

Appendix I

Summary Report of Archaeological Inventory Survey for Kaloko Makai Cultural Surveys Hawaii, Inc. May 2008

The Archaeological Inventory Survey (March 2008 and May 2008) consists of seven volumes. The complete report has been filed with Department of Land and Natural Resources State Historic Preservation, the Office of Environmental Quality Control, State Land Use Commission, and Office of Hawaiian Affairs.

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INTRODUCTION

Project Background

At the request of Stanford Carr Development, LLC, Cultural Surveys Hawai'i, Inc. (CSH) conducted archaeological inventory surveys covering the entire Kaloko Makai project lands. Given the large size of the total project area (over 1,100-acres) and the large number of archaeological sites identified (341) the work has been organized within separate studies for each of the four Tax Map Key parcels (TMK: [3] 7-3-009:017, 025, 026 & 028) as follows:

- *Archaeological Inventory Survey of a 224.43-Acre Parcel within Portions of Kaloko and Kohanaiki Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:017* (Bell, Groza, Shideler, and Hammatt 2008),
- *Archaeological Inventory Survey of a 360.131-Acre Parcel within Portions of Kohanaiki Ahupua'a and Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:025* (Bell, Groza, Simonson, Shideler, and Hammatt 2008),
- *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, Simonson, Esh, Groza, Shideler, and Hammatt 2008), and
- *Archaeological Inventory Survey of a 363.106-Acre Parcel within Portions of Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:028* (Esh, Bell, Simonson, Shideler, and Hammatt 2008)

The work to prepare these studies was carried out between March 2007 and April 2008 and involved approximately 6 archaeologist-years of work.

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 these archaeological inventory survey investigations completed. These investigations were 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, these inventory survey investigations were designed to fulfill the state requirements for archaeological inventory surveys (HAR Chapter 13-276). The inventory survey reports were prepared to support the proposed project's historic preservation review. The reports include project-specific effect recommendations and mitigation recommendations for the project area's historic properties that are recommended eligible to the Hawai'i Register. These documents are intended to support project-related historic preservation consultation among state agencies and interested Native Hawaiian and community groups.

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.

METHODS

Field Methods

The fieldwork effort for the archaeological inventory surveys 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 component of the archaeological inventory survey was carried out under archaeological permit numbers 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 each of the four study areas with subsurface testing at select archaeological sites. The pedestrian inspection of the study areas was accomplished through systematic sweeps. The interval between the archaeologists was generally 5 to 10 meters, varying based on visibility due to vegetation cover. Overall, heavy vegetation throughout the parcels was an impediment to ground and site visibility, and relatively narrowly spaced survey lines attempted to mitigate this issue. 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 the inventory survey had very shallow soil layers, if any. Some soil layers encountered consisted only of 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.

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 meters). For recording purposes, a site number was given to the pervasive agricultural features within each project area, with feature and sub-feature designations serving to differentiate various levels of intensity and variations in form. The far *mauka* portion of the northeastern project area (TMK: [3] 7-3-009:026) is subject to higher rainfall and 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 Kaloko Makai project area. This *mauka* area is consistent with the expansive 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.

Recording Lava Tubes

Lava tubes are ubiquitous within portions of the Kaloko Makai 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 blockage. 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 blocked 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 the 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.

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.

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 and the Land Survey Division of the Department of Accounting and General Services. Information on LCAs was accessed through Waihona 'Aina 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.

Consultation

A cultural impact assessment (Hammatt & Shideler 1996) was conducted for TMK 7-3-09:17, in 1996. Informants knowledgeable of TMK 7-3-09:17 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 a 1,150-Acre Parcel within portions of Kohanaiki and Kaloko Ahupua'a, North Kona District, Hawai'i Island TMK: [3] 7-3-009:017, 025, 026, 028" (Monahan et al. 2008). This CIA will include consultation for all four parcels within the Kaloko Makai project. The on-going consultation with organizations includes the State Historic Preservation Division (SHPD), the Office of Hawaiian Affairs (OHA), and the Hawai'i Island Burial Council.

Further consultation will be conducted in the course of the preparation of project burial treatment and site preservation plans.

BACKGROUND RESEARCH

A synopsis of the background research is presented below. More detailed background research is presented within each of the four archaeological inventory survey studies.

Traditional and Historical Background

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'i. 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'i 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 [T 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. The story focuses on a man named Ko'amokumokuohe'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'amokumokuohe'eia discovered a very small cave entrance that no else knew about. The cave had water dripping from its roof (Maguire 1966:30). Ko'amokumokuohe'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 *kahuna-nui* 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'ūpulehu (Kamakau 1961:147).

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 Kealahakua 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-maheihēi 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.

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 Keikepui, 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 Honokohamui...Ohiawela, a *pali*, on the road through the woods is a point on the boundary. This place is above Honokohamui, 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 Kīkīi an *ili aina*, thence to Kāohe, 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-Honokohau boundary was defined by different vegetation that also reflected former traditional gathering rights: "Honokohamui ends at Ohiawela, a *pali*. Kaloko takes the *koa*, and Honokohamui, the *ohia*...The *olona* grows on Honokohamui and Kealahake 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 (Figure 1 and Figure 2). Figure 1 shows the locations of the three Kohanaiki grants described above, as well as "Kealiithelepa 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, Kaanoimaka, and his congregation in the 1870s (Kelly 1971:14). A portion of Emerson's Registered Map (RM) 1449 and 1512 show a trail through the current project area; the trail ran from the Kohanaiki Homesteads to the Kaloko fishpond. As noted by Cordy (1991:418), Emerson's map of the area 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 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.

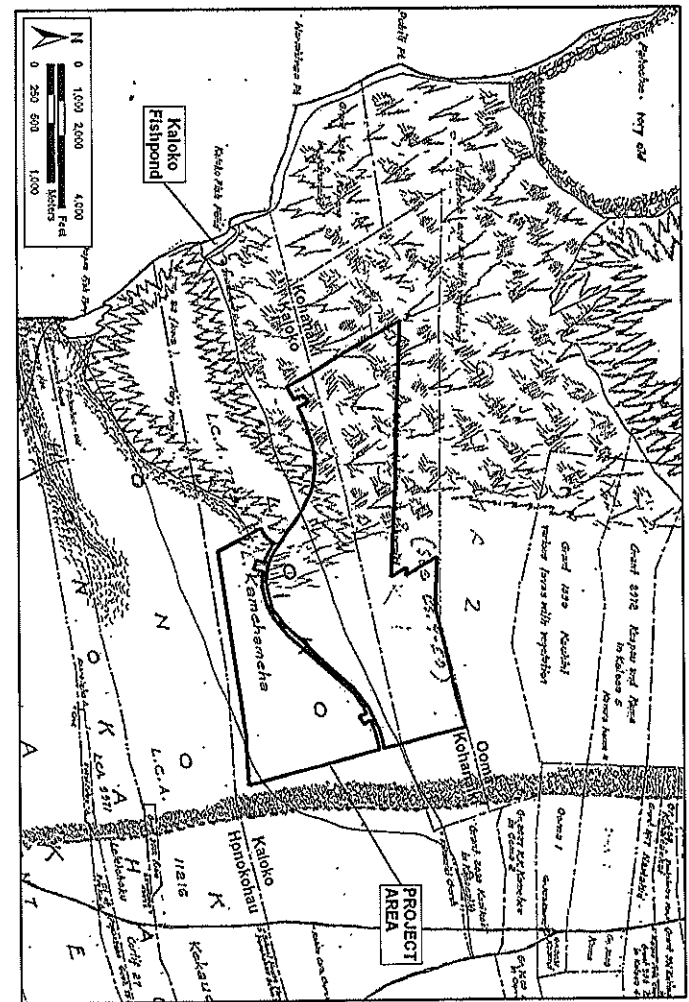
While all three Emerson maps are informative of the area, there are inconsistencies between them that are difficult to interpret. RM 1280 was likely produced with a somewhat different intent than the other two maps though they were all surveyed in such a short time period. Suggestive of the different 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 a 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. Kepū Maly (2003:41-42) translated serial accounts from *Ka Hōkai 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

Figure 1. Portion of Emerson's Registered Map (RM) 1280, showing approximate location of project area. The location of "Kohanaiki Church" and Kaloko Fishpond are also shown.



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.

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 Huchue 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 Huchue Ranch applied for a Patent Grant on... lots in 'O'oma 2nd, but he only secured Grant No. 4536.... Maguire's Huchue 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, Huchue 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 3) 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). Huchue Ranch bulldozed a jeep road to the shore around 1955 (Figure 4) 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.

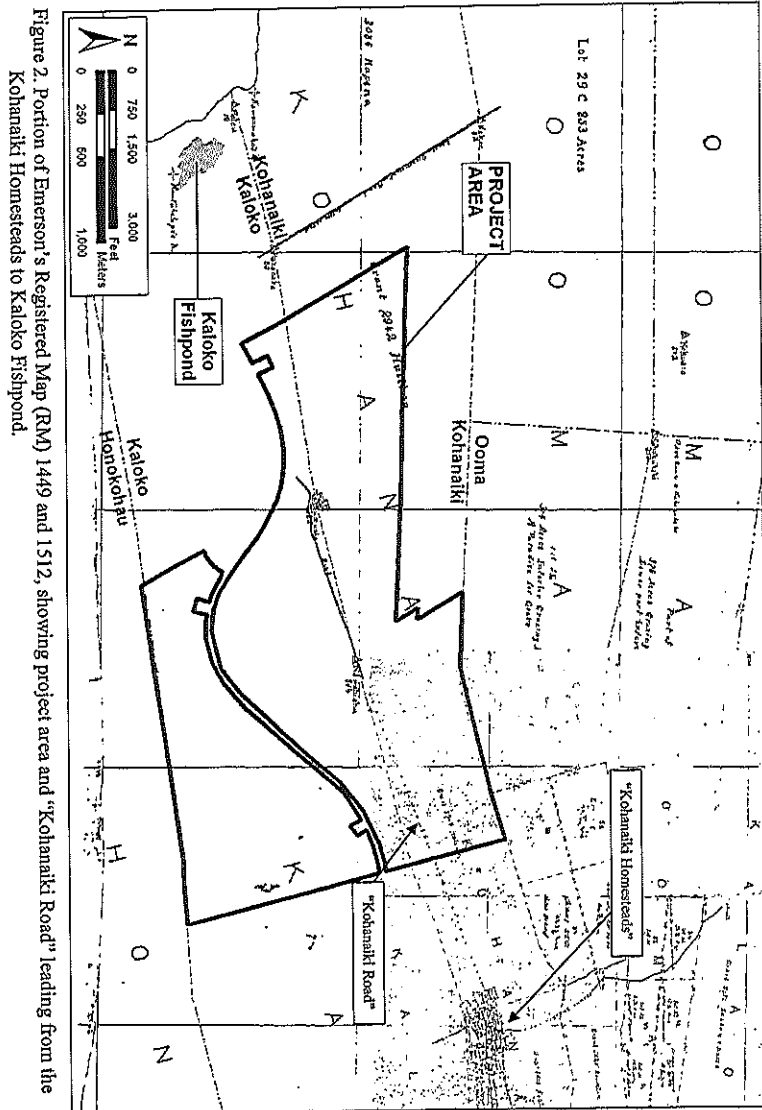


Figure 2. Portion of Emerson's Registered Map (RM) 1449 and 1512, showing project area and "Kohanaiki Road" leading from the Kohanaiki Homesteads to Kaloko Fishpond.

