commencement of any development activities. Execution of these mitigation measures will help to ensure that no cultural practices and beliefs or associated cultural resources will be adversely affected by the proposed development of a single-family residence on TMK:3-1-5-010:032.

REFERENCES CITED

- Barrera, W., Jr.
1990 Makuu, Puna, Hawaii Island: Archaeological Inventory Survey (TMK:3-1-5-10:33). Prepared by Chiniago Inc., Kamuela, Hawaii. Prepared for Makuu Aqua Farm, Keaau, Hawaii.
- Barrère, D.
1959 Political History of Puna. IN: Natural and Cultural History Report on the Kalapana Extension of the Hawai'i Volcanoes National Park: Vol. I, pp. 15-65. Compiled by Emory, K.P., W.J. Bonk, Y.H. Sinoto, D.B. Barrere, Department of Anthropology, B.P. Bishop Museum, Honolulu.
- Bordner, R.
1977 Archaeological Reconnaissance of the Proposed FAA Air Traffic Control Beacon System (ATCRBS) Facility at Pāhoa, Puna, Hawai'i Island (TMK:3-1-5-10:17). Archaeological Research Center Hawaii, Inc. Prepared for Federal Aviation Administration, Pacific-Asian Region.
- Cahill, E.
1996 *The Shipmans of East Hawai'i*. University of Hawai'i Press, Honolulu.
- Chaffee, D., and R. Spear
1993 Archaeological Investigations at Site 50-10-45-14675 and Site 50-10-45-14985, Makuu Aquafarms, Makuu, Puna, Hawai'i Island (TMK: 1-5-10:33). Scientific Consultant Services, Inc. Prepared for Dr. Dudley Seto, M.D., Intercontinental Medical Services, Inc.
- Charvet-Pond, A., and P. Rosendahl
1993 Archaeological Inventory Survey Vaughan Residential Parcel (TMK: 3-1-5-10:29). Lands of Maku'u, Popoki, and Halona, Puna District, Island of Hawaii. Paul H. Rosendahl, Ph.D., Inc. Report 1240-092093. Prepared for Susan Kay Vaughan, Keaau, Hawaii.
- Chinen, J.
1961 *Original Land Titles in Hawaii*. Honolulu: privately published.
- Clark, M., A. Ketner, and R. Rechtman
2008 An Archaeological Inventory Survey of TMK:3-1-5-010:032, Maku'u Ahupua'a, Puna District, Island of Hawai'i. Rechtman Consulting Report RC-0542. Prepared for Maureen Gapp, Pāhoa, Hawai'i.
- Clark, M., R. Rudolph, and R. Rechtman
2001 An Archaeological Inventory Survey of TMK: 3-1-5-02:24, Waiakahiula Ahupua'a, Puna District, Island of Hawai'i. Rechtman Consulting Report RC-0066. Prepared for Mr. Scott Gouker, Power Electric, Pāhoa, Hawai'i.
- Clark, M., J. Nelson, and R. Rechtman
2007 An Archaeological Inventory Survey of the Kulia Farm Parcel (TMK:3-1-5-010:023), Pōpōkī Ahupua'a, Puna District, Island of Hawai'i. Rechtman Consulting Report RC-0486. Prepared for Mr. David Bangert and Mrs. Linda Harris, Hau'ula, Hawai'i.
- Conte, P., M. Kolb, and J. Hayden
1994 Archaeological Inventory Survey of a Portion of Maku'u, Pōpōkī and Hālonā Ahupua'a (TMK: 3-1-5-10:4; 1-5-8:3). Puna District, Hawai'i Island. Historic Preservation Division, Department of Land and Natural Resources, State of Hawaii. Prepared for DLNR and DHHL, Hawai'i.

