
**Archaeological Inventory Survey of a
194.324-Acre Parcel within Portions of
Kohanaiki Ahupua‘a and Kaloko Ahupua‘a
North Kona District, Hawai‘i Island
TMK: [3] 7-3-009:026**

**Prepared for
Stanford Carr Development LLC**

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May 2008

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Management Summary

Reference	Archaeological Inventory Survey of a 194.324-Acre Parcel within Portions of Kohanaiki Ahupua'a and Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:026 (Bell et al. 2008)
Date	May 2008
Project Number (s)	Cultural Surveys Hawai'i (CSH) Job Code: KOHAN 1
Investigation Permit Number	CSH performed the inventory survey fieldwork under state archaeological permit numbers 07-19 and 08-14, issued by State of Hawai'i Department of Land and Natural Resources / State Historic Preservation Division (DLNR / SHPD).
Project Location	The project area is comprised of TMK: [3] 7-3-09:026. The project area is located in portions of Kaloko Ahupua'a and Kohanaiki Ahupua'a, and the <i>makai</i> (west) boundary is approximately 3.5 kilometers east from the western coast of Hawai'i Island. The project area is bound by Hina-Lani Street to the south and O'oma 2 Ahupua'a to the north, with TMK: [3] 7-3-009:025 adjacent to its west boundary. This area is depicted on the 1996 USGS 7.5-Minute Series Topographic Map, Keahole Point and Kailua Quadrangles (Figure 1). Fieldwork for the present project area was conducted concurrently with fieldwork for three other adjacent parcels (TMK: [3] 7-3-009:017, 025, 028), collectively comprising the Kaloko Makai project.
Land Jurisdiction	Private: Stanford Carr Development Kaloko Makai, LLC
Reviewing Agencies	State Historic Preservation Division / Department of Land and Natural Resources (SHPD/DLNR).
Project Description	The proposed Kaloko Makai project comprises the development of a residential subdivision with limited retail establishments near Queen Ka'ahumanu Highway. Associated ground disturbance will include grading and excavation related to the project area's development, to include engineering topography, placement of structural footings, utility installation, roadway, and parking area installation, and landscaping. Importation of substantial construction gravel and fill dirt will also likely accompany much of the construction.
Project Acreage	194.324-acres
Area of Potential Effect (APE) and Survey Acreage	The project's APE was generally conceived as the project's footprint (delimited by the boundaries of TMK: [3] 7-3-009:026). However, consideration was also given to potential project effects to known or potential historic properties outside the project footprint, for example those historic properties in the Kaloko-Honokōhau National Historic Park, located <i>makai</i> of the project area. The survey area for the current investigation included the entire 194.324-acre APE/project area.
Historic Preservation Regulatory Context	At the request of Stanford Carr Development LLC, CSH undertook this archaeological inventory survey. In consultation with SHPD, the inventory survey investigation was designed to fulfill the state

	requirements for archaeological inventory survey (HAR Chapter 13-276). This document was prepared to support the proposed project's historic preservation review under Hawaii Revised Statutes (HRS) Chapter 6E-42 and HAR Chapter 13-284.
Fieldwork Effort	The fieldwork effort for the archaeological inventory survey was carried out by Matthew Bell, B.A., Mindy Simonson, M.A., David Shideler, M.A., Kelley Esh, M.A., Jason Pickin, B.A., Shawn Fehrenbach, B.A., Sarah Wilkinson, B.A., Randy Groza, M.A., Amy Hammermeister, B.A., Todd McCurdy, M.A., Michelle Pammer, B.A., Llieliena Loynaz, B.A., Doreen Hrivnak, B.A., Mark Oxley, B.A. and Hallett H. Hammatt, Ph.D (principle investigator). The fieldwork took place on the following dates: June 5, 2007 – December 18, 2007 & April 7 – April 18, 2008, taking 570 person-days to complete.
Number of Historic Properties Identified	A total of 120 historic properties were identified within the project area. Six of the historic properties were previously identified and 114 were newly recorded as part of the current inventory survey.
Historic Properties Recommended Eligible to the Hawai'i Register of Historic Places (Hawai'i Register) ¹	All 120 historic properties identified within the project area are recommended eligible to the National/Hawai'i Register: SIHP # 50-10-27-10712, Criterion D SIHP # 50-10-27-26418, Criterion D SIHP # 50-10-27-26475, Criterion D SIHP # 50-10-27-26476, Criterion D SIHP # 50-10-27-26477, Criterion D SIHP # 50-10-27-26478, Criterion D & E SIHP # 50-10-27-26479, Criterion D SIHP # 50-10-27-26480, Criterion D & E SIHP # 50-10-27-26481, Criterion D SIHP # 50-10-27-26482, Criterion D SIHP # 50-10-27-26483, Criterion D SIHP # 50-10-27-26484, Criterion D SIHP # 50-10-27-26485, Criterion D SIHP # 50-10-28-5699, Criterion D SIHP # 50-10-28-6601, Criterion D SIHP # 50-10-28-10714, Criterion D & E SIHP # 50-10-28-16103, Criterion D & E

¹ To be considered eligible for listing on the Hawai'i and/or National Register a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet one or more of the following broad cultural/historic significance criteria: "A" associated with events that have made an important contribution to the broad patterns of our history; "B" associated with the lives of persons important in our past; "C" embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic value; "D" have yielded, or is likely to yield information important for research on prehistory or history; and, "E" (Hawaii Register only) have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property, or due to associations with traditional beliefs, events or oral history accounts – these associations being important to the group's history and cultural identity.

SIHP # 50-10-28-26486, Criterion D
SIHP # 50-10-28-26487, Criterion D
SIHP # 50-10-28-26488, Criterion D & E
SIHP # 50-10-28-26489, Criterion D & E
SIHP # 50-10-28-26490, Criterion D
SIHP # 50-10-28-26491, Criterion D
SIHP # 50-10-28-26492, Criterion D
SIHP # 50-10-28-26493, Criterion D
SIHP # 50-10-28-26494, Criterion D
SIHP # 50-10-28-26495, Criterion D
SIHP # 50-10-28-26496, Criterion D
SIHP # 50-10-28-26497, Criterion D
SIHP # 50-10-28-26498, Criterion D & E
SIHP # 50-10-28-26499, Criterion D
SIHP # 50-10-28-26500, Criterion D
SIHP # 50-10-28-26501, Criterion D & E
SIHP # 50-10-28-26502, Criterion D
SIHP # 50-10-28-26503, Criterion D & E
SIHP # 50-10-28-26504, Criterion D
SIHP # 50-10-28-26505, Criterion D
SIHP # 50-10-28-26506, Criterion D
SIHP # 50-10-28-26507, Criterion D
SIHP # 50-10-28-26508, Criterion D
SIHP # 50-10-28-26509, Criterion D & E
SIHP # 50-10-28-26510, Criterion D & E
SIHP # 50-10-28-26511, Criterion D
SIHP # 50-10-28-26512, Criterion D
SIHP # 50-10-28-26513, Criterion D
SIHP # 50-10-28-26514, Criterion D
SIHP # 50-10-28-26515, Criterion D & E
SIHP # 50-10-28-26516, Criterion D
SIHP # 50-10-28-26517, Criterion D
SIHP # 50-10-28-26518, Criterion D
SIHP # 50-10-28-26519, Criterion C, D & E
SIHP # 50-10-28-26520, Criterion D & E
SIHP # 50-10-28-26521, Criterion D
SIHP # 50-10-28-26522, Criterion D & E
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SIHP # 50-10-28-26530, Criterion D

SIHP # 50-10-28-26531, Criterion D
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SIHP # 50-10-28-26570, Criterion D & E
SIHP # 50-10-28-26571, Criterion D
SIHP # 50-10-28-26572, Criterion D & E
SIHP # 50-10-28-26573, Criterion D
SIHP # 50-10-28-26574, Criterion D & E
SIHP # 50-10-28-26575, Criterion D

	<p>SIHP # 50-10-28-26576, Criterion D & E SIHP # 50-10-28-26577, Criterion D SIHP # 50-10-28-26578, Criterion D SIHP # 50-10-28-26579, Criterion D SIHP # 50-10-28-26580, Criterion D SIHP # 50-10-28-26581, Criterion D SIHP # 50-10-28-26582, Criterion D & E SIHP # 50-10-28-26583, Criterion C, D & E SIHP # 50-10-28-26584, Criterion D SIHP # 50-10-28-26585, Criterion D SIHP # 50-10-28-26586, Criterion D SIHP # 50-10-28-26587, Criterion D SIHP # 50-10-28-26588, Criterion C & D</p>
Historic Properties Recommended Ineligible to the Hawai'i Register	None
Effect Recommendation	The proposed project will affect historic properties recommended eligible to the Hawai'i Register. CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures."
Mitigation Recommendation	<p>The following recommended significant historic properties will potentially be adversely affected by the proposed project. The recommended mitigation measures listed below are intended to alleviate this adverse effect. The scope and methods for these mitigation measures should be developed in consultation with SHPD. Historic properties not listed below have been adequately documented as part of this investigation and are not recommended for further cultural resource management work.</p> <p>SIHP # 50-10-27-10712, Preservation (with breaches) SIHP # 50-10-27-26478, Preservation and Data Recovery SIHP # 50-10-27-26480, Preservation SIHP # 50-10-27-26482, Data Recovery SIHP # 50-10-27-26483, Data Recovery SIHP # 50-10-27-26485, Data Recovery SIHP # 50-10-28-6601, Data Recovery SIHP # 50-10-28-10714, Preservation SIHP # 50-10-28-16103, Preservation and Data Recovery SIHP # 50-10-28-26486, Preservation SIHP # 50-10-28-26488, Preservation SIHP # 50-10-28-26489, Preservation SIHP # 50-10-28-26494, Preservation SIHP # 50-10-28-26495, Preservation and Data Recovery SIHP # 50-10-28-26498, Preservation and Data Recovery SIHP # 50-10-28-26499, Data Recovery SIHP # 50-10-28-26500, Data Recovery</p>

SIHP # 50-10-28-26501, Preservation
SIHP # 50-10-28-26502, Data Recovery
SIHP # 50-10-28-26503, Preservation
SIHP # 50-10-28-26507, Data Recovery
SIHP # 50-10-28-26509, Preservation
SIHP # 50-10-28-26510, Preservation and Data Recovery
SIHP # 50-10-28-26513, Data Recovery
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SIHP # 50-10-28-26521, Data Recovery
SIHP # 50-10-28-26522, Preservation and Data Recovery
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SIHP # 50-10-28-26529, Preservation
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SIHP # 50-10-28-26534, Preservation
SIHP # 50-10-28-26538, Preservation and Data Recovery
SIHP # 50-10-28-26544, Preservation
SIHP # 50-10-28-26545, Data Recovery
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SIHP # 50-10-28-26573, Data Recovery
SIHP # 50-10-28-26574, Preservation
SIHP # 50-10-28-26576, Preservation
SIHP # 50-10-28-26577, Data Recovery
SIHP # 50-10-28-26578, Data Recovery
SIHP # 50-10-28-26580, Preservation
SIHP # 50-10-28-26581, Data Recovery
SIHP # 50-10-28-26582, Preservation
SIHP # 50-10-28-26583, Preservation
SIHP # 50-10-28-26588, Preservation

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Section 1 Introduction

1.1 Project Background

At the request of Stanford Carr Development, LLC, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of a 194.324 acre parcel within portions of Kaloko Ahupua'a and Kohanaiki Ahupua'a, North Kona District, Hawai'i Island, TMK: [3] 7-3-009:026. The *makai* project area boundary is approximately 3.5 kilometers east from the western coastline of Hawai'i. The project area is bound by TMK [3] 7-3-009:025 and 032 to the west and east respectively, and Hina-Lani Street to the south. The surrounding parcels are largely undeveloped (Figures 1-4).

The approximately 194.324-acre parcel is privately owned by Stanford Carr Development Kaloko Makai, LLC. The proposed project comprises the development of a residential subdivision with limited retail establishments near Queen Ka'ahumanu Highway. Associated ground disturbance will include grading and excavation related to the project area's development, to include engineering topography, placement of structural footings, utility installation, roadway, and parking area installation, and landscaping. Importation of substantial construction gravel and fill dirt will also likely accompany much of the construction.

Fieldwork for the present project area was conducted simultaneously with fieldwork for three other adjacent parcels (TMK: [3] 7-3-009:017, 025, 028), for the same private owner; collectively, these parcels are referred to as the Kaloko Makai project. The CSH project number (job code) for the entire project is "Kohan 1". Given the large size of the total Kaloko Makai project area (over 1,100-acres), a decision was made to split the archaeological inventory survey reports by individual TMK, producing a total of four reports. The present report is the archaeological inventory survey for TMK: [3] 7-3-009:026 only, but because fieldwork was occasionally conducted simultaneously, certain numerical sequences span all four TMKs. Specifically, burials were reported to SHPD upon their discovery, and therefore their numerical sequence reflects the discovery date for the entire Kohan 1 project. These numerical designations are consequently not necessarily sequential within the TMK, but they do reflect the designations as originally reported to SHPD.

Based on available information, the proposed development will not impose adverse visual, auditory or other environmental impact to any known historic properties, including standing architecture, located outside the project area. Accordingly, the proposed project, based on available information lacks potential to affect historic properties outside the project area. As a result the project's APE is the same as the project area. The survey area for the current investigation included the entire 194.324-acre APE/project area.

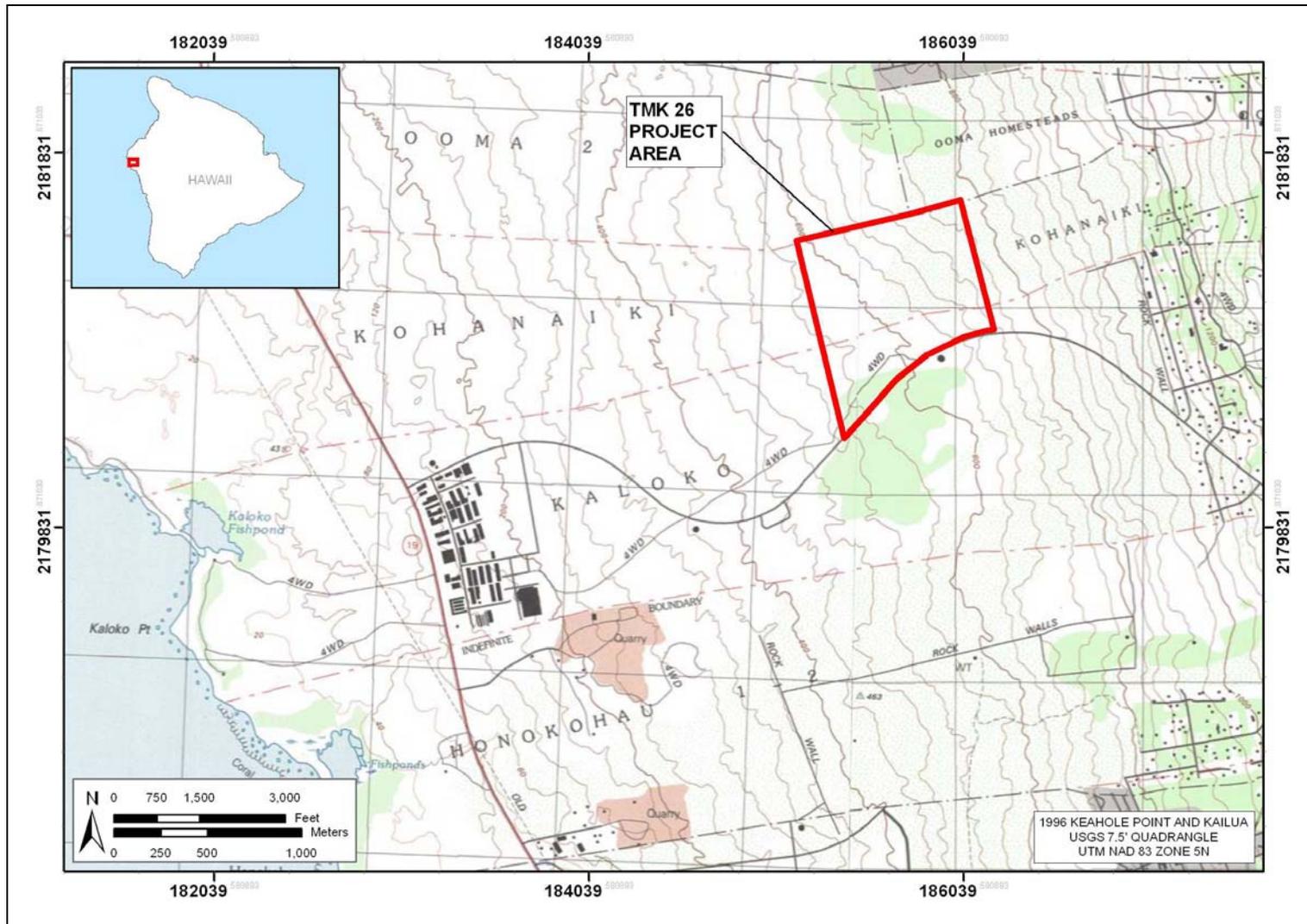


Figure 1. U. S. Geological Survey Quad Map showing project area

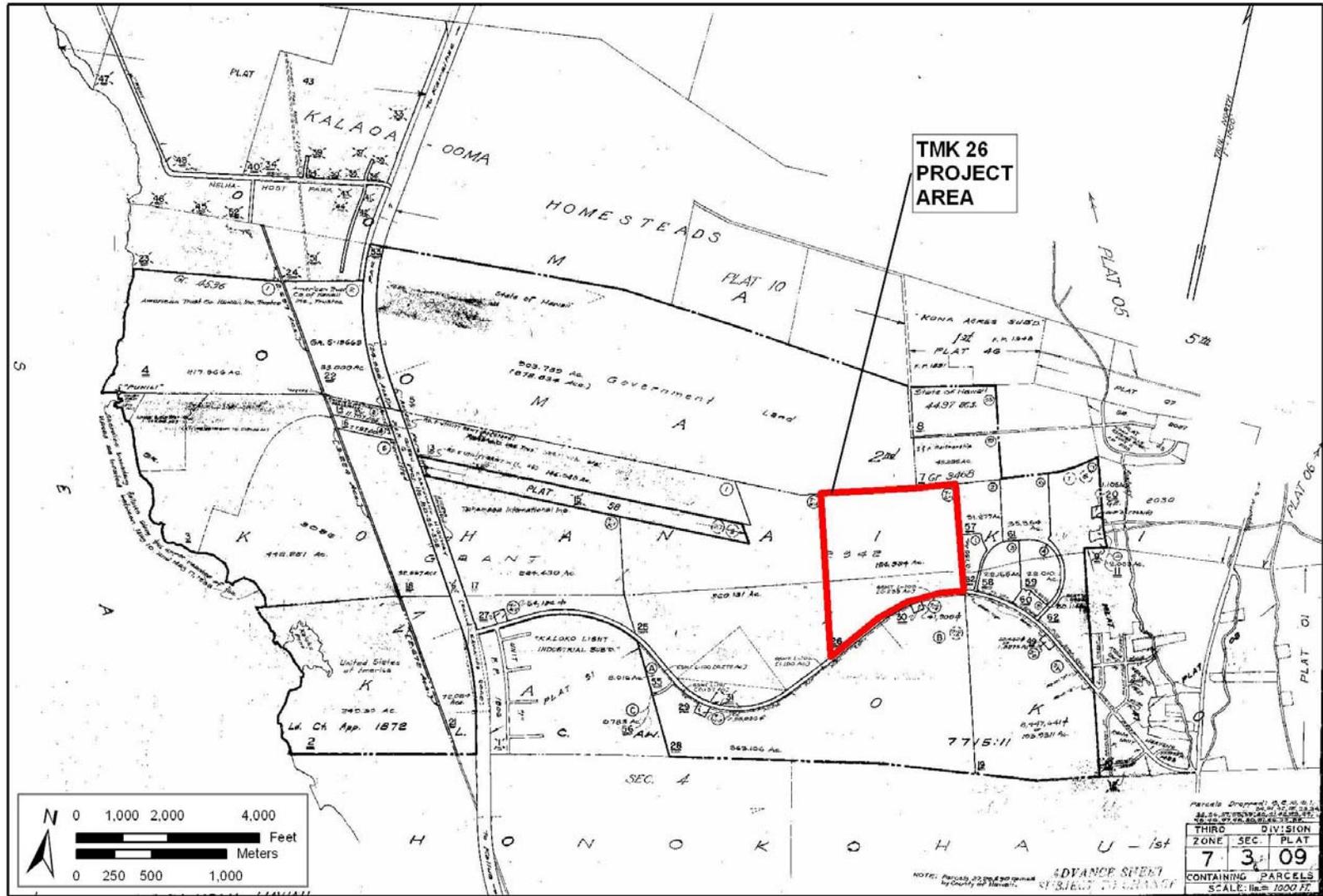


Figure 2. Tax Map Key (TMK) showing project area

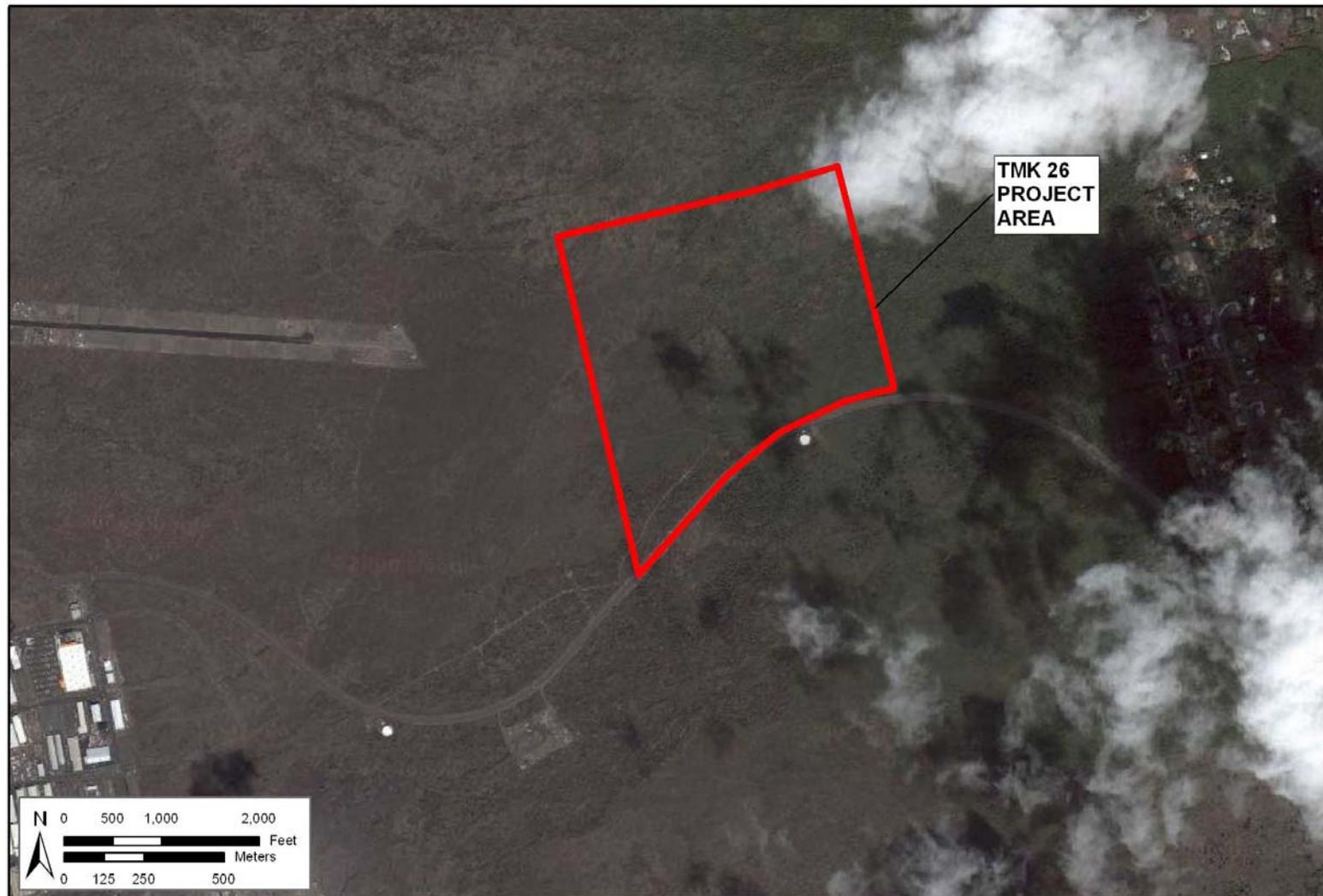


Figure 3. Aerial view of project area on the north side of Hina-Lani Street (source: USGS Orthoimagery 2005)

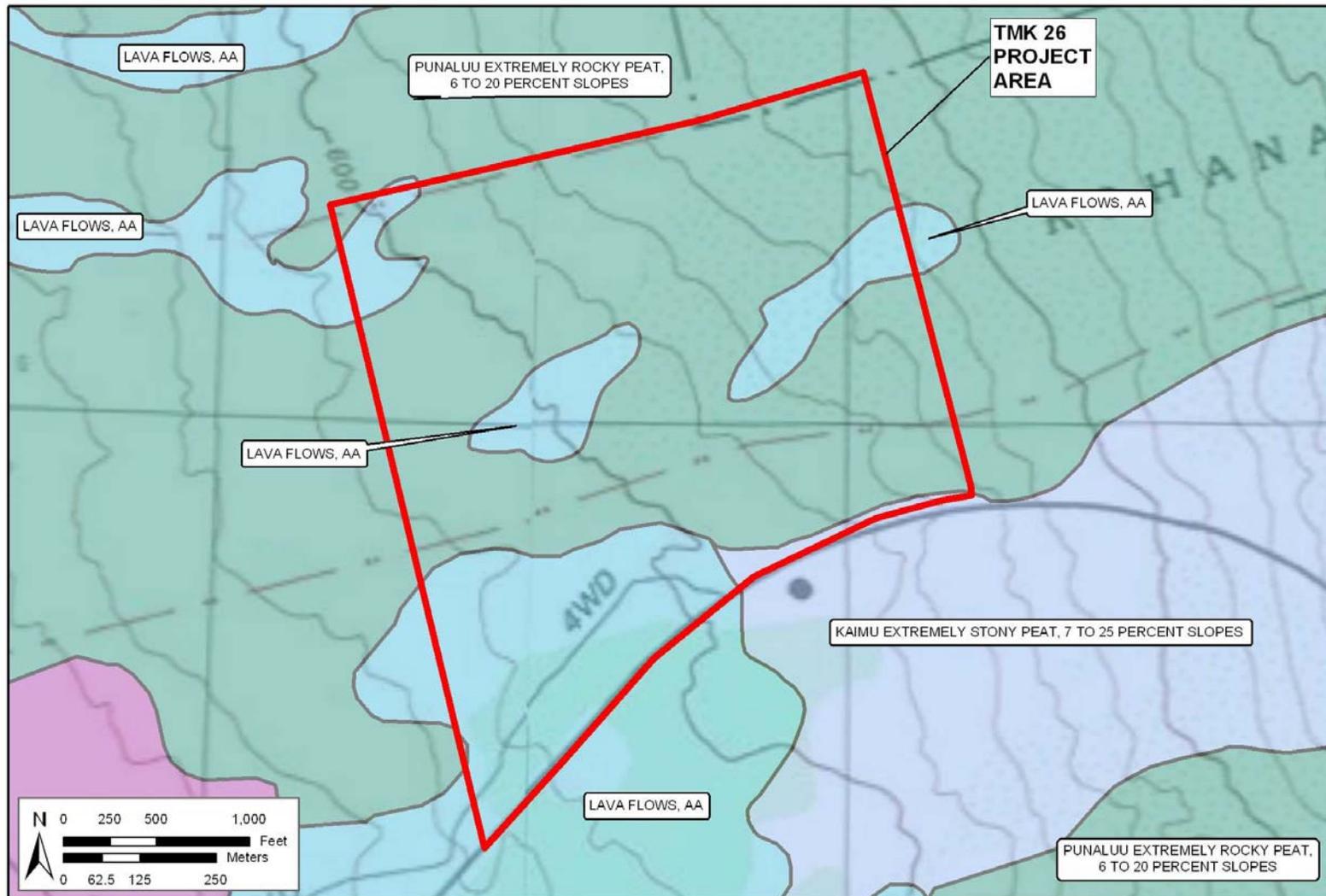


Figure 4. Soil map of the project area and vicinity

1.2 Historic Preservation Regulatory Context and Document Purpose

As a privately funded venture on private lands, the proposed development is a “project” subject to state of Hawai'i historic preservation review legislation (Hawaii Revised Statutes [HRS] Chapter 6E-42 and Hawai'i Administrative Rules [HAR] Chapter 13-284). Based on the project's scope, cultural setting, and the results of previous cultural resource management investigations in the vicinity, Stanford Carr Development, LLC had this archaeological inventory survey investigation completed. This investigation was carried out as part of and in compliance with the proposed development's historic preservation review.

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

In consultation with SHPD, this inventory survey investigation was designed to fulfill the state requirements for archaeological inventory surveys (HAR Chapter 13-276). This inventory survey report was prepared to support the proposed project's historic preservation review. The report includes a project-specific effect recommendation and mitigation recommendations for the project area's historic properties that are recommended eligible to the Hawai'i Register. This document is intended to support project-related historic preservation consultation among state agencies and interested Native Hawaiian and community groups.

1.3 Scope of Work

The following archaeological inventory survey scope of work was developed and implemented to satisfy SHPD requirements. The scope of work for this inventory survey was designed in accord with State Historic Preservation Division rules governing standards for archaeological inventory surveys and reports (HAR 13-13-276):

- 1) Appropriate consultation with knowledgeable members of the community, requesting information on historic properties in the project area.
- 2) A complete ground survey of the entire project area for the purpose of historic property identification and documentation. All historic properties would be located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation is to include photographs and scale drawings of selected historic properties. All historic properties are to be assigned *Inventory of Historic Properties* numbers by the State.
- 3) Subsurface testing to determine if subsurface deposits are located in the project area, and, if so, evaluate their significance. If appropriate samples from these excavations were found, they were analyzed for chronological and/or paleoenvironmental information.

- 4) Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research was to focus on the specific area with general background on the *ahupua'a* and district and was to emphasize settlement patterns.
- 5) Preparation of a survey report to include the following:
 - a. A topographic map of the survey area showing all historic properties;
 - b. Results of consultation with knowledgeable community members about the property and its historical and cultural issues.
 - c. Description of all historic properties with selected photographs, scale drawings, and discussions of function;
 - d. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the project area's historic properties;
 - e. A summary of historic property categories and their significance in an archaeological and historic context;
 - f. Recommendations based on all information generated that will specify what steps should be taken to mitigate impact of development on the project area's significant historic properties, such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the State agencies.

This scope of work includes full coordination with the State Historic Preservation Division (SHPD) relating to archaeological matters. This coordination takes place after consent of the landowner or representatives.

1.4 Environmental Setting

1.4.1 Natural Environment

The project area comprises approximately 194 acres in the *ahupua'a* of Kaloko and Kohanaiki. The lands are located on the leeward coast of Hawai'i Island within the district of North Kona on the lower west slope of Hualālai Volcano. The western boundary of the project area is 2.5 kilometers *mauka* (east) of Queen Ka'ahumanu Highway, and is bordered by Hinalani Street to the south. Elevation within the project area ranges from 535 ft. a.m.s.l. at the western boundary to 785 ft. a.m.s.l. along the eastern boundary; the *mauka* portion of the project area increases in slope and has an increased number of ridgelines with an excellent view to the south/southwest.

Kona weather is typified by afternoon showers brought on by warm air which has been moved inland by light sea breezes. The humid air gradually condenses over higher altitudes throughout the day. At night the land cools resulting in breezes which send warm air back out to sea. Rainfall in the project area averages 10 to 30 inches per year (Cordy 1991), increasing a fair amount on the *mauka* slopes. There are no natural springs or perennial streams within the project area, although there are a number of lava tubes with sufficient moisture for water collection..

The land surface is comprised predominately of exposed *pāhoehoe* lava with a few large 'a'ā flows running across it (Figure 4). The southwest corner of the project area is dominated by a rough 'a'ā flow that is heavily vegetated by *koa haole*, Christmas berry trees, and air plant.

Nearly all of the rest of the project area is relatively level *pāhoehoe* lava except for at the far northwest corner and two fairly large linear 'a'ā flows that run *mauka/makai* through the central portion of the project area. These 'a'ā flows tend to have somewhat sparser vegetation than the flow at the southwest corner, and are generally dominated by grasses and thick Christmas berry trees. The surface of the 'a'ā lava ranges from roughly level expanses to rough fractured ridges.

The *pāhoehoe* lava surface ranges from level expanses to highly fractured tumultuous areas. The western portion of the project area is generally characterized by small tumuli and pressure ridges with depressions or undulations in the *pāhoehoe* having thin soil pockets. Collapsed portions of lava tubes also contribute to the uneven surface of the *pāhoehoe* flows in this area. The eastern portion of the project area has more level expanses of *pāhoehoe* as the topography steepens *mauka*, but there are still very rough rocky areas of loose *pāhoehoe* and eroding pressure ridges. *Pāhoehoe* lava tube density increases significantly on the eastern portion of the project area, as do large sink areas caused by the collapsing of lava tubes.

Punaluu extremely rocky peat is the dominant soil type in the project area (Figure 4). Punaluu soils consist of well-drained, thin organic soils over *pāhoehoe* lava bedrock. The soils are gently sloping to moderately steep. The natural vegetation associated with this soil type consists of *koa haole*, Christmas berry (*Schinus terebinthifolius*), guineagrass (*Panicum maximum*), natal redtop (*Rhynchelytrum repens*), and sand bur. These soils are used for pasture (Sato et al. 1973). Both slope and soil development increase considerably with elevation.

In general, vegetation (especially ground cover) is incredibly dense throughout most of the project area and considerably obscures ground (and site) visibility (Figure 5 and Figure 6). The non-native *koa haole* tree (*Leucanena glauca*) dominates the project area vegetation along with the non-native air plant (*Kalanchoe pinnata*), non-native Christmas berry trees (*Schinus terebinthifolius*) and grasses (predominately non-native fountain grass, *Pennisetum sectacacum*, but the native *pili* grass, *Heteropogon contortus*, may also be present). At higher elevations Christmas berry (*Schinus terebinthifolius*) becomes more dominant, often growing in dense thickets that seriously impede pedestrian passage and greatly decrease ground visibility. Other non-native plants observed include lantana (*Lantana camara*) and *lilikoi* (*Passiflora edulis*). Native plants present include: 'ilima (*Sida fallax*) in scattered numbers, *noni* (*Morinda citrifolia*), 'ōhi'a trees (*Metrosideros polymorpha*), *laua'e* (*Phymatosorus scolopendria*), 'ohe trees (*Reynoldsia sandwicensis*), *alahe'e* (*Psydrax odorata*), *kukui* (*Aleurites moluccana*), *kī* (*Cordyline fruticosa*; also often referred to as *tī*) and *halapepe* (*Pleomele* spp.). Native plants observed at higher elevations include: *naio* (*Myoporum sandwicense*), 'a'ali'i (*Dodonaea* sp.) and 'ulei (*Osteomeles anthyllidifolia*). Vegetation on the *mauka* slopes of the project area is often extraordinarily dense with larger trees (i.e., Christmas berry tree groves), whereas the majority of the *makai* project area has very dense *koa haole* and thick grass.

1.4.2 Built Environment

Though much of the land around the project area remains rural (Figure 6), the built environment is distinct in the area *makai* and *mauka* of the parcel. Southwest of the project area is a large industrial area often referred to as “Kaloko Industrial” or “New Industrial” (in reference to an older industrial area near the old Kona airport). This area features numerous large warehouses, as well as light industrial and commercial businesses occupying industrial style

buildings (Home Depot and Costco, among others). As of the writing of this report, construction has commenced on additions to this commercial/industrial area *mauka* of the existing warehouses. There is also industrial development along Huliko'a Road, which is located just west of the project area.

Hina-Lani Street, a major coastal/inland (*mauka/makai*) connector road, forms the southern boundary of the project lands. Bulldozer roads and activity are present in the project area and some may be in part related to the construction of Hina-Lani Street as well as other modern (and historic ranching era) use of the area (Figure 7). Isolated push piles, intermittent bulldozing and short roads are concentrated within the vicinity of Hina-Lani Street; overall, bulldozer activity is considerably more concentrated on the Kaloko (south) portion of the project area. One bulldozer road runs more or less *mauka/makai* just north of Hina-Lani Street and is visible on the aerial view (see Figure 3). The historic *ahupua'a* wall between Kaloko and Kohanaiki runs *mauka/makai* across the center of the project area, and the westernmost portion of the wall has been heavily bulldozed and is largely collapsed.

The project lands themselves are generally undeveloped, and appear not to have been dramatically impacted by modern activity other than bulldozing. Some modern cattle ranching has apparently taken place intermittently within the project area. The historic *ahupua'a* wall is a good indication that historic animal husbandry occurred in the area, and there are several other ranching era sites within the parcel. Modern trash and occasional transient camps were found near some historic properties, but generally this type of modern disturbance is concentrated near the project boundaries (i.e., near Hina-Lani Street).