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.

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 4). 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 through the central portion of the project area, and leads *mauka* to a residential area (Kona Heavens) before the Palani Road 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.

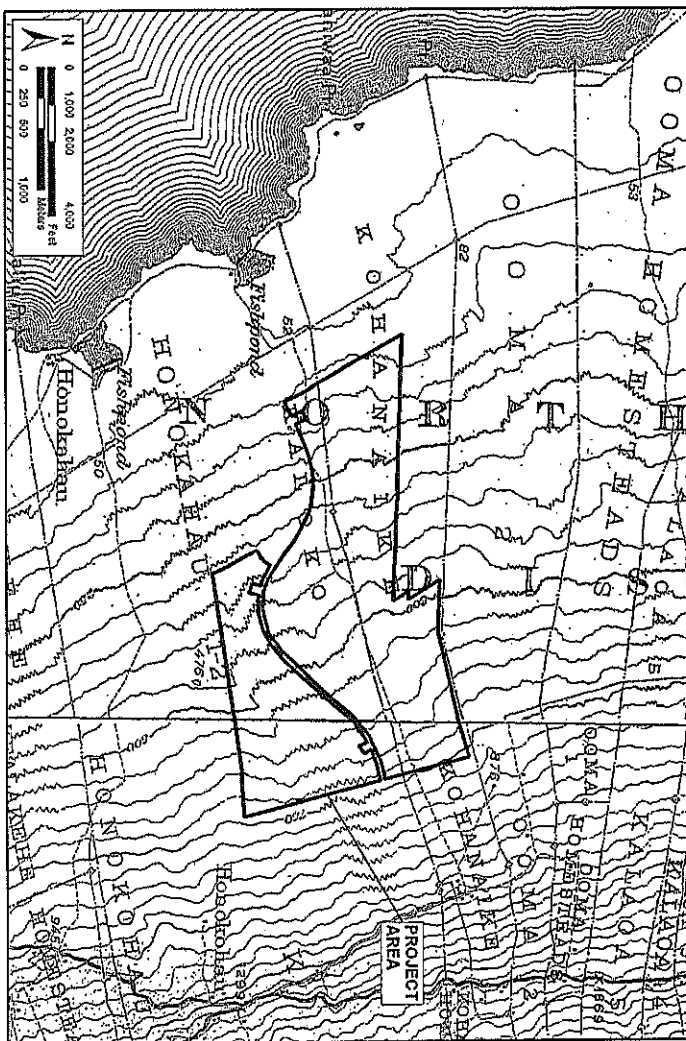
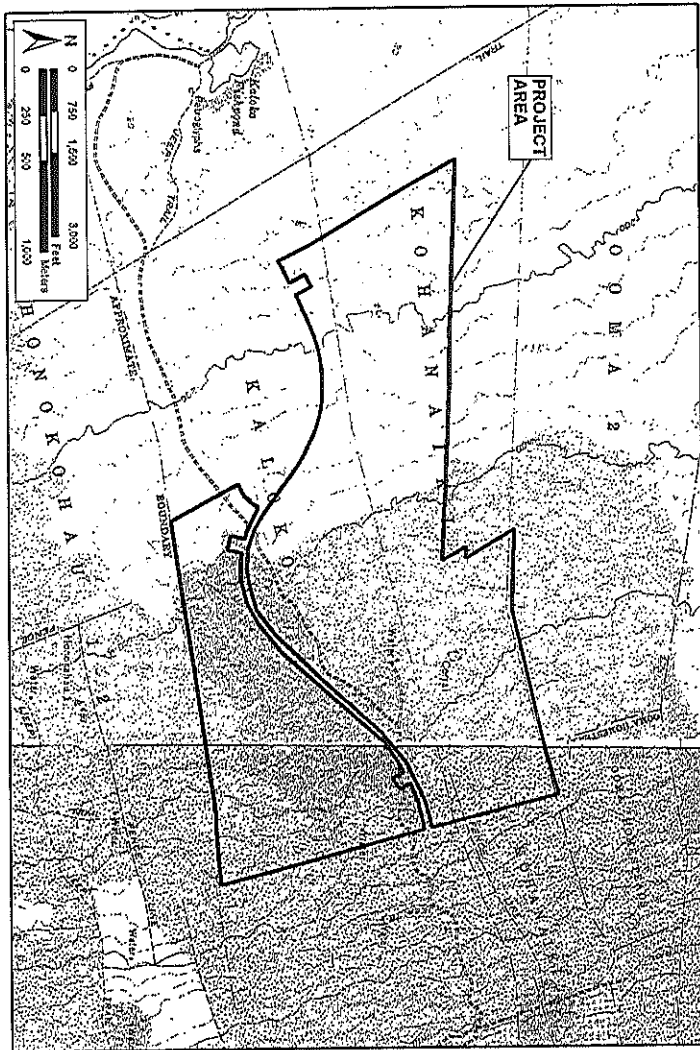


Figure 3. Portion of 1924 USGS map, Keahole Point and Kailua quadrangles, with overlay of project area

Figure 4. Portion of 1959 USGS map, Keahole Point quadrangle, with overlay of project area showing jeep road and signs of historic/modern animal husbandry



Previous Archaeological Research

Overview of Archaeological Studies Conducted within Kohanaiki and Kaloko

This section provides a synopsis of archaeological studies in Kaloko and Kohanaiki *ahupua'a* (Figure 5). 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. Studies previously conducted within the project area are highlighted within Table 1 in bold.

Previous archaeological surveys conducted 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 - 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, Honokohau, 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 Honokohau 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.

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.

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-Honokohau National Park (e.g. Honokohau Study Advisory Commission 1974, National Park Service 1975); and several reconnaissance-level studies (Ching 1980, Hammatt 1980, Soehren 1983).

Figure 5. Previous archaeological studies in the vicinity of the project area

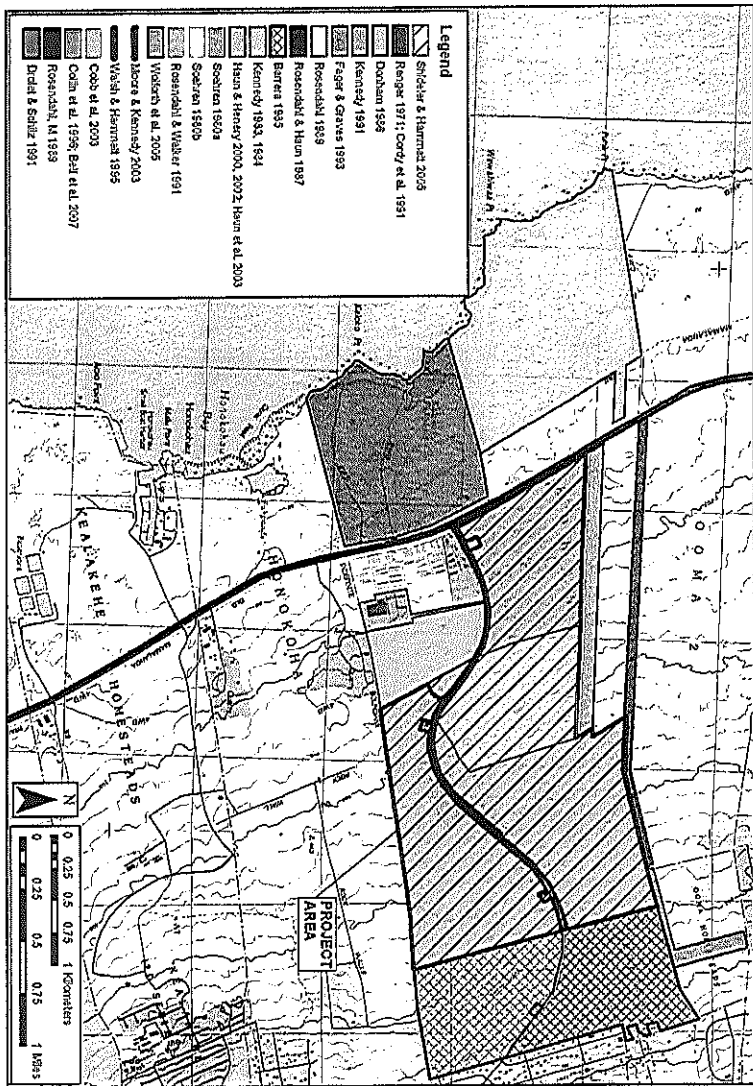


Table 1. Previous Archaeological Studies Within Kohanaiki and Kaloko *ahupua'a* (projects in present study area are in bold)

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	Within present project area
Kennedy 1984	Intensive Archaeological Survey	<i>Makai</i> of present project area	Results of investigations of 25 sites	Within present project area
Barrera Jr. 1985	Archaeological Survey	409 acres 700 to 1080' elevation	58 sites	<i>Mauka</i> of present project area

Source	Nature of Study	Area of Study	Finds	Comments
Donham 1986	Archaeological Reconnaissance Survey	470-acres <i>makai</i> of Queen K Hwy	105 sites	Kohana-iki development
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> end 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> end of present project area
Rosendahl & Walker 1991	Archaeological Field Inspection	Industrial crusher site, 2 adjacent 10 acre parcels	Identified a trail with two cairns	Within 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	North of present project area

Source	Nature of Study	Area of Study	Finds	Comments
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
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	Within 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

Source	Nature of Study	Area of Study	Finds	Comments
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)
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'ū 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	Runs through center of project area
Puette & Dye 2003	Archaeological Inventory Survey	22 acres 2100 to 2400' elevation	No finds	<i>Mauka</i> of Present Project Area

Source	Nature of Study	Area of Study	Finds	Comments
Rechtman 2003	Archaeological Assessment	3-7-3-26:5; 3,1000' elevation	No finds	<i>Mauka</i> of Present Project Area
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>maka</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

During the 1980s, PHRI began investigations of the entire *makai* portion of Kohanaiki Ahupua'a, bounded by its boundaries with 'O'oma 2 and Kaloko, 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...Habituation 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 Wawahiwa Points are concentrated in the coastal zone, near the shoreline. In the coastal area south of Wawahiwa 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].