- Cordy, R.
2000 *Exalted Sits the Chief, The Ancient History of Hawai'i Island*. Mutual Publishing, Honolulu, Hawai'i.
- Desilets, M., and R. Rechtman
2004 Archaeological Assessment of a 112 Acre Property (TMK: 3-1-6-03:por.07 and 3-1-6-146:17), Kea'au Ahupua'a, Puna District, Island of Hawai'i. Rechtman Consulting Report RC-0260. Prepared for Dean Hirabayashi, A & B Properties, Inc., Honolulu, Hawai'i.
- Dorrance, W. and F. Morgan
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawaii*. Mutual Publishing Co., Honolulu.
- Ellis, W.
1973 *Journal of William Ellis, Narrative of a Tour of Hawaii, or Owhyee...* Honolulu: Advertiser Publishing Co.
- Ewart, N., and M. Luscomb
1974 Archaeological Reconnaissance of Proposed Kapoho–Keaukaha Highway, District of Puna, Island of Hawaii. Department of Anthropology, Bernice P. Bishop Museum, Honolulu, Hawaii. Prepared for Sam O. Hirota, Inc. and Department of Public Works, County of Hawaii.
- Fornander, A.
1973 *An Account of the Polynesian Race: Its Origin and Migrations*. Tokyo: Charles E. Tuttle Co., Inc.
- Handy, E. S. C., E. G. Handy, and M. K. Pukui
1972 Native Planters in Old Hawai'i. *B.P. Bishop Museum Bulletin* 233. Bishop Museum Press, Honolulu.
- Holmes, T.
1985 A Preliminary Report on the Early History and Archaeology of the Puna Forest Reserve/Wao Kele o Puna Natural Area Reserve. Prepared for True/Mid Pacific Geothermal, Inc.
- Hudson, A.
1932 Archaeology of East Hawaii. Bernice P. Bishop Museum.
- I'i, J.P.
1959 Fragment of Hawaiian History. *Bishop Museum Special Publication* 70. Bishop Museum Press, Honolulu.
- Jurvik, S. and J. Jurvik (editors)
1998 *Atlas of Hawaii*. Third edition. University of Hawaii Press, Honolulu.
- Kamakau, S.M.
1992 [1961] *Ruling Chiefs of Hawaii*. The Kamehameha Schools Press, Honolulu.
- Kelly, M.
1983 *Na Mala O Kona: Gardens of Kona. A History of Land Use in Kona, Hawai'i. Departmental Report Series* 83-2. Department of Anthropology, B.P. Bishop Museum, Honolulu. Prepared for the Department of Transportation, State of Hawaii.
- Kame'eleihiwa, L.
1992 *Native Land and Foreign Desires: Pahea Lā E Pono Ai?* Bishop Museum Press, Honolulu.