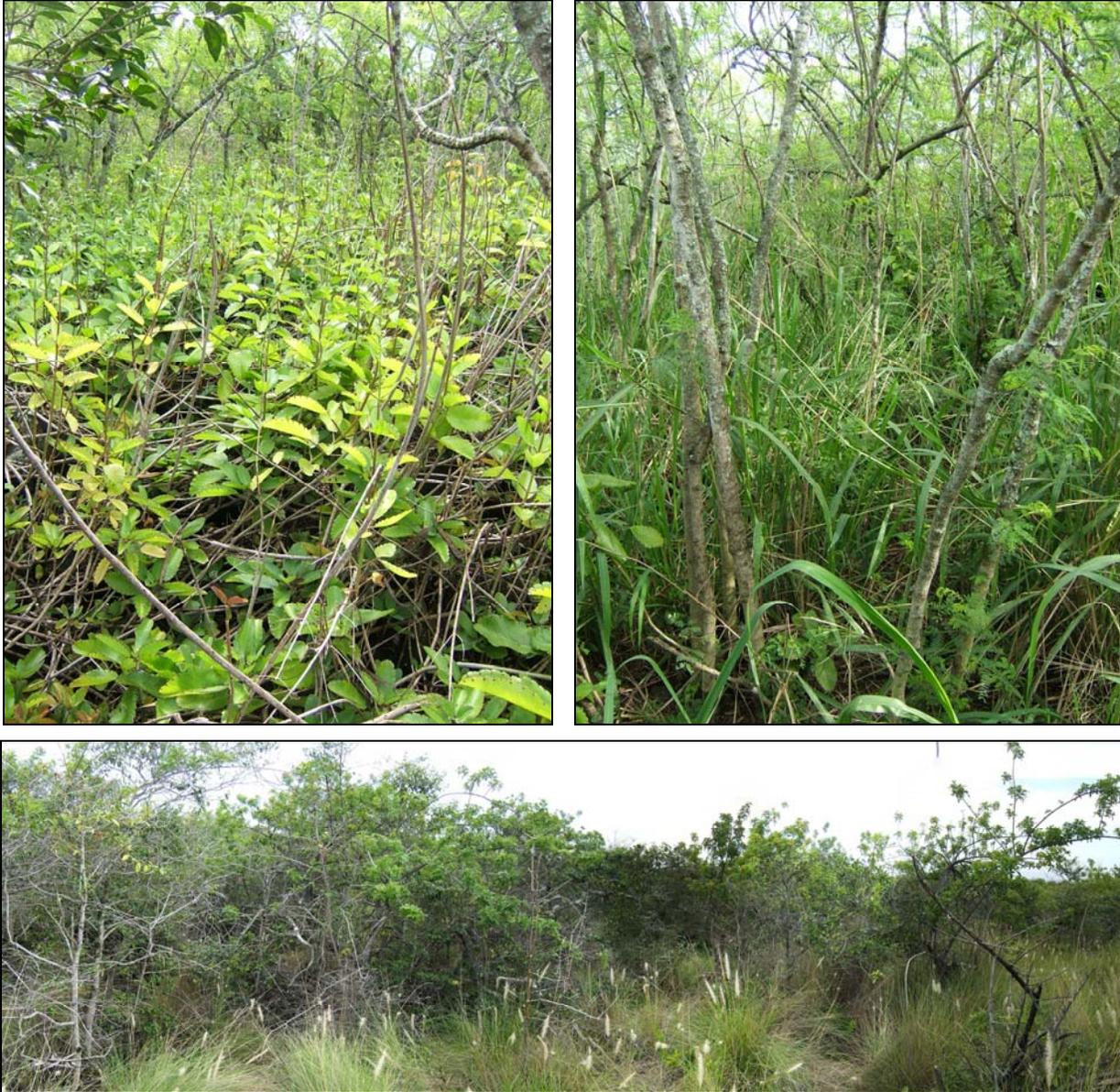


Figure 5. Overview photographs of dense vegetation in project area. Clockwise from top left: thick air plant obscuring ground visibility; *koa haole* and tall grass, which dominate the project area; Christmas berry trees, thick grass, and other small trees impeding pedestrian passage and reducing site visibility



Figure 6. Panorama photograph looking *makai* from east end of project area, showing dense vegetation and slope to the southwest

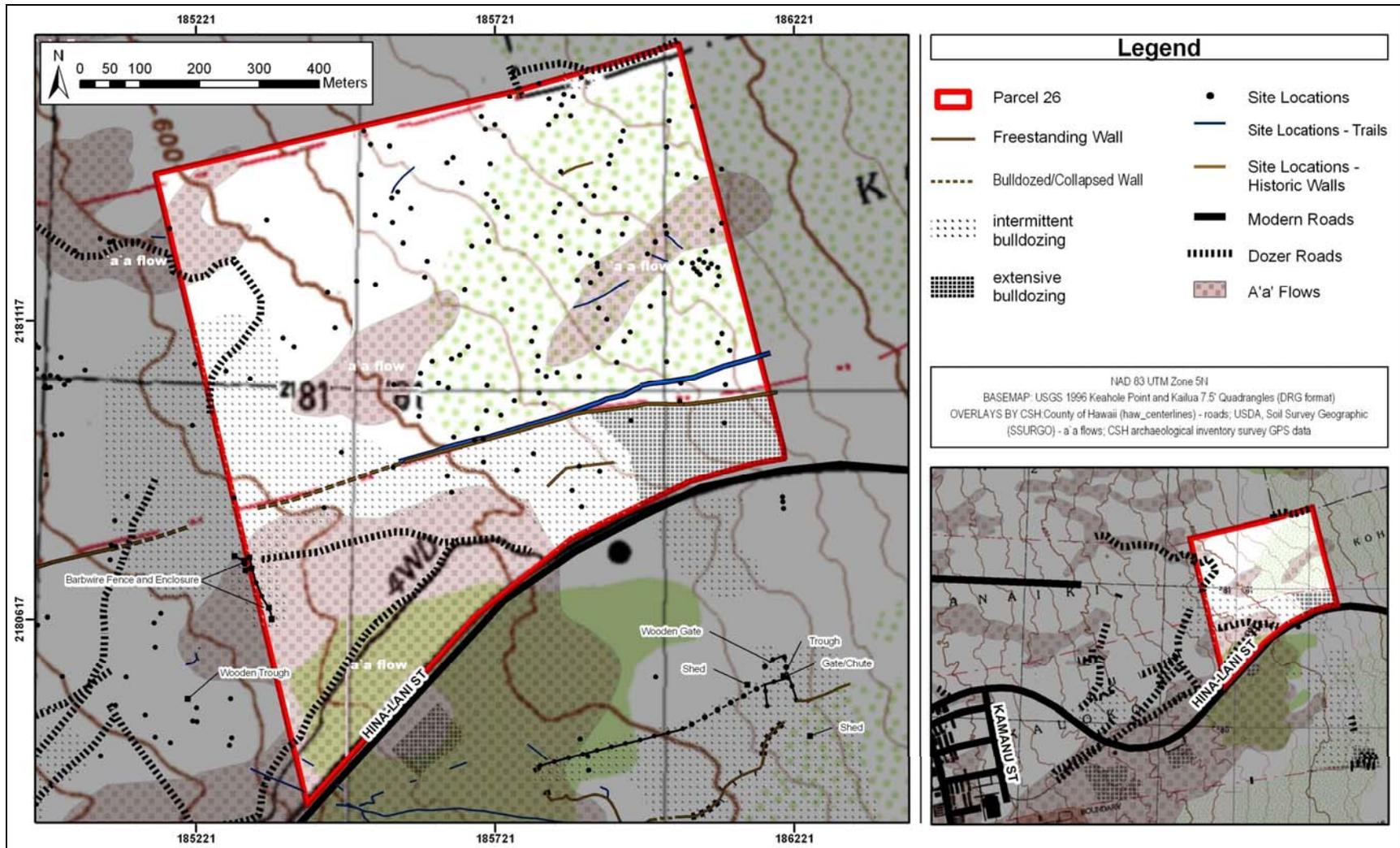


Figure 7. Map of project area showing modern bulldozer and historic ranching activity

Section 2 Methods

2.1 Field Methods

The fieldwork effort for the archaeological inventory survey was carried out by Matthew Bell, B.A., Mindy Simonson, M.A., David Shideler, M.A., Kelley Esh, M.A., Jason Pickin, B.A., Shawn Fehrenbach, B.A., Sarah Wilkinson, B.A., Randy Groza, M.A., Amy Hammermeister, B.A., Todd McCurdy, M.A., Michelle Pammer, B.A., Doreen Hrivnak, B.A., Mark Oxley, B.A. and Hallett H. Hammatt, Ph.D. (principle investigator). The fieldwork took place on the following dates: June 5, 2007 – December 18, 2007 & April 7 – April 18, 2008, taking 570 person-days to complete.

The fieldwork component of the archaeological inventory survey was carried out under archaeological permit number 07-19 and 08-14 issued by the Hawai'i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai'i Administrative Rules (HAR) Chapter 13-282.

Fieldwork consisted of a 100% coverage pedestrian inspection of the approximately 194.324-acre study area with limited subsurface testing at select archaeological sites. The pedestrian inspection of the study area was accomplished through systematic sweeps. The interval between the archaeologists was generally 5 to 10 meters, varying based on visibility due to vegetation cover. All historic properties encountered were recorded and documented with a written field description, scale drawings, photographs, and located with high quality GPS units including Garmin 60CSx high sensitivity units (accuracy +/- 3 m). Sites requiring the highest precision available, such as those recommended for preservation, were further located using Trimble Pro XR GPS survey technology (accuracy +/- 1 m).

Subsurface testing consisted of the partial excavation, by hand, of selected surface archaeological features located during the pedestrian survey. The purpose of the subsurface testing was to aid in determining the function of located surface sites, as well as to possibly obtain datable materials for later radiocarbon dating. In order to focus subsurface testing at sites with the best excavation potential, depth of deposits or construction was assessed as part of determining excavation potential. This assessment consisted of careful observation of the depth of crevices, stacked rock and piled rock that included careful removal and replacement of small portions of the top course of construction. In the event this minor removal of material allowed a natural ground surface to be observed and an absence of cultural material to be confirmed, excavation potential was generally observed to be poor. Otherwise, if necessary to determine or confirm function, a formal excavation was generally undertaken and reported in detail in conjunction with the respective site description.

All excavated material was sifted through a 1/8-inch wire mesh screen to separate out the soil matrix. Any cultural material was collected for analysis in the lab, except in the event excavation determined the site was a burial (or probable burial) in which case cultural material was carefully returned to the excavation. Each test excavation was documented with a scale section profile, photographs, and sediment descriptions. Sediment descriptions included characterizations of Munsell color designations, compactness, texture, structure, inclusions, cultural material present, and boundary distinctness and topography. While a stratigraphic profile is usually generated for

at least one soil profile per test unit, most excavation units during inventory survey had very limited soil layers, if any. Almost all soil layers encountered were a shallow natural deposition with no cultural material, and few excavation units had more than one significant soil stratum present. Graphic presentations would thus not aid in most strata description and were therefore not included with some testing results.

2.1.1 Recording Agricultural Sites

Agricultural features are pervasive in a low density throughout the project area. The majority of these features tended to be minimal modification, low energy-investment and spread over broad areas (sometimes over several hundred square meters). For recording purposes, a single agricultural site number (SIHP # 50-10-28-26507) was assigned for these pervasive agricultural features, with feature and sub-feature designations serving to differentiate various levels of intensity and variations in form. The far *mauka* portion of the project area has a large area of higher density and more formal agricultural modification that is noticeably more intense than the agricultural activity in the rest of the project area. This *mauka* area is consistent with the Kona Field System (SIHP # 50-10-28-6601) and was recorded as a portion of that larger site. Minor agricultural activity associated directly with a site primarily functioning for other purposes (i.e., habitation), was included in the description for that site.

2.1.2 Recording Lava Tubes

Lava tubes are ubiquitous within the project area, especially on the *pāhoehoe*, and vary greatly in size and shape. All openings in the bedrock were examined for the presence of cultural modification or cultural material. Any opening that appeared large enough to explore was examined thoroughly. Generally, an average size person can fit through a tube entrance 30 centimeters in diameter or greater, but the shape and geology of lava tubes varies greatly and occasionally a smaller size opening could be entered; likewise, sometimes a larger than 30 centimeter opening could not be traversed due to jagged edges, etc. Every effort was made to explore the entirety of all lava tubes to their terminus, within reason as far as tube size and safety (i.e., heavily collapsed tubes were entered with caution). When a tube can no longer be explored due to size or safety, this is considered its cultural terminus, and is denoted as impassable on maps. It should be noted that cultural material and burials have been located in lava tubes with entrances which were only barely physically passable, even for the most petite archaeologists in our group.

The primary purpose for the intensive exploration of lava tubes is to locate any human remains that may be present in remote areas of a lava tube, in addition to locating other cultural material. Lava tubes were traditionally used for concealment of burials, and human remains are often located far from any other cultural modification, sometimes at great distances from tube entrances; these burials may have been placed in the lava tube using an entrance that was then filled and concealed on the surface. Therefore, in an effort to locate all burial locations within the project area, a thorough effort was made to explore all lava tubes and side tubes to their natural or cultural terminus.

As mentioned above, human utilization of lava tubes sometimes involved blockage of entrances and inner side tubes. In order to complete the inventory survey, it was necessary to pass this type of blockage; when possible, this was done by finding another passageway for

access behind the blockage or attempting to assess what was behind the blockage (i.e., solid lava tube wall vs. a continuing passageway) without disturbing the constructed area. If it was determined that the tube did continue past blockage and there was no other way to access the tube, a photo was taken of the constructed area and then rocks were carefully removed until an archaeologist could pass through. After inspection of the lava tube, the rocks were replaced as carefully as possible to their original position.

All lava tubes with cultural material present were mapped using a compass for bearing and a laser for distances (Stanley FatMax Tru-laser Distance Measurer; stated accuracy for this device is +/- 6 cm). The laser reflects well off most surfaces in tubes, and is an excellent alternative to the rather impractical method of pulling measuring tapes through cramped areas, or simply estimating distances (it is extremely difficult to accurately estimate distances in lava tubes; see Wolforth 2005:24). The laser method may actually increase the efficiency of mapping tubes, since accurate measurements can be obtained nearly instantaneously; overall this technology seems to produce more accurate maps than simply estimating distances in about the same amount of time. In small tubes a regular measuring tape was used when practical.

Occasionally lava tubes extend long distances beyond any cultural modification. When this occurs, lava tubes are explored to their natural or cultural terminus. Maps are produced for all areas containing cultural materials, and the rest of the lava tube is described but not necessarily mapped. A distance and bearing from the site tag is given for all burials within lava tubes.

2.2 Laboratory Methods

Laboratory analyses of material recovered from limited subsurface testing within the project area included:

1. Preparation and submittal of datable material, such as charcoal, to Beta Analytic for radiocarbon dating.
2. Identification of invertebrate midden. Common marine shells were identified and analyzed at the Cultural Surveys Hawai'i laboratory in Kailua, Hawai'i.
3. Identification of vertebrate faunal material. All vertebrate faunal material was identified and analyzed at the Cultural Surveys Hawai'i laboratory in Kailua, Hawai'i.
4. Identification and cataloguing of traditional Hawaiian artifacts. Any artifacts collected *in situ* at the project area or contained within sediment samples were measured, weighed and classified by material type and artifact form. The analysis then focused on distinguishing artifact function.

2.3 Document Review

Background research included a review of previous archaeological studies on file at the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources (DLNR); a review of geology and cultural history documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs

at the Hawai'i State Archives and the Archives of the Bishop Museum; and a study of historic maps at the Survey Office of the DLNR. Information on LCAs was accessed through Waihona 'Āina Corporation's Māhele Data Base (www.waihona.com).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected type and location of sub-surface pre and post-contact historic properties in the project area.

2.4 Consultation

A cultural impact assessment (Hammatt & Shideler 1996) was conducted for TMK [3] 7-3-09:017, adjacent to the project area, in 1996. Informants knowledgeable of TMK [3] 7-3-09:017 and the project area vicinity were interviewed. These consultations focused on identifying traditional cultural practices conducted adjacent to the project area as well as addressed community concerns regarding possible burial sites.

Cultural Surveys Hawaii, Inc. is currently conducting consultation with organizations and the community to identify *kūpuna* and other individuals with knowledge of the history of the project area and its surroundings. The results of these interviews will be presented in a companion report for this project, titled "Cultural Impact Assessment for the Kohaniki Project (Magat et al. 2008)", and will include consultation for all four parcels within the Kaloko Makai ("Kohan 1") project (including the current project area). The on-going consultation with organizations includes the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), and the Big Island Burial Council.

Section 3 Background Research

3.1 Traditional and Historical Background

3.1.1 Mythological and Traditional Accounts

The *ahupua'a* of Kohanaiki and Kaloko lie at the southern end of Kekaha, the portion of North Kona extending from Honokōhau to 'Anaeho'omalū. The character of Kekaha - as it had been established in the Hawaiian consciousness - is represented in a traditional saying recorded by Mary Kawena Pukui and in a brief description by John Papa 'Ī'ī. The saying, "*Kekaha wai 'ole na Kona*", is defined by Pukui as "waterless Kekaha of the Kona district" and explicated by her as "Kekaha in Kona, Hawai'i, is known for its scarcity of water but is dearly loved by its inhabitants" (Pukui 1983:184). 'Ī'ī describes

...a cold wind from Kekaha, the Hoolua. Because of the calm of that land, people often slept outside of [sic] the tapa drying sites at night. It is said to be a land that grows cold with a dew-laden breeze, but perhaps not so cold as in Hilo when the Alahonua blows ['Ī'ī 1959:122].

These passages suggest that Kekaha was firmly identified with its austere physical environment. A legend told in Maguire (1966) reveals the importance of water resources in this general area (see also Wolforth 2005:8-9). The story focuses on a man named Ko'amokumokuhe'eia, who moved to an upland area and was told by the residents there that water was very scarce. Water, he was told, could be found in "celebrated" caves, but these caves were *kapu* (forbidden), and trespassers would be killed by the owner of the cave. However, Ko'amokumokuhe'eia discovered a very small cave entrance that no else knew about. The cave had water dripping from its roof (Maguire 1966:30). Ko'amokumokuhe'eia and his father used carved *'ōhi'a* and *wiliwili* trees to capture the dripping water, and his family was thus able to survive during dry spells. This legend clearly demonstrates the importance of water as a difficult to procure resource, as well as highlighting the importance of water collection caves.

Describing the apportioning of land by the *ali'i* (royalty) before the ascendancy of Kamehameha, the pioneer nineteenth-century Hawaiian historian Samuel M. Kamakau records this information about the lands of Kekaha:

Waimea was given to the Pa'ao kahuna class in perpetuity and was held by them up to the time of Kamehameha III when titles had to be obtained. But there was one land title held by the kahuna class for many years and that was Puuepa in Kohala. In the same way the land of Kekaha was held by the kahuna class of Ka-uahi and Nahulu [Kamakau 1961:231].

Kamakau further records that during the 1770s, "Kekaha and the lands of that section" were held by descendants of the Nahulu line, the Ka-me'e-ia-moku and Ka-manawa, the twin half brothers of Ke'e-au-moku, the Hawai'i island chief (Kamakau 1961:310).

Kamakau mentions Kaloko in an episode that suggests that *ahupua'a*'s significance within the pre-contact Kekaha landscape. Kamakau recounts an extraordinary day's reconnaissance of the west coast of Hawai'i Island by the spy Ka-uhi-o-ka-lani, sent to the island by Kama-lala-walu, chief of Maui. Having reached Kawaihae by canoe at night, Ka-uhi-o-ka-lani "ran about that

same evening [reaching as far south as Ka'awaloa] and returned before the canoes were dismantled..." Ka-uhi-o-ka-lani, recounting his journey and the landmarks he had observed, relates: "I went on to the long stretch of sand, to the small bay with a point on that side and one on this side. There are large inland ponds." He is told that the "sandy stretch is 'Ohiki, and the walled-in ponds are Kaloko and Honokōhau" (Kamakau 1961:56). This event unfolds during the time of the sixteenth-century Hawai'i Island *ali'i* Lono-i-ka-makahiki, suggesting that by the 1500s Kaloko and its fishpond were well-known features in the Kekaha landscape.

Intensive archaeological investigation during recent decades has clarified the picture of pre-contact Hawaiian life within Kekaha and the two *ahupua'a* under study. Especially detailed study of Kaloko has resulted in the following analysis of the development of pre-contact settlement throughout the *ahupua'a*:

Throughout its span of occupation Kaloko was but part of a larger society. Kaloko was apparently a unified community after A.D. 1200-1300. When initially occupied (A.D. 1000-1500), it may have been an outlier of another community. Nevertheless, from its initial occupation, Kaloko had 1 or more internal local residence groups containing constituent households. By A.D. 1200-1300 at least 2 residential groups were present in the community, and by contact (circa A.D. 1778) at least 4 residential groups had dwelled in the area. Each residential group performed religious functions as well as being a leisure unit. Members of the group held use rights to adjacent farm lands and probably to areas where forest and marine resources were located. Within each residential group, 1 household seems to have been dominant, being the spatial focus for its group's religious activities. It is suggested that such dominance was a function of consanguineal seniority and/or wealth. (Cordy et al. 1993:45)

While exact population figures for Kaloko were not possible, the study suggested that the "community seems to have gradually grown in size but could never have been larger than 118 and most likely was about 60-100 in size" (Cordy et al. 1993:45). The general pattern of land use and settlement suggested for Kaloko may also have existed within the similar environment of neighboring Kohanaiki.

A detailed study of Kaloko by Cordy et al. (1991) for the National Parks Service has developed a model of pre-contact settlement throughout the *ahupua'a*. The following is a summary of this model provided by the National Parks Service (2001):

Permanent settlements in the leeward portions of Hawai'i Island began by the A.D. 900s to 1000s, and possibly earlier. These would have occurred near favorable water sources, Kaloko bay probably having been one of the most sheltered and inviting large inlets along the Kona Coast. Coastal habitations had expanded by the 1200s, utilizing inland fields as well as sea resources for subsistence. The Kekaha lands north of Kaloko and extending to Kohala are thought to have undergone initial permanent settlement beginning in the 1400s, with subsequent occupation of the coast north and south over the next few centuries.

Sometime during the period of 1580 to 1600, Laeanuikaumanamana, the *kahunani* of the ruling chief, Liloa, acquired the Kekaha region. It is thought that the construction of fishponds at Kaloko and Honokahau began during this time, with Kaloko Fishpond dating from at least the 1400s to 1500s. During the 1600s to 1700s, as the Kona Coast population grew with the establishment of the royal residence of 'Umi-a-Liloa at Kona and the consequent increased demand for food production, Kaloko also increased to probably almost 200 residents. It continually supported a higher population than other Kekaha areas because of its fishpond and extensive inland field system [National Parks Service 2001].

The general pattern of land use and settlement suggested for Kaloko may also have existed within the similar environment of neighboring Kohanaiki.

Into the last decades of the 18th century - following western contact - Kohanaiki and Kaloko - as elements of the larger Kekaha area - remained under the control of Ka-me'e-ia-moku, who resided to the north at Ka'ūpūlehu (Kamakau 1961:147).

3.1.2 Early Historic Period

By the first decades of the 19th century, the inhabitants of Kaloko and Kohanaiki would have long experienced the social pressures and consequences of western contact. "As early as 1788, Hawaiians began enlisting as seamen on the foreign ships that stopped at Island ports, and their number increased rapidly with the growth of whaling in the Pacific" (Schmitt 1973:16). As harbor facilities were developed at Kailua and Kealakekua during the early 1800s, these burgeoning ports became centers of a population drawn from increasingly isolated (economically and socially) areas like Kaloko and Kohanaiki. Newly-introduced diseases cut the population severely.

Kaloko is recorded by Kamakau as the site where Kamehameha's bones were cached after his death in 1819:

Kamehameha had...entrusted his bones to Ulu-maheihei Hoa-pili with instructions to put them in a place which would never be pointed out to anyone. At midnight, therefore, when black darkness had fallen and no one was likely to be on the road and the rough lava plains of Pu'ukaloa lay hushed, Hoa-pili sent his man, Ho'olulu, to bring the container of wicker work in which the bones of Kamehameha were kept to Kaloko in Kekaha...The next morning Hoa-pili and Ke-opu-lani took canoe to Kaloko where Hoa-pili met the man who had charge of the secret cave and together they placed the bones there [Kamakau 1961:215].

Kamakau's account, if accurate, suggests that Kaloko's population, toward the end of the 19th century's second decade, had diminished to such an extent that the *ahupua'a* could provide the necessary isolation and secrecy for the burial.

Missionary censuses of the 1830s chart the diminishing population of Kekaha and North Kona. In 1834, the total population of Kekaha is recorded as 1,244, comprising 21% of the total North Kona population of 5,957 (Schmitt 1973:31). The North Kona figure represents a population loss of 692 since the previous census of 1831 (during which no figure specific to Kekaha was noted), which recorded 6,649 persons in the district (Schmitt 1973:9). One factor - inter-island migration - inducing the diminishing population of Kona was specifically noted by

missionaries in 1832: “We have been sensible for some time that the number of inhabitants in this island is on the decrease. There is an almost constant moving of the people to the leeward islands, especially since the removal of the governor (Kuakini) to Oahu. Some leave by order of the chiefs, and others go on their own responsibility” (cited in Schmitt 1973:16).

Records generated during the 1840s for Land Commission Awards (LCAs) conferred at mid-century document the disposition of population and land use within Kohanaiki and Kaloko *ahupua'a* that had evolved since western contact. At the Māhele of 1848, Kaloko was claimed by and awarded (LCA 7715) to Lot Kamehameha (who would become Kamehameha V). Kohanaiki was classified as Government Land. Subsequently, 18 *kuleana* claims - by commoners claiming to occupy and/or cultivate land parcels - were made in Kaloko. Twelve of these claims were awarded. All claims were for *mauka* lands - between 1200 and 1700 ft. elevation - adjacent to or just *makai* of the Government Road. Only testimony for Kahiona's LCA 9205/9237 claim (which was not awarded) mentions a fishpond; no site within the coastal area is claimed. Farmlands claimed are *māla*, *kīhāpai*, and *mo'o*, i.e. forms of dry land agriculture; actual crops identified in the award testimonies are taro and sweet potato. Only five of the total 18 claims mention residence on or use of the Kaloko lands dating to the time of Kamehameha I, the first decades of the nineteenth century; the remaining claims testify to residence/use beginning in the 1830s and 1840s.

Parcels within Kohanaiki, having become Government Land, were subject to sale - designated grants - by the Hawaiian government. Land sales began in the 1850s with Grant 2030 to Kaiakoili in 1856, awarding 102 acres adjacent to and *makai* of the Government Road. Also beginning in the 1850s, the first taxpayer rolls for Kohanaiki and Kaloko were documented: they indicate, within Kohanaiki, 8, 13 and 12 taxpayers during the years 1857, 1859 and 1860, respectively; within Kaloko, during the same years, 19, 21 and 23 taxpayers were recorded. Just past the middle of the 19th century, the populations of Kaloko and Kohanaiki have been drawn beyond the original subsistence-based economy into the western commercial paradigm.

As Cordy notes about Kaloko: “The historical documents suggest that by the 1840s-1850s, the Coastal Zone had been abandoned as a residential area, except probably for a house used by the fishpond's caretaker. This pattern would have been a stunning change from prehistoric and early historic times, when many coastal residences were present” (Cordy 1991:288). This pattern likely also held for Kohanaiki.

3.1.3 Mid- to late -1800s

The division of Kohanaiki - through sales of Government lands -continued throughout the remainder of the 19th and into the 20th century. Grant 2942 in 1864 awarded to Hulikoa 929.75 acres which included the width of the *ahupua'a*, extending *makai* from Kaiakoili's grant. In 1871, Grant 3086 awarded 154 acres to Kapena; this parcel extended *makai* from Hulikoa's grant to the shoreline.

Kaloko is documented during the 1870s in testimonies by Hawaiians before the government's Boundary Commission. Testifying on August 12, 1873, Nahuina (who had earlier received LCA 10327 in Kaloko) describes himself as “born at Kaloko North Kona Hawaii at the time of Keikepuipui, the building of the *heiau* at Kailua, and have always lived there” and states that the boundaries of Kaloko were shown to him by his father, the former *konohiki* of the *ahupua'a*.

Identifying the *mauka* portions of the boundary, Nahuina notes bounds defined by vegetation and a wall (*iwi 'āina*), and recalls a former habitation site:

...From the *makai* side of Kaupulehu the boundary runs along said land, the koa being on Kaloko and the mamani and pukeawe [sic] on Kaupulehu to the corner of Lanihau 2nd Keahuolu and Honokohaunui...Ohiawela, a *pali*, on the road through the woods is a point on the boundary. This place is above Honokohaunui, thence turn *makai* to Kahua, a place in the fern where houses used to stand, from thence the boundary runs *makai* along an *iwi aina* to Kapokalani, at the Government road. Thence *makai* still following the *iwi aina* to Kiikii an ili aina, thence to Kaohe, a grove of trees thence to *aa*...

Nahuina adds that Kaloko has “ancient fishing rights extending out to sea.” Testifying on the same date, Hoohia, who “moved to Honokohauiki when quite small and reside[s] there now”, adds details that suggest the *mauka* Kaloko-Honokōhau boundary was defined by different vegetation that also reflected former traditional gathering rights: “Honokohaunui ends at Ohiawela, a *pali*. Kaloko takes the *koa*, and Honokohaunui, the *ohia*...The *olona* grows on Honokohaunui and Kealakehe and the koa on Kaloko.”

During the 1880s, Kona lands - including Kaloko and Kohanaiki - were surveyed by J. S. Emerson for the Hawaiian government. Emerson produced three maps corresponding to the project area during this time period: Registered Map (RM) 1280, RM 1449, and RM 1512. Emerson's assistant, J. Perryman, also produced sketches of the west slopes of Hualālai. Though other surveyors and historians have produced maps for the area, these maps are the most comprehensive known. RM 1280 (Figure 8) is perhaps cited and reproduced with the most frequency. It is often dated to 1888, but in fact the map does not indicate the date, only the date the map was traced by another surveyor in 1952 for reproduction purposes. An independent attempt to verify its date during the present study was unsuccessful, as the original map is now retired and not available from the State Survey office. Circumstantial evidence dating the map includes the sketches of J. Perryman dated to 1882 which match the features of this map well and a date range penciled on the back of the traced map on file - “1877-1903.” RM 1449 and RM 1512, dating to 1888 and 1889 respectively, are essentially maps of the same series. RM 1449 is a broad overview map ranging from Kaloko to Kūki‘o in the north, RM 1512 is a detail of the land grants around the government road.

A portion of Emerson's Registered Map (RM) 1449, Akapipū Section (see Figure 9) shows a trail through the current project area; the trail ran from the Kohanaiki Homesteads to the Kaloko fishpond. The map also shows the locations of the three Kohanaiki grants described above, as well as "Kealiihelepa Hse" at the coast above the Kaloko fish pond and, near the government roads, "Kaloko Cath. Church" and "Kohanaiki Church". This is likely the Protestant church recorded as built by a minister, Kaanohimaka, and his congregation in the 1870s (Kelly 1971:14). As noted by Cordy (1991:418), Emerson's map of the area (Figure 9) including the Kohanaiki Church indicates "a set of about 16 stone house enclosures and a Protestant church, collectively called the Kohanaiki Homesteads"; Cordy suggests a "late 1880s age for the formation of the Kohanaiki Homesteads." The resident population in the late 1880s is understood to have been in a belt at the elevation of the Kohanaiki Church, Kaloko Catholic Church and Honokōhau School house shown on the Emerson map as located east of the present project lands

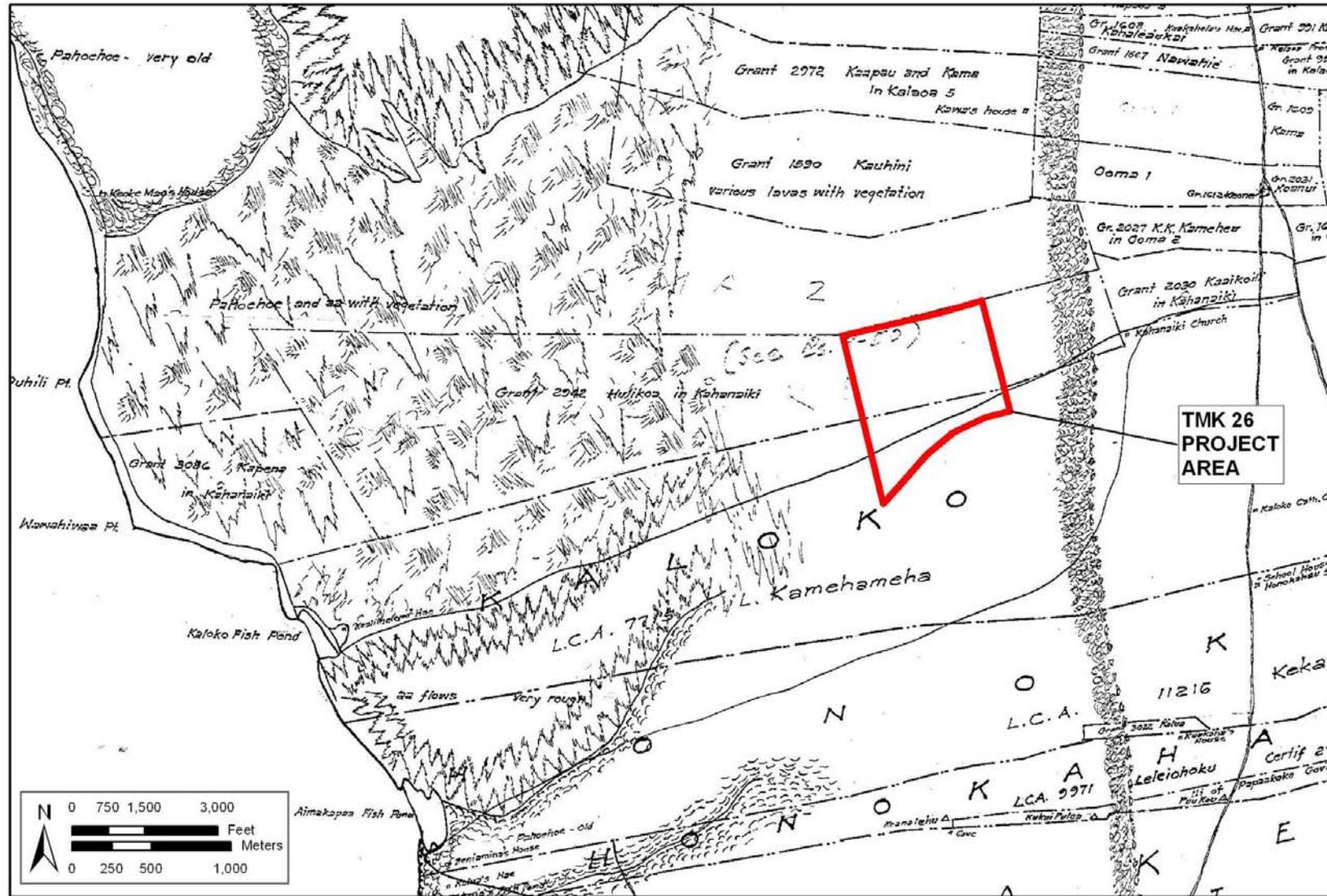


Figure 8. Portion of RM 1280, J. S. Emerson's survey map showing approximate location of project area

at an elevation of greater rainfall. Kelly (1971) notes that the Kohanaiki Homesteads would draw people as other areas of North Kona were abandoned. Government records of Kohanaiki grants show 18 parcels ranging in size from .73 acres to 25.45 acres awarded from 1895 to 1904.

While all three Emerson maps are informative of the area, there are inconsistencies between them that are difficult to interpret. RM 1280 was likely produced with a somewhat different intent than the other two maps though they were all surveyed in such a short time period. Suggestive of the different intent, RM 1280 does not indicate survey stations as the others do. However, perhaps the largest inconsistency is the route of the two roads extending *makai* from the homesteads – on RM 1280 crossing into Kaloko just outside of the homesteads and on RM 1449 further *makai*. Since RM 1280 does not give a name to this road and the date of the map is somewhat uncertain, it could be that there were two roads, one superseding the other. It is also likely that RM 1280 was simply a preliminary survey (if the dates for J. Perryman's sketches date the map) and was less accurate (didn't extensively use survey markers).

A few newspaper articles detailing life and the customs in Kekaha during the last half of the 19th century (written between 1928 and 1930) mention water collection. Kepā Maly (2003:41-42) translated serial accounts from *Ka Hōkū o Hawai'i* written by John Ka'elemakule Sr., a Kekaha native, and the following two excerpts demonstrate the significance of water catchment:

There were not many water holes, and the water that accumulated from rain dried up quickly. Also there would be weeks in which no rain fell... The water which the people who lived in the uplands of Kekaha drank, was found in caves. There are many caves from which the people of the uplands got water... [*Ka Hoku o Hawaii*, September 17, 1929:3].

...The *kūpuna* had very strict *kapu* (restrictions) on these water caves. A woman who had her menstrual cycle could not enter the caves. The ancient people kept this as a sacred *kapu* from past generations. If a woman did not know that her time was coming and she entered the water cave, the water would die, that is, it would dry up. The water would stop dripping. This was a sign that the *kapu* of Kāne-of-the-water-of-life (Kaneikawaiola) had been desecrated. Through this, we learn that the ancient people of Kekaha believed that Kāne was the one who made the water drip from within the earth, even the water that entered the sea from the caves. This is what the ancient people of Kekaha wai 'ole believed, and there were people who were *kia'i* (guardians) who watched over and cleaned the caves, the house of Kāne... [*Ka Hoku o Hawaii*, September 24, 1929:3].

Kaloko and most of Kohanaiki continued to be held by the *ali'i* throughout the remainder of the 19th century, passing, after the death of Lot Kamehameha, successively to Bernice Pauahi Bishop, Kalākaua and Kapi'olani.

Oral history interviews (Maly and Maly 2003) relate that in the mid 1800s only a few residences were on the coastal lands, in the uplands above 900 ft. elevation, and in the vicinity of Māmalahoa Highway (east of the project area). The land between 900 ft. and the coast was cattle, donkey, and goat pasturage. *Mauka/makai* trails through Kohanaiki, Kaloko, Kalaoa, and Honokōhau were utilized by upland families to access the coast to fish, and gather water during upland droughts.

3.1.4 1900s

During the 20th century, major developments focused on Kaloko Ahupua'a, with continuing commercial use of the fishpond and increasing animal husbandry. The Kohanaiki Homesteads were apparently in decline during the early part of the century (Maly and Maly 2003), and are mentioned only in passing in H.W. Kinney's 1913 visitor's guide, which notes that it is an "inland settlement without much interest".