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.

In 1983 Joseph Kennedy conducted a reconnaissance and subsequent intensive survey (1984) of a parcel that is within 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 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, 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.

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 to this particular site description since the report is currently under review by SHPD.

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; this updated reported comprises the TMK 17 portion of the current CSH Kaloko Makai (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'a* 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 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.

Haun (2003) also did an archaeological assessment of a portion of the current project area, largely via helicopter to cover the *'a'a* terrain, but also by foot in the thicker vegetation. He identified eight sites, all of which correlate to sites documented in the current Kaloko Makai inventory survey report for TMK 28.

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 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).

RESULTS OF ARCHAEOLOGICAL INVENTORY SURVEY

A total of 341 archaeological sites were identified in the course of the archaeological inventory survey work (59 sites in TMK 17, 121 sites in TMK 25, 120 sites in TMK 26 and 41 sites in TMK 28; see Figure 6). Site density for each parcel by acre is summarized in Table 2. Summaries of these sites are presented for each tax map key parcel in the following Table 3 through Table 8. An overview of the formal feature types, functional categories, and significance criteria is presented below followed by a summary discussion of the finds.

Table 2. Site density by parcel and acreage

	Acreage	# of Sites	Sites/Acre
TMK 17	224.43	59	0.26
TMK 25	360.131	121	0.34
TMK 26	194.324	120	0.62
TMK 28	363.106	41	0.11
Total	1141.991	341	0.33

Formal Feature Types

Formal feature type designations are descriptive - based on physical characteristics - and commonly refer to structural elements of a site. Fifteen primary feature types were identified within the project area. The following are brief descriptions of the different feature types encountered during the inventory survey:

Alignment: A single row of stones one courses high.

Cairn: A marker of stacked or piled stones. Cairns are frequently referred to as *ahu*.

Enclosure: A walled structure that completely encloses an area.

Lava blister: A small subterranean lava formation. Unlike lava tubes, however, they tend to be 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.

Modified depression: An area in which stones have been removed to create a depression or to expose a soil area. Two types of modified depressions were encountered, one type (encountered on a lava flow) appears to have functioned as a storage area and the second type in which the only modification consists of the removal of stones to create an area suitable for agriculture either in soil or possibly through mulching.

Modified outcrop: An area within an existing lava flow in which a portion of the flow has been humanly modified by the placement or removal of stones (a modified tumulus differs from a modified outcrop in that a modified tumulus is in a field of exposed outcrop whereas a modified outcrop may be surrounded by soil).

Mound: Linear, circular or amorphous stone pile which typically lacks a vertical face and level surface.

Pavement: A stone-filled floor or surface.

Platform: A raised free-standing stone structure with three or more vertical faces.

Rock art: A carving or inscription on a boulder, cobble, or slab.

Terrace: A raised stone construction partially built against, or level to, a ground or outcrop surface. These structures commonly resemble platforms. Unlike platforms, however, they are not totally free-standing.

Trail: A trodden lava surface, pavement or stone alignment set into the ground or outcrop surface.

Wall: A bi-faced and free-standing stone structure which is an isolated segment or defines large boundaries.

Function Interpretation

Function interpretation of a site or feature is determined by criteria which 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. Ten primary function categories were identified among the sites within the project area: agriculture; animal husbandry; habitation; human burial, ceremonial; indeterminate; marker; mining (quarrying) and storage (activity areas); rock art, transportation; and water collection (activity area). 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 may include lithic production, water collection, storage, fishhook manufacture, quarrying or mining, etc.

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.

Fireplace: Burn pit or lens of burned material in a limited area.

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

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.

Rock art: Petroglyphs and pictographs are functionally rock art.

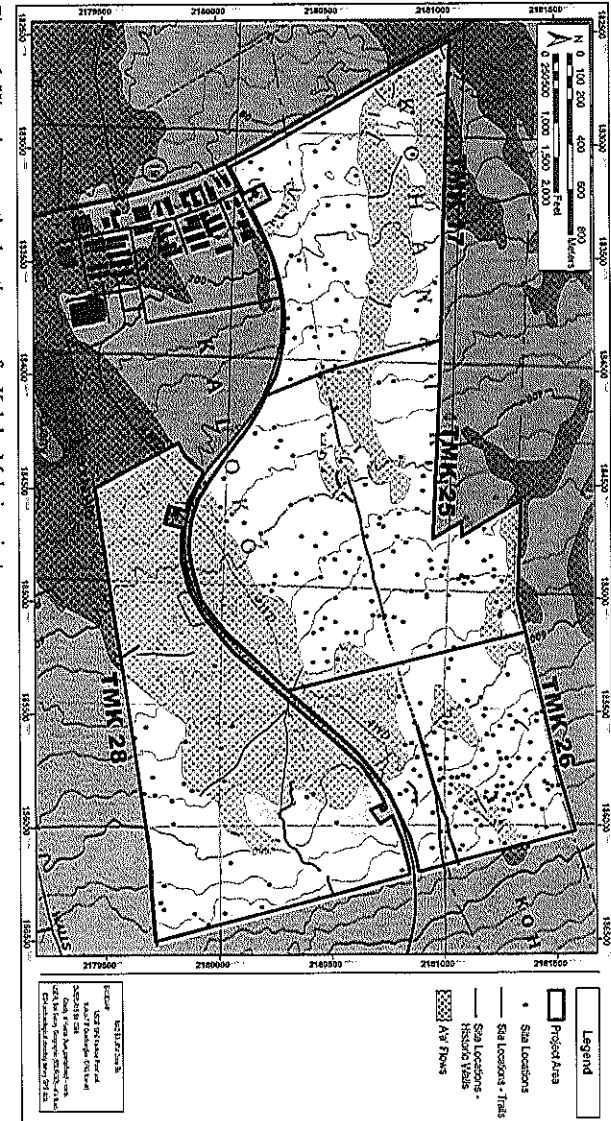
Transportation: The feature was used as a road or trail.

Significance Assessments

Sites were evaluated for significance according to the broad criteria established for the State Register. 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.

Figure 6. Historic properties location map for Kaloko Makai project area



SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendation
20715	Terrace	Temporary habitation	D	Pre-Contact	Data Recovery
20716	Modified tumulus	Possible Burial	D,E*	Pre-Contact	Preservation
20717	Modified tumulus	Temporary habitation	D	Pre-Contact	No Further Work
20718	Modified tumulus	Agriculture	D	Pre-Contact	No Further Work
20719	Rock shelter / Hearth	Temporary habitation	D	Pre-Contact	Data Recovery
20720	Terrace	Possible Burial (destroyed)	D,E*	Pre-Contact	No Further Work
20721	Modified tumulus	Temporary habitation	D	Pre-Contact	Data Recovery
20722	Trail	Transportation	D	Pre-Contact	No Further Work
20724	Trail	Transportation	D	Pre-Contact	No Further Work
20725	Modified tumulus	Temporary habitation	D	Pre-Contact	Data Recovery
20726	Trail	Transportation	D	Pre-Contact	No Further Work
20727	Lava tube	Temporary habitation	D	Pre-Contact	Data Recovery
20728	Enclosure	Temporary habitation	D	Pre-Contact	No Further Work
20729	See -15329	N/A	N/A	N/A	No Further Work
20730	Modified tumulus	Temporary habitation	D	Pre-Contact	Data Recovery
20731	Modified tumulus	Indeterminate	D	Pre-Contact	No Further Work
20732	Trail	Transportation	D	Pre-Contact	No Further Work
20733	Trail	Transportation	D	Pre-Contact	No Further Work
20734	Modified depression	Agriculture	D	Pre-Contact	No Further Work
20735	See -15325	N/A	N/A	N/A	No Further Work
20736	Trail	Transportation	D	Pre-Contact	No Further Work
20737	Trail	Transportation	D	Pre-Contact	No Further Work
20738	Enclosure	Agriculture	D	Pre-Contact	No Further Work
20739	Enclosure / Trail	Transportation	D	Pre-Contact	No Further Work
20740	Modified tumulus	Agriculture	D	Pre-Contact	No Further Work
20742	Lava tube	Temporary habitation	D	Pre-Contact	No Further Work
20743	Modified tumulus	Indeterminate	D	Pre-Contact	No Further Work
20744	Trail	Transportation	D	Pre-Contact	No Further Work
20745	Trail	Transportation	D	Pre-Contact	No Further Work
20746	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work

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Table 3. Archaeological Site Summary for TMK Parcel 17

SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendation
13493	Trail	Transportation	D	Pre-Contact	No Further Work
15324	Trail	Transportation	D, E*	Pre-Contact	No Further Work
15325	Wall, modified depressions, mound	Temporary habitation / Transportation / Storage	D	Pre-Contact	Data Recovery
15329	Modified tumulus	Temporary habitation	D	Pre-Contact	No Further Work
20696	Lava tube	Temporary habitation	D	Pre-Contact	No Further Work
20697	Modified tumulus	Temporary habitation	D	Pre-Contact	Data Recovery
20698	Pavements	Temporary habitation	D	Pre-Contact	Data Recovery
20699	Modified tumulus	Indeterminate	D	Pre-Contact	No Further Work
20700	Modified tumulus, Enclosure	Temporary habitation / Agriculture	D	Pre-Contact	Data Recovery
20701	Modified tumulus	Temporary habitation	D	Pre-Contact	No Further Work
20702	Mod. tumulus/terrace	Temporary habitation	D	Pre-Contact	Data Recovery
20703	Terrace, Pavement, Modified tumulus	Temporary habitation / Mining	D	Pre-Contact	Data Recovery
20704	Trails, walls	Temporary habitation / Transportation	D	Pre-Contact	No Further Work
20705	Modified tumulus	Possible burial	D, E*	Pre-Contact	Preservation
20706	Modified tumulus	Temporary habitation	D	Pre-Contact	No Further Work
20707	Lava tube	Temporary habitation	D	Pre-Contact	No Further Work
20708	Modified tumulus	Temporary habitation	D	Pre-Contact	Data Recovery
20709	Platform, enclosures, modified lava blister	Recurrent habitation / Agriculture / Storage	C,D	Pre-Contact	Preservation
20710	Lava tube, Alignment, Mound, Modified tumulus, Pavement	Temporary habitation	D	Pre-Contact	Data Recovery
20711	Enclosure	Temporary habitation	D	Pre-Contact	Data Recovery
20712	C-shape	Temporary habitation	D	Pre-Contact	No Further Work
20713	Cairn	Marker	D	Pre-Contact	No Further Work
20714	Wall	Temporary habitation	D	Pre-Contact	No Further Work

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Table 4. Archaeological Site Summary for TMK Parcel 25

SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
10712	Wall	Animal Husbandry	D	Historic	Preservation
20741	Complex	Temporary Habitation	C, D	Pre-Contact	Preservation
26275	Complex	Ceremonial	C, D, E	Pre-Contact	Preservation
26276	Modified depression	Temporary Habitation	D	Pre-Contact	No Further Work
26277	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26278	Trail	Transportation	D	Pre-Contact	No Further Work
26279	Modified outcrop	Indeterminate	D	Pre-Contact	No Further Work
26280	Lava blister	Temporary Habitation	D	Pre-Contact	No Further Work
26281	Mounds	Agriculture	D	Pre-Contact	No Further Work
26282	Lava blister	Temporary Habitation	D	Pre-Contact	No Further Work
26283	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26284	Complex	Permanent Habitation	C, D	Pre-Contact	Preservation
26285	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26286	Modified outcrop	Quarry	D	Pre-Contact	No Further Work
26287	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26288	Complex	Temporary Habitation	C, D	Pre-Contact	Preservation
26289	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26290	Lava tube	Burial	D, E*	Pre-Contact	Preservation
26291	Lava tube	Temporary Habitation/Quarry	D	Pre-Contact	Data Recovery
26292	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26293	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26294	Wall	Indeterminate	D	Pre-Contact/ Historic	No Further Work
26295	Cairn	Marker	D	Pre-Contact	No Further Work
26296	Enclosure	Permanent Habitation	C, D	Pre-Contact/ Historic	Preservation
26297	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26298	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
26299	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26300	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26301	Terrace	Temporary Habitation	D	Pre-Contact	No Further Work

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SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendation
20747	Trail	Transportation	D	Pre-Contact	No Further Work
20748	Lava tube	Storage	D	Pre-Contact	No Further Work
20749	Lava tube, terrace	Temporary habitation	D	Pre-Contact	Data Recovery
26259	Trail	Transportation	D	Pre-Contact	No Further Work
26260	Lava tube	Temporary habitation	D	Pre-Contact	Data Recovery
26261	Terrace	Temporary habitation	D	Pre-Contact	Data Recovery
26262	C-shape	Temporary habitation	D	Pre-Contact	No Further Work
26263	Lava tube	Temporary habitation	D	Pre-Contact	Data Recovery
26264	Modified tumulus	Agriculture	D	Pre-Contact	No Further Work

* Site is a probable burial

† Site was found to be outside project area

SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
26332	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26333	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26334	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26335	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
26336	Trail	Transportation	D	Pre-Contact	No Further Work
26337	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26338	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26339	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26340	Trail	Transportation	D	Pre-Contact	No Further Work
26341	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26342	Lava tube	Temporary Habitation	D	Pre-Contact/ Historic	Data recovery
26343	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26344	Complex	Permanent Habitation	D	Pre-Contact	Data recovery
26345	Modified outcrop/ Lava tube	Quarry	D	Pre-Contact	No Further Work
26346	Trail	Transportation	D	Pre-Contact	No Further Work
26347	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26348	Complex	Permanent Habitation	C, D	Pre-Contact	Preserve
26349	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26350	Complex	Permanent Habitation	C, D	Pre-Contact	Preserve
26351	Lava blister	Temporary Habitation	D	Pre-Contact	No Further Work
26352	Cairn	Marker	D	Historic	No Further Work
26353	Trail	Transportation	D, E	Pre-Contact	Preserve
26354	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26355	Trail/Wall	Transportation	D	Pre-Contact/ Historic	No Further Work
26356	Lava blister	Temporary Habitation	D	Pre-Contact	No Further Work
26357	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26358	Unknown/Bulldozed	Habitation/Indeterminate	D	Pre-Contact	No Further Work
26359	Trail	Transportation	D	Pre-Contact	No Further Work
26360	Wall	Animal Husbandry	D	Historic	No Further Work

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SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
26302	Cairn	Marker	D	Pre-Contact	No Further Work
26303	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26304	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26305	Modified outcrop	Temporary Habitation	D	Pre-Contact	No Further Work
26306	Modified outcrop	Indeterminate	D	Pre-Contact	No Further Work
26307	Complex	Ceremonial	C, D, E	Pre-Contact	Preservation
26308	Enclosure	Temporary Habitation	D	Historic	No Further Work
26309	Complex	Temporary Habitation	D	Pre-Contact	No Further Work
26310	Lava tube	Temporary Habitation/Burial	D, E*	Pre-Contact	Preservation
26311	Lava tube	Burial	D, E*	Pre-Contact	Preservation
26312	Cairn	Marker	D	Pre-Contact	No Further Work
26313	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26314	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
26315	Complex	Temporary Habitation	D	Pre-Contact	Data recovery
26316	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26317	Lava tube	Temporary Habitation/Quarry	D	Pre-Contact	No Further Work
26318	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26319	Lava tube	Activity Area	D	Pre-Contact	No Further Work
26320	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26321	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26322	Cairn	Marker	D	Pre-Contact	No Further Work
26323	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26324	Lava tube	Temporary Habitation	D, E**	Pre-Contact	Preserve
26325	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26326	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26327	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26328	Platform	Temporary Habitation	D	Pre-Contact	Data recovery
26329	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26330	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26331	Complex	Permanent Habitation	C, D	Pre-Contact	Preserve

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SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
26390	Lava Blister	Temporary Habitation	D	Pre-Contact	No Further Work
26391	Lava Tube	Temporary Habitation	D	Pre-Contact	No Further Work
26392	Mound	Agriculture	D	Pre-Contact	No Further Work
26393	Mound	Agriculture	D	Pre-Contact	No Further Work

* Site contains confirmed human remains

** Site contained human remains removed during a previous study (Kennedy 1983/1984)

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SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
26361	Trail	Transportation	D	Pre-Contact	No Further Work
26362	Lava tube	Burial	D, E*	Pre-Contact	Preserve
26363	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26364	Lava tube	Temporary Habitation	D, E	Pre-Contact	Preserve
26365	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26366	Wall	Animal Husbandry	D	Historic	No Further Work
26367	Enclosure	Animal Husbandry	D	Historic	No Further Work
26368	Trail	Transportation	D	Pre-Contact	No Further Work
26369	Trail	Transportation	D	Pre-Contact	No Further Work
26370	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26371	Trail	Transportation	D	Historic	No Further Work
26372	Trail	Transportation	D	Pre-Contact	No Further Work
26373	Lava tube	Temporary Habitation	D	Pre-Contact/ Historic	Data recovery
26374	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26375	Modified outcrop	Quarry	D	Pre-Contact	No Further Work
26376	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26377	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26378	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26379	Complex	Temporary Habitation/ Agriculture	D	Pre-Contact	Data recovery
26380	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26381	Enclosure	Permanent Habitation	C, D	Pre-Contact	Preserve
26382	Trail	Transportation	D	Pre-Contact	No Further Work
26383	Enclosure	Temporary Habitation	D	Pre-Contact	No Further Work
26384	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26385	Mounds	Temporary Habitation	D	Pre-Contact	No Further Work
26386	Modified outcrop	Activity Area	D	Pre-Contact	No Further Work
26387	Modified outcrop	Activity Area	D	Pre-Contact	No Further Work
26388	Lava tube	Temporary Habitation	D	Pre-Contact	Data recovery
26389	Enclosure	Permanent Habitation	D	Pre-Contact	Data recovery

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SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
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	Preservation
26495	Lava tube	Temporary Habitation	D	Pre-Contact	Preservation & Data Recovery
26496	Complex	Temporary Habitation	D	Pre-Contact	No Further Work
26497	Modified outcrop	Indeterminate	D	Pre-Contact	No Further Work
26498	Lava tube	Temporary Habitation & Burial	D, E	Pre-Contact	Preservation & Data Recovery
26499	Lava tube	Shelter	D	Pre-Contact	Data Recovery
26500	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
26501	Lava tube	Water Collection & Burial	D, E*	Pre-Contact	Preservation
26502	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
26503	Lava tube	Water Collection & Burial	D, E	Pre-Contact	Preservation
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
26508	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26509	Lava tube	Burial	D, E	Pre-Contact	Preservation
26510	Complex	Water Collection, Burial, & Ceremonial	D, E	Pre-Contact	Preservation & 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
26514	Complex	Permanent Habitation	D	Pre-Contact	Data Recovery
26515	Platform & Cairns	Burial & Marker	D, E	Pre-Contact	Preservation
26516	Modified outcrop	Storage	D	Pre-Contact	No Further Work