- Kirch, P.
2010 Key Note Address: When did the Polynesians Settle Hawai'i. Presented at the 24th Annual Hawaiian Archaeology Conference, Kauai.
- Komori, E. and I. Peterson
1987 Cultural and Biological Resources Survey of the Pohoiki to Puna Substation 69KV Transmission Corridor Kapoho to Kea'au, Puna, Hawaii Island. Ms. on file in State Historic Preservation Division Office.
- Lass, B.
1997 Reconnaissance Survey Along the Old Government Road, Kea'au, Puna, Island of Hawai'i. Department of Anthropology University of Hawai'i of Hawai'i-Hilo. Prepared for DLNR-DOFAW-Na Ala Hele. (September 1997).
- Malo, D.
1951 Hawaiian Antiquities. *B.P. Bishop Museum Special Publication 2*. B.P. Bishop Museum Press, Honolulu. (2nd edition) (Translated by N. Emerson).
- Maly, K.
1998 "PUNA, KA 'ĀINA I KA HIKINA A KA LĀ." A Cultural Assessment Study—Archival and Historical Documentary Research and Oral History Interviews for the Ahupua'a of 'Ahalanui, Laepāo'o, and Oneloa (with Pohoiki), District of Puna, Island of Hawai'i (TMK:1-4-02, por.07,13,73,74,75). Prepared for David Matsuura, A & O International Corporation; Oneloa Development, Hilo, Hawai'i.
- 1999 The Historic Puna Trail—Old Government Road (Kea'au Section): Archival-Historical Documentary Research, Oral History and Consultation Study, and Limited Site Preservation Plan, Ahupua'a of Kea'au, Puna District, Island of Hawai'i (TMK:1-6-01 various parcels). Prepared by Kumo Pono Associates Report HiAla-17 (011199). Prepared for *Na Ala Hele* Program, State Division of Forestry and Wildlife.
- McEldowney, H.
1979 Archaeological and Historical Literature Search and Research Design: Lava Flow Control Study. Hilo, Hawai'i. Department of Anthropology, B.P. Bishop Museum, MS: 050879, Honolulu. Prepared for U.S. Army Engineer Division, Pacific Ocean, Honolulu, Hawai'i.
- McEldowney, H., and F. Stone
1991 Survey of Lava Tubes in the Former Puna Forest Reserve and on Adjacent State of Hawaii Lands (TMK:3-1-2-10:2 and 3). District of Puna, Island of Hawai'i. Prepared for State Historic Preservation Division, Division of Water Resource Management, and the Department of Land and Natural Resource, State of Hawai'i.
- Osorio, J.
2002 *Dismembering Lāhui: A History of the Hawaiian Nation to 1887*. University of Hawaii Press, Honolulu.
- Pestana, C. Dagher, and R. Spear
2009a A Preservation Plan for Site 50-10-45-26660 Located on a 5.59-Acre Parcel in Maku'u Ahupua'a, Puna District, Island of Hawai'i [TMK: (3) 1-5-010:032]. Scientific Consultant Services Inc., Prepared for John Gapp, Pahoā, Hawai'i.
- 2009b A Burial Site Component of a Preservation Plan for Sites 50-10-45-26662, -26663, -26664, and -26665, Located on a 5.59-Acre Parcel in Maku'u Ahupua'a, Puna District, Island of Hawai'i [TMK: (3) 1-5-010:032]. Scientific Consultant Services Inc., Prepared for John Gapp, Pahoā, Hawai'i.

- Pukui, M.
1983 'Olelo Noeau, Hawaiian Proverbs & Poetical Sayings. *B.P. Bishop Museum Special Publication 71*. Bishop Museum Press, Honolulu.
- Rechtman, R.
2003 Archaeological and Limited Cultural Assessment for the Proposed DHHL Maku'u Water System (TMK: 3-1-5-08:01), Hālonā and Maku'u Ahupua'a, Puna District, Island of Hawai'i. Rechtman Consulting Report RC-0190. Prepared for Ron Terry, PhD., Geometrician, Kea'au, Hawai'i.
- Rosendahl, P.
1989 Paradise Park Development Parcel #2 Field Inspection: Lands of Makuu, Popoki, and Halona, Puna District, Island of Hawai'i (TMK 3-1-5-10:28). Paul H. Rosendahl, Ph.D., Inc. Report 643-061489. Prepared for Mr. John Dangora, Hilo, Hawaii.
- Silva, N.
2004 *Aloha Betrayed: Native Hawaiian Resistance to American Colonialism*. Duke University Press, Durham.
- Spear, R., D. Chaffee, and A. Dunn
1995 Data Recovery Excavations at Site 50-10-45-14,675 and Site 50-10-45-14,985, Makuu Aquafarms, Makuu, Puna, Hawai'i Island (TMK: 1-5-10:33). Scientific Consultant Services, Inc. Project Number 039-2. Prepared for Dr. Dudley Seto, M.D., Intercontinental Medical Services, Inc.
- Schmitt, R.
1973 The Missionary Census of Hawaii. *Pacific Anthropological Records No. 20*, Department of Anthropology B.P. Bishop Museum, Honolulu.
- Tatar, E.
1982 Nineteenth Century Hawaiian Chant. *Pacific Anthropological Records 33*. Department of Anthropology, B.P. Bishop Museum, Honolulu.
- Tomonari-Tuggle, M.
1985 Cultural Resource Management Plan, Cultural Resource Management at the Keauhou Resort. PHRI Report 89-060185. Prepared for Kamehameha Investment Corp.
- Wolfe E., and J. Morris.
1996 *Geologic Map of the Island of Hawai'i*. Geologic Investigations Series Map 1-2524-A. U.S. Department of the Interior, U.S. Geological Survey.
- Yent, M.
1983 Survey of a Lava Tube (TMK: 3-1-5-08:1) Pahoa, Puna, Hawaii Island. Prepared for Department of Land and Natural Resources, Division of State Parks (Historic Sites) and Forestry.
- Yent, M., and J. Ota
1982 Archaeological Reconnaissance Survey, Nanawale Forest Reserve, Halepua'a Section, Puna, Hawaii Island. On file, State Historic Preservation Office, Department of Land and Natural Resources.