Ranching, however, steadily increased. Once John Maguire purchased the former chiefly lands of Kaloko in 1906 (after the deaths of Kalakaua and Kapiolani; Kelly 1971:29), the *ahupua'a* uplands were developed into the Huehue Ranch. Maly and Maly (2003) discuss the acquisition of these lands and the types of ranching that were common:

In 1899, John A. Maguire, founder of Huehue Ranch applied for a Patent Grant on... lots in 'O'oma 2nd, but he only secured Grant No. 4536.... Maguire's Huehue Ranch did secure General Lease No.'s 1001 and 590 for grazing purposes on the remaining government lands in the Kohanaiki and 'O'oma vicinity. Thus, by the turn of the century, Huehue Ranch, utilized both the upper forest lands and lower kula lands to the shore for ranching purposes. Oral history interviews with elder former ranch hands record that this use extended across the Kapena and Huliko'a grant lands of Kohanaiki, from the fee and leasehold lands of Kaloko and 'O'oma. Nineteenth century goat drives, gave way to formalized cattle drives and round ups on these lands [Maly and Maly 2003:78].

Until the construction of the Queen Ka'ahumanu Highway in the 1970s, access to the "*kula kai* (shoreward plains)" (Maly and Maly 2003:101) was limited to local residents. The 1924 USGS map (Figure 10) shows "the road to the sea" connecting the Kohanaiki Homesteads with the Kaloko fishpond, and crossing the project area at the *ahupua'a* boundary between Kohanaiki and Kaloko. In the first half of the 20th century, the primary method of travel was "by foot or on horse or donkey, and those who traveled the land, were almost always native residents of Kalaoa, 'O'oma, Kohanaiki, Kaloko and Honokōhau" (Maly and Maly 2003:99). Huehue Ranch bulldozed a jeep road to the shore around 1955 (Figure 11) during the construction of the Kailua pier, and this was used primarily by the ranch employees for duties or for going fishing along the coast.

The Kaloko fishpond - leased from the Huehue ranch - continued as a commercial fishing operation until the 1950s. During the 1970s, the pond was incorporated into the newly-established Kaloko-Honokōhau National Historic Park.

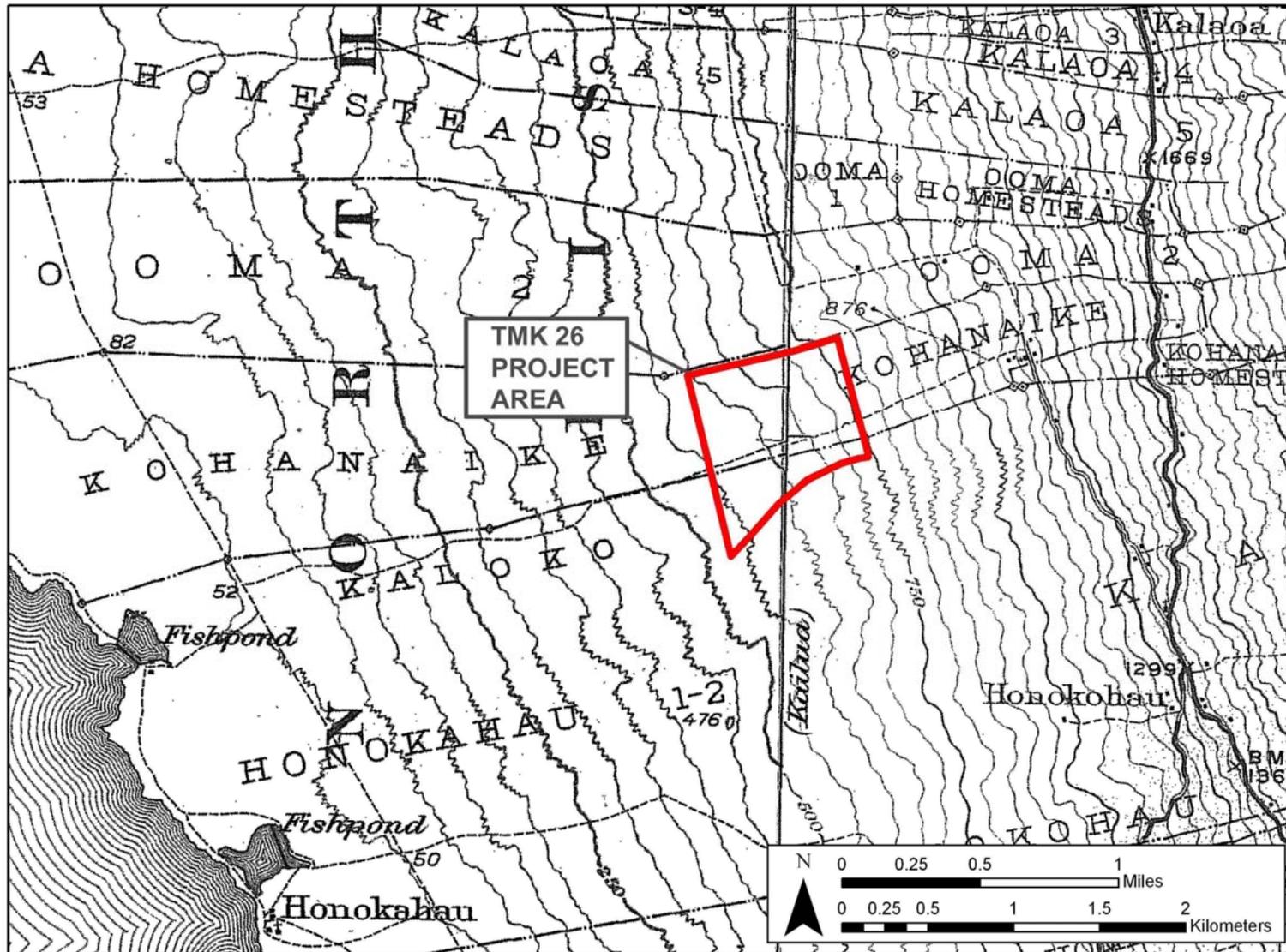


Figure 10. Portion of 1924 USGS map, Keahole Point and Kailua quadrangles, with overlay of project area

3.1.5 Modern Land Use

While the present project area is largely undeveloped, surrounding areas have seen increasing modern use. The Huehue Ranch jeep road and other signs of animal husbandry activity can be seen on the 1959 USGS map (Figure 11; see also Figure 7). More recent nearby development is largely industrial, and the Kaloko Industrial Area is just southwest of the project area, including large stores such as Home Depot and Coscto. Huliko'a Road, just northwest of the project area, is also heavily developed, primarily as an industrial area. Hina-Lani Street runs along the south border of the project area, and leads *mauka* to a residential area (Kona Heavens) before the Palani junction (at Māmalahoa Highway), as well as leading *makai* to the modern Queen Ka'ahumanu Highway. Bulldozing and modern trash are present in some portions of the project area, primarily on the Kaloko Ahupua'a side; some of this area has been used by squatters for campsites, leaving a variety of trash and furniture. However, the majority of this disturbance is near Hina-Lani Street, and most of the project area shows little sign of modern intrusion.

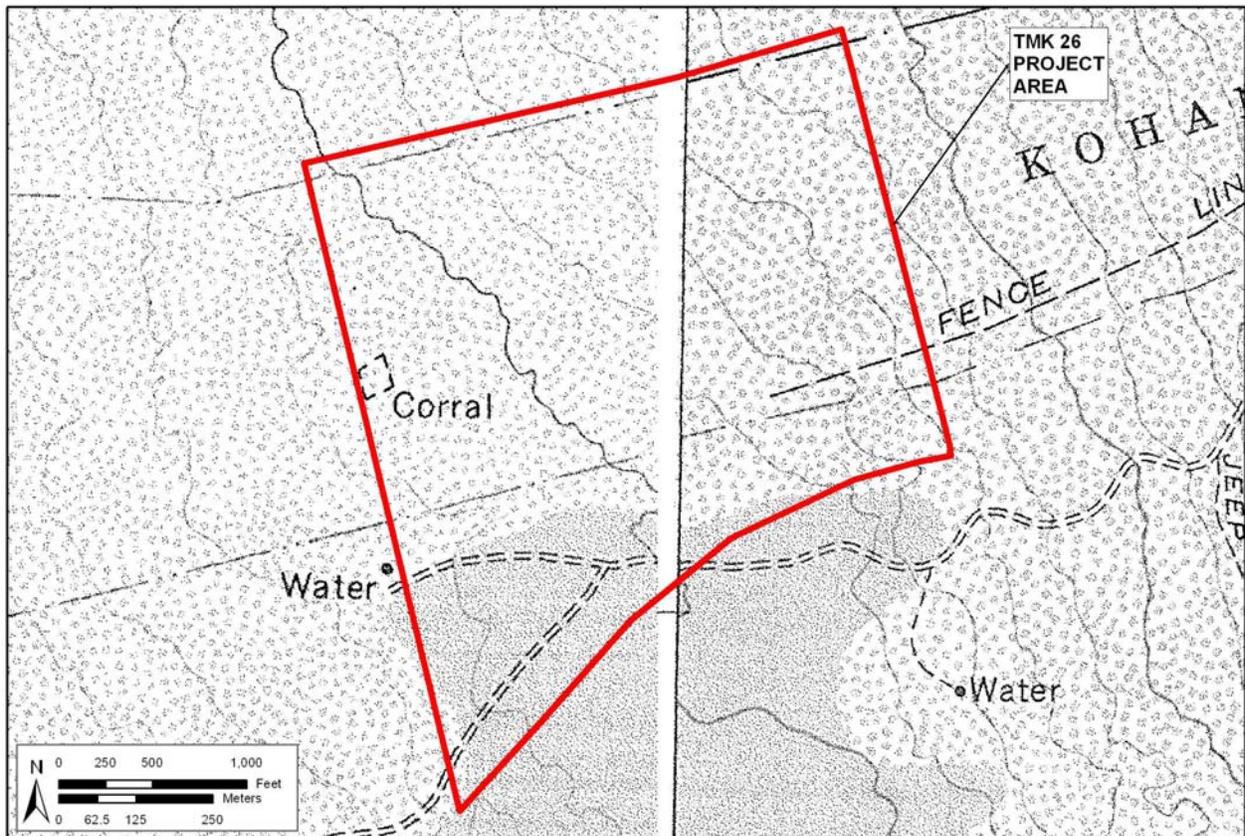


Figure 11. Portion of 1959 USGS map, Keahole Point quadrangle, with overlay of project area showing jeep road and signs of historic/modern animal husbandry

3.2 Previous Archaeological Research

3.2.1 Overview of Archaeological Studies Conducted within Kohanaiki and Kaloko

This section provides a general overview of archaeological studies in Kaloko and Kohanaiki *ahupua'a*. Table 1 lists archaeological studies in this area with brief comments; studies most relevant to the current project are discussed in additional detail in the text. The section following this discusses previous archaeological studies within the present project area in greater detail.

Previous archaeological surveys conducted (Figure 12 and Table 1) within portions of Kohanaiki and Kaloko *ahupua'a* began with the early coastal survey conducted by John Reinecke for the Bernice P. Bishop Museum in 1929-1930 (Reinecke 1930). This was a cursory survey in which approximate site locations and very brief site descriptions were recorded. John Reinecke (1930) recorded eight sites at the coast of Kohanaiki; the sites, which were minimally documented and mapped, included habitation sites and a *heiau*. The next survey was undertaken by Kenneth Emory and Lloyd Soehren in 1961 (Emory and Soehren 1971). This was also a coastal survey, and focused specifically upon the coast of Kaloko, Honokōhau, and Kealakehe. In 1970 and 1971, Robert Renger and students from the University of California at Santa Barbara conducted an intensive survey of Kaloko and Honokōhau between present day Queen Ka'ahumanu Highway and the coast (Cordy et al. 1991). This survey also included subsurface testing of selected sites. These three surveys identified a total of 94 sites within Kaloko between the coast and Queen Ka'ahumanu Highway as of 1971.

Additional archaeological work and historical research undertaken within or about Kaloko during the 1970s and 1980s include: an historical study by Marion Kelly (Kelly 1971); research relating to the establishment of the Kaloko-Honokōhau National Park (e.g. Honokohau Study Advisory Commission 1974, National Park Service 1975); research stemming from the fieldwork conducted by Renger in 1970-71 (see the list presented in Cordy et al. 1991:2); and several reconnaissance-level studies (Ching 1980, Hammatt 1980, Soehren 1983).

Cordy (1981) conducted a survey of the coastal area (up to 1/2 mile inland) of Kohanaiki in 1975; twelve sites were recorded including: pavings, platforms, enclosures and a trail. Eleven of the sites were interpreted as habitation constructs including sleeping houses, men's houses, special purpose, and a canoe house/men's house.

During the 1980s, PHRI began investigations of the entire *makai* portion of Kohanaiki Ahupua'a, bounded by 'O'oma 2 Ahupua'a and Kaloko Ahupua'a, and by the Pacific Ocean and the Māmalahoa Trail. During an inventory survey in 1986 (Donham 1986), "14 previously recorded sites were relocated and 91 sites were newly identified.... Habitation sites represented over half of the identified site total, and included habitation complexes, habitation/ceremonial and/or habitation/burial complexes, and temporary habitation sites" (Donham 1986:7-8). In 1991, PHRI performed data recovery of the project area (O'Hare and Goodfellow 1992); this work included: "detailed recording of (a) 31 sites (224 features) previously recorded in the project area, and (b) seven sites newly recorded during the Phase II work" (O'Hare and Goodfellow 1992:ii). Summarizing Kohanaiki settlement pattern within the zones represented by the project area, the report notes:

The data recovery work indicates that permanent habitation sites between Puhili and Wawahiwaa Points are concentrated in the coastal zone, near the shoreline. In

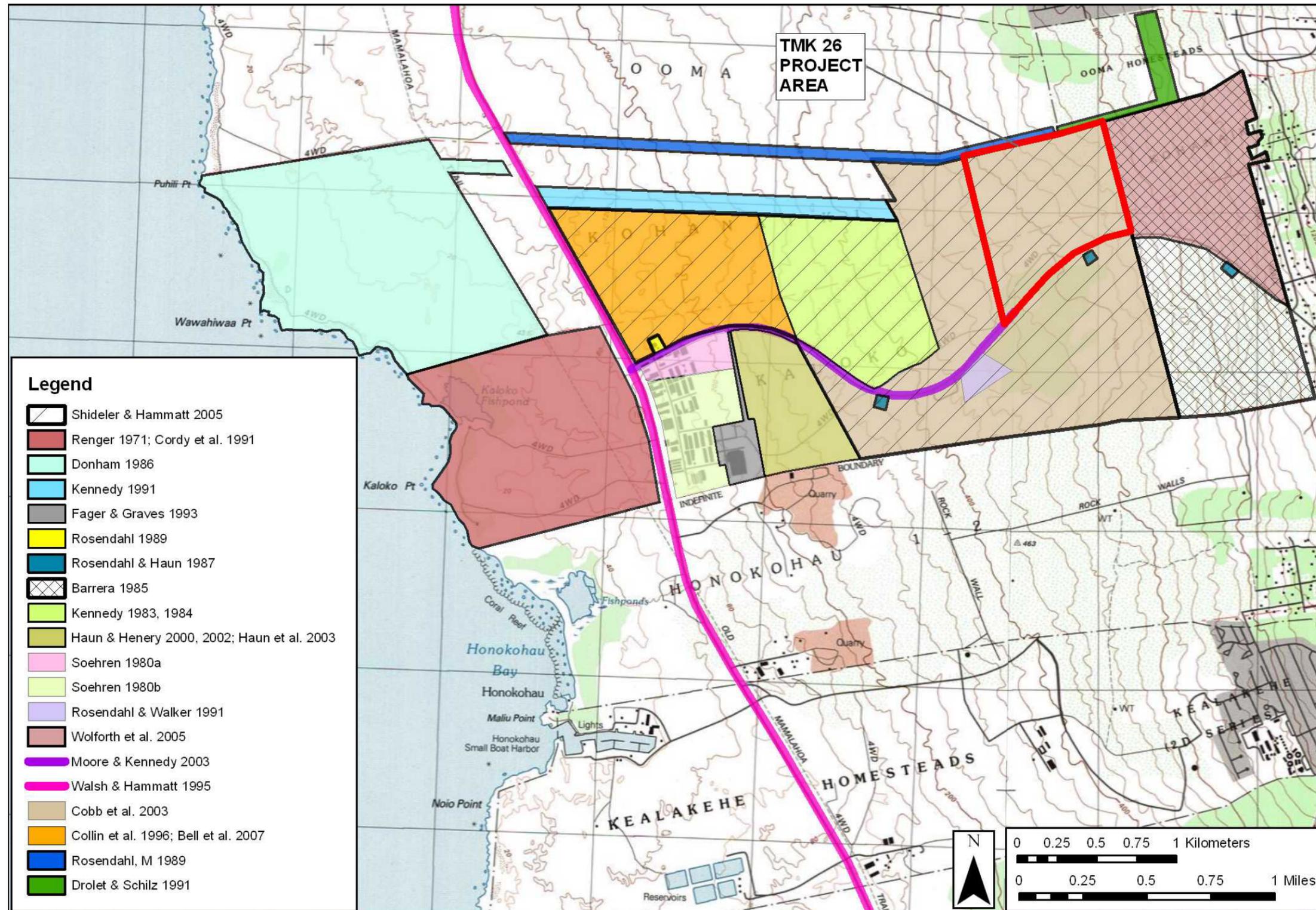


Figure 12. Map of previous archaeological studies in the project area and its vicinity

Table 1. Previous Archaeological Studies Within Kohanaiki and Kaloko *ahupua'a* (projects in present study area are in bold)

Source	Nature of Study	Area of Study	Findings	Comments
Reinecke 1930	Cursory survey	Coastal Survey	Briefly notes numerous sites	All sites <i>makai</i> of present project area
Emory & Soehren 1971	Cursory survey	Coastal Survey	Briefly notes numerous sites	All sites <i>makai</i> of present project area
Kelly 1971	Historical survey and background	Kaloko and Kuki'o <i>ahupua'a</i>	Background study	Good background study
Renger 1971	"Field Notes" of "Mauka excavations"	"Mauka excavations"	"Field Notes" describe several sites	No site location map thus hard to be sure where sites are
Soehren 1979	Letter Report Reconnaissance Survey	Kaloko Access Road Corridor (Hina-Lani Street)	No finds	Letter Report not actually seen
Soehren 1980a	Letter Report Reconnaissance Survey	Kaloko lowlands	No finds	Letter Report not actually seen
Soehren 1980b	Letter Report Reconnaissance Survey	Kaloko Access Road Corridor	Discusses 3 stepping stone trails, 2 <i>ahu</i> & a lava tube complex	Hina-Lani Street Letter Report not actually seen
Hammatt (ARCH) 1980	Archaeological Reconnaissance	410 acre parcel	Identified 2 sites	<i>Mauka</i> of present project area
Barrera Jr. 1983	Archaeological Reconnaissance	TMK 7-3-9:19	No finds	No map
Soehren 1983	Archaeological Reconnaissance Letter Report	-	-	Not seen
Kennedy 1983	Archaeological Reconnaissance	<i>Makai</i> of present project area	Identifies 27 sites	<i>Makai</i> of present project area
Kennedy 1984	Intensive Archaeological Survey	<i>Makai</i> of present project area	Results of investigations of 25 sites	<i>Makai</i> of present project area
Barrera Jr. 1985	Archaeological Survey	409 acres 700 to 1080' elevation	58 sites	<i>Mauka</i> of present project area
Donham 1986	Archaeological Reconnaissance Survey	470-acres <i>makai</i> of Queen K Hwy	105 sites	Kohana-iki development

Source	Nature of Study	Area of Study	Findings	Comments
Rosendahl & Haun 1987	Archaeological Reconnaissance Survey	3 1-acre parcels	Their project area <i>mauka</i> of present project area had one site	Water tanks along Hina-Lani Street
Barrera Jr. 1988	Archaeological Excavations	YO Project Area	60 sites	Report not actually seen
Rosendahl, M 1989	Archaeological Inventory Survey	200 ft.-wide corridor along boundary separating O'oma 2 and Kohanaiki	Identified 4 sites; site 5699 extends into current project area	Adjacent to and north of present project area
Rosendahl 1989a	Letter Report Addendum to Archaeological Inventory Survey	Addl info re: site 13493 stepping stone trail by <i>makai</i> tank	Identified one <i>pāhoehoe</i> slab trail (site 13493)	Water tank <i>makai</i> of present project area
Rosendahl 1989b	Field Inspection	Kaloko Mauka Parcel # 1	Identified 4 sites	Report not actually seen
Rosendahl 1989c	Field Inspection	Kaloko Mauka Parcel # 2	No sites identified	Report not actually seen
Rosendahl & Walker 1990	Addendum to Archaeological Inventory Survey	Addl info re: site 13493 trail by <i>makai</i> tank	Addl info re: site 13493 trail by <i>makai</i> tank	Water tank <i>makai</i> of present project area
Rosendahl & Walker 1991	Archaeological Field Inspection	Industrial crusher site, 2 adjacent 10 acre parcels	Identified a trail with two cairns	South of present project area
Barrera Jr. 1991	Archaeological Inventory Survey & Data Recovery Report	800 to 1100'	Identified 61 sites	<i>Mauka</i> of present project area
Cordy et al 1991	An Ahupua'a Study: The 1971 Archaeological Work at Kaloko	Kaloko-Honokōhau National Park	76 sites identified, 20 sites relocated	<i>Makai</i> of present project area
Kennedy 1991	Surface Reconnaissance	Long thin industrial development	No significant finds	<i>Makai</i> of present project area
Drolet & Schilz 1991	Archaeological Inventory Survey	8.8 acres in O'oma 2	29 sites identified; Site - 16103 extends into project area	Adjacent to and north of present project area

Source	Nature of Study	Area of Study	Findings	Comments
Barrera Jr. 1993	Archaeological Inventory Survey	5.7 acres; 1450 to 1630' elevation	Identified 40 features of Kona Field System	<i>Mauka</i> of present project area
Fager & Graves 1993	Archaeological Inventory Survey	Kaloko Industrial Park parcel	Identified 17 sites with 60 component features	<i>Makai</i> of present project area, south of Hina-Lani Street
Fager & Rosendahl 1993	Interim Report Archaeological Inventory Survey	Kaloko Industrial Park parcel; 15+ acres	Identified 17 sites with 60 component features	<i>Makai</i> of present project area, south of Hina-Lani Street
Henry & Graves 1993	Archaeological Inventory Survey	Transmission line project <i>mauka</i> side of Queen K Hwy.	Identified 8 sites <i>makai</i> of project area	<i>Makai</i> of present project area
O'Hare & Rosendahl 1993	Report on burials	On coast	Report on burials	Kohana-iki Resort project
Rosendahl 1993	Archaeological Field Inspection	Kaloko Mauka Parcel	4 sites discussed	Report not actually seen
Nees & Williams 1995	Archaeological Investigations	110 acres, 2100 to 2900' elevation	Identified enclosure, lava tube, terrace, wall, mounds	<i>Mauka</i> of Present Project Area
Walsh & Hammatt 1995	Archaeological Inventory Survey	Queen K Hwy Right-of-Way	Identified 9 sites adjacent to <i>makai</i> side of Hwy in Kohanaiki & Kaloko	<i>Makai</i> of Present Project Area
Colin et al. 1996	Archaeological Inventory Survey	224 acres <i>makai</i> of present project area	Identified 55 sites	<i>Makai</i> of present project area
Rechtman 1998	Archaeological Field Inspection	2400-2500' elevation	No finds	<i>Mauka</i> of Present Project Area
Rechtman & Henry 1999	Archaeological Inventory Survey	1450-1620' elevation	Identified 15 sites	<i>Mauka</i> of Present Project Area
Wolforth 1999	Monitoring Report	HELCO Keāhole-Kailua Transmission line corridor	Describes one site 21258	Says Walsh & Hammatt previously id'd site as 19946 (on <i>makai</i> side of hwy)

Source	Nature of Study	Area of Study	Finds	Comments
Haun & Henry 2000	Archaeological Inventory Survey	Kaloko Industrial Park TMK: 7-3-51:60; 102-acre parcel	45 sites with 81 features	<i>Makai</i> of present project area south of Hina-Lani Street
Rosendahl 2000	Archaeological Assessment	2435-2730' elevation	No finds	<i>Mauka</i> of Present Project Area
Clark & Rechtman 2002	Archaeological Inventory Survey	1200' to 1600' elevation	Identified 5 sites	<i>Mauka</i> of Present Project Area
Haun & Henry 2002	Data Recovery Plan	Kaloko Industrial Park TMK: 7-3-51:60; 102-acre	Data Recovery Plan addresses 8 specific sites	<i>Makai</i> of present project area south of Hina-Lani Street
Rechtman & Rivera 2002	Archaeological Assessment	3-7-3-26:4; 3,100'	No finds	<i>Mauka</i> of Present Project Area
Cobb, Elmore, and Kennedy 2003	Archaeological Assessment	TMK: 7-3-09:25, 26 & 28 at Kaloko and Kohanaiki (400 acres)	Briefly identifies 154 features, within present project area	Descriptions quite brief; map hard to correlate with sites found in present survey
Haun 2003	Archaeological Assessment	400-Acre Portion of TMK 7-3-09:28 Kaloko	Identifies 8 sites (63 features) north of present project area	Helicopter flight overhead led him to focus on open 'a 'ā area
Haun et al. 2003	Data Recovery Report	Kaloko Industrial Park TMK: 7-3-51:60; 102-acre	Data Recovery Report addresses 8 specific sites	<i>Makai</i> of present project area south of Hina-Lani Street
Moore & Kennedy 2003	Archaeological Inventory Survey	Roadway Corridor	Identified 1 site (23973) 2 mounds	South boundary of project area
Puette & Dye 2003	Archaeological Inventory Survey	22 acres 2100 to 2400' elevation	No finds	<i>Mauka</i> of Present Project Area
Rechtman 2003	Archaeological Assessment	3-7-3-26:5; 3,1000' elevation	No finds	<i>Mauka</i> of Present Project Area

Source	Nature of Study	Area of Study	Findings	Comments
Elmore et al. 2004	Archaeological Inventory Survey	1400' elevation	Identified one historic site 24133	<i>Mauka</i> of present project area
Shideler, and Hammatt 2005	Archaeological Field Inspection and Literature Review	1,200+ Acres in Kaloko and Kohanaiki	Numerous pre-contact sites observed, including: habitations, agricultural features, petroglyphs, boundary walls, and burials	Within present project area
Wolforth et al. 2005	Archaeological Inventory Survey	TMK: [3] 7-3-09: 032	A total of 89 sites were identified, consisting of burials, perm. habitation, temp. habitations, religious sites, trails, boundary walls, and agricultural sites	Immediately <i>mauka</i> of present project area
Nelson et al. 2006 (currently under review by SHPD)	Archaeological Inventory Survey	TMK:3-7-3-009:007	Identified site -16103, which extends into project area	Adjacent to and north of present project area; one site extends into project area

the coastal area south of Wawahiwaa Point permanent habitation sites were near the shoreline and further inland. Temporary habitation sites were present in all areas of the coastal zone and in the barren rockland zones. The radiocarbon date ranges indicate that sites in the northern coastal zone might have been inhabited as early as AD 1020. Sites in the southern coastal zone may have been inhabited as early as AD 1370, and sites in the barren rockland zones may have been inhabited as early as AD 1180. In the barren rockland zones, use of the sites was terminated before the historic period, and in the coastal zone most of the sites were not used in the historic period [O'Hare and Goodfellow 1992:ii].

In 1983 Joseph Kennedy conducted a reconnaissance and subsequent intensive survey (1984) of a parcel that is just *makai* of the present project area. The 1983 reconnaissance located and briefly described twenty-seven sites. These sites included 17 lava tubes, 3 *ahu* or cairns, 2 walls, 2 platforms, an enclosure, a modified outcrop, and a trail. The 1984 intensive survey identified:

45 separate cave openings and approximately 200 chambers in these caves. In addition there were 4 walls recorded, 5 enclosures, 13 platforms, 9 *ahu*, 2 trails and 2 sets of petroglyphs. Out of the 79 separate features on the property, 30 were judged to be worthy of re-investigation ... the remaining 49 sites that were not reinvestigated were comprised almost exclusively of relatively shallow caves with little or no evidence of cultural remains or associated modifications [Kennedy 1984:18].

Many (but not all) of the sites identified in 1984 are described and some of these sites were not mapped. Excavations were carried out in three caves (Sites 11, 22 and 49 in the Kennedy 1984 numbering system). Of the twenty-five sites for which information is presented in the Kennedy 1984 study, twenty-two sites are recommended for no further work and three (Kennedy 1984 site #s 11, 22 & 32) are recommended for preservation.

In 1985, Barrera (1985) surveyed approximately 409 acres within Kaloko and Kohanaiki *ahupua'a*; the 409-acre parcel is located between Māmalahoa Highway and Queen Ka'ahumanu Highway, just *mauka* of the present project area. Four sites were recorded in Kaloko, including an enclosure, a lava tube cave, a wall and a platform (possible burial). Fifty-five sites were recorded within Kohanaiki and include mounds, platforms, habitation complexes, walls, and terraces. A portion of the study area included the historic period Kohanaiki Homestead. Barrera's site #59 comprises constructions associated with the homestead and is described as a "series of Habitation areas enclosed by large stone walls." No estimate is given of the ages of the other fifty-eight sites.

In 1987, Paul H. Rosendahl Inc. accomplished an archaeological reconnaissance survey of three one-acre parcels - proposed water tank sites - in Kaloko (TMK: 7-3-09:Por.1,17) (Rosendahl and Haun 1987), along the south side of the then "main access road between Queen Ka'ahumanu Highway and Kona Heavens Subdivision" - i.e. the present Hina-Lani Street. The parcels were located at 350 ft. above mean sea level (A.M.S.L.), 630 ft. A.M.S.L., and 910 ft. A.M.S.L. Only one site (State site 10-28-10887) - an historic wall interpreted as a boundary or cattle wall - was recorded within the *mauka*-most parcel. Subsequently, in 1989, an additional water tank site parcel (TMK: 3-7-3-10:Por.17) - measuring 360 ft. north/south and east/west -

was subject of an archaeological inventory survey (Rosendahl 1989). The parcel bordered the north side of the then “proposed Kamanu Street extension in the Kaloko Light Industrial Park” at the south boundary along Hina-Lani Road. One site was recorded and designated state site 50-10-27-13493:

a steppingstone trail segment measuring 7.5 m (24.6 ft.) long (E-W) by 0.6-0.7 m wide (1.97-2.30 ft.) (N-S)...located on a section of aa lava...The segment consists of approximately six flat and roughly round pahoehoe slab steppingstones set on worn aa gravel. The steppingstones measure c. 0.4 m (1.31 ft.) in diameter by 0.1 m (0.33 ft.) thick. The trail is oriented c. 159 degrees Az. (magnetic). No portable remains were present in association with the trail. The trail appears to be prehistoric, and appears to have been used as a secondary transportation route [Rosendahl 1989:1].

In 1988, Cordy et al. (1991) began preparing a study of Kaloko *ahupua`a* for the new Kaloko-Honokōhau National Park. The study was based on Renger's 1971 fieldwork conducted for planned development of coastal Kaloko for Huehue Ranch. The fieldwork “included survey work in the intermediate and upland zones of Kaloko, which located additional sites, extensive excavation in the coastal area, and some excavation in the intermediate and upland sites” (Cordy et al. 1991:2). Renger identified, and in some cases re-identified, 94 sites that included 59 in the Coastal Zone, 30 in the Middle Zone, and five *mauka/makai* trails that crossed both zones and continued heading inland. As only “summary papers” had been previously written, the monograph published in 1991 includes the 1971 fieldwork data and resultant analyses, plus fieldwork conducted by Cordy and Hitchcock in the 1970s and 1980s (Cordy et al. 1991:2, 44).

In 1991, Archaeological Consultants of Hawaii (Kennedy 1991) performed a reconnaissance survey of a narrow corridor - 500 ft. north/south by 7260 ft. *mauka/makai* (TMK: 7-3-09:15) - in Kohanaiki extending *mauka* from Queen Ka'ahumanu Highway, located adjacent to the southern boundary of the present study area. No sites or features were observed; seven caves “were examined to term and were determined to be devoid of cultural materials” (Kennedy 1991:C-1).

In 1991 William Barrera produced an archaeological inventory survey and data recovery report of an extensive area just inland (*mauka/east*) of the present study area in which he identified 61 sites. These sites were rather clumped in the east central portion of his project area.

Rosendahl and Walker (1991) carried out an Archaeological Field Inspection for proposed Kaloko Industrial crusher sites just south of Hina-Lani Street at an elevation of approximately 450 ft. a.m.s.l. A trail and two associated cairns were identified.

In 1993, Paul H. Rosendahl Inc. conducted an inventory survey (Fager and Graves 1993) of an approximately 15-acre parcel adjacent to, and *mauka* of the Kaloko Industrial Park, which includes a road corridor extended from the main project area to Kamanu Street. The survey recorded 17 sites incorporating 60 component features. The sites were judged

...in poor to good condition and comprised the following formal types: terraces, modified outcrops, mounds, walls, caves, pahoehoe excavations, cairns, filled cracks, enclosures, and a trail. The formal types comprised the following functional types: animal husbandry, temporary habitation, agriculture, marker, quarry, and transportation [Fager and Graves 1993:ii].

In 1995, Cultural Surveys Hawai'i conducted an archaeological inventory survey with limited subsurface testing within a narrow strip of land, averaging 300 ft wide, along Queen Ka'ahumanu Highway between Palani Road and the Keāhole Airport entrance road (Walsh and Hammatt 1995). Three sites were identified in Kohanaiki: two trails and a set of three cairns. One of the trails - a *mauka-makai* trail - had been previously identified and designated Site 50-10-27-15324. The site is described as consisting of:

...two converging trail segments designated Features A and B...Both trail segments extend in a roughly *mauka-makai* direction, but angle toward each other and converge into one trail that continues inland. The point where the two trails meet is located at the edge of the bulldozed portion of the present highway right of way, 164 feet (50 m.) from the *makai* edge of the highway pavement...On the *mauka* side of the highway, the trail was observed at the edge of the bulldozed portion of the powerline (the new right-of-way boundary) and continuing inland at 65 degrees T.N. for at least another 100 feet (30 m.) [Walsh and Hammatt 1995:51].

In 1996, Cultural Surveys Hawai'i conducted an archaeological inventory survey (Colin et al. 1996) with limited subsurface testing within a 224.43-acre project site (TMK [3] 7-3-09: 017) for Kimura International. Fifty-five (55) sites were identified within the project area. All identified sites were of pre-Contact traditional Hawaiian origin and included the following site types: *ahu* (rock cairn) simple agricultural features, recurrent and temporary habitation sites, trails, enclosures, walls, and a quarry. The Colin et al. 1996 report was reviewed by the State Historic Preservation Division twice (8/15/1996 and 4/7/1997), however, during the review process the project was terminated; project funding stopped and final revisions to the report were not completed. Thus the Colin et al. report (1996) was never accepted by SHPD. An update for this report is currently in the process of being re-submitted to SHPD after recent re-survey; the recent fieldwork was done concurrently with the fieldwork for the present project area, consisting of the TMK 17 portion of the CSH Kohan 1 project.

A series of studies (Haun & Henry 2000, 2002, Haun et al. 2003) were carried out on a 102-acre Kaloko Industrial Park parcel *makai* of the present project area on the south side of Hina-Lani Street. Of note is the fairly dense and widely distributed site concentration and also extensive areas of both 'a' *ā* flow and bulldozing that are shown as widening as they approach the present study area adjacent to the east. Also of note is the jeep road in their project area labeled "Huehue Ranch Road", which continues into the current project area. This is likely the road that was cut around 1955 by Huehue Ranch during construction of the Kailua pier.

In recent years a number of studies have been undertaken in the Kaloko Mauka lands (east and upslope from the present project area) including studies by Barrera Jr. (1993), Nees & Williams (1995), Rechtman (1998), Rechtman and Henry (1999), Rosendahl (2000), Clark & Rechtman (2002), Rechtman and Rivera (2002), Puette & Dye (2003), Rechtman (2003), and Elmore et al. (2004).

In 2005 Wolforth et al. conducted an archaeological inventory survey of the northern portion of the Kaloko Heights Project (TMK [3] 7-3-09: 032), located immediately east of the current project area. A total of 89 sites were identified, consisting of burials, permanent habitations, temporary habitations, religious sites, trails, boundary walls, and agricultural sites. A historic

wall that runs along the *ahupua'a* boundary between Kaloko and Kohanaiki extends from TMK 32 into TMK 25.

In 2007, CSH completed an archaeological inventory survey of a 224+ acre project area in Kaloko and Kohanaiki [TMK (3) 7-3-009:017], *makai* of and adjacent to the current project area. A total of 59 historic properties were identified within the project area; 53 of the historic properties were previously identified and 6 were newly recorded during the inventory survey investigation. CSH had previously conducted an archaeological inventory survey (Colin et al. 1996, see above) in the same project area in 1996 with limited subsurface testing for Kimura International; the project was terminated during the review process. Fifty-five (55) sites were identified in 1996. All identified sites were of pre-Contact traditional Hawaiian origin and included the following site types: *cairn* (rock cairn) simple agricultural features, recurrent and temporary habitation sites, trails, enclosures, walls, and a quarry. During the 2007 inventory survey two sites (Site -20706 & -20741) identified by Colin et al. were determined to be outside of the project area, likely due to the lack of GPS technology during the 1996 survey.

3.2.2 Archaeological Studies Conducted within the Present Project Area

The following is a summary of previous archaeological studies conducted within the current project area, discussed in chronological order (see Table 1 above, bold entries). Table 2 (below) lists historic properties identified in the current project area that have previously been assigned State Inventory of Historic Property numbers.

Survey work was undertaken in 1970-71 by Renger inland of the highway - i.e. that middle zone of Kaloko that includes a portion of the present study area. Although the findings of much of this fieldwork within the middle zone were written up in detail (Cordy et al. 1991), the findings from the survey sample conducted specifically within the project area (i.e. that portion of the middle zone situated on the inland side of the Queen Ka'ahumanu Highway) were not included because, "regrettably... it appears that the maps and survey records have been misplaced since the end of the 1971 field season" (Cordy et al. 1991:340). Renger's summary of the findings from that part of the survey indicated that fifteen features were identified:

Very few sites were discovered within the "transitional middle zone" ... between the coastal and upland exploitation zones ... Seven lava tube shelters, four trails (coast-upland), three platforms, two cairns ... two low-walled enclosures, and an L-shaped structure were recorded. (cited in Cordy et al. 1991:340)

These sites are presumably the subject of a set of Renger's (1971) "Kaloko Field Notes" that begins "*Mauka* Excavations" but in the apparent absence of any site location map it is difficult to relate these notes to specific sites in the field.