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Table 5. Archaeological Site Summary for TMK Parcel 26 (Keahole Pt. Quad)

SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
10712	Wall	Animal Husbandry	D	Historic	Preservation
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	Temporary Habitation & Burial	D, E	Pre-Contact	Preservation & Data Recovery
26479	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
26480	Lava tube	Shelter & Burial	D, E	Pre-Contact	Preservation
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
26484	Lava tube	Water Collection	D	Pre-Contact	No Further Work
26485	Lava tube	Permanent Habitation	D	Pre-Contact	Data Recovery

Table 6. Archaeological Site Summary for TMK Parcel 26 (Kailua Quad)

SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
5699	Wall	Animal Husbandry	D	Historic	No Further Work
6601	Complex	Agriculture	D	Pre-Contact	Data Recovery
10714	Trail	Transportation	D, E	Pre-Contact/ Historic	Preservation
16103	Lava tube	Permanent Habitation & Burial	D, E	Pre-Contact	Preservation & Data Recovery
26486	Complex	Permanent Habitation	D	Pre-Contact	Preservation
26487	Enclosure	Permanent Habitation	D	Pre-Contact	No Further Work
26488	Lava tube	Burial	D, E	Pre-Contact	Preservation
26489	Complex	Permanent Habitation	D, E	Pre-Contact	Preservation

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SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
26543	Wall	Marker	D	Pre-Contact	No Further Work
26544	Enclosure	Permanent Habitation	C, D	Pre-Contact	Preservation
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	Preservation
26548	Lava tube	Temporary Habitation	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
26553	Lava tube	Temporary Habitation	D	Pre-Contact	No Further Work
26554	Lava tube	Water Collection	D	Pre-Contact	No Further Work
26555	Lava tube	Shelter	D	Pre-Contact	No Further Work
26556	Platform	Burial	D, E	Pre-Contact	Preservation
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	Preservation
26560	Trail	Transportation	D, E	Pre-Contact	No Further Work
26561	Cairn	Marker	D	Pre-Contact	No Further Work
26562	Complex	Permanent Habitation & Burial	D, E	Pre-Contact	Preservation
26563	Lava tube	Water Collection	D	Pre-Contact	No Further Work
26564	Lava tube	Burial	D, E	Pre-Contact	Preservation
26565	Complex	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	Water Collection & Burial	D, E	Pre-Contact	Preservation
26569	Lava tube	Water Collection & Burial	D, E	Pre-Contact	Preservation
26570	Lava tube	Water Collection & Burial	D, E	Pre-Contact/ Historic	Preservation
26571	Cairn	Marker	D	Pre-Contact	No Further Work

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SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
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	Preservation
26520	Lava tube	Burial, Ceremonial, & Animal Husbandry	D, E	Pre-Contact/ Historic	Preservation & Data Recovery
26521	Lava tube	Shelter	D	Pre-Contact	Data Recovery
26522	Lava tube	Burial & Water Collection	D, E	Pre-Contact/ Historic	Preservation & Data Recovery
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
26528	Lava tube	Water Collection	D	Pre-Contact	Data Recovery
26529	Lava tube	Water Collection & Burial	D, E	Pre-Contact	Preservation
26530	Platform	Temporary Habitation	D	Pre-Contact	No Further Work
26531	Enclosure	Agriculture	D	Pre-Contact	No Further Work
26532	Lava tube	Temporary Habitation & Burial	D, E	Pre-Contact	Preservation
26533	Platform	Agriculture	D	Pre-Contact	No Further Work
26534	Complex	Permanent Habitation	C, D	Historic	Preservation
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	Temporary Habitation & Burial	D, E	Pre-Contact	Preservation & Data Recovery
26539	Complex	Temporary Habitation	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

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Table 7. Archaeological Site Summary for TMK Parcel 28 (Keahole Pt. Quad)

SIHP No. 50-10-27-	Site Type	Function	Significance	Age	Mitigation Recommendations
26371	Trail	Transportation	D	Historic	Preserve
26414	Wall	Animal Husbandry	D	Historic	Preserve
26415	Trail	Transportation	D	Pre-Contact	No Further Work
26416	Lava Tube	Burial	D, E	Pre-Contact	Preserve

Table 8. Archaeological Site Summary for TMK Parcel 28 (Kailua Quad)

SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
26417	Mounds/Modified Depressions	Agriculture	D	Pre-Contact	No Further Work
26418	Trail	Transportation	C, D	Pre-Contact	Preserve
26419	Trail	Transportation	D	Pre-Contact	No Further Work
26420	Lava Tube	Activity Area	D	Pre-Contact	No Further Work
26421	Lava Tube	Temporary Habitation	D	Pre-Contact	No Further Work
26422	Trail	Transportation	D	Pre-Contact	No Further Work
26423	Lava Tube/ Modified Tumulus	Burial	D, E	Pre-Contact	Preserve
26424	Enclosure	Ceremonial	C, D, E	Pre-Contact	Preserve
26425	Lava Tube/ Modified Tumulus	Temporary Habitation/ Burial	D, E	Pre-Contact	Preserve & Data Recovery
26426	Modified Tumulus	Marker	D	Historic	No Further Work
26427	Lava Tube	Burial	D, E	Pre-Contact	Preserve
26428	Platform	Permanent Habitation	D	Pre-Contact	Data Recovery
26429	Modified Tumulus	Activity Area	D	Pre-Contact	No Further Work
26430	Modified Tumulus/ Platform/Terrace	Temporary Habitation	D	Pre-Contact	Data Recovery
26431	Lava Tube	Activity Area	D	Pre-Contact	Data Recovery

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SIHP No. 50-10-28-	Site Type	Function	Significance	Age	Mitigation Recommendations
26572	Complex	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	Preservation
26575	Lava tube	Water Collection	D	Pre-Contact	No Further Work
26576	Lava tube	Burial & Shelter	D, E	Pre-Contact	Preservation
26577	Mound	Permanent 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	Preservation
26581	Lava tube	Temporary Habitation	D	Pre-Contact	Data Recovery
26582	Lava tube	Burial	D, E	Pre-Contact	Preservation
26583	Complex	Permanent Habitation & Ceremonial	C, D, E	Pre-Contact	Preservation
26584	Complex	Transportation	D	Pre-Contact	No Further Work
26585	Complex	Agriculture & Temporary Habitation	D	Pre-Contact	No Further Work
26586	Cairn	Marker	D	Pre-Contact	No Further Work
26587	Platform	Agriculture	D	Pre-Contact	No Further Work
26588	Enclosure	Permanent Habitation	C, D	Pre-Contact	Preservation

* Site is a probable burial

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Summary of Feature Types and Site Function

Table 9 tallies the total occurrences of these formal feature types in the Kaloko Makai project area by parcel. There are a total of 658 features in the project area at 341 sites. Lava tubes are the most common feature type, and are particularly dense in TMK 26. Other common feature types include modified outcrops, enclosures, platforms, walls and trails. The majority of these feature types in the project area predominantly represent a pre-contact style of land use. Walls are an exception to this pattern as many are related to post-contact animal husbandry, including the landmark *ahupua'a* wall running through much of the project area. Other post-contact sites are relatively few, but include burials, trails and at least one enclosure as a post-contact habitation.

Percentages of functional categories are summarized in Table 10. These percentages represent the primary functional types for each site. Since some sites have multiple primary functions (i.e. a site may have both a habitation component as well as being a burial location), only overall percentages are given rather than total counts, as more than one functional category may be counted for a single site. Habitation is by far the most common function for sites within the project area, with permanent habitation increasing in the *mauka* parcel (TMK 26). Burial is also a common function, especially in TMK 26. Temporary habitation and trails are more common in the *makai* parcels.

Table 9. Summary Occurrences of Formal Feature Types (Total number of features: 658)

Feature Type	TMK 17		TMK 25		TMK 26		TMK 28		All TMKs	
	No.	%	No.	%	No.	%	No.	%	No.	%
Alignment	1	1	3	1.4	2	0.7	0	0	6	0.9
Cairn	1	1	8	3.6	17	6.1	2	3.3	28	4.3
Cupboard	2	2	0	0	0	0.0	0	0	2	0.3
Enclosure	12	12.1	31	14	19	6.9	2	3.3	64	9.7
Hearth	1	1	0	0	1	0.4	0	0	2	0.3
Lava blister	1	1	5	2.3	2	0.7	0	0	8	1.2
Lava tube	10	10.1	80	36.2	70	25.3	17	27.9	177	26.9
Modified depression	2	2	9	4.1	4	1.4	4	6.6	19	2.9
Modified outcrop	26	26.3	14	6.3	16	5.8	9	14.7	65	9.9
Mound*	3	3	8	3.6	26	9.4	4	6.6	41	6.2
Pavement	7	7.1	6	2.7	5	1.8	0	0	18	2.7
Platform	2	2	8	3.6	44	15.9	5	8.2	59	9.0
Rock art	0	0	2	0.9	4	1.4	0	0	6	0.9
Rock shelter	1	1	0	0	0	0.0	0	0	1	0.2
Terrace	7	7.1	13	5.9	23	8.3	3	4.9	46	7.0
Trail	21	21.2	17	7.7	12	4.3	7	11.5	57	8.7
Wall	2	2	17	7.7	32	11.6	8	13.1	59	9.0
Total # of Features (% of total features)	99 (15%)		221 (34%)		277 (42%)		61 (9%)		658 (100%)	

*There are several pervasive agricultural sites in the project area with widespread clearing and planting mounds. As these individual mounds are considered sub-features of the larger sites, each site/feature counts as one occurrence of the formal feature type.