ENVIRONMENTAL ASSESSMENT

**GAPP SINGLE-FAMILY RESIDENCE IN THE
CONSERVATION DISTRICT AT MAKU‘U**

**APPENDIX 4
Coastal Erosion Study**

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GEOHAZARDS CONSULTANTS INTERNATIONAL, INC.

Appraisal of hazards - reduction of risk

COASTAL EROSION STUDY

John & Maureen Gapp Property

(South of Hawaiian Paradise Park, Hawaii)

TMK: (3) 1-5-010:32

John P. Lockwood, Ph.D., CPG No. 9806



March, 2012

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Introduction:

The Hawaii DLNR Hawaii Administrative Rules, Chapter 13-5 (Adopted August 12, 2011) states that for Single Family Residential construction in coastal Conservation Districts, Applicants must consider rates of coastal erosion affecting their properties, in order to determine minimum shoreline setbacks for permitting. DLNR established a requirement that Annual Coastal Erosion Rates must be determined, based on formal “Coastal Erosion Studies”. This report documents the nature of erosion and shoreline migration at the Gapp property, based on a field inspection and office study of appropriate aerial photography, satellite imagery, and geologic literature.

Field Inspection information:

Date of inspection:	26 February, 2012
Time:	11:00-13:00 HST
Ocean tide state (approximate ¹):	+0.1 ft.
Sea state:	Moderate northeast waves and swells

Physical Setting – Geologic environment:

The Gapp Property (TMK: (3) 1-5-010:32 – hereafter “the Property”) fronts on the ocean for about 100 yards about three miles southeast of Kaloli Point. The entire coastline is underlain by relatively young pahoehoe lava flows from Kilauea volcano, labeled as unit f8d4 on the geologic map of Moore and Trusdell (1991), with estimated average radiocarbon ages of 335 yrs b.p. Because of their young ages, the undisturbed surfaces of these flows are marked by surface textures and basaltic glass that serve as good markers for determination of erosion effects. These flows are dense and relatively non-vesicular, and thus are resistant to mechanical erosion. The flows are near horizontal in this area – dipping toward the sea at only about 1-2 degrees, and forming a coastal platform that is partially inundated by highest tides (Figure 1).

¹ From DLNR 2012 Tide Calendar and NOAA Website: www.tideasandcurrents.noaa.gov.

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Figure 1. Coastal platform showing near-horizontal surface of lava flows, with storm-emplaced boulders in the foreground.

Findings:

Because of land subsidence, sea level rise and the fact that the lava flows were relatively thin where they entered the sea, no significant sea cliff has developed along the coast fronting the Property. Ocean-facing cliffs were only 1-2 feet above sea level when inspected, and incoming waves flowed gently over pahoehoe surfaces as tides rose, causing no erosion by normal wave activity.