It is our understanding that Lloyd Soehren (1979) conducted a reconnaissance survey of the Kaloko access road corridor, understood as the present alignment of present Hina-Lani Street, but identified no sites.

In 1989 Margaret Rosendahl conducted an archaeological inventory survey of a 200 ft.-wide corridor along the boundary separating O'oma 2 and Kohanaiki, north of the project area, for a water system. Survey results included the identification of four sites that included quarrying pits, a ceremonial/habitation complex, a marker, and a historic wall. The wall, Site -5699, ran along

“the inland boundary of the survey corridor” (Rosendahl, M 1989:13). During the current survey, 15 m of the wall’s south end extends within the project area, and continues roughly north for at least 500 m. The rubble-fill method of construction indicates the wall is historic. No further work was originally recommended, although possible inclusion into landscaping was suggested for consideration (Rosendahl 1989:14).

In 1991 Drolet and Schilz conducted an archaeological inventory survey of 8.8 acres in O‘oma 2, north of and adjacent to the current project area. Survey findings included the identification of 29 sites including two cave complexes, site -16103 and -16104, that extend into the current project area. Nelson et al. (2006:66) found that the two caves connect and actually consist of one subsurface complex. They referred to the sites as -16103. Drolet and Schilz (1991:27-28) determined that the sites were significant and their project, as planned, would avoid the sites and provide a “10 meter buffer zone” around them. Nelson et al. (2006:66) describe the site as containing “several architectural modifications, a plethora of cultural debris, and a single human burial.” They determined that “site 16103 retains integrity of location and is in good condition for an archaeological ruin” (Nelson et al 2006:66). CSH only had access solely to this site description since their report is currently under review by the SHPD.

In 2003, Archaeological Consultants of the Pacific, Inc. (Cobb et al. 2003) conducted an archaeological assessment of TMK (3) 7-3-009: 025, 026, and 028. One hundred fifty-four (154) features were identified and included “caves, walls, mounds, platforms, enclosures, trails, *cairn*, “C”-shaped structures, possible *heiau*, terraces, alignments and modified outcrops” (Cobb et al. 2003:1). Each feature was identified with a number prefaced with “TF”, and descriptions included feature type, a brief description, possible function and a preliminary significance evaluation. The report map does not show the location of particular sites found during the survey but has colored points for sites indicating “High Concern, Potential High Concern, and Minimal Concern” (Cobb et al. 2003:5). The current project area was included in the survey and several site tags from the 2003 survey were found in sites recorded during the current project (see Table 3 & Table 4 below).

In 2005 CSH completed an archaeological field inspection of a 1200+ acre project area in Kaloko and Kohanaiki [TMK (3) 7-3-009:017, 025, 026, and 028] that included the current project area. Numerous pre-Contact sites including, habitations, agricultural features, petroglyphs, boundary walls, and burials were observed (Shideler & Hammatt 2005).

Table 2. Historic Properties Previously Identified within the Current Project Area

SIHP No.	Site Type	Function	Age	Reference
50-10-27-5699	Wall	Animal Husbandry	Historic	Rosendahl, M 1989
50-10-28-6601	Kona Field System	Agricultural	Pre-contact	Wolforth et al. 2005 in immediately <i>mauka</i> parcel, multiple other sources
50-10-27, 28-10712	Wall	<i>Ahupua'a</i> boundary/Animal Husbandry	Historic	Kennedy 1983, 1984; Wolforth et al. 2005
50-10-28-10714	Trail	Transportation	Pre-contact/ Historic	Wolforth et al. 2005
50-10-28-16103	Lava Tube	Permanent Habitation and Burial	Pre-contact	Drolet & Schilz 1991; Nelson et al. 2007 (currently under review by SHPD)
50-10-27,28-26418	Trail	Transportation	Pre-contact	Esh et al. 2008 (currently under review by SHPD)

3.3 Background Summary and Predictive Model

3.3.1 Settlement Pattern

Kaloko Ahupua'a and Kohanaiki Ahupua'a are located within the Kekaha region of North Kona. The Kekaha region, or "Kekaha-Waiole, the desolate land without water" (Kelly 1973:74) refers to the barren lava fields extending north from Kailua-Kona to Anaeho'omalu (Kelly 1973:74).

As has been observed in Kaloko, Kohanaiki and other *ahupua'a* in Kekaha, this band of barren lava fields does not encompass the entire *ahupua'a* nor does it inhibit land usage from occurring along the coast and inland where rainfall is sufficient for intensive agriculture. Instead, Kekaha refers more accurately to portions or "zones" of the regions where lava flows encompass the lands which - according to elevation - sustain little rainfall. Correspondingly, the lands of Kekaha are suggested, based on ethnographies, ethno-histories and archaeological sources, to contain three general terrestrial zones that directly influenced land usage of prehistoric and historic populations. These three zones include: (1) Coastal; (2) Intermediate or Transitional and; (3) Upland. Based on the archaeological record of the present study area and previous archaeology in the Kaloko *ahupua'a* (Cordy et al. 1991) a land usage summary of each zone is provided below.

3.3.1.1 Coastal Zone

The Coastal zone begins at sea level and extends to approximately 15 ft. a.m.s.l. The zone contains evidence of prehistoric and historic settlement in both Kaloko and Kohanaiki.

Traditional Hawaiian Land Use-Coastal Zone

Kaloko contained a permanent settlement concentrated along the coast. The settlement probably comprised "several local residential groups with constituent households. One household headed each residential group" (Cordy et al. 1991:522). Radiocarbon dating for the coastal region within Kaloko Ahupua'a has produced dates ranging between A.D. 920 and A.D. 1430 (Cordy et al. 1991:465). Cordy concludes that one site (D13-3) on the Kaloko coast - with date ranges between A.D. 920-980 and A.D. 1005-1290 is one of the oldest permanent habitation known in leeward Hawaii (Cordy et al. 1991:473).

Although few absolute dates are known for the construction of fishponds, Cordy conjectures that the Kaloko and Honokohau fishponds were constructed by at least the A.D. 1400-1500 period (Cordy et al. 1991:576).

3.3.1.2 Intermediate Zone

The Intermediate Zone extends from the *mauka* margin of the coastal zone (15 ft. a.m.s.l.) to approximately 400 ft. a.m.s.l. Similar to other portions of Kekaha, the intermediate zone of Kaloko and Kohanaiki is characterized by low rainfall and un-eroded lava terrain.

Traditional Hawaiian Land Use-Intermediate Zone

The Intermediate Zone of Kaloko and Kohanaiki contained a scattered distribution of habitations of different modes (i.e. temporary and recurrent) which were generally located within

the vicinity of *mauka/makai* trails or in association with other functional site types like agricultural and lithic resource procurement.

The general lack of consistent rainfall and virtual absence of soil directly limits agricultural use within the Intermediate Zone. Nonetheless, small concentrations of mounds, modified outcrops (enclosing minimal soil areas), enclosures, and some *pāhoehoe* excavations evidence a degree of agricultural productivity. Lava tubes and blisters are abundant in this zone and contain temporary components, and post-habitation burial interments.

The Intermediate Zone is also characterized by an extensive network of *mauka/makai* trails. These trails facilitated inter-*ahupua'a* travel of residence between their coastal habitation and the Upland agricultural fields.

Within the Intermediate Zone permanent habitation may occur directly adjacent to the Coastal Zone and are associated with small scale agricultural activities.

3.3.1.3 Upland Zone

The Upland Zone of Kaloko and Kohanaiki begins at approximately 400 ft. a.m.s.l. and continues *mauka*. The Upland Zone is characterized by an increase in permanent habitation sites, in association with intensive non-irrigated (dry land) agricultural features. Gradually, the ascending natural landscape contains a greater soil base and due to an increase in elevation, the rainfall is more plentiful and consistent. The present project area is located within this zone.

Traditional Hawaiian Land Use-Upland Zone

Intensive non-irrigated agriculture is characteristic of the Kona slopes and other regions of Hawaii and Maui where irrigation, because of the lack of perennial waterways, is not possible. The “Kona Field System” - generally defined by a grid-like patterning of stone constructed field boundaries - represents an interrelated network of intensive non-irrigated agriculture covering an estimated area of 139 km² (456,037 ft.)² between Kealahou Bay and Kailua Bay (Kirch 1985:225). Archaeological studies beyond the arbitrary northern boundary of the “Kona Field System”, have documented evidence of intensive non-irrigated agriculture in the Kekaha region within the Upland Zone between 400 to 1200 ft. a.m.s.l. (i.e., Cordy 1985; Hammatt et al. 1987; Walker and Rosendahl 1990; Robins et al. 1993).

Intensive non-irrigated agriculture is characterized by concentrated occurrences of similar feature types (i.e. field walls, modified *'a'ā* lava, *pāhoehoe* excavations, and mound complexes). Variations in the methods of non-irrigated agriculture occur as a response to topographical and geological variation, and rainfall in the region. Radiocarbon dates taken from upland field shelters within the Kona Field System indicates that intensive agriculture began developing between ca. A.D. 1400 - 1600 and intensified with permanent upland settlements between ca. A.D. 1600 - 1779 (Schilt 1984).

3.3.1.4 Settlement Pattern Summary

The settlement pattern described above reveals a variety of land uses across all zones - including the Intermediate Zone - during the prehistoric and early historic period. The pattern then dramatically changed during the middle to late historic period (post *māhele* ca. 1850's).

The original settlement of both Kaloko and Kohanaiki was focused on the coast starting around 900 A.D. (Cordy et al. 1991). These earlier settlers were likely drawn to the coast by the presence of potable water found in the brackish ponds, the excellent fishing, and Kaloko specifically to which offered one of the most protected inlets on the Kona Coast (Cordy et al. 1991:575).

Radiocarbon dates from the Kekaha region, may indicate that all three zones of the Kaloko and Kohanaiki Ahupua'a were utilized to some degree or another as early as A.D. 1280 (Walker and Haun 1988). This period of time correlates with an apparent population increase and geographical expansion in the Hawaiian islands identified as the "Expansion Period" (Kirch 1985:303) or the middle of the "Pioneer Settlement" (Schilt 1984:276). Permanent settlement continued to be centered on the coast and agriculture developed upland as the endemic forest lands were gradually reduced by slash-and-burn methods.

Development of the intensive upland agricultural system probably occurred between ca. A.D. 1400 and 1650 (Schilt 1984:277) and focused along the more prime agricultural lands, at elevations where soil was abundant and rainfall sufficient for productive cultivation. During this period permanent settlement continued to be centered at the coast but also began to be developed in the upland localities of Kaloko and Kohanaiki, as the distance between the upland farms and original coastal settlement expanded. By the end of this period it is expected that most of the upland permanent habitations were occupied. This period is when the fishponds in Kaloko were likely constructed and a four class hierarchy: "ruler, high chiefs, local chiefs and commoners" was formed in Hawaii (Cordy et al. 1991:575).

During early historic times (ca A.D. 1800-1840) following western contact, Kaloko and Kohanaiki populations undoubtedly declined rapidly due to disease, and a major shift in the traditional Hawaiian settlement pattern. The residents who survived disease likely shifted their residences to economic centers - such as Kailua-Town - or in closer proximity to major roadways and localities of churches and schools established by the missionaries.

Following the Māhele (ca 1850's), Kaloko and Kohanaiki shorelines were virtually abandoned "with the Kohanaiki Homesteads the new upland population focus in the Kaloko area" (Cordy et al. 1991:580). As a result, the vacant lands were subsequently acquired for cattle ranching.

3.3.2 Project Area Predictive Model

The present project area's location within the interpreted "upland zone" places it within an area where an increase of permanent habitation and agricultural intensity is expected. The lower elevation (*makai*) portion of the project area is closer to the "intermediate zone" and therefore is somewhat outside the major areas of pre-contact Hawaiian habitation and activity; a lower density of archaeological sites is expected in this region. The higher (*mauka*) regions of the project area have higher rainfall, some soil formation, and a greater number of large lava tubes; density of sites is therefore expected to increase with elevation. It is thus suggested that traditional Hawaiian sites likely to occur within the project area would include:

- 1) temporary and permanent habitations, with increasing frequency of permanent habitation on the *mauka* slopes of the project area;

- 2) limited agricultural activity areas including *pāhoehoe* excavations and minimal soil enclosures in the lower elevation regions of the project area, with increasing agricultural intensity upslope (i.e., portions of the Kona Field System);
- 3) *mauka/makai* trails connecting coastal residences and upland agricultural areas, with branch trails extending to specific use areas within the project area; and
- 4) burial sites utilizing features of the terrain - including lava tubes, blisters, and cracks.

As noted above, during the decades following western contact, populations of both *ahupua'a* would have declined significantly - reduced by disease and out migration to developing commercial centers. As the western commercial model continued to displace the traditional subsistence economy, localities like the present project area would have been further marginalized and abandoned. Land Commission Award documents indicate that by the middle of the 19th century, habitation and activity within Kaloko (and likely Kohanaiki as well) had shifted far *mauka* to land between 1200 and 1700 ft. elevation near the Government Road. During the second half of the 19th century this *mauka*-ward shift is fully established with the formation of the Kohanaiki Homesteads near the Government Road. Throughout the 19th century, use of the project area would likely have been limited to use of existing *mauka/makai* trails for ocean access by *ahupua'a* residents of the uplands.

Into the 21st century, major developments within Kohanaiki and Kaloko have occurred outside the project area, which has remained undeveloped. Activities of the Huehue Ranch (established early in the 20th century), including walls and fencing, may have impacted the project area. Such activities are evidenced by the wall along the Kaloko-Kohanaiki boundary, i.e. site 40 recorded by Kennedy (1984) and Wolforth et al. (2005) in the project area (SIHP # - 10712). As Cordy (1991) notes, documentary evidence - including the absence of the wall in J.S. Emerson's 1888 notes and maps - suggests that the wall was constructed for the ranch in the early 1900s.

Section 4 Results of Fieldwork

4.1 Survey Findings

A total of 120 historic properties were identified within the project area (Table 3 and Table 4). Six of the historic properties were previously recorded (see Table 2 above) and 114 were newly recorded as part of the current inventory survey investigation. Cultural Surveys Hawai'i (CSH) temporary field numbers and corresponding State Inventory of Historic Properties (SIHP) numbers for each historic property are listed in Table 3 and Table 4. Some of these historic properties were previously noted in an archaeological assessment within the project area by Cobb et al. (2003), as well as some properties being more recently identified at the north parcel boundary by Nelson et al. (2006). These previously assigned temporary field numbers are listed in Table 3 and Table 4, when a definite match could be made.

Definitions of site/feature types and functional categories are discussed below, and a summary of findings can be found in the Summary and Interpretation Section. Table 16 in the Significance Assessments Section below lists significance and mitigation recommendations, as well as site type and function for specific features within sites (only primary site type and function are listed in Table 3 and Table 4). All sites within the USGS Keahole Point Quadrangle (a total of 13 sites within the project area) have a state site number with prefix "50-10-27", and all sites within the USGS Kailua Quadrangle (a total of 107 sites within the project area) have a state site number with prefix "50-10-28". Two of these sites cross the boundary between the USGS Quadrangles: Site -10712 is a long *mauka/makai* running *ahupua'a* wall; and site -26418 is a long trail that begins in the current project area (Keahole Point Quadrangle) but the majority of which is located in an adjacent southern parcel (TMK: [3] 7-3-009:28; Kailua Quadrangle). Both of these sites are listed in the Keahole Point Quadrangle table.

Table 3. Archaeological Site Summary (Keahole Pt. Quadrangle)

SIHP No. (50-10-27-	Temporary Field No.*	Site Type	Function	Age
10712	07-029	Wall	Animal Husbandry	Historic
26418	07-551	Trail	Transportation	Pre-Contact
26475	07-400	Lava tube	Temporary Habitation	Pre-Contact
26476	07-397	Mound	Agriculture	Historic
26477	07-401	Lava tube	Temporary Habitation	Pre-Contact
26478	07-137	Complex	Burial & Temporary Habitation	Pre-Contact
26479	07-390	Enclosure	Permanent Habitation	Pre-Contact
26480	07-391	Lava tube	Burial & Temporary Habitation	Pre-Contact
26481	07-222	Lava tube	Temporary Habitation	Pre-Contact
26482	07-383, TF-186	Lava tube	Water Collection	Pre-Contact
26483	07-357	Lava tube	Water Collection	Pre-Contact
26484	07-393	Lava tube	Water Collection	Pre-Contact
26485	07-375	Lava tube	Permanent Habitation	Pre-Contact

Table 4. Archaeological Site Summary (Kailua Quadrangle)

SIHP No. (50-10-28-	Temporary Field No.*	Site Type	Function	Age
5699	07-294	Wall	Animal Husbandry	Historic
6601	07-420, TF-120	Complex	Agriculture	Pre-Contact
10714	07-150	Trail	Transportation	Pre-Contact/ Historic
16103	07-295, RC-0312 T15	Lava tube	Burial & Permanent Habitation	Pre-Contact
26486	07-353	Complex	Permanent Habitation	Pre-Contact
26487	07-351	Enclosure	Permanent Habitation	Pre-Contact
26488	07-352	Lava tube	Burial	Pre-Contact
26489	07-356	Complex	Permanent Habitation	Pre-Contact
26490	07-374	Lava tube	Temporary Habitation	Pre-Contact
26491	07-349	Platform	Permanent Habitation	Pre-Contact
26492	07-223	Lava tube	Water Collection	Pre-Contact
26493	07-371	Lava tube	Water Collection	Pre-Contact
26494	07-347	Complex	Permanent Habitation	Pre-Contact
26495	07-358	Lava tube	Temporary Habitation	Pre-Contact
26496	07-345, TF-205	Complex	Temporary Habitation	Pre-Contact
26497	07-368	Modified outcrop	Indeterminate	Pre-Contact
26498	07-343	Lava tube	Burial & Temporary Habitation	Pre-Contact
26499	07-359	Lava tube	Temporary Habitation	Pre-Contact
26500	07-265	Lava tube	Temporary Habitation	Pre-Contact
26501	07-225	Lava tube	Burial & Water Collection	Pre-Contact
26502	07-362	Complex	Permanent Habitation	Pre-Contact
26503	07-224	Lava tube	Burial & Water Collection	Pre-Contact
26504	07-260	Lava tube	Water Collection	Pre-Contact
26505	07-364	Lava tube	Water Collection	Pre-Contact
26506	07-267	Lava tube	Temporary Habitation	Pre-Contact
26507	07-322, TF-173	Complex	Agriculture	Pre-Contact
26508	07-366	Lava tube	Temporary Habitation	Pre-Contact
26509	07-324	Lava tube	Burial	Pre-Contact
26510	07-258, RC-0312 T13	Complex	Burial, Water Collection & Ceremonial	Pre-Contact
26511	07-227	Lava tube	Temporary Habitation	Pre-Contact
26512	07-229	Lava tube	Temporary Habitation	Pre-Contact

SIHP No. (50-10-28-	Temporary Field No.*	Site Type	Function	Age
26513	07-255	Complex	Temporary Habitation	Pre-Contact
26514	07-340	Complex	Permanent Habitation	Pre-Contact
26515	07-251	Platform & Cairns	Burial	Pre-Contact
26516	07-264	Modified outcrop	Storage	Pre-Contact
26517	07-274	Lava tube	Water Collection	Pre-Contact
26518	07-334	Enclosure	Permanent Habitation	Pre-Contact
26519	07-252	Complex	Permanent Habitation	Pre-Contact
26520	07-275	Lava tube	Burial, Ceremonial, & Animal Husbandry	Pre-Contact/ Historic
26521	07-254	Lava tube	Shelter	Pre-Contact
26522	07-247	Lava tube	Burial & Water Collection	Pre-Contact/ Historic
26523	07-291	Platform	Temporary Habitation	Pre-Contact
26524	07-336	Lava tube	Temporary Habitation	Pre-Contact
26525	07-232	Lava tube	Temporary Habitation	Pre-Contact
26526	07-241	Cairn	Marker	Pre-Contact
26527	07-233	Lava tube	Temporary Habitation	Pre-Contact
26528	07-242	Lava tube	Water Collection	Pre-Contact
26529	07-288	Lava tube	Burial & Water Collection	Pre-Contact
26530	07-335	Platform	Temporary Habitation	Pre-Contact
26531	07-240	Enclosure	Agriculture	Pre-Contact
26532	07-276	Lava tube	Burial & Temporary Habitation	Pre-Contact
26533	07-277	Platform	Agriculture	Pre-Contact
26534	07-239, TF-165	Complex	Permanent Habitation	Historic
26535	07-297	Platform	Permanent Habitation	Pre-Contact
26536	07-234	Wall	Animal Husbandry	Historic
26537	07-296	Lava tube	Water Collection	Pre-Contact
26538	07-330	Lava tube	Burial & Temporary Habitation	Pre-Contact
26539	07-287	Complex	Temporary Habitation	Pre-Contact
26540	07-298	Cairn	Marker	Pre-Contact
26541	07-286	Cairn	Marker	Pre-Contact
26542	07-337	Platform	Temporary Habitation	Pre-Contact
26543	07-299	Wall	Marker	Pre-Contact
26544	07-332	Enclosure	Permanent Habitation	Pre-Contact
26545	07-326	Lava tube	Activity Area	Pre-Contact

SIHP No. (50-10-28-	Temporary Field No.*	Site Type	Function	Age
26546	07-314	Lava tube	Water Collection	Pre-Contact
26547	07-325, TF-211	Lava tube	Burial	Pre-Contact
26548	07-238, TF-166	Lava tube	Temporary Habitation	Pre-Contact
26549	07-312	Terrace	Agriculture	Pre-Contact
26550	07-303	Lava tube	Temporary Habitation	Pre-Contact
26551	07-441	Modified outcrop	Quarry	Pre-Contact
26552	07-304	Complex	Permanent Habitation	Pre-Contact
26553	07-301	Lava tube	Temporary Habitation	Pre-Contact
26554	07-284	Lava tube	Water Collection	Pre-Contact
26555	07-311	Lava tube	Temporary Habitation	Pre-Contact
26556	07-302	Platform	Burial	Pre-Contact
26557	07-313	Lava tube	Water Collection	Pre-Contact
26558	07-331, TF-200	Platform	Permanent Habitation	Pre-Contact
26559	07-328	Platform	Burial	Pre-Contact
26560	07-283	Trail	Transportation	Pre-Contact
26561	07-308	Cairn	Marker	Pre-Contact
26562	07-236	Complex	Burial & Permanent Habitation	Pre-Contact
26563	07-315, TF-199	Lava tube	Water Collection	Pre-Contact
26564	07-317	Lava tube	Burial	Pre-Contact
26565	07-403	Complex	Permanent Habitation	Pre-Contact
26566	07-402	Lava tube	Water Collection	Pre-Contact
26567	07-320	Mound	Agriculture	Pre-Contact
26568	07-406	Lava tube	Burial & Water Collection	Pre-Contact
26569	07-404	Lava tube	Burial & Water Collection	Pre-Contact
26570	07-318	Lava tube	Burial & Water Collection	Pre-Contact/ Historic
26571	07-407	Cairn	Marker	Pre-Contact
26572	07-281	Complex	Agriculture	Pre-Contact
26573	07-279	Lava tube	Temporary Habitation	Pre-Contact
26574	07-409, TF-197	Complex	Permanent Habitation	Pre-Contact
26575	07-329	Lava tube	Water Collection	Pre-Contact
26576	07-412	Lava tube	Burial & Temporary Habitation	Pre-Contact
26577	07-413	Mound	Permanent Habitation	Pre-Contact
26578	07-425	Lava tube	Temporary Habitation	Pre-Contact
26579	07-424	Cairn	Marker	Pre-Contact
26580	07-323	Enclosure	Permanent Habitation	Pre-Contact

SIHP No. (50-10-28-	Temporary Field No.*	Site Type	Function	Age
26581	07-439	Lava tube	Temporary Habitation	Pre-Contact
26582	07-426	Lava tube	Burial	Pre-Contact
26583	07-428, TF-196	Complex	Permanent Habitation & Ceremonial	Pre-Contact
26584	07-427	Complex	Transportation	Pre-Contact
26585	07-430	Complex	Permanent Habitation	Pre-Contact
26586	07-415	Cairn	Marker	Pre-Contact
26587	07-432	Mound	Agriculture	Pre-Contact
26588	07-431	Enclosure	Permanent Habitation	Pre-Contact

* Temporary field numbers from the current inventory survey begin with "07-". Temporary field numbers beginning with "TF-" correlate to those found in Cobb et al. (2003), and temporary numbers beginning with "RC-" correspond to those used for Nelson et al. (2007; currently under review by SHPD).

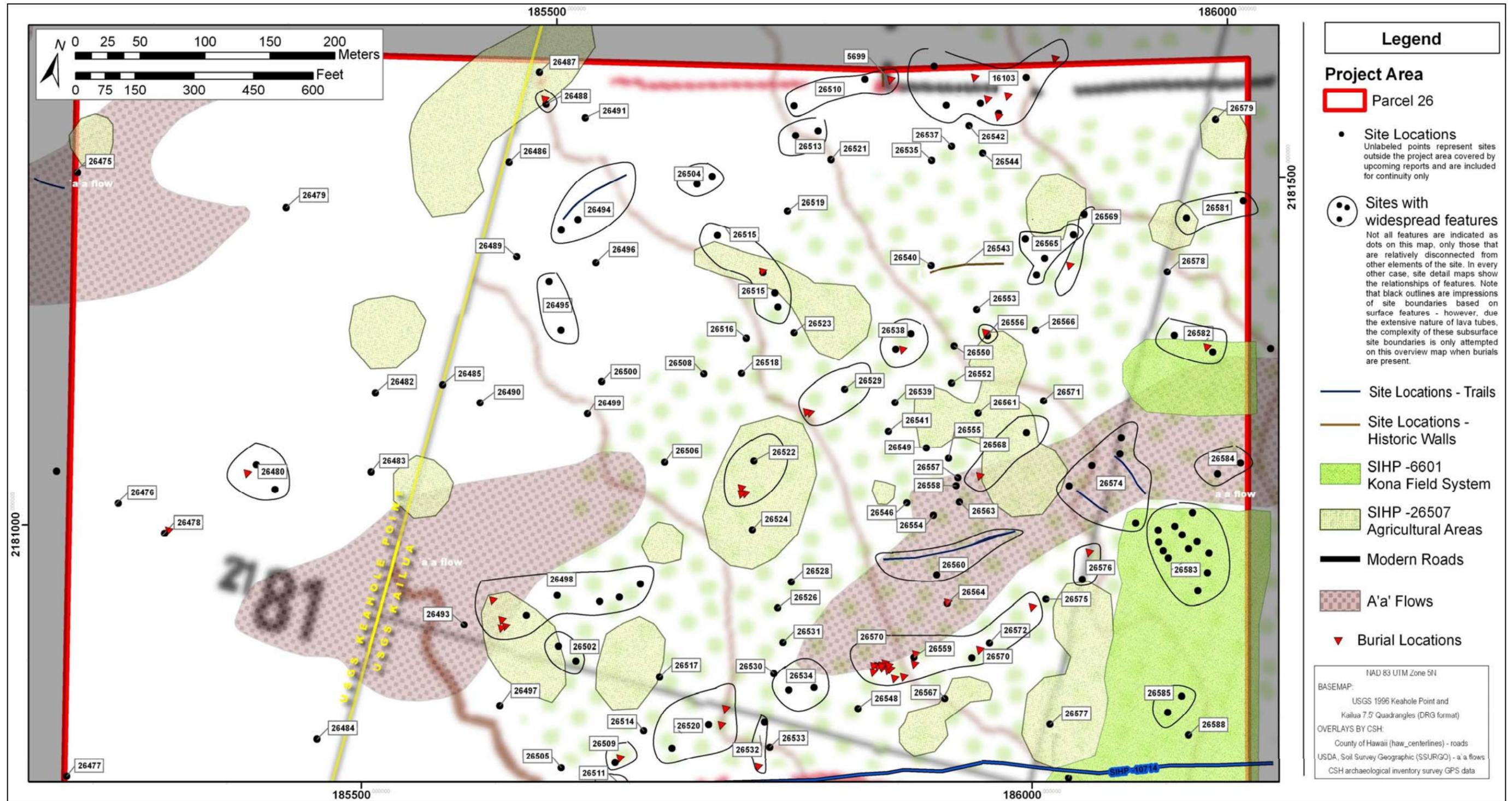


Figure 13. Portion of USGS topographic map showing the locations of historic properties within the northern portion of the project area

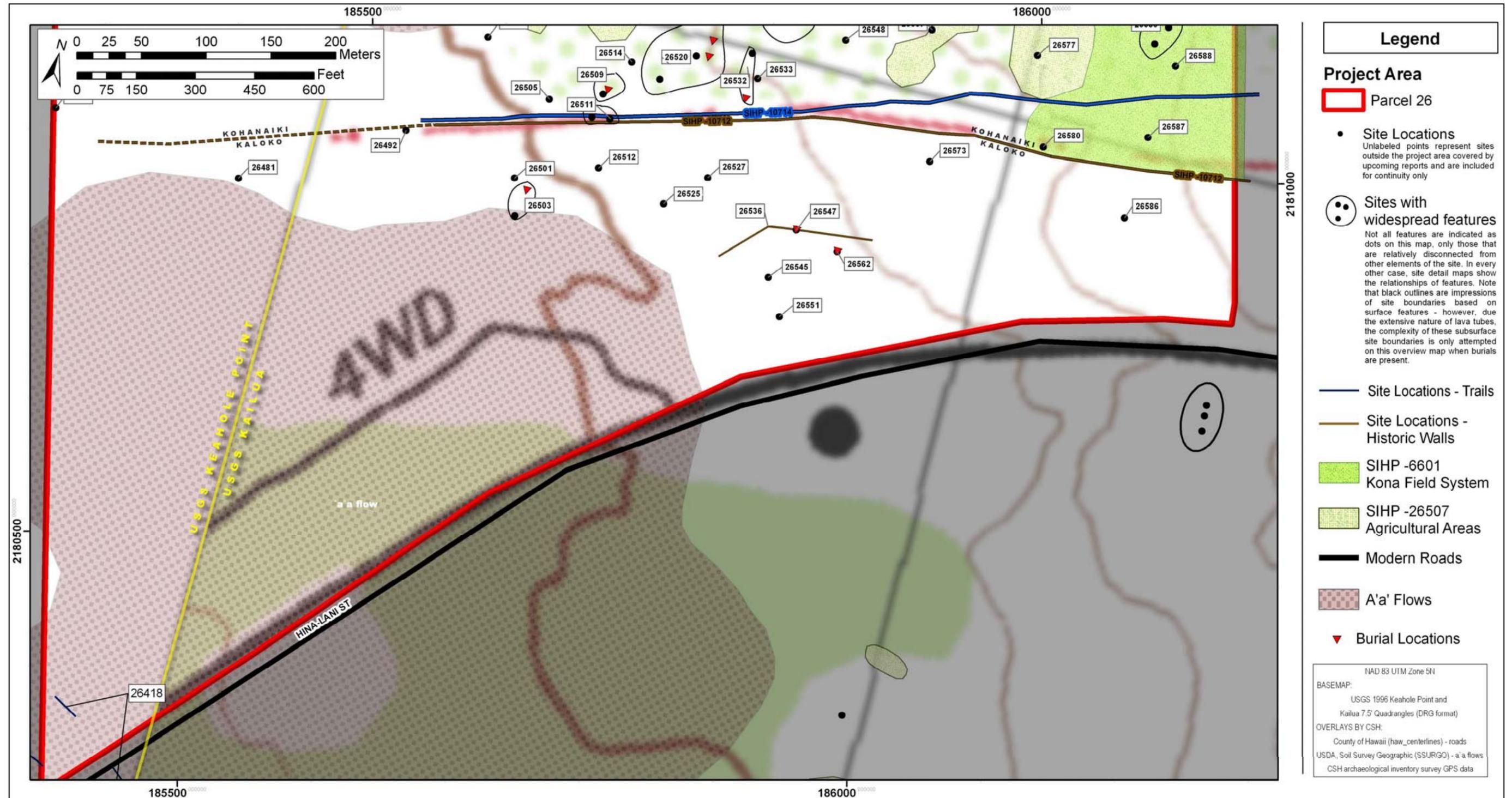


Figure 14. Portion of USGS topographic map showing the locations of historic properties within the southern portion of the project area

4.1.1 Formal Feature Types

Formal feature type designations are descriptive - based on physical characteristics - and commonly refer to structural elements of a site rather than the functional aspects. Seventeen primary feature types were identified within the project area (Table 5). The following are brief descriptions of the different feature types commonly encountered in the project area:

Alignment: A single row of stones one or more courses high. Alignments have less formal construction than walls and may represent a structural remnant.

Cairn: A marker of stacked or piled stones. A cairn may be square, rectangular, oval, round, or irregular. Generally cairns are stacked higher (greater overall height relative to the base width) and are smaller than mounds. Cairns are frequently referred to as *ahu*.

Complex: Two or more modifications or structures of multiple formal feature types. Modifications within a complex are generally within close geographical proximity but grouped together based primarily upon shared function.

Constructed Entrance: Lava tube or blister entrances that have been modified in part or whole through the placement or removal of rocks for the various functions including preventing, restricting, or enabling access, concealing a lava tube's presence or prohibiting wind flow to facilitate water collection. This feature type often utilizes and enhances the natural shape of the tube opening to create a more convenient entryway or habitation area.

Enclosure: A walled structure which completely encloses an area (square, rectangular, oval, round, or irregular in shape) or which partially encloses an area (C-, L-, or U-shape).

Hearth: Generally a circular or rectangular area enclosed with placed rocks. Ash or a lens of burned material is often present.

Lava Blister: Modifications or apparent usage of a small subterranean lava formation with an opening to the surface. Blisters are formed by the swelling of the crust of a lava flow due to gas or vapor beneath the flow, creating an opening under the surface. This subterranean space is the primary focus for utilization and modification, unlike excavated shallow collapsed blisters which are utilized as a modified depression. Unlike lava tubes, blisters tend to be relatively circular and do not extend in any direction for a great length.

Lava Tube: Modifications or apparent usage of a subterranean lava formation characteristic of *pāhoehoe* lava flows with an opening to the surface. Lava tubes are typically larger and longer than blister caves. Lava tubes are common within the project area and "Lava Tube" is a common site type, referring to a lava tube formation that has been utilized for varying purposes. As a site type, this generally encompasses the whole lava tube or an entire chamber of a lava tube. When "Lava Tube" is used as a feature type within a larger site, it refers to a specific area of modification/construction within the tube that does not fall into another feature type category. For example, a mound within a lava tube would be given the feature type "Mound", but modification within a lava tube consisting of, for instance, clearing and an upright slab, would simply be categorized as "Lava Tube" for feature type, as it does not clearly fit into any more specific category.

Modified Depression: An area in which stones have been removed to create a depression or to expose a soil area. Types of modified depressions include: shallow collapsed blisters that have been excavated; areas of exposed 'a'ā that have been excavated, and modified collapsed lava tubes that create a natural linear depression or sink. The purpose of utilizing a depression is commonly to create an area suitable for agriculture (possibly through soil or mulching) or as a storage area.

Modified Outcrop: An area within an existing lava flow exposure (outcrop) in which a portion of the flow has been humanly modified by the placement or removal of stones. This feature type includes modified tumuli (tumulus being geologically defined as an area where the pressure of slow-moving molten lava pushes the overlying crust upward to create an uplifted area, often with fractures running the length of the tumulus). A feature can be classified as a modified outcrop when the primary modification of the site is focused on the utilization of the bedrock exposure; often this involves filling cracks in the exposure or terracing edges to accommodate usage of the outcrop. For the purposes of this report, modified tumuli refer to bedrock exposures that are raised significantly above the surrounding terrain, usually more than a meter high; the rather prominent nature of these high tumuli significantly increases the frequency of human utilization, making a distinction useful for archaeological purposes.

Mound: Linear, circular or amorphous stone pile which typically lacks a vertical face and level surface. Mounds are used for purposes other than markers, such as planting, land clearing, and burial.

Pavement: A stone-filled floor or surface, which creates a flat and relatively smooth area flush with the ground surface.

Platform: A raised free-standing stone structure with three or more vertical faces and a relatively flat surface. A platform may be square, rectangular, oval, round, or irregular in shape.

Rock art: A carving or inscription on rock (petroglyph) or painting on rock (pictograph).

Terrace: A raised stone construction partially built against, or level to, a ground or outcrop surface. A terrace has no more than two vertical faces and is not totally free-standing. Terraces create relatively flat surfaces that are bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side.

Trail: A trodden surface, pavement, step-stone, or stone alignment set into the ground or outcrop surface that defines a pathway for transportation.

Wall: A bi-faced and free-standing stone structure which is an isolated segment or defines large boundaries. A wall is generally higher, longer and more formally constructed than an alignment.

Table 5 below tallies the total occurrences of these formal feature types in the project area by feature. There are a total of 277 features in the project area within 120 sites. Lava tubes are by far the most common feature type, followed by platforms, walls, mounds, terraces and enclosures. The majority of feature types are pre-contact in nature except for some animal husbandry walls; however, there are a few lava tubes with a historic component as well as a large walled enclosure with a platform inside that is associated with historic.

Table 5. Occurrences of Formal Feature Types (Total number of features: 277)

Formal Feature Type	Number of Sites	Percentage
Alignment	2	0.7
Cairn	17	6.1
Complex	2	0.7
Constructed Entrance	6	2.2
Enclosure	19	6.9
Hearth	1	0.4
Lava Blister	2	0.7
Lava Tube	63	22.7
Modified Depression	4	1.4
Modified Outcrop	14	5.1
Mound	27	9.7
Pavement	5	1.8
Platform	44	15.9
Rock Art	4	1.4
Terrace	23	8.3
Trail	12	4.3
Wall	32	11.6

4.1.2 Functional Categories

Function interpretation of a site or feature is determined by criteria that included: site construction and complexity; locational context (association with other sites and/or geological determinates); analysis of cultural remains (surface and subsurface); and external correlations with other archaeological sites in Hawai'i. Twelve primary function categories were identified among the sites within the project area, and are summarized in Table 6. The following are brief descriptions of the different function types commonly encountered in this general area:

Activity area: The feature represents the extent of space serving a special function, or the scope of a specific activity; this category includes activities like lithic production, storage, or fishhook manufacture. General activity areas which are more common and more specialized within the project lands are given their own category. Specifically, water collection and quarrying are each considered a separate primary function category (see below).