SIHP No. 50-10-28	Site Type	Function	Significance	Age	Mitigation Recommendations
26432	Wall	Animal Husbandry	D	Historic	No Further Work
26433	Trail	Transportation	D	Pre-Contact	No Further Work
26434	Lava Tube	Temporary Habitation	D	Pre-Contact	Data Recovery
26435	Wall	Animal Husbandry	D	Historic	No Further Work
26436	Wall/Cairn	Animal Husbandry	D	Historic	No Further Work
26437	Cairn	Marker/Animal Husbandry	D	Historic	No Further Work
26438	Lava Tube	Temporary Habitation/Burial	D, E	Pre-Contact	Preserve & Data Recovery
26439	Lava Tube	Temp. Habitation	D	Pre-Contact	Data Recovery
26440	Lava Tube	Temporary Habitation/Burial*	D, E	Pre-Contact	Preserve
26441	Lava Tube	Activity Area	D	Pre-Contact	No Further Work
26442	Wall	Animal Husbandry	D	Historic	No Further Work
26443	Enclosure	Permanent Habitation	D	Pre-Contact	Preserve
26444	Wall	Animal Husbandry	D	Historic	No Further Work
26445	Modified Tumulus	Temporary Habitation	D	Pre-Contact	Data Recovery
26446	Lava Tube	Temporary Habitation	D	Pre-Contact	No Further Work
26447	Lava Tube	Temporary Habitation	D	Pre-Contact	No Further Work
26448	Modified Tumulus	Temporary Habitation	D	Pre-Contact	Data Recovery
26449	Lava Tube	Animal Husbandry	D	Historic	No Further Work
26450	Wall	Animal Husbandry	D	Historic	No Further Work
26451	Modified Tumulus	Temporary Habitation	D	Pre-Contact	No Further Work
26452	Lava Tube	Activity Area**	D, E	Pre-Contact	Preserve & Data Recovery
26453	Platform	Burial*	D, E	Pre-Contact	Preserve

* Site is a probable burial

** Site contains burials located outside of the project area

Table 10. Summary Occurrences of Formal Site Function (Total number of sites: 341*)

Function	TMK 17		TMK 25		TMK 26		TMK 28		TOTAL
	No.	%	No.	%	No.	%	No.	%	%
Activity Area	0	0.0	3	2.3	24	17.1	3	7.0	3.0
Agriculture	7	10.6	4	3.1	9	6.4	1	2.3	5.6
Animal husbandry	0	0.0	4	3.1	3	2.1	7	16.3	3.7
Burial (Known)	0	0.0	5	3.9	24	17.9	5	11.6	9.3
Burial (Probable)	3	4.5	1	0.8	2	2.1	2	4.7	2.4
Ceremonial	0	0.0	2	1.6	2	1.4	1	2.3	1.3
Indeterminate	3	4.5	4	3.1	1	0.7	0	0.0	2.1
Marker	1	1.5	5	3.9	8	5.7	2	4.7	4.2
Quarrying	1	1.5	5	3.9	1	0.7	1	2.3	2.1
Storage	3	4.5	0	0.0	1	0.7	0	0.0	1.1
Permanent Habitation	1	1.5	10	7.8	25	17.9	2	4.7	10.1
Temporary Habitation	31	47.0	72	56.3	34	24.3	13	30.2	39.8
Transportation	16	24.2	13	10.2	4	2.9	6	14.0	10.3

*Since some sites have dual primary functions, i.e. habitation and burial, these functions are each counted as one instance each in the table; thus, the total counts for each parcel here are slightly different than the actual total number of sites (341), for this table only.

SUMMARY AND INTERPRETATION

Summary of Site Type and Function within the Project Area

The inventory survey of the more than 1100-acre parcel resulted in the identification and documentation of 341 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), with site density increasing substantially in the *mauka* portions of the project area. The types, functions, and distribution of sites present match closely the anticipated finds for the Intermediate and Upland zones of the Kekaha region of North Kona within which the project area lies.

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.

The current project area falls into the Intermediate and Upland Zones. Based on the archaeological record of the present study area and previous archaeology in the Kaloko *ahupua'a* (Cordy et al. 1991), the Intermediate Zone 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. TMK 17, TMK 25, and the *makai* portion of TMK 28 are located in the Intermediate Zone.

In contrast, 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 *mauka* portion of the project area in TMK 26 and TMK 28 is located within this 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 present project area's location within the interpreted Intermediate and Upland Zones places it within an area where an increase of permanent habitation and agricultural intensity is expected

upslope. 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; overall, density of sites increases with elevation as expected.

Historic properties within the project area range from the pre-contact period to the historic ranching era. Feature types typically involve formal and informal stone construction (ranging from formal habitation and ceremonial structures to informal shelters and planting/clearing mounds), modification of lava tubes, construction of trails, and agricultural modification and clearing. Site functions include habitation, burial, ceremonial, transportation, agriculture, water collection and animal husbandry among other minor functions such as storage and quarrying. The following discussion summarizes the most common types of modification present within the Kaloko Makai project area and discusses the interpreted function of these sites, with a summary of site distributions and overall conclusions following.

Agriculture

The terrain throughout the majority of the project area severely limits agricultural productivity, since large portions of the project area are barren 'a'ā lava or rough *pāhoehoe* with no soil development. However, some of the *pāhoehoe* areas do have soil development, although these tend to be fairly small and shallow everywhere except for the far *mauka* extent of the project area. The agriculture related features throughout most of the lower elevations of the project area represent more of an opportunistic approach versus the more expansive/intensive approach practiced at higher, more productive elevations.

Agricultural features in the project area ranged from minimal constructions, characterized by the removal of stones to clear small depressions in *pāhoehoe* lava, to larger more defined concentrations of clearing and/or planting mounds. Other agricultural features included excavated blisters, informal enclosures, terracing, and the use of small cobble mulch. Throughout most of the project area, these features are fairly informal and somewhat ephemeral, tending to occur in low density concentrations often in gulch areas or low natural depressions in the topography. In the *mauka* portion of the southern parcel (TMK 28), eroded 'a'ā flows appear to be used as planting areas with high concentrations of small 'a'ā cobble mounds in geologically distinct areas.

The agricultural sites within the project area are collectively characteristic of and are a variation of what is currently termed the "Kona Field System" (State site 50-10-37-6601). The Kona Field System is an intensive, non-irrigated dry land agriculture complex, which has been identified along the upland slopes of North and South Kona, leeward Hawai'i, from Kealahou Bay to beyond the northern limits of Kailua Town. Numerous archaeological studies in this region (e.g., Newman 1970; Yen 1978; Schilt 1984; Barrera 1990; Hammatt et al. 1995, among others) define the field system as a grid-like patterning of rectangular fields formed by earthen and stone boundaries. Although variants occur, the fields' long axis walls (*kaūiwi*) extend in a *mauka/makai* direction and are intersected by shorter walled boundaries cross-cutting the slope.

The definition of the Kona Field System as a "system" relies on the interaction of four terrestrial eozones or subzones classifying areas of differential agricultural use in *ahupua'a* or district, as it is most commonly applied. Classification of these subzones was initially introduced by T. Stell

Newman (1970) with subsequent contributions by Marion Kelly (1983). Newman defined the terrestrial subzones using aerial photography in correlation with historic accounts of early visitors to Hawai'i. Kelly's subsequent research of the Native Claims Registers (from 1846 to 1848) provided Hawaiian names of the subzones and, based on reported claims, what type of traditional or historic crop was cultivated in each subzone. The subzones follow rainfall gradients generally predicted by elevation in Kona and delineate optimum areas for intensive agriculture. Rose Schilt in "Subsistence and Conflict in Kona Hawai'i" presents a comprehensive summary of the subzones using Newman and Kelly's studies and rainfall data compiled during her research (Schilt 1984:6). The following subzone classifications are based on Schilt's compiled data (the first and second zones, *Kula* and *Kahulu*, are most 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*).

Kahulu 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*), ti (*kā*), 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*)

It is notable that historic period crops were also cultivated in the *Kahulu* 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.

The agricultural sites within the project area are regarded as interrelated components of a non-intensive, non-irrigated field system with the *ahupua'a*, and are believed to generally reflect utilization of the *Kula* and *Kahulu* subzones presented above. Given relatively low rainfall within most of the project area, despite its slightly higher elevation, it is reasonable to assume that most areas follow a pattern more consistent with the *Kula* subzone. Overall, this suggests that sweet potato, gourds, mulberry, and possibly taro are the most likely crops to have been grown in this area. As noted in the Background Research section above, the actual crops identified in the award testimonies during the Māhele of 1848 for Kaloko lands are taro and sweet potato.

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 (*kua'iwi*) about 2 feet high and in the enclosure were put weeds of every kind, 7 tree ferns and so on, and then topped well with soil taken from the patch itself, to enrich ti, 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; while no walled (i.e. *kua'iwi*) fields are present in the *makai* portions of the project area, there are several located in the *mauka* portion of TMK 26.

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 area formally designated as 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.

Animal Husbandry

Walls built for animal husbandry were a commonly identified feature type throughout the project area. The walls suggest a fairly major historic presence of cattle or goat ranching within the southeastern portion of the project area, which is not unexpected given the presence of the Huehue Ranch in Kaloko beginning in the late nineteenth and early twentieth century. The presence of barbed wire fences, troughs, and sheds in association with historic walls (primarily in TMK 28) suggests that ranching continued into the modern area. Other definitive signs of animal husbandry in the area are the large number of goat (and cattle) skeletons found in lava tubes.

Historical research suggests that both goat and cattle grazing probably took place within the project area. Captain George Vancouver gave Ke'eaumoku, an *ali'i*, a pair of goats in 1792, and the following year, he brought Ke'eaumoku 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).

Post-contact animal husbandry appears to be most extensive in the southeastern portion (TMK 28) of the project area, again likely associated with nearby activity at the Huehue Ranch. The majority of the southern project area parcel is inappropriate for grazing, and most archaeological remains of animal husbandry in this area appear to be an attempt to keep cattle off the rougher *'a'a* flows, and within the level *pāhoehoe* flow at the far *mauka* end. Other historic animal husbandry sites in the rest of the project area confirm that there was at least minimal use of this land for ranching purposes, and the large number of bulldozer roads in certain areas may be related to modern ranching activity.