A 10-12 foot high berm of storm-carried boulders located 75-150 feet inland from the coastal cliff face forms a barrier to storm wave activity, and coincides with the lowest level of coastal vegetation (hala, naupaka, and coconut palms). Individual boulders thrown inland by storm waves or tsunamis were found up to 50 feet onshore from the vegetation line, but are covered by dense vegetation and are not recent in origin. The degree of rounding of these boulders in the coastal berm indicates that most have been in place for a long time, as they are rounded by wave action, and are not derived by recent erosion of the coastline (Figure 2). Angular boulders (indicative of recent erosion by wave action) constituted only about 3% of all boulders. The distribution of boulder shapes is shown in Table 1.

Table 1: Shapes of storm-boulders along coastal berm (visual estimates)

Boulder Shape	Approximate percentage
Well-Rounded	15%
Sub-rounded	70%
Sub-angular	12%
Angular	3%



Figure 2. Coastal boulder berm and vegetation line fronting the Property.

Erosion Rate:

At the coastal front of the Property significant changes in shoreline position (as defined by Boak and Turner (2005) and Hwang, 2005) have been caused primarily by land subsidence and global sea level rise rates, and not by erosion. Inspection of aerial photographs dating back to 1954 (Table 2) revealed no discernible changes in the positions of the sea cliff nor of the vegetation-defined shoreline, but the large photo scales and variable tide positions between photograph pairs could obscure small changes. Determination of global secular sea level rise is complex and highly variable, owing to local and temporal variations, but is estimated at 1 mm/yr over the long term (Fletcher and others, 2010 – Chapter 9). Land subsidence in east Hawaii was estimated at 4.8 mm/yr by Moore, 1970, although it is much greater (8-17 mm/yr) 12 miles to the east in the Kapoho area (Hwang, 2007). Additionally, catastrophic, sudden tectonic events can cause great local subsidence (Lipman and others, 1985) in specific areas. In their description of the hazards facing this area, Fletcher and others (2002) state that the land in this area “sank and was inundated by a locally generated tsunami after a 4.1 earthquake rocked the southeast portion of the island [in 1868].

The fact that Hawaiian petroglyphs and lava flow surface structures and glass survive on the intertidal pahoehoe platform (Figure 3) attests to the fact that surface erosion of the pahoehoe is negligible, although marine algae covering some petroglyphs (Figure 4) demonstrate that land subsidence relative to sealevel is occurring. Minor lateral erosion does take place by hydraulic ramming of storm waves into sub-horizontal interflow contacts, and have the power to lift massive subangular boulders onto

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the coastal intertidal platform (Figure 5), but the rarity of such blocks inshore shows this is an infrequent event. In one area fronting the Property, angular surfaces on one flow remnant showed that mechanical erosion had occurred at the base of the coastal boulder berm, but the presence of petroglyphs within 3 feet of this broken area defined the maximum extent of any erosion as less than three feet in the period since the petroglyphs were made. All petroglyphs observed consist of European-influenced alphabetic characters, of probable mid-nineteenth century age.



Figure 3. Post-European contact age petroglyphs exposed in the intertidal zone, indicating lack of erosion.

Effect of Subsidence and Sea Level Rise on shoreline:

As indicated above, the impact of mechanical erosion on the coastal shoreline at the Property is negligible, involving occasional mechanical dislocation of lava blocks from coastal sea cliffs during

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major storm events, without quantifiable effect on shorelines. The combined effect of land subsidence and global sea level rise (likely about 5mm/yr at this site) could, however, substantially impact shoreline positions on these near-horizontal lava flows (Figure 1) were it not for the presence of the coastal boulder berm (Figure 2). The position of this berm and the vegetation growing at its crest appear to be form a stable barrier to lateral transgression of rising seas – at least over the short term, or until major tectonic events like 1868 or future major tsunami waves impact the coastal berm.