Agriculture: Primary function is for farming, horticulture, or subsistence planting.

Animal husbandry: The feature is associated with the care of livestock.

Burial: Used for the interment of human skeletal remains. This functional category is also used for human remains found out of primary context.

Ceremonial: Used for ritual or religious purposes.

Habitation: A place for living, which may be either temporary or permanent habitation. Temporary habitation sites are generally distinguished from shelters by an increased energy investment in modification and formal construction.

Indeterminate: The feature function could not be determined due to remnant status of site or ephemeral nature of modification.

Marker: A point visibly marked for the purpose of identifying a point on a line on the surface of the earth such as a boundary or trail.

Quarry: The mining of rock for various construction or utilization purposes.

Rock art: Petroglyphs and pictographs are functionally rock art.

Transportation: The feature was used as a road or trail.

Water collection: An area that was used to collect water, most often using a gourd or other type of vessel to collect moisture dripping from lava tube ceilings and walls. Also referred to as water catchment.

Table 6 below tallies the total occurrences of primary function categories of the 120 historic properties in the project area. The table is a count of primary site function, not individual feature function. The majority of sites are habitation areas, with burial, water collection, and agriculture also being very common. Several sites have dual functions, i.e., habitation areas with burials present. When this occurs, the functional category is considered "Temporary Habitation and Burial", for example. A few sites have multiple functions, i.e., habitation, burial, and intensive water collection at the same site, all with a similar level of intensity such that none could be considered only a secondary function. When this occurs, the functional category is considered

“Complex”. This occurs only rarely since sites were designated based not only on proximity of features, but also on an evaluation of similar functional aspects. Nonetheless, a few sites have multiple functions, and these complex sites include Site -26510 and -26520.

Table 6. Occurrences of Formal Function Types (Total number of Sites in Project: 120)

Function	Number of Sites	Percentage
Activity Area	1	0.8
Agriculture	10	7.5
Animal Husbandry	3	2.5
Burial	8	6.7
Burial & Permanent Habitation	2	1.7
Burial & Temporary Habitation	6	5.0
Burial & Water Collection	7*	5.8
Burial, Ceremonial, & Animal Husbandry	1	0.8
Burial, Ceremonial, & Water Collection	1	0.8
Indeterminate	1	0.8
Marker	8	6.7
Permanent Habitation	20	18.3
Permanent Habitation & Ceremonial	1	0.8
Quarry	1	0.8
Storage	1	0.8
Temporary Habitation	29	23.3
Transportation	4	3.3
Water Collection	16	13.3

*One of the sites contains a probable burial and is included in the count based on the likelihood that a burial is present.

4.2 Test Excavations Findings

Of the 120 sites recorded in the project area, a total of 32 sites required subsurface testing to aid in determining the function of the site, for a total of 63 test excavations conducted (Table 7); see also discussion of subsurface testing methods in Field Methods section above and Results of Laboratory Analysis below). Detailed discussion of specific testing results is included with the individual site description in Appendix A. Most subsurface testing was conducted to ensure that no burials were present at the site or to confirm function, though testing also examined subsurface deposits and attempted to collect charcoal for radiocarbon dating analysis.

A large percentage (one-third) of excavations focused on the agricultural modification within the project area, primarily to confirm function as agricultural and rule out the possibility of burial mounds. Eleven test excavations were completed at features of Site -26507, and ten excavations were completed at Site -6601 (Kona Field System). The majority of these excavations confirm the agricultural function and no burials were found. There was, however, a fairly large amount of habitation related cultural material present in a few of the agricultural features, and these likely represent intermittent or short-term habitation related to more intense agricultural activity in the *mauka* portion of the project area, as well as a general increase in habitation and land use on the *mauka* slopes.

Of a total 63 test excavation units, 21 test excavation units within 8 sites (-6601, -26494, -26497, -26502, -26507, -26509, -26519, -26530) were found to contain midden. A fair number of sites (19) had charcoal recovered, and nine of these charcoal samples were considered in good context for dating. Of these nine samples, five were sent to Beta-Analytic for radiocarbon dating analysis (see Results of Laboratory Analysis section below).

Most findings from subsurface testing improved interpretation of site function and in some cases changed initial impressions of function. Nearly all excavations into probable agricultural features were confirmed as being agricultural in function, and no burials were found in any mounds initially interpreted as agricultural. Several mounds or informal platforms that were initially of indeterminate function were confirmed as habitation platforms during excavation, as considerable midden was recovered (i.e., site -26577). These habitation platforms were initially not discernable as such because of heavy root and vegetation disturbance that collapsed large portions of them and created very non-level surfaces, making habitation seem unlikely until excavation revealed the extent of disturbance.

Four burials were located during excavation of features. Two of these burials were located in surface platforms (one very small platform with a cairn constructed on top of it, and one rather large platform on top of a natural rise). The other two burials were found in lava tubes, one located in a constructed mound in a small chamber, and the other in a formally constructed platform/retaining wall in a lava tube entrance chamber (see also Table 12 in Summary and Interpretation section below).

Table 7. Summary of Subsurface Testing

SIHP No.	Feature	Unit No.	Site Type	Function assessment prior to testing	Results
-6601	--	47-53, 55-57	Complex	Agriculture	Confirms agricultural function (Kona Field System); secondary function as activity area for tool making
-26476	--	60	Platform	Agriculture	Confirms agricultural function
-26489	C	18	Mound	Agriculture	Confirms agricultural function
-26494	A	17	Platform	Permanent Habitation	Confirms permanent habitation
-26497	--	15	Modified outcrop	Indeterminate	No findings, remains indeterminate
-26498	A	23	Modified outcrop	Temporary Habitation	Confirms temporary habitation
-26500	--	26	Lava tube	Temporary Habitation & Possible Burial	No burial found, confirms habitation function
	G	25	Terrace	Temporary Habitation	Confirms habitation function
	I	24	Terrace	Temporary Habitation	Confirms habitation function
-26502	A	27	Platform	Permanent Habitation	Confirms permanent habitation
	C	21-22	Platform	Permanent Habitation	Confirms permanent habitation
-26503	--	28	Lava tube	Water Collection & Possible Burial	Burial 62 found during excavation
-26507	B	31	Mound	Agriculture	Confirms agricultural function
	C	33	Mound	Agriculture	Confirms agricultural function with secondary habitation function
	D	34	Mound	Agriculture	Confirms agricultural function with secondary habitation function
	E	36	Enclosure	Agriculture	Confirms agricultural function
	F	37-38	Mound	Agriculture	Confirms agricultural function

SIHP No.	Feature	Unit No.	Site Type	Function assessment prior to testing	Results
-26507 (cont.)	J	59	Mound	Agriculture	Confirms agricultural function
	N	61	Mound	Agriculture	Confirms agricultural function
	R	62	Mound	Agriculture	Confirms agricultural function
	S	30	Mound	Agriculture	Confirms agricultural function
	X	41	Mound	Agriculture	Confirms agricultural function
-26509	--	16	Lava tube	Burial	Burial 60 found during excavation
-26515	A	10	Platform	Possible Burial & Marker	Burial 59 found during excavation
	C	19	Cairn	Marker	Function changed to agricultural
-26519	G	13	Mound	Permanent Habitation & Possible Burial	No burial found, confirms habitation function
	I	12-Nov	Platform	Permanent Habitation & Possible Burial	No burial found, confirms habitation function
	N	20	Lava tube	Permanent Habitation & Possible Burial	No burial found, confirms habitation function
-26530	--	14	Platform	Temporary Habitation	Confirms temporary habitation
-26533	--	63	Platform	Agriculture	Confirms agricultural function
-26535	--	7	Platform	Possible Burial	No burial found; function changed to permanent habitation
-26539	A	5	Platform	Temporary Habitation & Possible Burial	No burial found, confirms habitation function
-26542	--	9-Aug	Platform	Temporary Habitation	Confirms temporary habitation
-26549	--	6	Terrace	Agriculture	Confirms agricultural function
-26552	E	35	Mound	Permanent Habitation	Confirms habitation function
-26556	--	39	Platform	Burial	Burial 61 found during excavation
-26558	--	32	Platform	Permanent Habitation	Confirms permanent habitation

SIHP No.	Feature	Unit No.	Site Type	Function assessment prior to testing	Results
-26565	A	58	Platform	Permanent Habitation	Confirms permanent habitation function
-26567	--	2-Jan	Mound	Agriculture	No burial or evidence of habitation found, interpretation changed to agricultural clearing mound
-26568	--	40	Lava tube	Water Collection & Burial	Burial 54 found during excavation; also confirms water collection activity area function
-26572	C	29	Mound	Ceremonial & Possible Burial	No burial found, confirms agricultural or possible ceremonial marker function
-26574	C	42	Platform	Permanent Habitation	Confirms permanent habitation function
	D	43	Platform	Marker	Confirms marker function
	G	44	Platform	Permanent Habitation	Confirms permanent habitation function with secondary storage function
-26577	--	3	Platform	Agriculture and/or Temporary Habitation	Confirms temporary habitation function; additional function as shelter for nearby tube
-26582	A	54	Lava blister	Other	Function changed to shelter based upon excavation results
-26585	B	45	Platform	Possible Burial	No burial found, function changed to agriculture with secondary habitation function
-26587	--	4	Mound	Possible Burial	No burial found, function changed to agriculture
-26588	--	46	Enclosure	Permanent Habitation & Possible Burial	Confirms permanent habitation with possible ceremonial function

4.3 Site Descriptions

Due to the large number of sites in the project area, descriptions for individual historic properties were compiled in Appendix A. All site descriptions are included in this separate document, entitled: *Archaeological Inventory Survey of a 194.324-Acre Parcel within Portions of Kohanaiki and Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:025, Appendix A*. Cultural Surveys Hawai'i, Kailua, HI. The printed version of Appendix A is separated into Part 1 and Part 2, with the Table of Contents located in Part 1. Part 1 consists of all sites through Site -26519, and Part 2 consists of Site -26520 through Site -26588.

Section 5 Results of Laboratory Analysis

5.1 Midden Analysis

Midden (1,234.6 g) was recovered from 21 of the 63 test units in 32 sites excavated during the testing phase of the project (see Table 8). Charcoal and sediment samples were also collected from test excavations (see Table 9), and five carbon samples were sent for radiocarbon analysis (see Radiocarbon Analysis section and Table 10 below). The majority of test units were conducted to test for the presence of human remains, and to confirm function of the site. Four of the test units revealed human remains (see Table 7 above).

Marine midden (vertebrate and invertebrate, not including coral) accounted for approximately 65% (779.2 g) of all the midden recovered from the project area. Of the total marine midden inventory, 90% (704.7) represents shellfish, 9.3% are echinoderms (73.4 g), and 0.1% fish bone (1.1 g). The small amount of identifiable fish bone consisted of *Scaridae* and *Balistidae*: one *Scaridae* lower pharyngeal was recovered from Site -6601, Feature B54 (Unit 52) in Stratum II (60-120 cmbs); and one *Balistidae* tooth was recovered from -26558, Stratum III (40-50 cmbs). Coral was also present and consists of 205.8 g of recovered marine fauna.

The most common components of marine shell midden recovered in the project area include the following types in descending order: Snakehead cowry (*Cypraea caputserpentis*), Reticulated cowry (*Cypraea maculifera*), pipipi (*Nerita picea*), Cone shell (*Conus sp.*), Drupes shell (Thaididae), Pearl shell (*Isognomon sp.*), 'opihi (*Cellana sp.*), *Cymatium sp.*, Auger snail (*Terebra sp.*), and *Theodoxus sp.* The majority of these shellfish species are typically found in the tidal zone along rocky shores or sandy areas. Unidentified shellfish accounted for a majority of the shell midden found (106.8 g), and 23.7% of the marine midden inventory.

Of the total midden inventory, 35% (455.4 g) was terrestrial midden. Of the total terrestrial midden inventory approximately 95% was *kukui* endocarp, some of which was likely naturally deposited. Other terrestrial midden includes 11.2 g of goat bone (*Capra hircus*), 5.3 g of dog bone (*Canis sp.*), 0.2 g rodent bone, and the remaining 5.8 g consisted of unidentified mammal bone.

The predominance of marine midden recovered from the project area clearly attests that coastal resources were a primary source of protein-related food for the residents of the Kaloko and Kohanaiki Ahupua'a. This particular pattern, with a large amount of marine midden and relatively very little terrestrial resources (i.e., pig) in the midden is suggestive of a pre-contact pattern of subsistence. The shellfish types represented in the midden inventory are typically found in the tidal zones (shallow water) of both rocky and sandy areas with the bivalves of *Isognomon* possibly from a fishpond environment (Cordy et al. 1991:559). Additionally, *Theodoxus sp.* is commonly found in brackish waters such as the anchialine ponds that dot the shoreline of Kaloko and Kohanaiki Ahupua'a. Most of the shellfish species were likely obtained locally along the Kaloko/Kohanaiki coastline and are attributable to near shore shellfish collection.

Table 8. Midden Catalog (all depths in centimeters below surface and weights in grams)

SIHP # 50-10-27/28	-6601	-6601	-26494	-26497	-26497	-26502	-26507	-26507	-26507	-26507	-26509	-26519	-26519	-26519	-26519	-26519	-26519	-26519	-26530	-26530	-26530	
Feature	B54	D13	A	-	-	A	C1	D	F2	S	-	G	I	I	I	I	I	I	-	-	-	
Trench	52	47	17	15	15	27	33	34	38	30	16	13	11	11	11	12	12	12	14	14	14	
Stratum	II	II	II	II	III	II	II	II	II	II	I	I	I	III	IV	I	II	III	II	III	IV	
Depth	60 - 120	50 - 80	90 - 105	30 - 45	45 - 70	20 - 35	50 - 65	30 - 60	50 - 60	30 - 55	0 - 100	0 - 137	10 - 15	15 - 25	25 - 60	0 - 60	60 - 70	70 - 90	45 - 60	60 - 70	70 - 75	
<i>Brachidontes crebristriatus</i>																						
<i>Cellana Sp</i>												4.7										
<i>Conus Sp</i>	14.7																0.7					
<i>Cymatium Sp</i>											3.5											
<i>Cypraea caputserpentis</i>						9.9	6.6	1.7				15.5	6.2		1.2	0.7	2.6	0.4	2.9			
<i>Cypraea granulata</i>																						
<i>Cypraea malculifera</i>													6.8	1.4		14.8		1.7				
<i>Isognomon Sp</i>				0.6	0.7	0.9	0.2	3		0.5		0.3	0.1	0.3			0.2			0.4		
<i>Neritina granosa</i>																						
<i>Nerita picea</i>						1.4	0.4											0.3	7.2	11	0.2	
<i>Nerita polita</i>																						
<i>Neritidae Sp</i>																						
<i>Terebra Sp</i>																1.2						
<i>Tellina palatam</i>																						
<i>Theodoxus</i>							0.2					0.1										
<i>Thaididae Sp</i>								5.3						1	0.5		1					
Unidentified Misc Shell						39		17.9			39			0.6	0.2		1.4				8.7	
Total Shell Midden	14.7	0	0	0.6	0.7	51.2	7.4	27.9	0	0.5	42.5	20.6	13.1	3.3	3.1	15.5	5.9	2.4	10.1	20.1	0.2	
Echinoderm	2.1						0.2	3.7				4.1	1	0.6	7.3		4.3	29.6		0.6	0.1	
Coral	9.1					4.6								0.7		134.2	7.6					
Fish Bone	0.5											0.1						0.1			0.1	
Total Marine Midden	26.4	0	0	0.6	0.7	55.8	7.6	31.6	0	0.5	42.5	24.8	14.1	4.6	10.4	149.7	17.8	32.1	10.1	20.7	0.4	
Rat Bone												0.1						0.1				
Dog Bone	1.9																	3.4				
Goat Bone											11.2											
Unident. Mammal Bone											5.5	0.1										
<i>Kukui</i> endocarp	132	16.5	15.6				1.3		9.5			0.2	0.1	0.1		6.9	3.6	2.5				
Total Midden	160.3	16.5	15.6	0.6	0.7	55.8	8.9	31.6	9.5	0.5	59.2	25.2	14.2	4.7	10.4	156.6	21.4	38.1	10.1	20.7	0.4	

SIHP # 50-10-27/28	-26533	-26535	-26535	-26539	-26542	-26542	-26549	-26552	-26558	-26558	-26565	-26565	-26565	-26568	-26572	-26574	-26574	-26577	-26577	-26585	-26588
Feature	-	-	-	A	-	-	-	E	-	-	A	A	A	-	C	C	G	-	-	B	-
Trench	63	7	7	1	8	9	6	35	32	32	58	58	58	40	29	42	44	3	3	45	46
Stratum	I	II	III	II	IIA	I	II	I	II	III	I	II	III	I	II	II	II	II	III	II	II
Depth	0 - 35	70 - 80	80 - 100	60 - 70	50 - 60	0 - 70	65 - 75	0 - 65	30 - 40	40 - 50	0 - 30	30 - 50	50 - 70	0 - 90	50 - 72	70 - 100	40 - 100	65 - 80	80 - 93	40 - 100	45 - 95
<i>Brachidontes crebristriatus</i>							0.2														
<i>Cellana Sp</i>												1.6									
<i>Conus Sp</i>		1.3	5	0.3									0.6					1.1			
<i>Cymatium Sp</i>																					
<i>Cypraea caputserpentis</i>		5.3	102.5					5				10.1	16.4			1.3	3.6	24.6	30.6		5.1
<i>Cypraea granulata</i>							21.5														
<i>Cypraea malculifera</i>				11.2																	
<i>Isognomon Sp</i>			54.1				0.2											7.5	23.7		
<i>Neritina granosa</i>																		3.6	7		
<i>Nerita picea</i>			3.2	0.1	2.5	0.2												1.8	10		
<i>Nerita polita</i>			74																		
<i>Neritidae Sp</i>													1								
<i>Terebra Sp</i>													1								
<i>Tellina palatam</i>																					
<i>Theodoxus</i>	1.2		11.5		0.4																
<i>Thaididae Sp</i>			6.6	0.1																	
Unidentified Misc Shell			56.3		1.1				0.1		5.4		20.3						39.3	59.8	
Total Shell Midden	1.2	6.6	313.2	11.7	4	21.7	0.4	5	0.1	0	5.4	11.7	39.3	0	0	1.3	3.6	77.9	131.1		5.1
Echinoderm			13.5	0.7				3.3	1.2				0.3				0.1	0.7			
Coral		8.6	36.8									4.2									
Fish Bone			0.2							0.1											
Total Marine Midden	1.2	15.2	363.7	12.4	4	21.7	0.4	8.3	1.3	0.1	5.4	15.9	39.6	0	0	1.3	3.7	78.6	131.1	0	5.1
Rat Bone																					
Dog Bone																					
Goat Bone																					
Unident. Mammal Bone																		0.2			
<i>Kukui</i> endocarp		1.8	1.5	6.9	1.2		7.3	12.1	4.6	34	0.3	5.1	5	11.3	15.8	2.1				1.3	8.5
Total Midden	1.2	17	365.2	19.3	5.2	21.7	7.7	20.4	5.9	34.1	5.7	21	44.6	11.3	15.8	3.4	3.7	78.8	131.1	1.3	13.6

Table 9. Charcoal and Sediment Sample Catalog (all depths in centimeters below surface and weights in grams)

Site #	Feature	Trench #	Stratum	Depth (cm)	Mass (g)	Comments
-6601	B54	52	II	60 - 120	13.5	charcoal sample
	B54	52	II	60 - 120	293.5	sediment sample
	D13	47	II	50 - 80	0.1	charcoal sample
-26497	-	15	II	30 - 45	1.1	charcoal sample
		15	II	30 - 45	25.7	sediment sample
		15	III	45 - 70	84.1	sediment sample
		15	III	45 - 70	3.1	charcoal sample
-26500	I	24	I	0 - 30	1.6	charcoal sample
	A	1	II	60 - 70	1.5	charcoal sample
-26502	A	27	All	20 - 45	6.3	charcoal sample from NW half
		27	II	20 - 30	0.4	charcoal sample from SE half
		27	III	35 - 45	0.9/6.5	0.9 grams of charcoal sample; 6.5 grams of sediment sample
-26507	C1	33	II	50-65	0.1	charcoal sample
	D	34	II	30 - 60	2.2	charcoal sample
	F2	38	II	50 - 65	112.7	sediment sample
	S	30	II	30 - 55	1.7	charcoal sample
-26509	-	16	I	0 - 100	0.9	charcoal sample
-26519	I	11	I	0 - 10	350	sediment sample
		11	II	10 - 15	100	sediment sample
		11	III	15 - 25	2.2	charcoal sample
		11	III	15 - 25	150	sediment sample
		11	IV	25 - 60	150	sediment sample
		12	II	60 - 70	71.5	sediment sample
		12	III	70	61	sediment sample
		12	III	70	2.2	charcoal sample
-26525	A	10	II	60 - 75	0.4	charcoal sample
-26530	-	14	II	70 - 75	81.2	sediment sample
	-	14	III	68 - 70	72.1	sediment sample
	-	14	III	60 - 70	1	charcoal sample
	-	14	IV	70 - 75	0.3	charcoal sample
-26535	-	7	II	70 - 80	1.8	charcoal sample
	-	7	II	70 - 80	43.2	sediment sample
	-	7	III	80 - 100	4.7	charcoal sample
	-	7	III	80 - 100	1.9	charcoal sample (from west end of trench)
	-	7	III	80 - 100	85.6	sediment sample

Site #	Feature	Trench #	Stratum	Depth (cm)	Mass (g)	Comments
-26542	-	8	IIA	50-60	0.3	charcoal sample
-26552	E	35	I	0 - 65	3.2	charcoal sample
		35	I	0 - 65	5.5	charcoal sample from bottom
-26556	-	39	III	135 - 150	2.9	charcoal sample
-26558	-	32	II	30 - 40	7.6	charcoal sample
		32	II	30 - 40	12.3	charcoal sample (between II and III)
		32	II	30 - 40	53	sediment sample
		32	III	40 - 50	156.9	sediment sample
		32	III	40 - 50	21.3	charcoal sample
-26565	A	58	II	30 - 50	3.3	charcoal sample
		58	III	50 - 70	5.9	charcoal sample
		58	III	50 - 70	320.5	sediment sample
-26568	-	40	I	0-30	0.5	charcoal sample
		40	II	30-50	171.1	sediment sample
		40	II	30-50	0.2	charcoal sample
-26577	-	4	II	65-80	2.9	seed sample (<i>Mucuna gigantea</i>)
		3	III	80 - 93	2.1	charcoal sample
-26588	-	46	II	45 - 95	10.5	charcoal sample

5.2 Radiocarbon Analysis

Charcoal collected during test excavations from five sites was sent to Beta Analytic, Inc. for radiocarbon dating, utilizing the accelerator mass spectrometry (AMS) technique and the standard radiometric process, in order to better establish the age range of occupation at the site. Table 10 below shows the context of the charcoal, and the number assigned by Beta Analytic. The radiocarbon analysis is currently in progress, with a due date from Beta Analytic on June 2, 2008.

The radiocarbon sample for Site -6601 is contextually associated with surface habitation within the Kona Field System; and for Site -26588 the sample is contextually associated with surface habitation within the Kona Field System. The other three samples being analyzed date components of permanent habitation complexes throughout the project area. Other test excavations in the project area that contained material in good context for dating are also included in the Table 10; these should be considered for radiocarbon analysis during data recovery.

Table 10. Charcoal Catalog (all depths in centimeters below surface and weights in grams)*

Site	Trench	Layer	Size	Feature Type, Function	Comments	BETA #, Dating Method
26519/I	12	III (70 cmbs)	2.2 g	Platform, Permanent Habitation	Dates hearth in habitation platform, associated with midden	243918 AMS
26535	7	III (80-100 cmbs)	1.9/4.7 g	Platform, Permanent Habitation	Dates large platform with large amount of midden	243919 AMS
26556	39	III (135-150 cmbs)	2.9 g	Platform, Burial/Ceremonial	Dates charcoal associated with Burial 61	-
26558	32	III (40-50 cmbs)	21.3 g	Platform, Permanent Habitation	Dates hearth in low habitation platform, associated with midden	243920 Radiometric
26502/A	27	III (35-45 cmbs)	0.9 g	Platform, Permanent Habitation	Dates hearth in low habitation platform, associated with midden and larger site complex	-
26565/A	58	III (50-70 cmbs)	5.9 g	Platform, Permanent Habitation	Dates habitation platform, north end of parcel, associated with midden	-
26577	3	III (80-93 cmbs)	2.1 g	Platform, Permanent Habitation	Dates rough habitation platform, originally interpreted as agricultural	-
6601 (B54)	52	II (60-120 cmbs)	13.5 g	Platform, Temporary Habitation/Agriculture	Dates small platform in Kona Field System	243921 AMS
26588	53	II (45-95 cmbs)	10.5 g	Enclosure, Permanent Habitation	Dates possible ceremonial enclosure in Kona Field System	243922 AMS

*Entries in bold were submitted to Beta-Analytic for testing on April 21, 2008. All other samples in this table are in good context for dating and should be considered in the data recovery plan.

5.3 Artifact Analysis

Indigenous Hawaiian portable artifacts were noted in surface contexts and within lava tubes during the inventory survey. Volcanic glass flakes, bone awls, water worn stones, and abraders, including basalt and coral, were the most commonly encountered Indigenous Hawaiian artifacts during the inventory survey. Other artifacts include modified shell, fishing lures, pandanus brushes, and a *poi* pounder. Some less common artifacts were also found and include a tapa beater (Figure 21) and several petroglyphs (Figure 22 and Figure 23).

A total of 28 artifacts were collected, 19 artifacts were collected as they were encountered during test excavations (Table 11). All other artifacts will either be preserved in place or will be retrieved during data recovery (these artifacts are discussed in the individual site descriptions; see Appendix A). A detailed table listing all collected artifacts, Table 11, is provided on the following page. Figure 15 - Figure 26 are photographs of some of the larger artifacts collected, and are organized in order of their accession numbers (ACC) also listed in the table.

The most common type of artifact found during test excavation is volcanic glass. Eleven of the artifacts, some of which consist of multiple flakes, are cutting tools. Twenty-two tools were encountered in total at seven sites; eight in a single trench during excavation of -26502, Feature A. One of the flakes was basalt, and the other seven were volcanic glass. Volcanic glass debitage was also found in this same trench. Two trenches within -6601 (Trench 47 & 52) contained cutting tools. Trench 52 contained seven flakes, two basalt and the remainder volcanic glass. Site -26565 contained three tools, one basalt flake and the remaining two, volcanic glass. The remaining flakes were all volcanic glass and individually found during test excavation. Two tools, one from -26519 and the other from -26539, contained some cortex; the tool found in -26558 is a possible core fragment. Debitage was also present in two trenches is Site -26507.

The second most frequent artifact type found during test excavation is abraders. Three were encountered in total at three sites; two are coral (Figure 19) and one is scoria and is an adze-shaped tablet (Figure 16). The remaining artifact types found during excavation consist of two possible hammer stones, a possible sinker (Figure 15), a bone awl (Figure 17), and a scraper (Figure 18).

Historic artifacts included fence nails, metal fragments, several bottles (Figure 20 and Figure 26), including a perfume bottle (Figure 24), and a ceramic plate fragment (Figure 25). All bottles found in the project area appear to date between 1890 and 1930.

Table 11. Artifact Catalog (all depths in centimeters below surface and weights in grams)

Accession Number	Site #	Feature	Trench	Stratum	Depth	# of Pieces	Length	Width	Thickness	Total Weight	Material Type	Function	Comments
1	-26519	I	11	IV	25 - 60	1	1.5	0.9	0.2	0.3	Volcanic Glass	cutting tool	some cortex
2	-26519	I	12	II	60 - 70	1	3.1	1.7	1.1	7.1	Pencil Urchin Spine	possible sinker	grooved
3	-26519	I	12	II	60 - 70	1	17	9.6	4.2	500	Scoria	abrader	adze shaped tablet
4	-26519	I	12	III	70 - 90	1	4.3	0.6	0.2	1.1	Mammal Bone	awl	bone awl
5	-26539	A	1	II	60 - 70	1	1.9	1.4	0.4	0.6	Volcanic Glass	cutting tool	some cortex
6	-26535		7	III	80 - 100	12	2.2/1.3	1.7/0.5	0.5/0.2	1.7/0.1	Volcanic Glass	cutting tool	flake
7	-26535		7	III	80 - 100	1	4.6	3.4	3.4	84.3	Basalt	possible hammer stone	water-worn
8	-26507	C1	33	II	50 - 65	2	1.6/0.9	0.8/0.7	0.2/0.2	0.1/0.1	Volcanic Glass	cutting tool	waste flakes
9	-26507	D	34	II	30 - 60	2	0.7/0.6	0.6/0.6	0.1/0.1	0.1/0.1	Volcanic Glass	cutting tool	waste flakes
10	-26530		14	II	45 - 60	1	5.6	3.5	1.7	0.1	Coral	abrader	worked on its sides
11	-26542		9	I	60	1	5.6	4.9	0.5	18.6	Shell	scraper	modified cowry
12	-26558		32	III	40 - 50	1	1.9	1.4	1	2.8	Volcanic Glass	cutting tool	possible core fragment
13	-26502	A	27	II	20 - 35	7	2.1/1.0	1.6/0.9	0.6/0.3	1.7/0.1	Volcanic Glass, Basalt	cutting tool	1 basalt flake, 7 volcanic glass flakes
14	-26502	A	27	II	20 - 30	1	0.9	1.1	0.3	0.2	Volcanic Glass	cutting tool	waste flakes
15	-26565	A	58	III	50 - 70	3	1.8/0.8	1.3/0.7	0.2/0.2	0.5/0.1	Volcanic Glass, Basalt	cutting tool	1 basalt flake, 2 volcanic glass flakes
16	-26565	A	58	III	50 - 70	1	3.3	1.3	1.1	8.1	Coral	abrader	coral abrader
17	-6601	B54	52	II	60 - 120	7	4.3/1.2	1.3/0.8	0.6/0.3	4.8/0.1	Volcanic Glass, Basalt	cutting tools	2 basalt flakes, 5 volcanic glass flakes
18	-6601	D13	47	II	50 - 80	1	1.6	1.1	0.2	0.4	Volcanic Glass	cutting tools	volcanic glass fragment

Accession Number	Site #	Feature	Trench	Stratum	Depth	# of Pieces	Length	Width	Thickness	Total Weight	Material Type	Function	Comments
19	-6601	D13	47	II	50 - 80	1	6.6	4.5	3.7	142.4	Vesicular Basalt	possible hammerstone	water-worn
20	-10714	-	-	-	surface	1	27.2	7.2	0.5		Glass (brown)	container (post-contact bottle)	Beer bottle (Nippon Kosen Beer); broken on neck
21	-26498	-	-	-	surface (in lava tube)	1	34.5	5.0	4.5		Dense Wood (species yet unidentified)	I'e (tapa beater)	pre-contact type; rounded cross-section and a slightly curved long axis (not made from saw cut lumber)
22	-26560	-	-	-	surface	1	20.0	12.0	7.0		Vesicular Basalt	probable petroglyph fragment on portable slab	possible pecking to enhance distinct natural lines in rock; close association with petroglyph ACC #23
23	-26560	-	-	-	surface	1	24.0	13.0	5.5		Vesicular Basalt	petroglyph fragment on portable slab	clear pecking creating a human figure on a small, broken portable slab. Head and arms are missing.
24	-26560	-	-	-	surface	1	14.25	8.0	6.25		Vesicular Basalt	probable petroglyph fragment on portable slab	very little of pecking is present on slab, just on edge where it appears very likely. Close proximity (less than 1m) to ACC #23).
25	-6601	A	-	-	surface	1	22.0	13.0	10.0		Vesicular Basalt	possible papamu	small portable slab with fairly regular sized pecked indentations; possible informal grid resembling konane board
26	-26534	-	-	-	surface	1	12.0	8.5	4.0		Glass (lavendar)	container	likely historic perfume bottle
27	-2634	-	-	-	surface	1	12.5	8.0	0.5		Glazed, hand painted ceramic	container	size and shape consistent with chamber pot; painted pattern suggests other function
28	-10714	-	-	-	surface	1	24.0	7.0 shoulder/6.25 base	N/A		Glass (clear)	container	Honolulu B. & M. Co., LTD; historic soda bottle.



Figure 15. Site -26519, possible sinker (Pencil urchin spine). ACC #2



Figure 16. Site -26519, scoria abrader. ACC #3



Figure 17. Site -26519, bone awl. ACC #4



Figure 18. Site -26542, modified cowry. ACC #11



Figure 19. Site -26565, coral abrader. ACC #16



Text around shoulder: “BNK” anagram repeated three times.

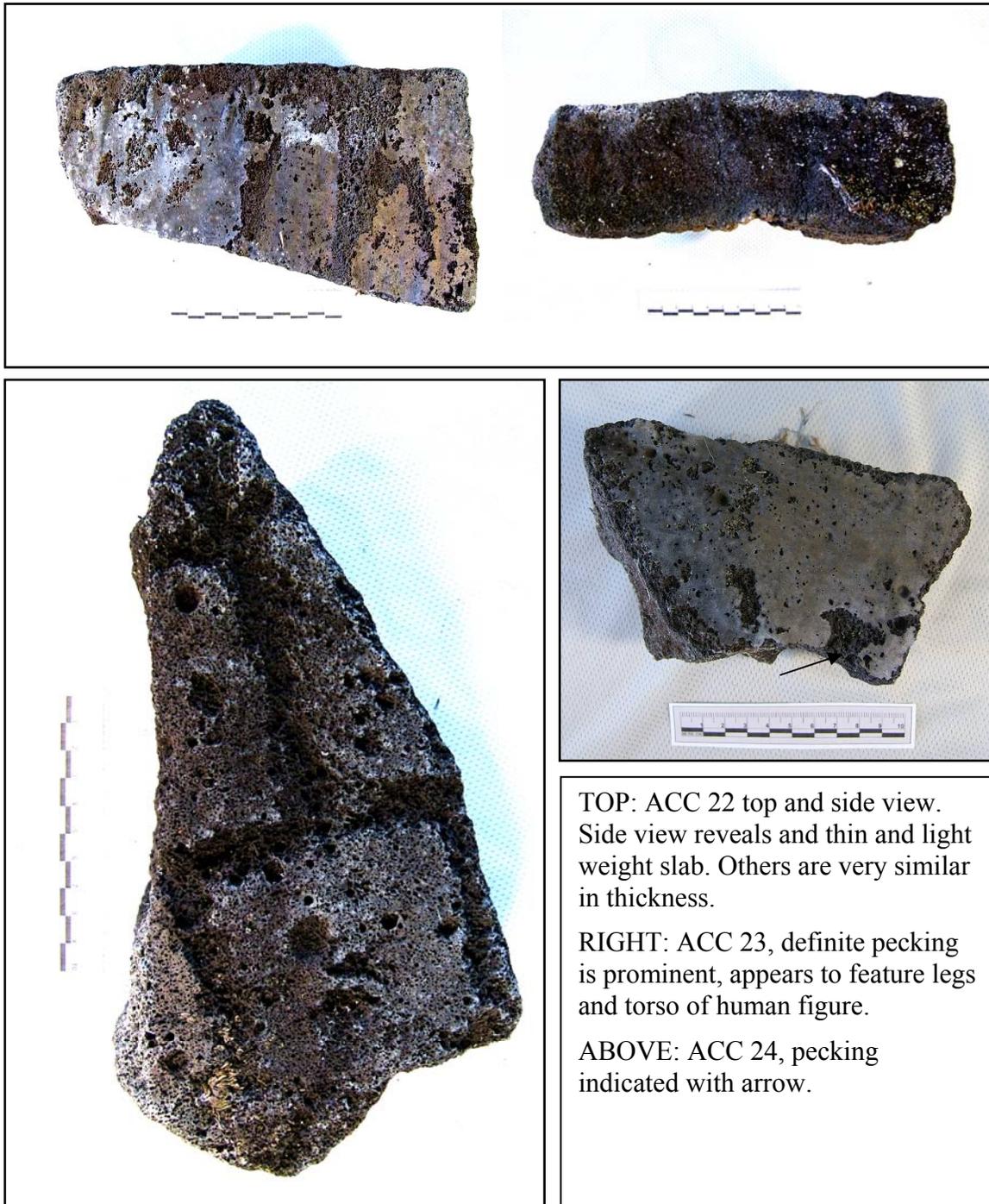
Text around base: “NIPPON BEER KOSEN CO LTD.”

Very limited information about the Nippon Beer Kosen Co, indicates that the company ceased to exist in the early 1930s. Most bottle diagnostics were inconclusive on this bottle – the lack of a lip complicates dating.

Figure 20. Site -10714, historic beer bottle. ACC #20



Figure 21. Site -26498, tapa beater. ACC #21



TOP: ACC 22 top and side view. Side view reveals and thin and light weight slab. Others are very similar in thickness.

RIGHT: ACC 23, definite pecking is prominent, appears to feature legs and torso of human figure.

ABOVE: ACC 24, pecking indicated with arrow.