Burials

There are a total of sixty-five confirmed burials at more than thirty sites. Fifty-five (85%) of these are located in TMK 26. 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, 025 and 026), resulting in non-sequential numbers for burials within each of the four parcels. The CSH burial numbers 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.

The majority of confirmed burials (with identified human remains) are located within lava tubes, which vary in size from very small to fairly large tubes. There is often a single burial per site, but in some cases there are several individuals present at the same site and/or in the same burial chamber. In most cases, there are no directly associated burial goods, although several of the burials have modification associated with them (e.g., placed rocks designating the boundary of the burial area) or possible burial items nearby (e.g., modified shell). However, there are several historic burials that do have coffins and historic artifacts associated with them (buttons, cloth fragments, etc.). Burials in lava tubes with no associated historic artifacts are generally assumed to date to the pre-contact period.

In addition to confirmed burials, there are several probable burials within the project area (no identified human remains, but strong archaeological evidence for presence of a burial). One probable burial site consists of three adjacent platforms that are consistent with Hawaiian burial platforms. Most other probable burials are located within portions of lava tubes that have been systematically and formally sealed off. These areas often involve small spaces that have been blocked with upright slabs or tightly packed cobbles. In the lower elevation portion of the project area, filled crevices on top of tumuli represent a similar type of construction that are considered probable burials.

Burials are usually located in isolated areas, and many burial sites have burial as the sole primary function. However, more than half of the burials in the project area are also associated with another primary function, most often with habitation and water collection. This association suggests either interment of the burial after the other portions of the tube were no longer used, or, less likely, contemporaneous usage of a tube for dual purposes.

Ceremonial

While ceremonial sites make up less than 2% of the total historic properties within the project area, there are several portions of the Kaloko Makai project area that utilized sites in whole or in part as a ceremonial place. Most often this is evidenced by the placement of branch coral, petroglyphs, and/or the style of construction. While these sites were certainly ceremonial areas, there are only a few that are possible *heiau*. The following is a discussion of the diagnostic attributed used to identify *heiau* and other ceremonial structures.

The general consensus regarding *heiau* (e.g. Bennett 1930, Kolb 1991, and Stokes and Dye 1991) is that they are “extraordinarily diverse” (Kolb 1991:108) and “found in a bewildering variety of forms, sizes, and locations throughout the islands” (Kirch 1985:257). W.C. Bennett’s 1930 dissertation continues to be “the most comprehensive survey of *heiau* to date” (Kolb 1991:108). Bennett, among others, attempted to provide diagnostic attributes from which *heiau* could be identified and classified. These include size, uprights, depressions, altar, paving, tiers/terraces, coral, historical reference, location, and function.

Size refers to the surface area (i.e. square meters) of the structure. Initially, W. C. Bennett designated two size classifications for *heiau*, small and large. The dividing line between them was arbitrarily set at 50 feet “though this figure is not absolutely fixed” (Bennett 1930:4). Over the years this has been refined to include three general size ranges, small being less than 200 m², “mid-sized” (Kirch 1985:261) ranging from 200 to 400 m² and large being greater than 400 m². Based on these specifications, site -26424 (225 m²) fits into the lower end of the mid-size range. In general, mid-size structures and larger have been interpreted as religious structures (Hammatt et al 1997:181).

Attributes including altars and paving, generally refer to internal features of the 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). Formal paving of two different types (slabs and ‘*a’u* cobble) is evident within site -26424, as are various internal features, including a placed head branch coral.

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).

Although there are several platforms and other smaller structures in the project area that were likely shrines or had a ceremonial aspect, and some of the are possible *heiau*, there is one structure in particular that is a probable *heiau* (in TMK 28). This structure (an enclosure) has a fair amount of internal construction, formally paved floors, a placed head of branch coral, and a very formal *pāhoehoe* slab trail that leads to it. This combination of features suggests that this historic property functioned as a *heiau*. Other ceremonial features in the project area consist of platforms with some branch coral and/or multi-tiered formal construction, petroglyphs in lava tubes, and small agricultural shrines.

Habitation

Habitation sites are the most common type of historic property in the project area, and range from small lava tube shelters to multi-component complexes. The temporary and permanent habitation designation for the sites within the project area fit the models of type of habitation expected within the Intermediate and Upland Zones 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. Permanent habitation tends to increase upslope, where there are more lava tubes and better soil development for agriculture, but both temporary and permanent habitation sites are present throughout all four parcels in the project area.

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, with a brief summary of the correlation to sites within the project area included.

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.

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.

Substantiveness of sites/features

- 1) Substantial - Well paved, bifaced, (thick) sturdy walls, volume (though no specific m²), 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.

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" [Kamaka 1976:96]) were occupied by the *ali'i* or wealthy commoners, and the single-house residences were occupied by other commoners (*maka'ainana*). Hawaiian scholar, David Malo, described a *maka'ainana* 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.

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 (middens, 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.

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."

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.

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. The following is a summary discussion of temporary and permanent habitations within the present project area.

Temporary and Permanent Habitation within the Project Area

Within the current project area, the majority of sites discussed as temporary habitations (or as in the case of many lava tubes, as shelters), have a floor area less than 20 m². In some cases where the floor area is larger, the overall site is overall informally constructed and considered temporary habitation for that reason. Specifically, lava tubes tend to be temporary habitation sites rather than permanent, but often have rather large floor spaces. Permanent habitation structures tend to be larger, often with multiple living surfaces that increase the total habitation space.

A full range of architectural types is present within the project area, including both temporary and permanent habitation platforms, enclosures, terraces, and lava tubes. Temporary habitations tended to consist of only one or just a few structures of fairly informal construction, while permanent habitation complexes often involved multiple architectural types and/or at least one formally constructed primary structure. The substantiveness of permanent habitation structures tended to be an important factor in determining the type of habitation, and is the main reason that the less formally modified lava tubes (as opposed to formally constructed surface structures) are generally considered temporary habitation.

Many of the larger habitation site complexes within the project area have internal features, in the form of hearths, storage areas, or internal alignments that suggest permanent rather than temporary habitation. Formal construction style, internal features, and multiple component features do seem to occur concurrently at permanent habitation sites within the project area, while temporary habitation tends consist of fewer features with little or no internal construction.

Finally, the distribution of the temporary habitation sites within the project does tend to be near activity areas and minor agricultural areas, whereas permanent habitation is more likely to be associated with shrines, lava tubes, and more intense agricultural modification.

Lava Tubes

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 denser on the *mauka* slopes, but are present throughout all four individual TMKs. Some blisters and small tubes, inspected during the present survey, showed no evidence of utilization, but a surprisingly large number do have at least minor modification, and some lava tubes were extensively utilized for recurrent habitation. The range of functions for tubes and blisters within the project area include burial, habitation, and activity areas (specifically water collection and tool production).

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.

Habitation-related modification in lava tubes generally consisted of floor clearing, constructed entrances, midden deposits, and signs of tool manufacture (lithic debitage, portions of fishing implements such as octopus lures, etc.). Other habitation related items include several *papamū* game boards, as well as a tapa beater and poi pounder. Habitation of lava tubes ranged from a few cleared rocks and a small amount of midden to large subsurface complexes including platforms, pavements, walls, and petroglyphs.

Other than habitation, the two other primary functions for lava tubes in the project area are burial and water collection. A large percentage of the burials in the project area are located inside lava tubes, and are interred utilizing various styles. Some lava tube burials within the project area are historic (associated with historic goods and/or coffins) but most have no associated grave goods and are assumed to be pre-contact. It is notable that many of the burials located during the inventory survey were far from entrances and/or in difficult to reach locations, sometimes due to the main entrance to the burial chamber being intentionally blocked.

Water collection in lava tubes is also quite frequent, especially in the *mauka* regions of the project area. Small informal concentrations of cobbles and small boulders in lava tubes are indicative of water collection activity areas. 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). Some 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 lava tubes have a fair amount of internal construction, such as formally modified entrances which appear to constrict the tube entrances (possibly 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.

While no gourds were found in place in the project area - or any other containers such as wooden bowls or carved logs - 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.

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.

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. Overall, lava tube utilization within the project area was likely an important factor in settlement patterns and site distribution.

Trails

Trails are a common site type within the Kekaha region in general and one of the more prevalent types specific to the Intermediate Zone. Although some of the trails in the project area were little more than remnants, several run many hundreds of meters and are in good to excellent condition. The most common type of trail consists of *pāhoehoe* slabs placed stepping distance apart on 'a'ā; these trails range from remnants (only a few slabs) to a trail that consists of immediately adjacent *pāhoehoe* slabs for several hundred meters. *Pāhoehoe* slab trails are generally considered to be pre-contact. Historic trails, of which there are a few in the project area, tend to be wider and have curbing and causeways (typical of historic horse trails).

The intersection of three of the trails in TMK 28 (one very formal *pāhoehoe* slab trail, one informal slab and crushed 'a'ā trail, and a historic curbed horse trail) is especially of interest, as it appears to represent trail use during subsequent periods of time. The construction type also is indicative of changing needs in transportation, specifically the creation of trails more amenable to travel by horse or other pack animal.

Another long historic trail is located in the north east portion of the project area (TMK 26). 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. This trail is associated with several large habitation sites, as well as the Kona Field System.

The large number of trails within the project area reveal that the residents of Kaloko and Kohanaiki (both pre- and post-contact) had a significant network of travel routes that provided access to resources and exchange of resources over the 'a'ā (especially in TMK 17 and TMK 25). The presence of several different types of trails as well as intersecting/overlapping trails suggests use of this area over various periods of time. The trail network includes both *mauka/makai* and cross slope-oriented trails, and the trails thus provide fairly direct coast-to-uplands routes via the project area and access to activity areas within the project area. The activity areas include: agricultural pursuits, ceremonial sites, and temporary and recurrent habitation sites, as well as animal husbandry areas. Overall the trails suggest a high level of energy investment in constructing paths for traversing the 'a'ā flow, both in pre-contact times as well as historically.