General Coastal Zone Hazards at this Property:

Fletcher and others (2002, p. 149) rate this area of the Puna coastline to be high (6 on a 1-7 scale), with specific hazards rated as follows (Table 3):

Hazard Type	Relative Hazard	Scale (1-4)
Tsunami	High	4
Stream Flooding	Medium-high	3
High Waves	Medium-low	2
Storms	High	4
Erosion	Medium-low	2
Sea Level change	High	4
Volcanic / seismic	High	4



Figure 4. 19th century petroglyph partially covered with marine algae in the intertidal zone. This demonstrates significant land subsidence since the arrival of Europeans in Hawaii.

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Figure 5. Large angular boulders on the intertidal platform fronting the property. The boulder in the foreground is about three feet in length.

Table 2. Aerial photographs and imagery inspected

Date	Agency	Flight Line	Frames	
1954 (November 12)	USN-USGS	017	116, 117	
1965 (February 06)	USDA	EKL-12CC	31, 32	
1977 (February 19)	USGS	GS-VEEC-6	120, 121	
2012	Google Earth			

Summary:

Stereographic inspection of aerial photographs taken in 1954, 1965, and 1977 (Table 2) and comparison with recent Google Earth views revealed no changes in the position of rocky shorelines, of the coastal boulder berm, nor of the vegetation line during this 58 year period. Scale limitations of the aerial photographs inspected make identification of individual ocean-facing rock outcrops impossible, but it is probable that some individual rocks have been broken from the wave impact impact zone during this time period, but no measurable overall erosion has taken place.

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Any future changes in shoreline position will be related to relative change of sea level in the area, and not to erosion.

References Cited:

Boak, E. H. and Turner, I. L., 2005, Shoreline definition and detection – A review: *Journal of Coastal Research*, v. 21, pp 688-703.

Fletcher, C. H., Boyd, R., Neal, W. J., and Tice, V., 2010, *Living on the Shores of Hawaii – Natural Hazards, the Environment, and our Communities*: University of Hawaii Press, 371 pp.

Fletcher, C. H., , Grossman, E. E, Richmond, B. M. and Gibbs, A. E., 2002, *Atlas of Natural Hazards in the Hawaiian Coastal Zone*: U.S. Geological Survey, Geologic Investigations Series Map I-2761, scale 1:50,000.

Hwang, D. J., 2005, *Hawaii Coastal Zone Mitigation Handbook: Hawaii Coastal Zone Management Program*, DBED, State of Hawaii, 216 pp.

Hwang, D. J., 2007, *Coastal Subsidence at Kapoho, Puna, Island and State of Hawaii*: Private report for Hawaii County Planning Department, 82 pp.

Lipman, P. W., Lockwood, J. P., Okamura, R. T., Swanson, D. A., and Yamashita, K. M., 1985, Ground deformation associated with the 1975 magnitude 7.2 earthquake and resulting changes in activity of Kilauea volcano, Hawaii: U. S. Geological Survey Professional Paper 1276, 45 pp.

Moore, J. G., 1970, Relationship between subsidence and volcanic load, Hawaii: *Bulletin of Volcanology*, V. 34, pp. 562-576.

Moore, J. G. and Fornari, D. J., 1984, Drowned reefs as indicators of the rate of subsidence of the Island of Hawaii: *Journal of Geology*, v. 92, p. 752-759.

Moore, R. B. and Trusdell, F. A., 1991, *Geologic Map of the Lower East Rift Zone of Kilauea Volcano, Hawaii*: U. S. Geological Survey Misc. Investigations Series, Map I-2225, Scale:1:24,000.

Wright,,T L., Chun, J.Y.F., Esposito, Joan, Heliker, C., Hodge, J., Lockwood, J. P., and Vogt, S. M., 1992, *Map showing Lava-flow Hazard Zones, Island of Hawaii*: U.S. Geological Survey, Misc. Field Studies Map MF-2193, 1:250,000.