Figure 22. Site -26560, petroglyph slabs. ACC #22, 23, 24



Figure 23. Site -6601 Feature A20, pecked slab, possible *papamū*. ACC # 25

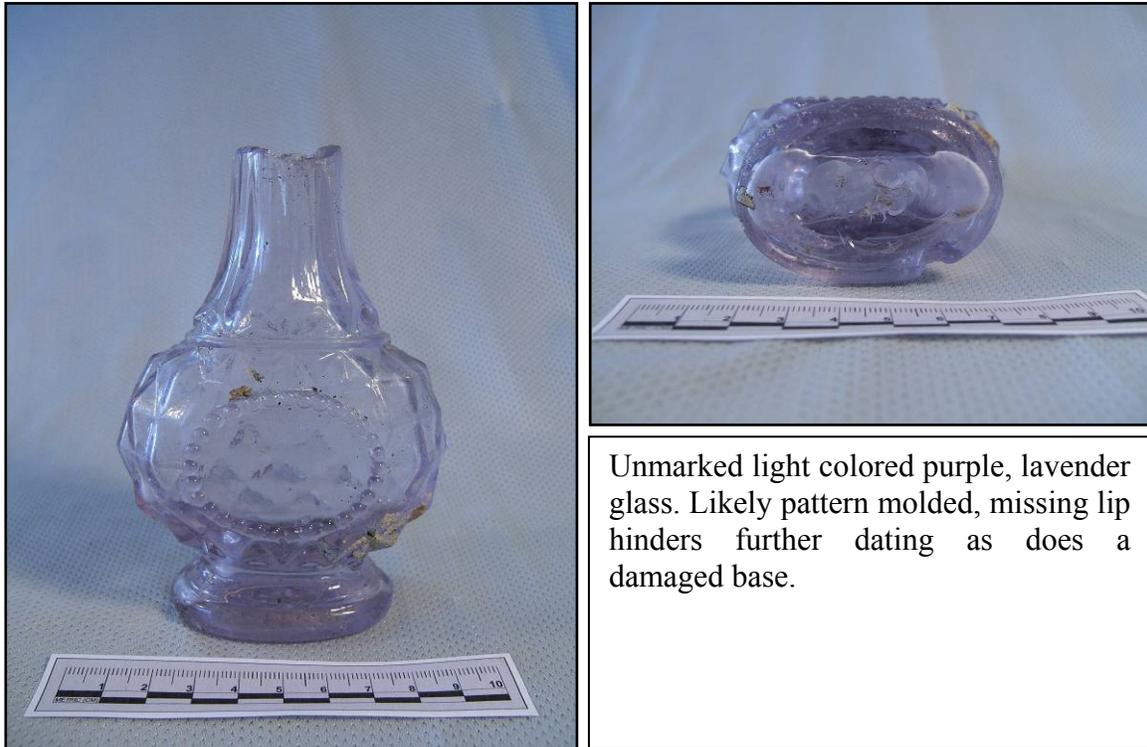


Figure 24. Site -26534, historic perfume bottle. ACC #26

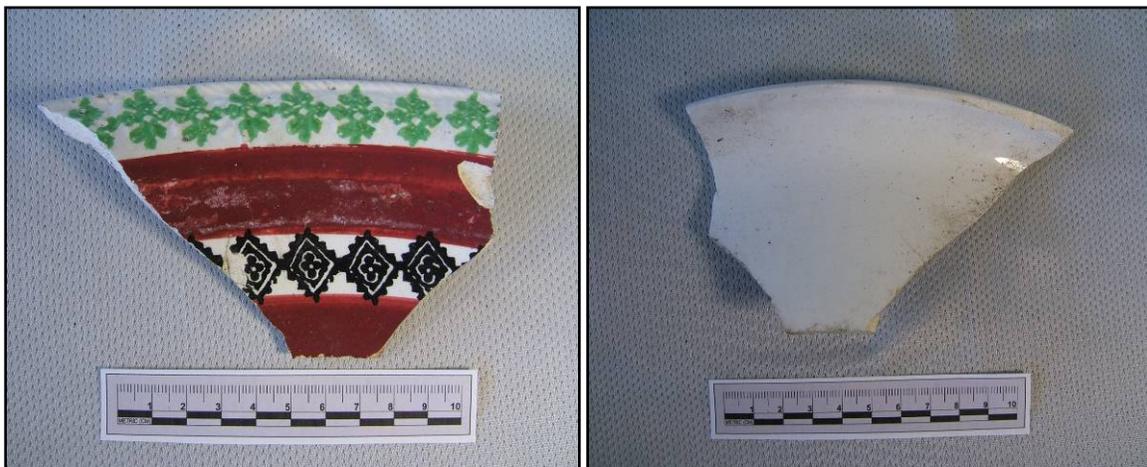


Figure 25. Site -26534, glazed, hand-painted ceramic fragment. ACC #27



Text along body:

HONOLULU B.&M. Co., LTD.
HONOLULU, T.H.

Text on base:

L.P.C CO
3003

Mouth-blown post mold, embossing on base and body. Numerous air bubbles. Most likely date range 1898 – 1920, probably on the earlier end of this range based on mouth-blown characteristics.

Figure 26. Site -10714, historic soda bottle. ACC #28

Section 6 Summary and Interpretation

6.1 Feature Types

The site (or feature) type designation refers to the actual structural or non-structural (i.e. lava tube, blister, enclosure) elements of a site (or feature). Of the 120 sites (277 features), the most common feature types are discussed below; a table summarizing counts of feature types can be found in the Results of Fieldwork (Table 5). The most prevalent types are lava tubes and blisters (65), platforms (44), walls (32), mounds (27 total features designated, with dozens of individual mounds), terraces (23), enclosures (19), cairns (17), modified outcrops (14) and trails (12).

6.1.1 Lava tubes and blisters

Lava tubes and blisters are numerous throughout the region and - depending on a wide range of factors such as size, accessibility, and interior environmental conditions - were utilized for various functions. In the present project area these tubes are primarily located in Kohanaiki Ahupua'a. Compared to parcels *makai* of the current project area, there is a fairly steep increase in the size and density of lava tubes on the *mauka* slopes, and it was rare to find a lava tube without any cultural material or modification. While some modified lava tubes consisted of only a small blister opening and less than 5-10 square meters of usable space, other lava tubes are very large and run for hundreds of meters, often interconnecting in complex ways. Both small and large tubes were utilized, with some modification and cultural material located surprisingly far inside long lava tube systems.

A total of seventy-one sites within the project area contain a lava tube or lava blister (sixty-five of these sites have "Lava Tube" as their primary feature type). The range of functions for tubes and blisters within the project area include: burial (sites -26478/C, -26480, -16103, -26488, -26498, -26503, -26509, -26510, -26520, -26522, -26529, -26532, -26538/A, -26547, -26562, -26564, -26568, -26569, -26570, -26576, -26582), probable burial (-26501, -26520), numerous temporary and permanent habitation sites, and water collection activity areas (sites -26478, -26481, -26492, -26511, -26512, -26525, -26527, -26548, -26528, -26519/N, -26521, -26513B, -26504, -26500, -26506, -26517, -26573, -26554, -26539/B, -16103, -26537, -26553, -26550, -26552/A, -26552/B, -26555, -26557, -26546, -26563, -26545, -26575, -26538, -26524). Most of the blisters and small tubes inspected during the present survey were modified in some way and were assigned a site number. There were very few that showed no evidence of utilization.

Lava tubes also generally offer a greater degree of midden and artifact preservation compared to surface sites. Of the more than fifty indigenous artifacts found during the inventory survey (including lithics, abraders, bone awls, manuports, a poi pounder, a tapa beater, *papamū* boards, etc.), the vast majority were observed in lava tubes. Although most lava tubes in the project area contain a minimal amount of soil deposition, there is high potential for data recovery of the surface midden present, as well as recovering datable charcoal and wood/gourd fragments associated with water collection features.

6.1.2 Platforms, Enclosures and Terraces

Platforms, enclosures, and terraces are common feature types associated with both temporary and permanent habitation, as well as occasionally associated with agricultural modification. The types of habitation platforms, enclosures and terraces encountered and a thorough discussion of their function is presented below in the Functional Interpretation section, under the Habitation category.

There are more than 45 features in the project area that consist of platforms, and they represent a range of sizes (from less than 2 m square to more than 4 m square) and heights (some are very low to the ground and some are over a meter in height). The majority of platforms are surface features, but some of them do occur in lava tubes. The function of platforms includes habitation (permanent and temporary), burial, ceremonial, and occasionally informal platforms are used for agricultural purposes. It is notable that there are a relatively large number of platforms in the current project area compared to other *makai* parcels.

There are nineteen enclosures in the project area, located at eighteen individual sites. Seven sites consist solely of an enclosure, and enclosures consist of 4.2% of all the features. While most of the enclosures are associated with either temporary or permanent habitation, Sites -26531, -26548/C, and -26583/B consist of informal enclosures that are agricultural in function, and -26572/A is a ceremonial feature within an agricultural complex. The size and formality of enclosures within the project area varies greatly and ranges from C-shaped enclosures to fully enclosing walls, with a full range of very informal to formal style of construction. The enclosures associated with agriculture and ceremonial function are discussed in the Agriculture and Ceremonial categories in the Functional Interpretation section below.

There are twenty-three features designated as terraces in the project area, and nearly all of these are associated with habitation complexes (both temporary and permanent). There are also a large number of terraces in the Kona Field System portion of the project area (Site-6601), both formal and informal, and these terraces are associated with intensive agricultural modification.

6.1.3 Walls

Walls within the project area range from long animal husbandry walls to short walls (only a few meters long) constructed in lava tubes, as well as walls built for general habitation purposes (see also discussion of enclosures). The low-density presence of animal husbandry walls suggest minor historic era cattle or goat ranching within the project area, which is not surprising given the nearby Huehue Ranch operation in Kaloko which began in the late nineteenth and early twentieth century. Walls within lava tubes often occur near their entryway and may serve a variety of functions, such as the delineation of space within the tube, blocking of a portion of the entrance to maintain moisture within the tube for water collection, or other habitation related functions such as storage.

6.1.4 Mounds and Modified Outcrops

Mounds are linear, circular or amorphous stone piles which typically lack a vertical face or a level top surface. They often accompany excavated blisters, or follow depressions or subtle topographic lines. Similarly, modified outcrops generally consist of some type of construction

associated with a distinct bedrock outcrop, such as informal or haphazard piling of stones along the edges of blisters or depressions, or the excavation of a portion of flow to create a depression (i.e., for storage). In the case of the project area, virtually all of the mounds and modified outcrops identified were for agriculture.

No burials were identified in selected test excavations and most of the mounds were too small for this to be a consideration. Two sites in particular contain the majority of the mounds and modified outcrops within the project area. Site -6601 is a large previously identified agricultural system generally known as the Kona Field System. Multiple mounds associated with the site were found in the *mauka* portion of the project area. Site -26507 contains informal clearing mounds that often occur in clusters with excavated blisters and other minimal modification features, but are rarely formally constructed or very dense. These agricultural features were found throughout the project area. Another type of agricultural mound are planting mounds, which tend to be constructed of well-sorted smaller-size cobbles than the poorly sorted “tossed” clearing mounds. This type of planting area is more common within Site -6601 than Site -26507.

Modified outcrops are associated with storage, quarrying, and habitation functions in addition to primarily being associated with agriculture. Mounds and modified outcrops are also utilized in lava tubes for various functions, most commonly as transportation to get in and out of deeper chambers or skylights. Site -26522 contains several mounds (Features B, D and F) that were designated as transportation function since these features provide easy access into the lava tube. Other lava tube sites have mounds that were used as part of the general habitation within the tube.

6.1.5 Cairns

There are various uses for cairns, and they can vary considerably in form. This type of marker was used to identify survey points, as noted in Emerson's field books. Fishing locations were marked by placing cairns so that when viewed from the ocean, they pointed towards a good fish or shellfish location. Cairns also likely marked other important locations, such as trails.

Cairns within the project area (seventeen cairns at fifteen sites) mark a variety of activity, probably most often trails; however, since low modification trails over *pāhoehoe* are likely no longer visible, these cairns may be the only remaining evidence. For example, sites -26541, -26561 and -26571 appear to be a line of cairns, but no trail was found near them. Other possibilities for cairn use are for marking lava tubes (water collection and activity areas) and for surface platform burials (Site -26515). See also the discussion on markers in the Functional Interpretation section below.

6.1.6 Trails

Twelve trails within 10 sites were encountered during the inventory survey (Sites -10714, -26428, -26483, -26489, 26494, -26510, -26560, -26570, 26574, -26584). The majority of trails within the project area appear to be pre-contact in nature, although site -10714 is thought to be primarily historic with a probable pre-contact component. Most trails are *pāhoehoe* slab trails running over 'a'ā flows, with Site -10714 (a long curbed trail over *pāhoehoe*) being the primary exception. Four of the trail features occur within lava tubes, and appear to make access through the tube easier; these lava tube trails are all associated with water collection.

The trails are generally widespread throughout the project area, except for a cluster of trails crossing the fairly large 'a'ā flow near the central east end of the project area. These trails are associated with several large habitation sites, specifically Site -26574 and -26583, as well as the Kona Field System. The trails associated with -26574 and -26560 both likely have some ceremonial function (one of the -26574 trails leads to a large ceremonial/habitation platform, and Site-26560 is associated with several petroglyphs and a tī plant). Most other slab trails in the project area are less formal and not in particularly good condition.

Site -10714 is the only long *mauka/makai* trail in the project area, and it appears to be historic. It is a curbed trail over *pāhoehoe*, which is typical of historic horse trails. It is presently believed that this is a portion of the *mauka/makai* route identified as Kohanaiki Road on Emerson's Registered Map 1449, which dates to around 1888. The route on Emerson's map appears to match well with the trail in the current project area; see the site description for Site -10714 for a complete discussion.

Attempts were made with all trails in the project area to follow them to their full extent and where possible make relevant correlations. It proved impossible to follow trails on the grass-covered *pāhoehoe* adjacent to the 'a'ā lava where the trails were still visible. The uniformity of the terrain (usually consisting of undulating *pāhoehoe*) surrounding the 'a'ā flows negates the necessity of extensive trail construction and leads the authors to believe that while the trails followed a single route over the 'a'ā flows once the trail exited the 'a'ā more than one path may have been traversed by travelers.

6.2 Feature Functions

The basis for functional interpretations are presented in the Results of Fieldwork Section 4 (Table 6) of this report. Eleven primary function categories were identified within the project area and include: agriculture, animal husbandry, burial, ceremonial, habitation, indeterminate, marker, quarry, storage, transportation and water collection. Rock art is also present within the project area at several sites.

6.2.1 Agriculture

During the inventory survey twelve sites were considered to function, in whole or part, in an agricultural capacity (ten sites have agriculture as a primary function and two list agriculture as a secondary function). Of these sites, there are two that consist of widespread agricultural modification, Site -26507 and Site -6601. Site -26507 consists of minimal energy investment, low density agricultural modification that is spread throughout most of the project area. Generally this modification consists of clearing mounds, modified blisters, and other minor agricultural features that tend to occur in clusters. However, these clusters of agricultural features are rarely very formal. In contrast, the *mauka* portion of the project area has increasingly dense agricultural modification, including formal terracing, *kuāwi*, and dense clearing and planting mounds, which in total suggest a very high level of energy investment. This area is consistent with the Kona Field System, which is designated Site -6601.

Agricultural subzones generally provide some insight into what activities may have occurred in the project area's agricultural sites. These subzones have been long in development but are clearly set out by Rose Schilt in *Subsistence and Conflict in Kona Hawai'i*. The subzones follow rainfall gradients generally predicted by elevation in Kona and, thus, delineate optimum areas for intensive agriculture. The following subzone classifications are based on Schilt's compiled data (the second zone *kaluulu* is applicable to the present study area):

Kula Subzone/Coastal Area

Elevation: Sea level to 500 ft (0 to 150 m)

Annual Rainfall: c. 30-50 in. (0.8-1.2 mm.)

Late Pre-contact crops: Sweet potatoes (*'uala*), gourd (*ipu*), and mulberry (*wauke*).

Kaluulu Subzone/Seaward Slope

Elevation: 500-1000 ft. (c. 150-300 m)

Annual Rainfall: c. 40-55 in. (1.00-1.35 mm.)

Late Pre-contact Crop: Breadfruit (*'ulu*), with sweet potatoes (*'uala*) and mulberry (*wauke*) interspersed; mountain apple (*'ōhia'ai*) and some taro (*kalo*).

'Apa'a Subzone/Upland Slope

Elevation: 1000-2500 ft (300-750 m)

Annual Rainfall: c. 55-80 in. (1.35-2.00 mm.)

Late Pre-contact Crop: Taro (*kalo*), sweet potatoes (*'uala*), tī (*kī*), and sugarcane (*kō*).

'Ama'u Subzone/Upland Jungle

Elevation: 2500-4000 ft (750-1200 m)

Annual Rainfall: c. 80 in. (2.0 mm.)

Pre-contact Crops: Bananas and plantains (*mai'a*)

Note: Historic period crops were also cultivated in the *Kaluulu* and *'Apa'a* subzones and to a lesser degree in the *Kula* subzone. These crops included cabbage, melons, onions, oranges, tobacco, beans, coffee, corn, cotton, pineapple, Irish potatoes, and pumpkin.

Sweet potato was likely the most abundantly grown crop in the *makai* portion of the project area because of its adaptability to stony and dry environments. It was commonly planted in mounds and in *pāhoehoe* excavations. Henry J. Lyman son of missionary couple that first arrived in Hilo in 1831, describes features in Puna similar to *pāhoehoe* clearings, as seen in the project, which were cultivated with sweet potatoes:

Wherever the lava could be pounded into scoria, a plantation of sweet potatoes was laboriously formed by digging among the stones and filling in the holes with dried grass brought from the mountainside. Placed in the nest, the tuberous buds were covered with gravel, and there grew with astonishing luxuriance, yielding the largest and finest potatoes on the island [in Frierson 1991:167].

During the mid 1800's, Captain Charles Wilkes of the American Exploring Team comments on the agricultural use of *pāhoehoe* excavations (similar to the modification of *pāhoehoe* outcrop seen in the project) which he observed specifically in the Kona region:

Cultivation is carried on in many places where it would be deemed almost impractical in any other country. The natives, during the rainy season, also plant, in excavations among the lava rocks, sweet potatoes, melons, and pine-apples, all of which produce a crop (Wilkes 1845:91).

Sweet potatoes were also cultivated within walled fields or depressions in the walls themselves. E.S. Craighill Handy and Elizabeth Green Handy reveal this method using an account taken from the Hawaiian newspaper *Ka Nupepa Ku'oko'a* March 24, 1922):

Rocky lands in the olden days were walled up all around with the big and small stones of the patch until there was a wall (*kuaiwi*) about 2 feet high and in the enclosure were put weeds of every kind, 'ī tree ferns and so on, and then topped well with soil taken from the patch itself, to enrich tī, or in other words to rot the rubbish and weeds to make soil.

After several months, the rotted weeds were converted into soil of the best grade. The farmer waited for the time when he knew that the rains would fall, then he made the patch ready for planting. If for sweet potatoes, he made mounds for them and for taro too, on some places on Hawai'i [in Handy and Handy 1972:131].

The above accounts describe agricultural modifications in rough rocky terrain similar to that of the present project area, though no walled (i.e. *kuaiwi*) fields are present at the *makai* end of the project area and would generally not be expected at this elevation.

In contrast, the *mauka* portion of the project area has increased rainfall at the higher elevation and considerably more formal agricultural modification, consistent with the Kona Field System (Site -6601). This upland area would likely have been able to support a wider range of crops, likely including breadfruit (*'ulu*), sweet potatoes (*'uala*), with interspersed mulberry (*wauke*), mountain apple (*'ōhia 'ai*) and some taro (*kalo*). It is interesting to note that some of the upland enclosures within Site -6601 in the project area are likely for arboriculture, which were not observed in lower elevation agricultural areas.

6.2.2 Animal Husbandry

Three sites within the project area are interpreted as animal husbandry sites (-5699, -10712, -26520, -26536). One site (-10712) is the historic *ahupua'a* wall between Kaloko and Kohanaiki that was likely built sometime after Emerson's 1880s surveys. Only about 15 m of another site (-05699) is within the project area; the wall, which was previously identified (Rosendahl 1989:11, 13, 14), continues roughly north for at least 500 m outside the project area.

Site -26520, designated as a burial, ceremonial, and animal husbandry site, has three wall features (Features A-C) that have evidence of historic utilization (there are nails and wood pieces associated with at least one of the walls). The walls formed pens and prevented animals from wandering into side lava tubes, and apparently kept the animals within this large sink area.

Historical research suggests that both goat and cattle grazing probably took place within the project area. Captain George Vancouver gave Ke'eumoku, an *ali'i*, a pair of goats in 1792, and the following year, he brought Ke'eumoku four sheep. Vancouver also brought the first cattle, California longhorns, to Kamehameha in 1793.

Historic documents related to the Government Homestead Program of the late 1880s indicate officials determined that goats were the only animals that were adept at grazing within arid, rocky Kaloko and Kohanaiki (Maly and Maly 2003:76, 79). Goats were present in the area prior to the late 1880s and may have been present within the project area. Limited cattle ranching was practiced at the same time, although by 1900, cattle ranching had for the most part replaced the goats (Maly and Maly 2003:75). Feral pigs are also currently present within the project area.

6.2.3 Burial

A total of 25 sites within the project area were found during the present study to contain a total of 55 burials (Table 12). While most burial sites have a single individual present, there are six sites that contain multiple individuals (see Table 12).

Eight sites (-26488, -26509, -26515, -26547, -26556, -26559, -26564, and -26582) are designated solely as burials. Six sites were interpreted as burial and temporary habitation (-26478, -26480, -26498, -26532, -26538, -26476); two sites were interpreted as burial and permanent habitation (-16103, -26562). Seven sites were interpreted as burial and water collection (-26503, -26522, -26529, -26568, -26569, -26970). Two sites have multiple functions designated: Site -26520 is a burial, ceremonial, and animal husbandry site with a probable burial in Feature E (this probable burial is within a chamber that is associated with petroglyphs, and there are also confirmed burials at this site), and Site -26510 is burial, water collection and ceremonial site. Site -26501 contains the only probable burial in the project area that is not

associated with other burials (Site -26520 has a probable burial chamber in addition to confirmed burials). No excavation was undertaken in this difficult to access tube due to the likelihood of burial function.

Most confirmed burials (with identified human remains) are located within lava tubes, which vary in size from very small to fairly large tubes. Two burials (-26515, -26556) were located within a surface platform, and Site -26559 is a surface platform built over a skylight that leads to a tube within Site -26570 that contains 18 burials.

Given the lack of historic artifacts and the burial style (concealed within lava tubes or beneath a platform), most confirmed burials are understood to be of Native Hawaiian ancestry and interred in a pre-contact style of burial. In lava tubes, frequently this takes the form of the use of natural shelves, natural cupboards, chambers beyond a sharp drop in ceiling height, constructed mounds, modified natural mounds of ceiling fall and use of a distinct chamber floor.

In the case of historic burials, many also show some affinity to pre-contact burial practices in lava tubes, indicating that all of these burials are most likely post-contact Native Hawaiian in origin. Historic burials include both those with coffins and those without. Sites -26522 and -26570 both have evidence of pre-contact and historic usage. Site -26522 contains a coffin burial; and burials without coffins but associated with historic burial goods. Site -26570 also contains clearly historic burials such as burials in wooden coffins and burials in wood and corrugated iron coffins, but also nearly a third of the burials in the tube are placed in a more pre-contact style and have no associated burial goods.

Numerical designations given to burials by CSH are sequential for the entire Kohan 1 project (including the present project area as well as TMK: [3] 7-3-009: 017, 026 and 028), resulting in non-sequential numbers for burials within the present project area. The CSH burial numbers listed in Table 12 correspond to the burial numbers reported to SHPD upon initial discovery of a burial, and therefore represent the order of discovery during the Kohan 1 project fieldwork. The numerical designations have been retained to ensure consistency between the records of initial discovery (as reported to SHPD) and discussion in the inventory survey report.

Table 12. List of Burials and Associated Sites

SIHP No. (50-10- 27/28-)	CSH Burial Number	Site Type	Function	Age
16103	41-45	Lava Tube	Burial (confirmed)	Pre-contact
26478	65	Lava Tube	Burial (confirmed)	Pre-contact
26480	51	Lava Tube	Burial (confirmed)	Pre-contact
26488	50	Lava Tube	Burial (confirmed)	Pre-contact
26498	46-49	Lava Tube	Burial (confirmed)	Pre-contact
26501	---	Lava Tube	Probable Burial	Pre-contact
26503	62	Lava Tube	Burial (confirmed)	Pre-contact
26509	60	Lava Tube	Burial (confirmed)	Pre-contact
26510	35	Lava Tube	Burial (confirmed)	Pre-contact

SIHP No. (50-10- 27/28-)	CSH Burial Number	Site Type	Function	Age
26515	59	Platform	Burial (confirmed)	Pre-contact
26520	6 & 63	Lava Tube	Burial (confirmed)	Pre-contact
26522	36-40	Lava Tube	Burial (confirmed)	Pre-contact/ Historic
26529	33-34	Lava Tube	Burial (confirmed)	Pre-contact
26532	7	Lava Tube	Burial (confirmed)	Pre-contact
26538	32	Lava Tube	Burial (confirmed)	Pre-contact
26547	9	Lava Tube	Burial (confirmed)	Pre-contact
26556	61	Lava Tube	Burial (confirmed)	Pre-contact
26559	Associated with 11-28	Platform	Burial (confirmed)	Pre-contact
26562	8	Lava Blister	Burial (confirmed)	Pre-contact
26564	10	Lava Tube	Burial (confirmed)	Pre-contact
26568	54	Lava Tube	Burial (confirmed)	Pre-contact
26569	53	Lava Tube	Burial (confirmed)	Pre-contact
26570	11-30	Lava Tube	Burial (confirmed)	Pre-contact/ Historic
26576	52	Lava Tube	Burial (confirmed)	Pre-contact
26582	55	Lava Tube	Burial (confirmed)	Pre-contact

6.2.1 Ceremonial

None of the sites within the project area are designated solely as ceremonial. However, one site (-26510), comprising five features, is designated as a burial, ceremonial, and water collection sites. Another site (-26520) comprising seven features, is designated as burial, ceremonial and animal husbandry. A third site (-26583) comprising 12 features is designated as permanent habitation and ceremonial. Additionally, two features, -26570/I and -26572/A, are designated as ceremonial. To assist in functional interpretation Table 13 categorizes these ceremonial sites by size and structural type. This table also includes a comments column that provides further justification for ceremonial site function, though no specific *heiau* interpretation is attempted.

Site 26510/C is a constructed platform directly under a skylight chamber with no clear facing on its sides. The top surface is predominantly paved with small *pāhoehoe* cobbles, and is very level and flat. A small dog skeleton is buried under some small *pāhoehoe* cobbles roughly 2 m (6.6 ft.) southwest of the platform. Based upon its proximity to Feature D, a ceremonial platform (see below), -26510/C is also interpreted as ceremonial function.

Site 26510/D is a formal platform constructed on an elevated *pāhoehoe* outcrop that has an excellent view of the coast from south of Honokōhau Harbor to just south of the Kona airport; the fish ponds at Kaloko-Honokōhau are also visible. Construction is mounded cobbles between *pāhoehoe* upright slabs and the remnants of faced walls. The platform appears to originally have

had facing on all sides, however, due to collapse, only remnants of the outside faced walls remain. Based on the construction style -26510/D is interpreted as ceremonial.

Site -26520/D is comprised of a small lava tube, Tube 4, and its contents, and two anthropomorphic petroglyphs at the opening to this tube. The south petroglyph is more visible, though both are clearly anthropomorphic. The south petroglyph appears to have a phallus, indicating depiction of maleness. Gender specificity is not clear for the north petroglyph. -26520/E (a probable burial chamber) is associated with these petroglyphs. Nearby, Site -26520/F is a small platform constructed at the base of a natural downward slope at Entrance 1 of Tube 8. A piece of branch coral is located on the slope above the platform.

Site 26583/H is a multi-tiered possible *heiau* located on a *pāhoehoe* flow that slopes downward to the southwest. The feature is situated on a ridge along the hillside that affords an extensive view of the coastline. Based on its location within the extensive Kona Field System, it is a possible agricultural *heiau*.

Site -26570/I is a low, very small platform, 2-3 courses high, very square in shape that is located on the surface. The entire perimeter of the bottom 2 courses are faced. Ceremonial function is supported by excavation results; the platform is well constructed. It is possibly a shrine related to the large number of burials at the site.

Site -26572/A is a J-shaped enclosure that opens to the east. A small boulder in the northwest interior corner creates a defacto cupboard that may have been intentionally constructed. The function of Feature A is agricultural shrine due to the presence of uprights and formal stacking.

Table 13. Characteristics of Ceremonial Features

Site Number/Feature	Formal Type	Surface Area (m ²)	Comments
26510/C	Platform	8.75	Small dog skeleton buried 2 m to the southwest
26510/D	Platform	53.65	Excellent views of the coast and the Kaloko fish pond
26520/D	Rock Art	1.5	Two anthropomorphic petroglyphs; may mark burial location
26520/F	Platform	1.8	Branch coral present
26570/I	Platform	1.0	Possible shrine
26572/A	Enclosure	13.76	Possible agricultural shrine
26583/H	Platform	9.6	Possible agricultural <i>heiau</i>

Small structures, like the structure within site -26520 and -26570, are generally classified as shrines. All households contained shrines “where offerings were made daily to Lono and to ancestral deities (*‘aumākua*)”. Shrines were also “frequently incorporated within the men’s house or *mua*”, which was also present in every household (Kirch 1984:260).

Attributes including altars and paving, generally refer to internal features of ceremonial structures (Hammatt et al 1997:176-177). Altar in this case is employed to describe a slightly

elevated or raised stone foundation within the structure. Bennett designated altars as one of the *heiau* features focusing primarily on ethnographic evidence related to “*lele*” which he described a “a sort of scaffolding supported by posts on which offerings were laid and left to moulder away” (Bennett 1930:39).

According to David Malo (1903), “In front of the *lele* was a pavement of pebbles (or framework) on which offerings were deposited until they were offered up, when they were laid on the *lele*” (Malo 1990:213-214).

The term paving is employed referring to well constructed surface layer(s) of a specific structure. Although a common structural component, paving is suggestive of a “greater construction effort” (Hammatt et al 1997:185). Paving is evident within 26307/A and 26307/B, both of which are terraces.

Location refers to our perception of prominent placement of specific structures in terms of view planes from and to the particular structures (Hammatt et al 1997:189). The importance of *heiau* location has been well documented (Bennett 1930:341; Buck 1964:516; Stokes and Dye 1991:21; and Kolb 1991:80-83).

When considering location (Kolb 1991):

...local topography of a temple was intimately tied to the concept of religious “sanctity”. Large *heiau* were generally situated upon prominent locations such as hill tops, bluffs, or knolls. This higher ground affirms the divine and inaccessible nature of high-ranking *ali'i*, while affording an excellent view of the surrounding countryside and coast. Smaller *heiau*, on the other hand were usually placed within villages, upon mountain slopes, in upland valleys, along the coast, or in any other location that would best serve the people (Bennett 1931:35).

The incorporation of the local topography makes any cursory analysis of *heiau* form suspect in two ways (Hommon 1987:24-5). First, the placement of *heiau* architectural elements tends to be influenced more by the contour of the landscape than by the abstract plan imposed upon the site by the architect. This suggests that the location of a *heiau* played a much more important role in its design than previously thought, and may partially explain the large amount of variability present in *heiau* form. Each promontory varies in its size, shape, and orientation of natural rock outcrops....

Second, some platforms and terraces that appear to be solid architectural elements are actually masonry veneers, and thus are deceptive as to the amount of labor used in their construction. (Kolb 1991:82-83).

As previously mentioned, Site 26510/D is on an elevated *pāhoehoe* outcrop with excellent views of the coast and the Kaloko-Honokōhau fish ponds. Site 26583/H, a possible agricultural *heiau*, is on a ridge and has an extensive view of the coastline.

6.2.2 Habitation

Fifty-eight (58) sites (48.3% of the total sites) in the project area, in part or in whole, are interpreted as habitation sites. Nine (9) of these sites also contain non-habitation component features (i.e. -16103, -26480, -26498, -26532, -26538, -26562, -26576, -26578, and -26583). The temporary and permanent habitation designation for the sites within the project area fit the models of type of habitation expected within the lower portion of the Upland Zone as well as meeting a set of criteria for interpreting modes of habitation (i.e. Cordy et al. 1991:529 and Clark 1986:198).

Two specific types of habitation types – temporary (which includes shelters) and permanent - are used in the present analysis of these sites. Of the total 58 habitation sites in the project area, 35 sites fit the characteristics of temporary habitation and 23 are categorized as permanent habitation.

The distinction between the two habitation modes is posited based on the following set of criteria, which have been developed by CSH over years doing archaeological research within the Hawaiian Islands. This includes locales where other researchers have developed models for distinguishing temporary and permanent habitation (Cordy 1981, Cordy et al. 1991 and Jensen 1988). Thus, models for distinguishing temporary versus permanent (Cordy et al. 1991, Clark 1986, Weisler and Kirch 1982, Green 1980) are available for comparative analyses.

CSH incorporates aspects of these models into the set of criteria that we then apply to the range of sites within a project area. The process of interpretation involves: 1) in field site recordation and tentative interpretations; 2) laboratory analysis that includes a) reevaluation based on inventory of all sites; b) incorporation of subsurface testing data; c) correlation to previous studies; and d) review of historic background data. In field interpretations can thus be altered based on compilation of full inventory survey data and correlations to previous studies.

The primary criteria utilized for in field interpretations include size, architecture type (e.g. lava tube, c-shape, platform, terrace, etc.) and substantiveness of architecture (i.e. substantial versus insubstantial). These three primary criteria provide essential determining factors that are found in the existing habitation models (e.g., Cordy et al. 1991:527-536, Clark 1987:105-214, Green 1980:54-63), and are discussed in detail below:

6.2.2.1 Size

While there is no set size determination to differentiate temporary and permanent habitation, structures can be roughly categorized as small (<20 m²) or large (>20 m²), with larger structures having a tendency to be permanent habitation.

Though size can be a key determining factor there are variables which can affect its diagnostic value. These variables include differences in field and recordation methodology related to measuring and reporting on sites or features size. Examples include utilization of interior versus exterior measurements, defining natural areas or surfaces utilized for habitation (e.g. cave floor areas, modified outcrop surface area) and personal perception(s) of site or feature limits (e.g. exterior perimeters of enclosures, platforms, c-shapes, etc.). CSH utilizes maximum exterior measurements as the basis for calculating area. Thus, based on the documented size range differences and the regional variations in habitation models, as well as the above-mentioned

variables Cultural Surveys Hawai'i utilizes structure size of ca. 20 m² as a general dividing line between large and small. The implication here is that large is suggestive of permanent habitations with small indicative of temporary habitations. However, additional criteria are necessary to affix these differing modes of habitation, especially because of variability in architecture or structure type and substantiveness of structures which size (m²) does not address.

6.2.2.2 *Architectural type*

- 1) Temporary Habitation - lava tubes & blisters, irregular shapes, standard C- and L-shapes platforms enclosures, terraces, alignments
- 2) Permanent Habitation - platforms, enclosures (rectangular, square), terraces

Based on the previous habitation models as well as Cultural Surveys Hawaii's research (Hammatt et al. 1997), certain architectural or structural types tend to be more often associated with one mode of habitation or the other. Types such as C- and L-shaped enclosures, isolated hearths, caves, and modified outcrops, for example, are more often associated with temporary habitations. Platforms, rectangular enclosures and terraces are more often associated with permanent habitations. However, these architectural types are not necessarily mutually exclusive and therefore besides size, and type, substantiveness of architecture is essential in the interpretations.

6.2.2.3 *Substantiveness of sites/features*

- 1) Substantial - Well paved, bifaced, (thick) sturdy walls, volume (though no specific m³), defined areas by alignments
- 2) Unsubstantial - Minimally or unmodified tubes/blisters, rough, loose paving (or none), uniface (piled versus stacked) walls, incorporated natural features.

Substantiveness of structures refers to quality of construction which in part infers amount of labor invested. Permanent habitations are expected to have more substantial architecture; such as well-paved surfaces; bi-faced, thick, sturdy walls; and in the cases of platforms and terraces, significant rock fill. In contrast, temporary habitations are expected to have less substantial architecture; such as minimally or unmodified lava tubes or blisters; rough, loose pavings; incorporation of natural features (e.g. large boulders, bedrock ledges, outcrops); and unfaced or uniface walls. Thus the substantiveness criterion suggests mode of habitation based on perceived labor investment as an indicator of the pre-determined use of the structure. In other words, greater investment would be put into permanent habitations to provide stable and comfortable structures versus little effort invested in structures that were pre-determined for short-term or temporary use.

These three criteria: size, architecture type, and substantiveness provide the basis of CSH mode of habitation interpretations. However other criteria are viewed as necessary in supporting these interpretation. These additional criteria include: single versus multi-component site layout; internal features; functional associations and; geographic location.

6.2.2.4 *Single versus Multiple Components*

- 1) Temporary Habitation - generally single featured but multiple not all that unusual

- 2) Permanent Habitation - either single or multiple component but usually other feature associations.

Habitation sites are described as either single-structure site or as a complex of related multiple structures. Typically, but not exclusively, temporary habitation sites are single-structure sites or they contain only one habitation structure in a complex layout. In contrast, permanent habitation residences, although commonly containing one primary habitation structure (i.e. sleeping house), often include other function-specific structures (e.g., men's house, sleeping house and cooking house), in addition to other functional feature types that supplement a permanent household (e.g. garden areas, storage or special-use caves, and family temples).

The variation between single-structure and multiple-structure permanent residences have been described, by several 19th-century Hawaiian scholars (summarized in Cordy 1981:73-76), as being dependent on the inhabitants' social rank. The larger, multiple-structure permanent residences (containing "men's houses, sleeping houses, heiau houses, women's eating houses, houses for the storage of provisions, houses for cooking, and many other houses" [Kamakau 1976:96]) were occupied by the *ali'i* or wealthy commoners, and the single-house residences were occupied by other commoners (*maka'āina*). Hawaiian scholar, David Malo, described a *maka'āinana* house as a "little shanty" in which all residential activities took place, "the fireplace was close to their head, and the poi dish conveniently at hand" (ibid.). Ethnographers E.S. Craighill Handy and Mary Kawena Pukui also noted the presence of single-structure households and multi-structure households, although they emphasized the multi-structure pattern (Handy and Pukui 1972:7, 112). The supposition that a multiple-house (structure) design was common among both social classes has been demonstrated in the archaeological record (e.g. Cordy 1981; Weisler and Kirch 1982). Cultural Surveys Hawai'i's work in inland settlements, in Waiohinu, Ka'u, and Honokohau, North Kona (Robins et al. 1992 and 1995 respectively), documented that multiple-structure households were common, accounting for approximately 50% of all permanent habitation sites.

6.2.2.5 Internal features

- 1) Temporary Habitation - few, if any, from just survey level observation, cupboards (excavation observations, e.g. multiple hearths)
- 2) Permanent Habitation - cupboards, single, well-defined hearth, constructed entrances or pathways, internal alignments (indicating segregation for multiple purposes)

The presence of internal features in habitation structures tend to indicate longer or permanent use of the structure. The more common internal features associated with permanent habitation are: solitary inlaid hearths, entry ways (including constructed pathways and doorways), and alternating surfaces (tiers) or internal alignments defining different living areas. Internal features that may occur in both temporary and permanent habitation structures include cupboards, post-holes, alignments, and less substantially constructed hearths.

Observations of cultural material (midden, artifacts, manuports, etc.) at sites provide additional supportive data, however the presence or absence of such material was not a key determining criterion.

If extensive excavation of habitation sites has occurred then thickness of a site's or feature's cultural deposit and the type of associated artifacts may assist in distinguishing between temporary and permanent habitation. For example, thicker cultural deposits that contain a variety of domestic-related tools could be an indicator of permanent habitation activities (Clark 1986: 207), while sparser cultural deposits with a limited variety of tool types may be an indicator of temporary habitation activities (op.cit. 199-200). However, the density of a cultural deposit or artifact types alone does not necessarily distinguish between temporary and permanent use, since similar domestic activities - revealed by similar artifact types - may be found at both temporary and permanent habitation sites (Cordy et al. 1991:528, 533-534). In addition, a dense and thick cultural deposit may be produced at a temporary habitation site that was used frequently over a long period of time (i.e., recurrent habitation). Regardless of whether or not intact cultural deposits can indicate temporary or permanent use, not enough subsurface data was obtained, during the inventory survey of this project, to facilitate this type of comparative analysis.

6.2.2.6 *Functional Associations*

- 1) Temporary Habitation - agricultural, natural resources (lithics, mining, sources) fish/shell fish
- 2) Permanent Habitation - other permanent habitation, burials, religious features/sites (uprights, i.e. heiau), shrines; potable water source(s)

The functional association of other features, sites, or complexes can assist in mode of habitation interpretations. Based on previous research temporary habitations in the central Kona region tend to be associated with *mauka/makai* trails, intensive agriculture, specific resource procurement (e.g. lithics, birds, timber, etc.) and natural features such as lava tubes and/or blisters. Permanent habitations may be associated with other permanent habitations in a cluster or "village" setting, burials, religious sites/features, potable water, and ocean access (Clark 1986, Jensen 1988, Cordy et al. 1991, Robins et al. 1995, Colin et al. 1996). Additionally, historic records related to Land Commission Awards (LCAs) are evaluated when applicable, as providing functional interpretations, possibly related to mode of habitation and thus is included in the column on "other functional associations."

6.2.2.7 *Geographic location*

- 1) Temporary Habitation - coast to inland, but more prevalent inland, amongst intensive agriculture, along trails, edges and/or interfaces of lava flows
- 2) Permanent Habitation - mainly coastal but scattered inland, shoreline access

Similar to other criteria previous research has documented trends pertaining to geographic location of temporary and permanent habitations. This category should be considered in regards to the topography/geology of the specific project area. The trends pertinent to the Kona region for temporary habitations indicate that sites may be found from the coast to inland, but that they are more commonly found inland, especially within an intensive agricultural context (Hammatt and Clark 1980, Robins et al. 1995). Permanent habitations are more commonly documented historically and archaeologically as being coastal with scattered inland sites. The predominance of permanent habitations being coastal is especially true for clustered housing, or "village"-like settings.

6.2.2.8 Interpretation Summary

The interpretations of habitation sites into temporary or permanent can be an uncomplicated process depending on survey area, number of sites, and type of sites present. However as can be seen in large studies, like the present survey, the quantity, variety and varying conditions of habitation sites necessitates utilization of a wide range of interpretive criteria. As explained, CSH makes in-field interpretation based on observable criteria, particular size, architectural type, and substantiveness of architecture. Other criteria are then applied as supportive data of one mode or the other. Table 14 and Table 15, for temporary habitation and permanent habitation respectively, have columns for the individual criterion utilized on a per site/feature basis. The following are summary sections for temporary and permanent habitations within the present project area.

6.2.3 Temporary Habitation

Thirty-five (35) habitation sites (representing 60.35 % of the total habitation sites) in the project area are interpreted as temporary in usage. Table 14 lists the criteria that distinguish them as temporary in use.

6.2.3.1 Size

The temporary habitation surface structures of the sites measure an average of 16.5 m², in a range from 5 m² to 45 m². The majority (81.8%) of these structures measures under 20 m². The temporary habitation lava tube structures of the sites measure an average of 12.1 m², in a range from 1.6 m² to 54.5 m². The majority (84.3%) of these structures measures under 20 m².

6.2.3.2 Architectural Type

The structures represented in the non-lava tube temporary habitation sites include a variety of architectural (“formal”) types. More than half (64.2%) of the non-lava tube temporary habitation structures are platforms. No other structure type accounts nearly as large a percentage of the temporary habitation structures. Terraces make up 14.2%. Modified depressions, mounds, and enclosures each represent 7% of the temporary habitation structures.

6.2.3.3 Single versus Multiple Components

The temporary habitation sites are comprised of 42 single-structure sites and 29 multiple-structure sites. Only 18 (-26475, -26477, -26478, -26480, -26490, -26495, -26498, -26500, -26508, -26524, -26525, -26532, -26538, -26539, -26550, -26576, -26578, and -26581) of the total 64 temporary habitation sites (three of the multiple-structure sites and 15 lava tube sites) contain non-habitation components. These non-habitation components include activity area for water collection, agriculture, ceremonial, markers, burials, transportation and commemorative rock art.

6.2.3.4 Distribution of Temporary Habitation

The majority of the temporary habitation sites within the project area are located on the *pāhoehoe* flow that dominates the majority of the project area. In terms of elevation the majority of the temporary habitation sites are located above 680 ft a.m.s.l. The sites are scattered across the eastern portion of the project area in both Kaloko Ahupua‘a and Kohanaiki Ahupua‘a.

Table 14. Characteristics of Temporary Habitation Sites and Features*

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26475*	Lava tube	Lava tube	N/A	Informal	Access mound, minimal water collection	None
26477*	Lava tube	Lava tube	N/A	Minimally cleared	Minimal water collection	None
26478	Lava tube complex	Lava tube	---	---	Lava tubes	Burial
26478/A	Lava Tube	Lava tube	8.0**	Cleared, leveled	None	None
26478/B	Modified depression	Lava tube	16.0	Faced, leveled	Constructed depressions, enclosures, terrace, ramp	None
26480*	Lava tube complex	Lava tube and surface	---	---	Lava blister	Burial, storage
26480/A*	Constructed entrance	Surface	N/A	Informal stacking	None	None
26480/C*	Modified outcrop	Surface	N/A	Informal, core filled	Wall	None
26481	Lava tube	Lava tube	15.0**	Cleared	None	None
26490*	Lava tube	Lava tube	4.0**	Cleared, leveled	Water collection, wall, slab path	Water collection. Heavy amount of agriculture sites in vicinity
26495	Lava tube complex	Lava tube and surface	---	---	Rock art, modified outcrop, wall, constructed entrance	Rock art, storage, water collection, transportation
26495/A	Terrace	Lava tube	11.2	Paved	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26495/C	Platform	Lava tube	18.0	Cleared, leveled, paved	Walls, pavement	None
26495/D	Terrace	Lava tube	6.8	Leveled, paved	Constructed ramp	None
26495/F	Wall	Lava tube	N/A	Thick	None	None
26495/H	Pavement	Lava tube	9.1	Leveled, cleared	None	None
26495/J	Terrace	Surface	6.4	Leveled, faced	None	None
26496	Complex	Surface	---	---	---	None
26496/A	Terrace	Surface	15.0	Leveled	None	None
26496/B	Mound	Surface	N/A	Loosely mounded	None	None
26496/C	Platform	Surface	20.0	Mounded	None	None
26498	Lava tube complex	Lava tube and surface	---	---	Cairn	Burial, marker and water collection
26498/A	Modified outcrop	Lava tube	6.0	Leveled, paved	Pavement	None
26498/B	Terrace	Lava tube	4.8	Leveled, paved	None	None
26498/C	Platform	Lava tube	6.0	Paved	None	None
26498/D	Enclosure	Surface	10.5	Paved	None	None
26499*	Lava tube	Lava tube	N/A	Minimal modification	Minimal water collection	None
26500	Lava tube complex	Lava tube	---	---	---	Water collection
26500/A	Platform	Lava tube	9.2	Mounded	None	None
26500/B	Wall	Lava tube	N/A	Filled	None	None
26500/C	Platform	Lava tube	N/A	Leveled, small	None	None
26500/D	Terrace	Lava tube	6.0	Leveled	None	None
26500/E	Wall	Lava tube	N/A	Coursed stacking	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26500/F	Alignment	Lava tube	N/A	Single course, boulders	None	None
26500/G	Terrace	Lava tube	19.6	Leveled, paved	None	None
26500/H	Wall	Lava tube	N/A	Varying formality	None	None
26500/I	Terrace	Lava tube	30.0	Leveled, rough pavement	None	None
26506*	Lava tube	Lava tube	54.5	Cleared outside entrance	None	None
26508	Lava tube	Lava tube	10.0**	Cleared	Water collection	Water collection
26511*	Lava tube	Lava tube	N/A	Not modified	None	None
26512*	Lava tube	Lava tube	N/A	Not modified	None	None
26513	Complex	Lava tube and surface	---	---	---	Water collection
26513/A	Platform	Surface	5.0	Paved	None	None
26513/B	Lava tube	Lava tube	27.5**	Leveled, cleared	Wall	None
26521*	Lava tube	Lava tube	N/A	Not modified	None	Water collection
26523	Platform	Surface	14.0	Leveled, paved	Probable hearth	None
26524*	Lava tube	Lava tube	N/A	None	Minimal water collection	None
26525*	Lava tube	Lava tube	5.7**	Cleared, leveled	None	Water collection
26527	Lava tube complex	Lava tube	---	---	None	None
26527/A	Modified lava tube	Lava tube	12.0**	Cleared, paved	None	None
26527/B	Modified lava tube	Lava tube	6.0**	Cleared	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26527/C	Modified lava tube	Lava tube	3.0**	Cleared, paved	Informal wall	None
26530	Platform	Surface	6.0	Rough surface	Cairn	None
26532	Lava tube	Lava tube	2.5**	Cleared, paved	Alignment, pavement, wall, water collection	Burial and water collection
26538	Lava tube complex	Lava tube	---	---	Lava tubes	Burial, water collection
26538/B	Modified depression	Lava tube	45.0	Cleared, leveled	Wall, pavement	None
26538/C	Lava tube	Lava tube	9.8**	Cleared, leveled	Mound, pavements	None
26539	Complex	Lava tube and surface	---	---	Lava tube	Water collection
26539/A	Platform	Surface	8.0	Mounded, paved	Enclosure	None
26542	Platform	Surface	40.0	Mounded	None	None
26548	Modified lava tube	Lava tube and surface	2.50**	Cleared, paved	Wall, constructed entrance, enclosure	Water collection, agriculture
26550	Lava tube	Lava tube	6.0**	Paved	Pavement, water collection	Water collection
26553	Lava tube	Lava tube	5.0**	Cleared	Wall, ramp	None
26555*	Lava tube	Lava tube	18.0**	Cleared	Informal modifications	None
26573	Lava tube	Lava tube	3.5**	Leveled, paved	Pavement, wall	None
26576*	Lava tube	Lava tube	5.0	Leveled area in sink	Constructed blockades	Burial
26577	Mound	Surface	11.7	Faced	None	Shelter
26578*	Lava tube	Lava tube	1.6**	Cleared	Wall	Activity area. Agriculture sites in vicinity
26581	Lava tube	Lava tube and surface	---	---	---	Water collection

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26581/A	Modified depression	Surface	45.0	Cleared	None	None
26581/B	Wall	Lava tube	N/A	Rough stacking	Water collection	Water collection

*Denotes a site recorded as having a shelter function (as opposed to temporary habitation)

**Calculated area refers to modifications within the lava tube with quantifiable floor size, such as platform surfaces, terraces, pavements, and cleared or leveled areas

6.2.4 Permanent Habitation

Twenty-four (24) of the habitation sites (representing 39.65% of the total 58 habitation sites) are considered to be permanent habitation sites. Table 15 lists the criteria that distinguish them as permanent habitation in function. These criteria are the same as those listed in Table 14 for temporary habitations thus allowing for comparison per mode of habitation.

6.2.4.1 Size

The surface permanent habitation structures measure between 2 m² and 70.2 m², with the exception of one site structure (Site 26534/B) measuring 600.0 m². This structure has been excluded as it is a large enclosing wall of a permanent habitation site complex. The average size of the structures, excluding 26534/B, is 31.5 m². While some of the structures fall into the small category their substantiveness, internal features, and associations as parts of larger habitation complexes justifies the interpretation of these structures as permanent habitation structures.

Nine permanent habitation sites (-16103, 26485, -26486, -26502, -26514, -26519, -26552, -26562, -26574, -26583) have surface and lava tube features. Twelve of the habitation features that are within lava tubes measure between 0.7 m² and 24.0 m². The average size of the structures is only 9.6 m². Though this average size is small for permanent habitation structures, as explained above, their substantiveness, internal features, and associations as parts of larger habitation complexes justifies the interpretation of these structures as permanent habitation structures.

6.2.4.2 Architectural Type and Internal Features

The permanent habitation sites consist of 70 individual structures that represent a variety of architectural types. Platforms are the most common type (representing 31.4% of the feature inventory) in the project area, with enclosures (21.4%), walls (20.0%), and terraces (17.1%) following in prevalence.

All but a few of the permanent habitation structures have some elements of substantial or solid architecture, such as: paved surfaces and bifaced walls. Those few structures that lack substantial architecture are either associated with other substantially built structures in a complex or they are poorly preserved structures. The majority of these architectural types also include internal features suggestive of permanent habitation use. Such features include: single hearths, constructed entrances, constructed depressions, and internal alignments designating different use areas. Cupboards are also present in both permanent habitation and temporary habitation structures.

6.2.4.3 Single versus Multiple Components

Of the 23 permanent habitation sites, nine sites are single-structure sites and 14 are multiple-structure sites comprising between two and eleven structures.

Seven of the sites (26284, 26314, 26335, 26348, 26350, 26381, and 26389) are interpreted solely as permanent habitation in usage. Less than half (42.9%) of these solely permanent habitation sites are single-structure sites while the majority (57.1%) are complexes ranging between two and five structures. These non-habitation components include agriculture, animal husbandry, markers, quarrying, possible burials, and storage.

6.2.4.4 Distribution of Permanent Habitation

The majority of the permanent habitation sites within the project area are located on the *pāhoehoe* flow that dominates the majority of the project area. In terms of elevation the majority of the temporary habitation sites are located above 680 ft a.m.s.l. The sites are scattered across the eastern portion of the project area in both Kaloko Ahupua'a and Kohanaiki Ahupua'a.

Additionally, nine permanent habitation sites (-16103, 26485, -26486, -26502, -26514, -26519, -26552, -26562, -26574, -26583) containing both surface and lava tube features were encountered in both Kaloko Ahupua'a and Kohanaiki Ahupua'a.

Table 15. Characteristics of Permanent Habitation Sites and Features

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
16103	Lava tube complex	Lava tube and surface	---	---	Mound, rock art, cairns, lava tube	Burial, marker, rock art, water collection
16103/A	Wall	Lava tube	N/A	Faced	None	None
16103/B	Wall	Lava tube	N/A	Faced	None	None
16103/C	Wall	Lava tube	N/A	Faced	None	None
16103/D	Terrace	Lava tube	7.5	Paved, leveled	None	None
16103/E	Modified Outcrop	Lava tube	N/A	Coursed stacking	None	None
16103/G	Platform	Surface	25.5	Paved	None	None
16103/H	Wall	Lava tube	N/A	Mounded	None	None
16103/L	Terrace	Lava tube	6.0	Leveled	None	None
16103/M	Terrace	Lava tube	3.0	Faced	None	None
16103/N	Wall	Lava tube	N/A	Faced	None	Burial
16103/O	Wall	Surface	N/A	Faced	None	None
16103/Q	Terrace	Surface	37.5	Leveled	None	None
26479	Enclosure	Surface	4.0	Bifaced	None	None
26485	Lava tube complex	Lava tube and surface	---	---	---	None
26485/A	Terrace	Lava tube	11.2	Paved	Cupboard	None
26485/B	Wall	Lava tube	7.5	Mounded, paved along side	None	None
26485/C	Terrace	Lava tube	6.0	Leveled	None	None
26485/D	Terrace	Surface	15.0	Mounded	None	None
26486	Complex	Lava tube and surface	---	---	---	None
26486/A	Enclosure	Surface	4.0	Bifaced	None	None
26486/B	Enclosure	Surface	6.3	Bifaced	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26487	Enclosure	Surface	16.0	Bifaced	None	None
26489	Complex	Surface	---	---	Mound, trail	Agriculture and transportation
26489/A	Platform	Surface	16.6	Paved, leveled	Rock art	Rock art
26489/B	Enclosure	Surface	N/A	Bifaced	None	None
26491	Platform	Surface	15.0	Leveled, faced	None	None
26494	Complex	Surface	---	---	Trail	Transportation
26494/A	Platform	Surface	21.7	Faced, leveled, paved	None	None
26494/B	Wall	Surface	40.5	Cleared, leveled, paved	None	None
26502	Complex	Lava tube and surface	---	---	Lava tube	Water collection
26502/A	Platform	Surface	14.6	Leveled, paved	None	None
26502/B	Mounds	Surface	8.0	Leveled, paved in between	Pavement	None
26502/C	Platforms (2)	Surface	4.0	Faced, leveled	None	None
26514	Complex	Lava tube and surface	---	---	Lava tube	Shelter
26514/A	Platform	Surface	10.0	Faced, paved	None	None
26518	Enclosure	Surface	2.4	Bifaced	None	None
26519	Complex	Lava tube and surface	---	---	Rock art	Rock art, water collection
26519/A	Terrace	Lava tube	7.2	Leveled, roughly paved	None	None
26519/B	Platform	Lava tube	N/A	Mounded	None	None
26519/C	Wall	Lava tube	N/A	Mounded	None	None
26519/D	Platform	Lava tube	23.0	Faced, paved	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26519/F	Enclosure	Lava tube	9.8	Leveled	None	None
26519/G	Mound	Lava tube	N/A	Well-sorted	None	None
26519/H	Wall	Lava tube	N/A	Mounded	None	None
26519/I	Platform	Surface	29.3	Faced, paved	Wall	None
26519/J	Platform	Surface	20.0	Faced	Depression	None
26519/K	Platform	Surface	5.3	Faced, paved	None	None
26519/L	Terrace	Surface	8.8	Paved	None	None
26519/M	Modified outcrop	Surface	16.0	Leveled	Wall, alignment	None
26519/N	Lava tube	Surface	5.0** *	Leveled	None	None
26534	Complex	Surface	---	---	---	None
26534/A	Pavement	Surface	70.2	Cleared	Pavement, trails	None
26534/B	Wall	Surface	600	Faced, leveled interior area	Depressions	None
26535	Platform	Surface	24.0	Mounded	None	None
26544	Enclosure	Surface	11.9	Bifaced	None	None
26552	Complex	Lava tube and surface	---	---	Lava tube, cairn	Storage, marker
26552/A	Modified lava tube	Lava tube	9.6	Paved	None	None
26552/C	Wall	Surface	N/A	Faced	None	None
26552/D	Pavement	Lava tube	0.7	Cleared, paved	None	None
26552/E	Mound	Lava tube	N/A	Linear	Cupboard	None
26552/G	Enclosure	Surface	7.5	Cleared, leveled	None	None
26558	Platform	Surface	20.3	Mounded	Depression	None
26562	Complex	Lava tube and surface	---	---	Lava blister	Burial

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26562/A	Enclosure	Surface	6.0	Faced	None	None
26565	Complex	Surface	---	---	Cairn	Marker
26565/A	Platform	Surface	32.6	Faced, leveled, paved	None	None
26565/B	Terrace	Surface	2.0	Faced	None	None
26565/D	Platform	Surface	17.0	Leveled, paved	Informal enclosure	None
26574	Complex	Lava tube and surface	---	---	Trails, mounds, lava tube	Ceremonial, transportation, agriculture, shelter
26574/A1	Platform	Surface	27.0	Leveled	Hearth	Ceremonial
26574/A2	Enclosure	Surface	45.0	Faced	None	None
26574/A3	Enclosure	Surface	40.5	Bifaced	None	None
26574/C	Platform	Surface	9.0	Faced	None	None
26574/D	Platform	Surface	3.0	Faced	None	None
26574/G	Platform	Surface	9.9	Faced	Lava blister	Storage
26580	Enclosure	Surface	11.0	Leveled, faced	Wall	None
26583	Complex	Lava tube and surface	---	---	Modified outcrop, platform, lava tube	Storage, ceremonial. Heavy amount of agriculture sites in vicinity
26583/A	Wall	Lava tube	24.0	Cleared, leveled area adjacent	None	Activity area
26583/B	Enclosure	Surface	13.6	Faced	None	None
26583/C	Platform	Surface	9.6	Mounded, roughly faced	None	None
26583/D	Terrace	Surface	8.0	Faced, paved, leveled area adjacent	Modified outcrop	None
26583/E	Mound	Surface	N/A	Formal stacking	None	None

Site Number/ Feature	Formal Type	Location	Floor Size (m ²)	Substantiveness	Internal Features	Other Functional Associations
26583/F	Mound	Surface	N/A	Mounded	None	None
26583/I	Terrace	Surface	52.2	Faced, leveled, paved	None	None
26583/J	Wall	Surface	N/A	Faced	Filled crevice, small terrace remnants	None
26583/K	Lava tube	Lava tube	N/A	Faced	Water collection (1 feature)	Water collection
26588	Enclosure	Surface	42.0	Bifaced, paved	Pavement	None

***Calculated area refers to modifications within the lava tube with quantifiable floor size, such as platform surfaces, terraces, pavements, and cleared or leveled areas

6.2.5 Indeterminate

Only one site within the project area lacked characteristics that would, upon field inspection, help to determine function (Site -26496). This site has therefore been listed as “indeterminate.” The site is a modified outcrop that was test excavated to determine whether a burial was present and to verify the initial interpretation of temporary habitation. Habitation was not indicated based on construction and lack of cultural material. Additionally, no human bone, blister openings or crypts were found, and thus the feature remains of indeterminate function.

6.2.6 Marker

Eight sites, in part or in whole, within the project area are considered to function as markers. They consist primarily of cairns and there are a total of nineteen marker features (sites -16103/F, -16103/J, -16103P, -26498/E, -26510/A, -26515/B, -26515/D, -26526, -26528/B, -26540, -26541, -26543, -26552/F, -26561, -26565/C, -26571, -26579, -26584/B, -26586). These sites and/or features marked the location of a burial, former trails, habitation sites, water collection areas, and one (-26540) that has no discernable objective.

Site -16103 Feature F marks an overlook of the coast; Feature J marks this permanent habitation site; and Feature P marks the end of a wall feature. Site -26498/E marks nearby temporary habitation sinks and burials. Site -26510/A marks the entrance to 30 water collection features, and possibly a burial within the lava tube. Site -26526 appears to mark a lookout area. Site 26528/B marks a water collection activity area lava tube. Site -26515 contains an alignment of four markers, one of which (Feature A) is situated on top of a small platform that contained a burial, and another that is on an agricultural mound (Feature C). Site -26561 appears to mark agricultural Site -26507 Feature C. Site -26975 is a marker for -26507 Feature P, a pervasive agriculture site located 10 m south of the cairn. Site -26584/B marks -26584/A, a trail. Several markers including -26541, -26561 and -26571 are possibly related; they are all similarly constructed cairns on *pāhoehoe* that are probable trail markers, and appear to be in an alignment. Site -26574/D marks a trail, -26574/E, within a complex. Site -26586 may be related to site -10712, the *ahupua'a* wall, given its proximity to that site.

6.2.7 Quarrying

Only one site in the project area (-26551) appears to have been utilized as a quarry area. Site -26551 is an isolated quarry area located approximately 40 m (131.2 ft.) north of Hina-Lani Street. Although this site is the most distinctive quarrying area in this general vicinity, there are many eroding *pāhoehoe* exposures that were probably quarried for stone, since stones are relatively easy to remove without extensive quarrying activity. The bedrock in the vicinity is so eroded that large pieces could simply have been picked up and removed, rather than removing slabs from an intact exposure. This removal of stones without quarrying explains some of the tossed stones that are prevalent in the site's vicinity although there is no evidence of bulldozing. Overall, quarrying in the project area is very minor.

6.2.8 Rock Art

Several sites in the project area had rock art present, in the form of petroglyphs. These petroglyphs ranged from anthropomorphic figures to pecked portable slabs. The most common

type of rock art were *papamū* boards, which usually consisted of slabs with rows of small pecked circular depressions. These are game boards and were relatively common in the project area, occurring in several lava tubes (both on portable slabs and on tube floors). Other types of rock art included portable petroglyphs (small slabs with pecked figures) and petroglyphs on the sides or floors of lava tubes. Most notable are the two anthropomorphic figures at Site -26520, the petroglyph panel at -26519, the portable petroglyph fragments at Site -26560, and the probable ceremonial petroglyphs at Site -26489.

6.2.9 Storage

One site (-26516) and four features (-26480/B, -26495/E, -26552/B, -26583/G) are designated as storage. The majority of storage features in the project area are believed to have been utilized for articles associated with habitation activities as indicated by the four designated storage features. Some cupboards are also found in relation to ceremonial sites. In most cases, the cupboards were part of a larger feature in which they were described and so do not have their own designation. Site -26516 is the only site within the project area designated solely as storage. This modified eroding *pāhoehoe* outcrop is a small cupboard with no other apparent function. The site is not associated with any other sites and the closest site is located 30 m northeast. Site -26480/B is within a shelter/activity area site; -26485/E consists of three large cupboards within a permanent habitation; -26552/B consists of two cupboards within a permanent habitation; and -26583/G is a small cupboard within a permanent habitation complex with a ceremonial platform.

6.2.10 Transportation

Transportation refers to the project area's twenty trail segments within thirteen sites. As stated previously, this is a common site type within the Kekaha region. The trails or trail segments observed indicate a network of transportation corridors, composed primarily of widespread, short *pāhoehoe* slab trails over 'a'ā, in many cases located only as a remnant trail segment. Many of the trails are associated with larger habitation complexes, i.e. Site -26574, which indicates use primarily for traveling in the near vicinity to habitation areas.

The only clearly historic trail in the project area was located on the east side of the project area. Site -10714 is a wide, curbstone trail over *pāhoehoe* that utilizes constructed causeways to cross low-lying areas in the flow. This trail matched well with "Kohanaiki Road" seen on Emerson's maps dating to around 1888, and was also found in the Wolforth (2005) study area directly *mauka* of the current project area.

Often the observed portions of trails are not lengthy, and this is especially true where trails shortly assume a route primarily on *pāhoehoe* where it rarely can be traced. Most trail routes located in the project area were only identified on 'a'ā flows, as following trails on the *pāhoehoe* lava was particularly problematic. The *pāhoehoe* flow generally negates the necessity of constructing a substantial trail structure for foot trails. Additionally, grass and *koa haole* growth is thickest on the *pāhoehoe* terrain; this, in combination with the lack of trail structure, makes identifying specific trail alignments on the *pāhoehoe* lava essentially impossible. Thus, determining trail origin or destination is speculative in many cases.

6.2.11 Water Collection

Thirty-nine of the seventy-one sites that contain lava tubes in the project area were used in whole or in part for water collection. Twenty-four of these sites have water collection as a primary function, where there are sufficient numbers of water catchment features to consider this the main activity at the site. Of these twenty-four, eight of them also have burial as a primary function (dual primary function). Six are associated with temporary habitation or activity areas, and two have surface structures in addition to lava tube construction.

Fifteen sites have water collection as a secondary function, generally in association with habitation (as the primary function). Three of these secondary water collection sites are also associated with burials. In total, eleven of the sites that have some water catchment activity are also associated with a burial. A total of nineteen sites that contain water collection in some form are also associated with habitation.

Small informal concentrations of cobbles and small boulders in lava tubes are indicative of water collection activity areas. Lava tubes containing these features generally have high humidity and water drips are often evident on the ceiling. The rock concentrations were placed to hold a container, often a bottle gourd, upright to collect the falling water drops. No gourds were found in place in the project area, nor were any other containers such as wooden bowls or carved logs, although occasionally gourd fragments were found. In more intensive water collection lava tubes, there is often charcoal associated with water collection features, which can sometimes be identified as charred *kukui* nut; the *kukui* nuts (also known as candle nut) were almost certainly used as a light source during collection of water vessels. Both gourd fragments and charcoal associated with water collection are good candidates for radiocarbon dating during data recovery.

Generally water catchment features consist of small to medium sized cobbles placed in rough circles or stacked against outcrops in tubes to create a stable area for some sort of container (gourds or carved wood). Several sites in the project area have more formal water collection features, which are often rectangular in shape and larger than the less obvious informal water catchments. Many water catchment sites have a fair amount of internal construction, such as formally modified entrances which appear to constrict the tube entrances (probably for moisture retention) as well as making movement through the tube easier. Other associated features include small cairns in the lava tube, which appear to direct a person to tube exits.

The story of Ko'amokumokuohe'eia and historic newspaper articles translated by Kepa Maly (see above Background Research section) suggest that water collection was very important in the Kekaha region, and the two formal water collection sites mentioned above appear to fit very closely with the type of activity described in these accounts. Differences in the size and formality of water collection features may be attributable to varying sizes of containers used, i.e., gourds versus carved trees.

6.3 Site Distribution

The distribution of sites within the project area, like the types and functions, correlate closely with expectations for a portion of the Upland Zone. Site density is noticeably different in Kaloko and Kohanaiki, with the *mauka* slopes of Kohanaiki Ahupua'a having by far the highest site density for the entire Kaloko Makai project area. The difference in site density between the two *ahupua'a* may be due to differential exposure to bulldozing and perhaps cattle ranching; the *mauka* portion of Kohanaiki is relatively undisturbed, while Kaloko and the *makai* portion of Kohanaiki have evidence of bulldozer activity, modern trash dumps, and distinct bulldozer roads. This is particularly evidenced by the poor condition of the *ahupua'a* wall and Site -10714 (the historic *mauka-makai* trail) in the *makai* region of the parcel, which appears to be related to heavy bulldozer activity.

Differences in site density within the project area are also explained by geological and environmental differences. The *mauka* slopes (east side) of the project area are within a zone that receives noticeably more rainfall and has greater soil development, in addition to having many areas with an excellent view point due to numerous north-south running ridges. These view-points additionally provide a cool breeze and many of the larger habitation sites within the project area specifically take advantage of this type of landscape. The increased rain fall and soil development create the necessary variables for more intensive agricultural pursuits, and the Kona Field System begins to be present in earnest at the far east boundary of the parcel. The lower elevation portions of the project have widespread agricultural features as well, but these tend to be less formal and occur in lower density, varying based largely on geology and elevation.

Lava tube density also appears to be a major factor in site distribution. Of the fifty-six habitation sites in the project area, thirty-eight are associated with a lava tube at the site, and thirteen of these contain both lava tubes and surface habitation. Overall, most habitation sites are also associated with water collection tubes nearby. Thus, lava tubes appear to be an important consideration in settlement pattern, both as shelters and cool resting areas, as well as probably being an essential resource as far as water procurement in an area that does not have a source of flowing water. Lava tubes also seem to be the preferred method for burials within the project area, and burial locations are generally widespread throughout the parcel.

In general, there is a clear preference of *pāhoehoe* terrain over *'a'ā* terrain in terms of site location. The *'a'ā* tends to display features such as trails, habitation, and storage sites and generally the elevated flows likely create separation and distinction for certain ceremonial sites. However, the majority of sites are located on the relatively level *pāhoehoe* terrain. Because many of the sites are close together, it seems reasonable to conclude that many, though probably not all, the structures were in use contemporaneously. If not used contemporaneously in this area, it is difficult to understand why so many enclosures were constructed, instead of modifying existing structures. The intensive agricultural modification near the eastern edge of the project area is the best evidence that many of these Kohanaiki habitations were well populated. It stands to reason that several families lived permanently and seasonally in the area. It also seems likely that survivors of disease epidemics after contact made the shortest move possible, to the Kohanaiki Homesteads established along the government road (Māmalahoa Highway) 2.4 kilometers or 1.4 miles directly upslope.

6.4 Conclusions

The inventory survey of the 194.324-acre parcel resulted in the identification and documentation of 120 archaeological sites. Based on historic background literature and previous archaeological studies, the site density appears consistent with general ideas about settlement of this area (see the Background Research section of this report). Overall, site density for this parcel is relatively high, and sites tend to consist of large permanent habitation complexes, burials, and some ceremonial sites. The large numbers of lava tubes within the project area are intensively utilized, especially in the *mauka* region of Kohanaiki.

Most of the recorded sites in the project area are presumed to be pre-contact, with some historic period activity. Based on historic information, goat and cattle and grazing was the main form of land use during the historic to modern era, although there is one historic homestead type site (-26534) present, as well as historic burials.

The site and feature types/functions correlate with the anticipated finds for the region and zone within which the project area lies. Habitation sites have been interpreted as temporary and permanent sites, with an increase of recurrent habitation area upslope. Burials, trails, habitation complexes, water resource procurement and agricultural modification are documented site types within the Upland Zone of the Kekaha region and are present within the project area. Agricultural sites/features are present in increasing density on the *mauka* slopes where the Kona Field System begins in earnest; lower elevation agricultural modifications represent opportunistic productivity versus the type of full scale land modification for intensive productivity at higher elevations. Historic *mauka/makai* transportation through the center of the project area is suggested by the trail (-10714) adjacent to the historic *ahupua'a* wall (-10712) on the boundary of Kohanaiki and Kaloko, while pre-contact trails tend to consist of slab trails over *'a'ā* flows. In general, this project area has a large number of significant historic properties, and preservation and data recovery plans for the Kaloko Makai project will need to give special consideration to the site density and overall preservation of the cultural resources in this area.

Section 7 Significance Assessments

7.1 Significance Assessments

A total of 120 sites of varied archaeological significance are present in the project area. Individual site significance and recommended treatment are specified in Table 16. Sites were evaluated for significance according to the broad criteria established for the National and State Registers. The five criteria are:

- A Site reflects major trends or events in the history of the state or nation.
- B Site is associated with the lives of persons significant in our past.
- C Site is an excellent example of a site type.
- D Site may be likely to yield information important in prehistory or history.
- E Site has cultural significance; probable religious structures (*shrines, heiau*) and/or burials present.

Of the total 120 sites with the project area all meet Criterion D and 85 sites (71%) are considered solely to meet Criterion D. Five sites (4%) were interpreted as additionally conforming to Criterion C, and 32 (27%) additionally conform to Criterion E. Two sites conform to Criterion C, D and E. No sites were found to meet Criterion A or B. For a breakdown by site, please see Table 16 on the following page.

Significance criterion C - "site is an excellent example of a site type" is assigned to five sites in the project area. These sites represent the best examples of structural and functional archaeological components (i.e. best condition and architecture) within the project area, and all primarily function as permanent habitation.

Significance criterion D - "site may be likely to yield information important in prehistory and history" is assigned to all 120 sites in the project area. All of these sites provide important information to the settlement patterns and livelihood of the residents (by the site's plotted location, and structural and functional nature), and some of these sites may provide more detailed archaeological data through future excavations or other additional documentation.

Significance criterion E - "site has cultural significance; probable religious structures...and burials" - is given to thirty-two sites in the project area. These sites include all of the confirmed and probable burials encountered as well as sites with ceremonial components or associated petroglyphs.

Table 16. Significance Assessments and Recommendations

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-10712	--	Wall	Animal Husbandry	D	Historic	Preserve
-26418	--	Trail	Transportation	D	Pre-Contact	No Further Work
-26475	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26476	--	Mound	Agriculture	D	Historic	No Further Work
-26477	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26478	--	Complex	Burial & Temporary Habitation	D, E	Pre-Contact	Preserve & Data Recovery
	A	Lava tube	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	B	Modified depression	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	C	Lava tube	Burial	D, E	Pre-Contact	Preserve
	D	Lava tube	Water Collection	D, E	Pre-Contact	Data Recovery
-26479	--	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
-26480	--	Lava tube	Burial & Shelter	D, E	Pre-Contact	Preserve
	A	Constructed entrance	Shelter	D	Pre-Contact	No Further Work
	B	Lava blister	Storage	D	Pre-Contact	No Further Work
	C	Modified outcrop	Shelter	D	Pre-Contact	No Further Work
-26481	--	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
-26482	--	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
-26483	--	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
	A	Pavement	Transportation	D	Pre-Contact	Data Recovery
	B	Trail	Transportation	D	Pre-Contact	Data Recovery
	C	Wall	Water Collection	D	Pre-Contact	Data Recovery
-26484	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26485	--	Lava tube	Permanent Habitation	D	Pre-Contact	Data Recovery
	A	Terrace	Permanent Habitation	D	Pre-Contact	Data Recovery
	B	Wall	Permanent Habitation	D	Pre-Contact	Data Recovery

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
	C	Terrace	Permanent Habitation	D	Pre-Contact	Data Recovery
	D	Terrace	Permanent Habitation	D	Pre-Contact	Data Recovery
-5699	--	Wall	Animal Husbandry	D	Historic	No Further Work
-06601	--	Complex	Agriculture	D	Pre-Contact	Data Recovery
-10714	--	Trail	Transportation	D, E	Pre-Contact/ Historic	Preserve
-16103	--	Lava tube	Burial & Permanent Habitation	D, E	Pre-Contact	Preserve & Data Recovery
	A	Wall	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	B	Wall	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	C	Wall	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	D	Terrace	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	E	Modified outcrop	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	F	Mound	Marker	D, E	Pre-Contact	Data Recovery
	G	Platform	Permanent Habitation	D, E	Pre-Contact	Preserve
	H	Wall	Permanent Habitation	D, E	Pre-Contact	Data Recovery
	I	Rock Art	Rock Art	D, E	Pre-Contact	Preserve
	J	Cairn	Marker	D, E	Pre-Contact	No Further Work
	K	Lava tube	Burial	D, E	Pre-Contact	Preserve
	L	Terrace	Permanent Habitation	D, E	Pre-Contact	Preserve
	M	Terrace	Permanent Habitation	D, E	Pre-Contact	Preserve
	N	Wall	Permanent Habitation	D, E	Pre-Contact	Preserve
O	Wall	Permanent Habitation	D, E	Pre-Contact	Data Recovery	
P	Cairn	Marker	D, E	Pre-Contact	Data Recovery	
Q	Terrace	Permanent Habitation	D, E	Pre-Contact	Data Recovery	
-26486	--	Complex	Permanent Habitation	D	Pre-Contact	Preserve
	A	Enclosure	Permanent Habitation	D	Pre-Contact	Preserve
	B	Enclosure	Permanent Habitation	D	Pre-Contact	Preserve

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26487	--	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
-26488	--	Lava tube	Burial	D, E	Pre-Contact	Preserve
-26489	--	Complex	Permanent Habitation	D, E	Pre-Contact	Preserve
	A	Platform	Permanent Habitation	D, E	Pre-Contact	Preserve
	B	Enclosure	Permanent Habitation	D, E	Pre-Contact	Preserve
	C	Mound	Agriculture	D, E	Pre-Contact	No Further Work
	D	Trail	Transportation	D, E	Pre-Contact	No Further Work
-26490	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26491	--	Platform	Permanent Habitation	D	Pre-Contact	No Further Work
-26492	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26493	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26494	--	Complex	Permanent Habitation	D	Pre-Contact	Preserve
	A	Platform	Permanent Habitation	D	Pre-Contact	Preserve
	B	Wall	Permanent Habitation	D	Pre-Contact	Preserve
	C	Trail	Transportation	D	Pre-Contact	Preserve
-26495	--	Lava tube	Temporary Habitation	D	Pre-Contact	Preserve
	A	Terrace	Temporary Habitation	D	Pre-Contact	Preserve
	B	Rock Art	Rock Art	D	Pre-Contact	Preserve
	C	Platform	Temporary Habitation	D	Pre-Contact	Preserve
	D	Terrace	Temporary Habitation	D	Pre-Contact	Preserve
	E	Modified outcrop	Storage	D	Pre-Contact	Preserve
	F	Wall	Temporary Habitation	D	Pre-Contact	Preserve
	G	Wall	Water Collection	D	Pre-Contact	Preserve
	H	Pavement	Temporary Habitation	D	Pre-Contact	Preserve
	I	Constructed entrance	Transportation	D	Pre-Contact	Preserve
	J	Terrace	Temporary Habitation	D	Pre-Contact	Preserve
-26496	--	Complex	Temporary Habitation	D	Pre-Contact	No Further Work
	A	Terrace	Temporary Habitation	D	Pre-Contact	No Further Work

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
	B	Mound	Temporary Habitation	D	Pre-Contact	No Further Work
	C	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
-26497	--	Modified outcrop	Indeterminate	D	Pre-Contact	No Further Work
-26498	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact	Preserve & Data Recovery
	A	Modified outcrop	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	B	Terrace	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	C	Platform	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	D	Enclosure	Temporary Habitation	D, E	Pre-Contact	Data Recovery
-26499	--	Lava tube	Shelter	D	Pre-Contact	Data Recovery
-26500	--	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	A	Platform	Temporary Habitation	D	Pre-Contact	Data Recovery
	B	Wall	Temporary Habitation	D	Pre-Contact	Data Recovery
	C	Platform	Temporary Habitation	D	Pre-Contact	Data Recovery
	D	Terrace	Temporary Habitation	D	Pre-Contact	Data Recovery
	E	Wall	Temporary Habitation	D	Pre-Contact	Data Recovery
	F	Alignment	Temporary Habitation	D	Pre-Contact	Data Recovery
	G	Terrace	Temporary Habitation	D	Pre-Contact	Data Recovery
	H	Wall	Temporary Habitation	D	Pre-Contact	Data Recovery
-26501	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact	Preserve
-26502	--	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
	A	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
	B	Mound	Permanent Habitation	D	Pre-Contact	Data Recovery
	C	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
	D	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
-26503	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact	Preserve

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26504	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26505	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26506	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26507	--	Complex	Agriculture	D	Pre-Contact	Data Recovery
	A	Mound/Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	B	Mound	Agriculture	D	Pre-Contact	No Further Work
	C	Mound/Enclosure	Agriculture	D	Pre-Contact	No Further Work
	D	Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	E	Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	F	Mound	Agriculture	D	Pre-Contact	No Further Work
	G	Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	H	Mound	Agriculture	D	Pre-Contact	No Further Work
	I	Mound	Agriculture	D	Pre-Contact	No Further Work
	J	Mound	Agriculture	D	Pre-Contact	No Further Work
	K	Mound/Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	L	Mound	Agriculture	D	Pre-Contact	No Further Work
	M	Modified outcrop	Agriculture	D	Pre-Contact	No Further Work
	N	Mound	Agriculture	D	Pre-Contact	No Further Work
O	Mound	Agriculture	D	Pre-Contact	No Further Work	
P	Mound	Agriculture	D	Pre-Contact	No Further Work	
-26508	--	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
-26509	--	Lava tube	Burial	D, E	Pre-Contact	Preserve
-26510	--	Complex	Burial, Water Collection & Ceremonial	D, E	Pre-Contact	Preserve & Data Recovery
	A	Cairn	Marker	D, E	Pre-Contact	Data Recovery
	B	Trail	Transportation	D, E	Pre-Contact	Data Recovery

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
	C	Platform	Ceremonial	D, E	Pre-Contact	Preserve
	D	Platform	Ceremonial	D, E	Pre-Contact	Preserve
	E	Trail	Transportation	D, E	Pre-Contact	Data Recovery
-26511	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26512	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26513	--	Complex	Temporary Habitation	D	Pre-Contact	Data Recovery
	A	Platform	Temporary Habitation	D	Pre-Contact	Data Recovery
	B	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
-26514	--	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
	A	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
	B	Lava tube	Shelter	D	Pre-Contact	Data Recovery
-26515	--	Platform & Cairns	Burial	D, E	Pre-Contact	Preserve
	A	Platform	Burial	D, E	Pre-Contact	Preserve
	B	Cairn	Marker	D, E	Pre-Contact	No Further Work
	C	Mound	Agriculture	D, E	Pre-Contact	No Further Work
	D	Cairn	Marker	D, E	Pre-Contact	No Further Work
-26516	--	Modified outcrop	Storage	D	Pre-Contact	No Further Work
-26517	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26518	--	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
-26519	--	Complex	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	A	Terrace	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	B	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	C	Wall	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	D	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	E	Rock Art	Rock Art	C, D, E	Pre-Contact	Preserve
	F	Enclosure	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	G	Mound	Permanent Habitation	C, D, E	Pre-Contact	Preserve
H	Wall	Permanent Habitation	C, D, E	Pre-Contact	Preserve	

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
	I	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	J	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	K	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	L	Terrace	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	M	Modified outcrop	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	N	Lava tube	Permanent Habitation	C, D, E	Pre-Contact	Preserve
-26520	--	Lava tube	Burial, Ceremonial, & Animal Husbandry	D, E	Pre-Contact/ Historic	Preserve & Data Recovery
	A	Wall	Animal Husbandry	D, E	Historic	Data Recovery
	B	Wall	Animal Husbandry	D, E	Historic	Data Recovery
	C	Wall	Animal Husbandry	D, E	Historic	Data Recovery
	D	Rock Art	Ceremonial	D, E	Pre-Contact	Preserve
	E	Lava tube	Burial	D, E	Pre-Contact	Preserve
	F	Platform	Ceremonial	D, E	Pre-Contact	Preserve
-26521	G	Platform	Temporary Habitation	D	Pre-Contact	Data Recovery
-26521	--	Lava tube	Shelter	D	Pre-Contact	Data Recovery
-26522	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact/ Historic	Preserve & Data Recovery
	A	Constructed entrance	Activity Area	D, E	Pre-Contact/ Historic	Preserve
	B	Mound	Transportation	D, E	Pre-Contact/ Historic	Preserve
	C	Alignment	Activity Area	D, E	Pre-Contact/ Historic	Preserve
	D	Mound	Transportation	D, E	Pre-Contact	Data Recovery
	E	Modified depression	Transportation	D, E	Pre-Contact	Data Recovery
	F	Mound	Transportation	D, E	Pre-Contact	Data Recovery
	G	Hearth	Activity Area	D, E	Historic	Preserve

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26523	--	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
-26524	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26525	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26526	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26527	--	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	A	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	B	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	C	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
-26528	--	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
	A	Constructed entrance	Transportation	D	Pre-Contact	Data Recovery
	B	Cairn	Marker	D	Pre-Contact	Data Recovery
-26529	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact	Preserve
-26530	--	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
-26531	--	Enclosure	Agriculture	D	Pre-Contact	No Further Work
-26532	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact	Preserve
-26533	--	Platform	Agriculture	D	Pre-Contact	No Further Work
-26534	--	Complex	Permanent Habitation	C, D	Historic	Preserve
	A	Pavement	Permanent Habitation	C, D	Historic	Preserve
	B	Wall	Permanent Habitation	C, D	Historic	Preserve
-26535	--	Platform	Permanent Habitation	D	Pre-Contact	No Further Work
-26536	--	Wall	Animal Husbandry	D	Historic	No Further Work
-26537	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26538	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact	Preserve & Data Recovery
	A	Lava tube	Water Collection & Burial	D, E	Pre-Contact	Preserve
	B	Modified depression	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	C	Lava tube	Temporary Habitation	D, E	Pre-Contact	Data Recovery
	D	Lava tube	Water Collection	D, E	Pre-Contact	Data Recovery

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26539	--	Complex	Temporary Habitation	D	Pre-Contact	No Further Work
	A	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
	B	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26540	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26541	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26542	--	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
-26543	--	Wall	Marker	D	Pre-Contact	No Further Work
-26544	--	Enclosure	Permanent Habitation	C, D	Pre-Contact	Preserve
-26545	--	Lava tube	Activity Area	D	Pre-Contact	Data Recovery
-26546	--	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
-26547	--	Lava tube	Burial	D, E	Pre-Contact	Preserve
-26548	--	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	A	Wall	Water Collection	D	Pre-Contact	Data Recovery
	B	Constructed entrance	Water Collection	D	Pre-Contact	Data Recovery
	C	Enclosure	Agriculture	D	Pre-Contact	Data Recovery
-26549	--	Terrace	Agriculture	D	Pre-Contact	No Further Work
-26550	--	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
-26551	--	Modified outcrop	Quarrying	D	Pre-Contact	No Further Work
-26552	--	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
	A	Lava tube	Permanent Habitation	D	Pre-Contact	Data Recovery
	B	Lava tube	Storage	D	Pre-Contact	Data Recovery
	C	Wall	Permanent Habitation	D	Pre-Contact	Data Recovery
	D	Pavement	Permanent Habitation	D	Pre-Contact	Data Recovery
	E	Mound	Permanent Habitation	D	Pre-Contact	Data Recovery
	F	Cairn	Marker	D	Pre-Contact	No Further Work
G	Enclosure	Permanent Habitation	D	Pre-Contact	Data Recovery	
-26553	--	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
-26554	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26555	--	Lava tube	Shelter	D	Pre-Contact	No Further Work
-26556	--	Platform	Burial	D, E	Pre-Contact	Preserve
-26557	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26558	--	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
-26559	--	Platform	Burial	D, E	Pre-Contact	Preserve
-26560	--	Trail	Transportation	D, E	Pre-Contact	No Further Work
-26561	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26562	--	Complex	Burial & Permanent Habitation	D, E	Pre-Contact	Preserve
	A	Enclosure	Permanent Habitation	D, E	Pre-Contact	Preserve
	B	Lava blister	Burial	D, E	Pre-Contact	Preserve
-26563	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
-26564	--	Lava tube	Burial	D, E	Pre-Contact	Preserve
-26565	--	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
	A	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
	B	Terrace	Permanent Habitation	D	Pre-Contact	Data Recovery
	C	Cairn	Marker	D	Pre-Contact	No Further Work
	D	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
-26566	--	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
-26567	--	Mound	Agriculture	D	Pre-Contact	No Further Work
-26568	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact	Preserve
-26569	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact	Preserve
-26570	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact/ Historic	Preserve
	A	Terrace	Activity Area	D, E	Pre-Contact/ Historic	Preserve/Data Recovery
	B	Pavement	Activity Area	D, E	Pre-Contact/ Historic	Preserve/Data Recovery

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
	C	Modified outcrop	Activity Area	D, E	Pre	Preserve/Data Recovery
	D	Trail	Transportation	D, E	Pre	Preserve/Data Recovery
	E	Complex	Burial	D, E	Pre-Contact/ Historic	Preserve
	F	Wall	Activity Area	D, E	Pre-Contact	Preserve
	G	Enclosure	Activity Area	D, E	Pre-Contact	Preserve/Data Recovery
	H	Platform	Burial	D, E	Pre-Contact	Preserve
	I	Platform	Ceremonial	D, E	Pre-Contact	Preserve
-26571	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26572	--	Complex	Agriculture	D, E	Pre-Contact	No Further Work
	A	Enclosure	Ceremonial	D, E	Pre-Contact	No Further Work
	B	Terrace	Agriculture	D, E	Pre-Contact	No Further Work
	C	Wall	Agriculture	D, E	Pre-Contact	No Further Work
-26573	--	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
-26574	--	Complex	Permanent Habitation	D, E	Pre-Contact	Preserve
	A	Platform	Permanent Habitation	D, E	Pre-Contact	Preserve
	B	Trail	Transportation	D, E	Pre-Contact	Preserve
	C	Platform	Permanent Habitation	D, E	Pre-Contact	No Further Work
	D	Platform	Permanent Habitation	D, E	Pre-Contact	No Further Work
	E	Trail	Transportation	D, E	Pre-Contact	No Further Work
	F	Lava tube	Shelter	D, E	Pre-Contact	No Further Work
G	Platform	Permanent Habitation	D, E	Pre-Contact	No Further Work	
-26575	--	Lava tube	Water Collection	D	Pre-Contact	No Further Work
	A	Constructed entrance	Water Collection	D	Pre-Contact	No Further Work
	B	Wall	Water Collection	D	Pre-Contact	No Further Work

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26576	--	Lava tube	Burial & Shelter	D, E	Pre-Contact	Preserve
-26577	--	Platform	Temporary Habitation	D	Pre-Contact	Data Recovery
-26578	--	Lava tube	Shelter	D	Pre-Contact	Data Recovery
-26579	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26580	--	Enclosure	Permanent Habitation	D	Pre-Contact	Preserve
-26581	--	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
	A	Modified depression	Temporary Habitation	D	Pre-Contact	Data Recovery
	B	Wall	Temporary Habitation	D	Pre-Contact	Data Recovery
-26582	--	Lava tube	Burial	D, E	Pre-Contact	Preserve
-26583	--	Complex	Permanent Habitation & Ceremonial	C, D, E	Pre-Contact	Preserve
	A	Wall	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	B	Enclosure	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	C	Platform	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	D	Terrace	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	E	Mound	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	F	Mound	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	G	Modified outcrop	Storage	C, D, E	Pre-Contact	Preserve
	H	Platform	Ceremonial	C, D, E	Pre-Contact	Preserve
	I	Terrace	Permanent Habitation	C, D, E	Pre-Contact	Preserve
	J	Wall	Permanent Habitation	C, D, E	Pre-Contact	Preserve
K	Lava tube	Permanent Habitation	C, D, E	Pre-Contact	Preserve	
-26584	--	Trail & Cairn	Transportation	D	Pre-Contact	No Further Work
	A	Trail	Transportation	D	Pre-Contact	No Further Work
	B	Cairn	Marker	D	Pre-Contact	No Further Work
-26585	--	Enclosure & Platform	Agriculture	D	Pre-Contact	No Further Work
	A	Enclosure	Agriculture	D	Pre-Contact	No Further Work
	B	Platform	Agriculture	D	Pre-Contact	No Further Work

SIHP # 50-10-27-/ 50-10-28-	Feature	Site Type	Function	Significance	Age	Mitigation Recommendation
-26586	--	Cairn	Marker	D	Pre-Contact	No Further Work
-26587	--	Mound	Agriculture	D	Pre-Contact	No Further Work
-26588	--	Enclosure	Permanent Habitation	C, D	Pre-Contact	Preserve

Section 8 Project Effect and Mitigation Recommendations

8.1 Project Effect

The proposed project will affect historic properties recommended eligible to the Hawai'i Register. CSH's project specific effect recommendation is "effect, with agreed upon mitigation measures."

Historic properties outside of the project area do have the potential to be affected by the current development. The proximity of the project area to Kaloko-Honokōhau National Historical Park to the east is the primary concern. Historic properties north and south of the project area are of less concern due to the extensive industrial/commercial developments separating the project area from the potential sites there.

In the case of the National Historical Park, there is potential visual impact by further development of the slopes of Hualālai and potential auditory impact due to increased use and/or expansion of Queen Ka'ahumanu Highway and/or Hina-Lani Street. In both cases, significant impact has already been made by large industrial/commercial developments *mauka* of Queen Ka'ahumanu Highway. However, due to the situation of the parcel on the slope immediately overlooking the park, there is a potential cumulative effect.

Because this report represents one of four parcels which CSH was contracted to survey for the Kaloko Makai project, there is significant potential for development to affect historic properties outside of the project area as it has been defined for the purposes of the report – in those other parcels. All of these parcels are included in our client's project plans, suggesting development is just as likely for each parcel. Therefore the effect on historic properties in the present project area will be greatest by the development inside the respective parcel. Detailed consideration for one project area of the four parcels in the Kaloko Makai inventory survey affecting another is not undertaken here.

8.2 Mitigation Recommendations

Overall, the project area contains a large number of significant sites that are recommended for preservation and/or data recovery. It is recommended that of the 120 sites in the project area, 31 sites (26%) be subjected to a program of data recovery to address scientific and informational concerns and 38 sites (32%) be preserved (see Figure 27 and Figure 28). Seven of these sites are recommended specifically for both preservation and data recovery. Other preservation sites should be considered for some amount of data recovery effort as part of the preservation plan, to include further photographic documentation, dating, etc. as appropriate. It is believed that continued documentation in some cases could help mitigate possible vandalism or looting.

The remaining 58 sites are not recommended to undergo further research, as the documentation and plotting of location during the current study has addressed the limited information available at these sites. These sites are classified under Criterion D significance only and are generally characterized as sites in poor structural condition, or sites such as minimally modified lava tubes, trail remnants, agricultural features, or animal husbandry walls that lack excavation potential.



Figure 27. Map showing mitigation recommendations for historic properties within the northern portion of the project area (note that drawn site boundaries for multi-component sites are not meant to indicate the preservation boundary)

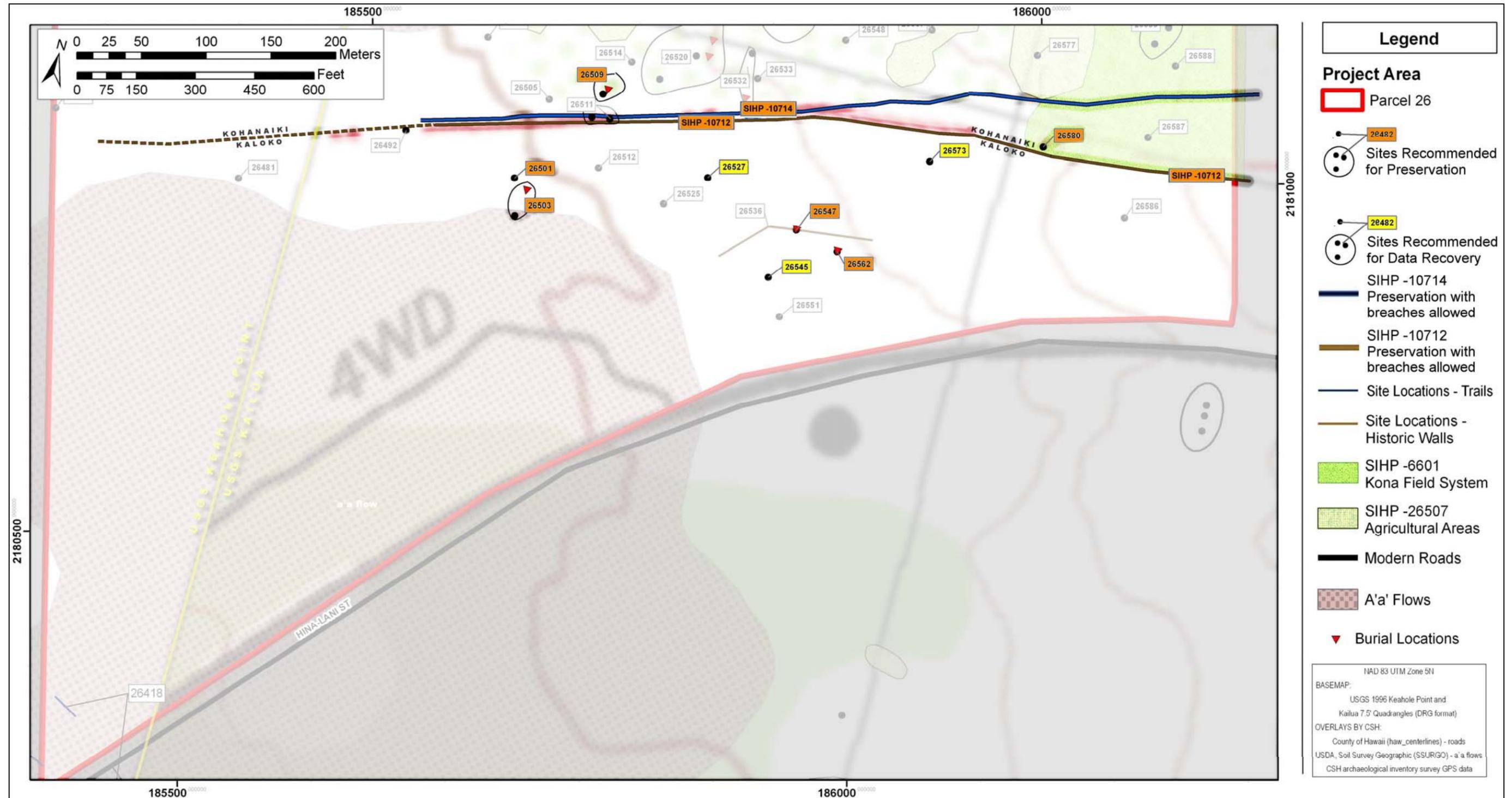


Figure 28. Map showing mitigation recommendations for historic properties within the southern portion of the project area (note that drawn site boundaries for multi-component sites are not meant to indicate the preservation boundary)

Mitigation for impact on historic properties outside the project area is best addressed by architectural and landscaping measures to minimize visual impact on the environment in Kaloko-Honokōhau National Historical Park. Based on previous development of the vicinity, tall buildings directly adjacent to the highway, bright or light colored paint, heavy use of corrugated metal and landscaping using non-native plants would have the greatest visual impact on those properties in the park. Use of low-rise architecture, local stone, muted colors and native plants would be preferable from a mitigation perspective and would minimize the urban feel of the land most immediately visible from, and historically tied to, that preserved in the park.

8.2.1 Data Recovery

Thirty-one (31) sites (see Table 17) are recommended for data recovery and should be subjected to further documentation and, if appropriate, excavation to address scientific and information interests. Data recovery should proceed in accordance with a data recovery plan that is to be submitted to DLNR State Historic Preservation Division for review and approval. Some sites are recommended specifically for both data recovery and preservation, and those sites which should be addressed in both preservation and data recovery plans are listed (by feature) in Table 17 and Table 18 (see marked entries); the specific features listed in each table are those that need to be considered for that particular mitigation measure.

The sites selected for data recovery include a variety of site and function types attributable to traditional Hawaiian use. Functional types include habitation (temporary and permanent) and activity areas (water collection in lava tubes). Seven of these sites are associated with burials, but the burial is located in a separate area of the lava tube (see marked entries in Table 17).

The majority of sites slated for data recovery are those sites with the most formal construction and/or the largest cultural deposits. In this project area this results in a close focus on habitation (both temporary and permanent), both in lava tubes and on the surface. Thirteen of the data recovery sites have surface components, while twenty-six have a lava tube component. In addition to excavation with a focus on midden and artifact recovery, it is recommended that the large number of water collection areas within lava tubes be addressed; for example, there is ample charcoal directly associated with water catchment features that could be systematically sampled and dated to address the time frame and span for this activity.

Although the sites listed in Table 17 can be wholly or partially mitigated through data recovery, these historic properties may have a valuable aspect for the proposed residential neighborhood, and interim preservation is an alternate consideration. These sites speak to the history of the locale, creating a uniqueness that cannot be engineered into an urban area. One option is to voluntarily preserve these habitation sites on lots that would appeal to home owners who are interested in history and would perceive this as value added to their property. The recommendation would thus be interim preservation with an option to pursue data recovery at the landowner's discretion.

Potential research topics that further documentation could answer should be explored in the data recovery plan. At this time it is recommended that further consideration be given to research topics such as those listed below, as well as any pertinent questions raised by contemporary research on the island, or in comparable environments elsewhere in the Pacific region. Further,

the plan should consider numerous new technologies entering the field of archaeology that could answer new types of questions.

Possible Data Recovery Topics:

- (1) An evaluation of historic property distribution as it compares to common settlement models (e.g., Schilt 1984; Kirch 1985; and Cordy et al. 1991). That is, were Kohanaiki and Kaloko exceptions to these models or do they confirm their veracity? In addition, historic versus pre-contact settlement patterns could be addressed.
- (2) Further study of the use of permanent and temporary habitation sites in the upland zone to include further functional interpretation and analysis of greater quantities of midden for subsistence patterns in the area. Results could be compared with other habitation models (e.g. Cordy et al. 1991; Mitchell and Kolb 1992; and Hammatt et al. 1995).
- (3) To a limited degree, habitation research may collect data with potential to provide some insight into social dynamics in both *ahupua'a* through a comparison with Dr. Ross Cordy's 1991 model of social rank determinants in coastal Kaloko and Honokōhau I and II *ahupua'a*. There are several large habitation complexes within the project area that include ceremonial components, and these aspects could be more thoroughly addressed.
- (4) Water collection within lava tubes is a frequent activity throughout the project area, and site distribution appears to be partially dependent on this resource. Thus, a focus on the distribution and chronology of this particular resource and its relationship to habitation is recommended.
- (5) Assessment of the suitability of non-radiometric dating of structures and/or trails, such as TL/OSL.
- (6) Higher quality digital photographic documentation.

Table 17. Historic Properties Recommended for Data Recovery

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-26478*	A	Lava tube	Temporary Habitation	D, E	Pre-Contact
	B	Modified depression	Temporary Habitation	D, E	Pre-Contact
	D	Lava tube	Water Collection	D, E	Pre-Contact
-26482	--	Lava tube	Water Collection	D	Pre-Contact
-26483	--	Lava tube	Water Collection	D	Pre-Contact
-26485	--	Lava tube	Permanent Habitation	D	Pre-Contact
-6601	--	Complex	Agriculture	D	Pre-Contact
-16103*	A	Wall	Permanent Habitation	D, E	Pre-Contact
	B	Wall	Permanent Habitation	D, E	Pre-Contact
	C	Wall	Permanent Habitation	D, E	Pre-Contact
	D	Terrace	Permanent Habitation	D, E	Pre-Contact
	E	Modified outcrop	Permanent Habitation	D, E	Pre-Contact
	F	Mound	Marker	D, E	Pre-Contact
	H	Wall	Permanent Habitation	D, E	Pre-Contact
	O	Wall	Permanent Habitation	D, E	Pre-Contact
	P	Cairn	Marker	D, E	Pre-Contact
Q	Terrace	Permanent Habitation	D, E	Pre-Contact	
-26498*	A	Modified outcrop	Temporary Habitation	D, E	Pre-Contact
	B	Terrace	Temporary Habitation	D, E	Pre-Contact
	C	Platform	Temporary Habitation	D, E	Pre-Contact
	D	Enclosure	Temporary Habitation	D, E	Pre-Contact
	E	Cairn	Marker	D, E	Pre-Contact
-26499	--	Lava tube	Shelter	D	Pre-Contact
-26500	--	Lava tube	Temporary Habitation	D	Pre-Contact

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-26502	--	Complex	Permanent Habitation	D	Pre-Contact
-26507	--	Complex	Agriculture	D	Pre-Contact
-26510*	A	Cairn	Marker	D, E	Pre-Contact
	B	Trail	Transportation	D, E	Pre-Contact
	E	Trail	Transportation	D, E	Pre-Contact
-26513	--	Complex	Temporary Habitation	D	Pre-Contact
-26514	--	Complex	Permanent Habitation	D	Pre-Contact
-26520*	A	Wall	Animal Husbandry	D, E	Pre-Contact/ Historic
	B	Wall	Animal Husbandry	D, E	Pre-Contact/ Historic
	C	Wall	Animal Husbandry	D, E	Pre-Contact/ Historic
	G	Platform	Temporary Habitation	D	Pre-Contact/ Historic
-26521	--	Lava tube	Shelter	D	Pre-Contact
-26522*	D	Mound	Transportation	D, E	Pre-Contact/ Historic
	E	Modified depression	Transportation	D, E	Pre-Contact/ Historic
	F	Mound	Transportation	D, E	Pre-Contact/ Historic
-26527	--	Lava tube	Temporary Habitation	D	Pre-Contact
-26528	--	Lava tube	Water Collection	D	Pre-Contact
-26538*	B	Modified depression	Temporary Habitation	D, E	Pre-Contact
	C	Lava tube	Temporary Habitation	D, E	Pre-Contact
	D	Lava tube	Water Collection	D, E	Pre-Contact
-26545	--	Lava tube	Activity Area	D	Pre-Contact
-26546	--	Lava tube	Water Collection	D	Pre-Contact
-26548	--	Lava tube	Temporary Habitation	D	Pre-Contact
-26552	--	Complex	Permanent Habitation	D	Pre-Contact
-26558	--	Platform	Permanent Habitation	D	Pre-Contact

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-26565	--	Complex	Permanent Habitation	D	Pre-Contact
-26566	--	Lava tube	Water Collection	D	Pre-Contact
-26573	--	Lava tube	Temporary Habitation	D	Pre-Contact
-26577	--	Platform	Temporary Habitation	D	Pre-Contact
-26578	--	Lava tube	Shelter	D	Pre-Contact
-26581	--	Lava tube	Temporary Habitation	D, E	Pre-Contact

* Site is recommended for preservation and data recovery for certain features and/or areas of the site; see also Table 18

8.2.2 Preservation

Thirty-eight (38) sites in the project area recommended for preservation (see Table 18). All preservation sites should be considered for some amount of data recovery effort as part of the preservation plan, to include further photographic documentation, dating, etc. However, sites that specifically should be addressed in both preservation and data recovery plans are listed (by feature) in Table 18 and Table 17; the specific features listed in each table are those that need to be considered for that particular mitigation measure.

Of the sites recommended for preservation, twenty-four (24) sites contain or are associated with confirmed burials, and one (1) is a probable burial. The majority of these burials occur in lava tubes and the preservation plan will need to thoroughly address the logistical aspects of preserving these sites, since burials sometimes occur in multiple locations throughout a lava tube system and/or at a great distance from any passable entrance to the lava tube (making accurate GPS data problematic). Maps generated during the inventory survey may not be of high enough precision to accurately determine the location of a burial from the surface within a reasonable error range, when the burial is far from any entrance. Thus, the preservation plan will need to address the logistics of preservation boundaries in terms of accurate locational information as well as how to preserve/seal entrances associated with burials.

Nine (9) of the preserve sites are habitation complexes and/or or enclosures that are significant due to a ceremonial component and/or due to being a good example of a site type. While five of these sites are solely surface sites, four of them consist of both surface construction as well as lava tube modification. One of these nine sites is a historic habitation complex, while the rest are pre-contact in style, and generally consist of multiple formal surface features, lava tube modification, and/or formal habitation enclosures.

One (1) preserve site consists of the historic *mauka-makai* trail that runs through the project area, and one (1) site consists of the historic *ahupua* 'a wall that delineates Kohanaiki and Kaloko Ahupua'a. While these two sites are in good condition in the *mauka* portion of the project area, the *makai* portion has suffered bulldozing and only the eastern portions should be considered for preservation, with breaches allowable.

Finally, two (2) sites (one surface habitation complex and a lava tube habitation complex that is a possible refuge cave) are listed for preservation but are considered more flexible; these are recommended for further consideration and consultation to be finalized before acceptance of a preservation plan (see those sites marked with a "***" in Table 18). It is recommended that considerations for the preservation of these sites be detailed in an archaeological preservation plan approved by the State Historic Preservation Division. Though it would be archaeologically preferable to preserve both of these habitation sites, the information they contain can be addressed through extensive data recovery and preservation of each is not deemed necessary. These sites could also be considered a potential amenity for the proposed residential neighborhood. They speak to the history of the locale, creating a uniqueness that cannot be engineered into an urban area. One option might be to voluntarily preserve these habitation sites on lots that would appeal to home owners who are interested in history and would perceive this as value added to their property. The recommendation would thus be interim preservation with an option to pursue data recovery at the landowner's discretion.

Table 18. Historic Properties Recommended for Preservation

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-10712 ¹	--	Wall	Animal Husbandry	D	Historic
-26478*	--	Burial & Temporary Habitation	Burial	D, E	Pre-Contact
	C	Lava tube	Burial	D, E	Pre-Contact
-26480	--	Lava tube	Burial & Shelter	D, E	Pre-Contact
-10714	--	Trail	Transportation	D, E	Pre-Contact/ Historic
-16103*	--	Lava tube	Burial & Permanent Habitation	D, E	Pre-Contact
	G	Platform	Permanent Habitation	D, E	Pre-Contact
	I	Rock Art	Rock Art	D, E	Pre-Contact
	K	Lava tube	Burial	D, E	Pre-Contact
	L	Terrace	Permanent Habitation	D, E	Pre-Contact
	M	Terrace	Permanent Habitation	D, E	Pre-Contact
	N	Wall	Permanent Habitation	D, E	Pre-Contact
-26486	--	Complex	Permanent Habitation	D	Pre-Contact
-26488	--	Lava tube	Burial	D, E	Pre-Contact
-26489	--	Complex	Permanent Habitation	D, E	Pre-Contact
-26494**	--	Complex	Permanent Habitation	D	Pre-Contact
-26495**	--	Lava tube	Temporary Habitation	D	Pre-Contact
-26498*	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact
-26501	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact
-26503	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact
-26509	--	Lava tube	Burial	D, E	Pre-Contact
-26510*	--	Complex	Complex	D, E	Pre-Contact
	C	Platform	Ceremonial	D, E	Pre-Contact
	D	Platform	Ceremonial	D, E	Pre-Contact

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-26515	--	Platform & Cairns	Burial	D, E	Pre-Contact
-26519	--	Complex	Permanent Habitation	C, D, E	Pre-Contact
-26520*	--	Lava tube	Complex	D, E	Pre-Contact/ Historic
	D	Rock Art	Ceremonial	D, E	Pre-Contact/ Historic
	E	Lava tube	Burial	D, E	Pre-Contact/ Historic
	F	Platform	Ceremonial	D, E	Pre-Contact/ Historic
-26522*	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact/ Historic
	A	Constructed entrance	Activity Area	D, E	Pre-Contact/ Historic
	B	Mound	Transportation	D, E	Pre-Contact/ Historic
	C	Alignment	Activity Area	D, E	Pre-Contact/ Historic
	G	Hearth	Activity Area	D, E	Pre-Contact/ Historic
-26529	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact
-26532	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact
-26534	--	Complex	Permanent Habitation	C, D	Historic
-26538*	--	Lava tube	Burial & Temporary Habitation	D, E	Pre-Contact
	A	Lava tube	Water Collection & Burial	D, E	Pre-Contact
-26544	--	Enclosure	Permanent Habitation	C, D	Pre-Contact
-26547	--	Lava tube	Burial	D, E	Pre-Contact
-26556	--	Platform	Burial	D, E	Pre-Contact
-26559	--	Platform	Burial	D, E	Pre-Contact
-26562	--	Complex	Burial & Permanent Habitation	D, E	Pre-Contact
-26564	--	Lava tube	Burial	D, E	Pre-Contact
-26568	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact
-26569	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact
-26570	--	Lava tube	Burial & Water Collection	D, E	Pre-Contact/ Historic

SIHP # (50-10-27/ 50-10-28)	Feature	Site Type	Function	Significance	Age
-26574	--	Complex	Permanent Habitation	D, E	Pre-Contact
-26576	--	Lava tube	Burial & Shelter	D, E	Pre-Contact
-26580	--	Enclosure	Permanent Habitation	D	Pre-Contact
-26582	--	Lava tube	Burial	D, E	Pre-Contact
-26583	--	Complex	Permanent Habitation & Ceremonial	C, D, E	Pre-Contact
-26588	--	Enclosure	Permanent Habitation	C, D	Pre-Contact

¹ Historic ranching wall is recommended for preservation with breaches allowed in consultation with SHPD

* Site is recommended for preservation and data recovery for certain features and/or areas of the site; see also Table 17

** Site is recommended for preservation and data recovery, but is more flexible than those not indicated. Substantive data recovery may alternatively address these sites, and it is recommended that this decision be made in consultation with SHPD and in consideration of the overall preservation plan.

8.3 Disposition of Materials

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

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Appendix A Site Descriptions

All site descriptions are included in a separate document, entitled: *Archaeological Inventory Survey of a 194.324-Acre Parcel within Portions of Kohanaiki and Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:025, Appendix A*. Cultural Surveys Hawai'i, Kailua, HI.