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 some 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 suggests 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. 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.

Site Distribution

Overall, the site/feature types and functions observed during the inventory survey correlate with the anticipated finds for the Intermediate and Upland Zone of the Kekaha region in which the project area lies. Historic properties within the project area include agricultural modification, permanent and temporary habitation complexes, a large number of lava tube sites (including tubes used for habitation, water collection, burial, and ceremonial activity), historic animal husbandry, and several intact trail systems. Most habitation sites have been interpreted as temporary in nature, with permanent habitation sites increasing in density significantly in the *mauka* portions of 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. Several long trails traverse various portions of the project area and are both historic and pre-contact in style. Finally, burials are most commonly found in lava tubes and the majority are located within the northeastern parcel, TMK 26. Overall, the majority 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 are a few historic homestead sites present, as well as historic burials.

Site distribution clearly indicates a preference for permanent habitation in the *mauka* portion of the project area, most notably in the northeastern parcel (TMK 26). There are fairly distinct differences between Kaloko and Kohanaiki Ahupua'a site density; very possibly due to ranching activity and bulldozing disturbing much of the Kaloko portions of the *ahupua'a*. The site density in Kohanaiki is especially high in TMK 25 and 26. Probably most surprising is the large number of sites in TMK 25, and large amount of widespread temporary habitation in what is generally

thought of as a "barren" land. The increased amount of habitation on the *mauka* slopes (eastern portion of TMK 26) is less surprising, as this is a common pattern for this area, although this makes the numerous site complexes no less impressive. The lava tube density in TMK 26 is also quite impressive, with nearly every lava tube encountered having at least minor cultural modification, and lava tube sites ranging from small shelters to high energy-investment permanent habitation complexes. Water collection in this parcel is also quite remarkable, with the number of total water catchment features numbering in the hundreds, if not thousands for the entire Kaloko Makai project area, with the majority located in TMK 26.

Geologically, the large south parcel (TMK 28) is largely barren 'a'ā with very low site density (approximately 0.11 sites/acre); relatively level *pāhoehoe* areas in the *mauka* section of the parcel were more heavily utilized in the past but there does appear to be disturbance of older sites from historic and modern ranching activity. It is notable that the majority of sites in this parcel 28 (and within the Kaloko Ahupua'a portions of the project area in general) are either lava tubes or located on high outcrops/tumuli. This undoubtedly is in part due to the advantages of these locations for habitation (shade, cool breeze, good views, etc.), but it is also hypothesized that bulldozing and ranching activity could also be responsible for the lack of intact surface structures in this area. In TMK 28, the most notable sites include a more than 500 meter long formally constructed *pāhoehoe* slab trail that leads to a ceremonial enclosure (probable *heiau*) at the edge of the 'a'ā flow. There is also a series of three large burial platforms in the northeastern corner of this parcel.

The northern *makai* parcel, TMK 17, also has fairly low site density relative to the *mauka* parcels (0.26 sites/acre). This is not unexpected given the rough *pāhoehoe* and 'a'ā that dominate this area, with little access to water and generally very rough conditions. About 20% of the sites in this parcel consist of *mauka/makai* trails (mostly *pāhoehoe* slab stepping stone trails) running across 'a'ā flows. An unusual aspect of this set of trails is their proximity to the *ahupua'a* boundary, suggesting that there was substantive traffic between Kohanaiki and Kaloko Ahupua'a in this area. There is a noticeable concentration of surface sites that runs from the center of the project area up a moderate *pāhoehoe* ridge that ends at a foot of a very prominent, tall 'a'ā flow near the *mauka* boundary of the project area. Due to the height of this 'a'ā flow, there are many sites here, including some over the boundary of the project area. This parcel also has a fairly large number of modified outcrops and enclosures, which mainly function as intermittent (temporary) places for habitation. Most temporary habitation sites are located near identifiable or inferred transportation routes, and sites generally are most frequent on ridges and tumuli, or in lava tubes. In this way, the dense sites along the 120 foot contour and the other distinct ridges are expected. Lava tubes are relatively rare in this parcel, adding to the difficulty of water procurement, and this portion of the project area fits the model for the Intermediate Zone (Cordy 1991) very well.

Immediately *mauka* of parcel 17, site density begins to increase in TMK 25, with 0.34 sites/acre. Habitation (both temporary and permanent) site density increases, with more formal and larger habitation complexes in the east portion of the parcel. Notably, there was considerably more habitation sites than was expected given that most of the parcel is within the "Intermediate Zone" (Cordy 1991). 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. 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. Interestingly, the number of enclosures in Kohanaiki is in sharp contrast to Kaloko, with several permanent habitation sites and the relatively dense area of habitation around the top of Huliko'a Drive (in Kohanaiki). Though there are few lava tubes to collect water in, the intensive agricultural site near the northern edge of the project area is the best evidence that many of these Kohanaiki habitations were well populated. It stands to reason that it is likely that several families lived seasonally in the area, perhaps more often. 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.

The northeastern (*mauka*) parcel, TMK 26, has by far the highest site density (0.62 sites/acre). This area is characterized by large expanses of *pāhoehoe*, an increased amount of soil development and rain fall, and an increase in the size and number of lava tubes. While the west portion of the parcel is similar in site density and in character to TMK 25, the eastern upland portion has a very steep increase in site density and the number of large site complexes. The site complexes tend to have multiple features (note that 43% of all features from the entire project area are located within this parcel, despite it being the smallest in acreage) and sites are more commonly formal than in the other three parcels. There is an increase in the number and size of permanent habitation complexes and an increase in intensity of lava tube utilization. Water collection within lava tubes is ubiquitous, as is low-intensity agriculture throughout the parcel. On the *mauka* slopes of the project area agriculture increases greatly in intensity and becomes more formal; this area is considered a portion of the Kona Field System and was recorded as a portion of that large agricultural complex. This parcel also has a fairly formal trail running *mauka/makai*; this trail appears to match Emerson's historic maps that refer to it as "Kohanaiki Road" (see trails discussion above). Other notable sites include several ceremonial structures and petroglyph panels; some of the ceremonial structures are probable *heiau*. Finally, burials are also very common within this parcel, most often located within lava tubes, although several surface structures have also been determined to be burial platforms. Burials are often single individuals, but some tubes were clearly being utilized as burial tombs, and burials range from pre-contact to historic. Many burials are located far from any tube entrance, and this issue will need to be fully addressed in preservation and burial treatment plans.

Conclusions

Kohanaiki and Kaloko, based on the present research, had fairly different resources at the elevation of the project area, and varied significantly in the types of resources as elevation increased. Rainfall, eroded *pāhoehoe* preferable for agriculture, and barren *'a'ā* all created distinct landscapes for these *ahupua'a* in the project area. Both had numerous lava tubes a great resource in this arid region. In Kohanaiki the *mauka* regions had greater potential for agriculture and had very dense lava tubes, attracting habitation to this area.

As a whole, inhabitants of Kohanaiki and Kaloko were fairly spread out, but were more concentrated along the upper half of the project area. Pre-contact times there could have been as many as a dozen households living in this more *mauka* area. As has been demonstrated elsewhere in Kona, strong preference was given to ridges, small rises and proximity to lava tubes in the case of most of these habitations. This habitation area in the project area was most likely the *makai* edge of an inland population center, that likely extended *mauka* of the Kohanaiki

Homesteads. In post-contact times, it is likely that many of those who remained resettled near the new government road, at the Kohanaiki Homesteads or in the land claims awarded in this vicinity. Still, findings show that the area continued to be an important resource and habitation area evidenced by a notable number of historic sites including a habitation, platforms, two curb stone trails, a historic habitation and numerous historic burials. In these post-contact times, the *mauka* project area probably served as an informal extension to the Kohanaiki Homesteads to the *makai*.

Residents of these areas were industrious and opportunistic use of the natural terrain and natural resources is evident. The lack of readily available freshwater led to a number of adjustments in living practices. Agricultural areas are concentrated higher up the slope where rainfall is more prevalent. Lava tubes were utilized to capture dripping ground water almost without exception, even when the labor required to do so would have been very significant. Habitation was also somewhat intensive, with dense complexes of structures located further *makai* than might have been expected by previous work in the area. These areas were interdependent with other portions of the *ahupua'a*. Presence of significant marine food remains in *mauka* agricultural areas and habitations reinforce the importance of coastal resources here. The *makai* project area was probably frequently traversed on *mauka-makai* trails, which were identified to some degree in the project area and have been identified in Kaloko-Honōkōhau National Historic Park to the west. Interestingly, evidence was found that Kaloko and Kohanaiki may have been interdependent upon each other at these elevations, perhaps more than with other neighboring *ahupua'a*. Dense clusters of trails crossing *'a'ā* flows in both the *makai* project area (TMK 17) and the middle project area (the center of TMK 25) virtually straddle the presently known *ahupua'a* boundary. Also, historic maps show that the major *mauka-makai* trail, Site -10714, crossed from Kohanaiki into Kaloko in the middle project area, though this was not definitively confirmed with archaeological findings. At least one possible crossing preserved as a gap in the post-contact *ahupua'a* wall was also located near the *mauka* end of the project area.

Until the construction of Queen Ka'ahumanu Highway, the use of some of these trails likely continued for access to the coast. Other historic use, in particular ranching, played a major role in a continually evolving landscape. Huehue ranch provided jobs for paniolo who continued utilize the area, introduced fodder flora have overtaken much of the landscape and grazing and mechanical clearing have likely negatively impacted many sites. Modern use has continued to affect the area and disturbance in the form of bulldozing, dumping and camp sites along Hina Lani Street have had the greatest impact.

Nevertheless, these numerous stages of land use have had a large area to share, and much of the earliest land use in pre-contact times is still in good condition. Further research on these cultural resources through a comprehensive data recovery program will add considerably to this knowledge. Preservation will also be a major consideration especially in the northeast project area with emphasis on trails, burials and sites of high interpretive value.

PROJECT EFFECT AND MITIGATION RECOMMENDATIONS

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. Also of some concern are the remaining Kohanaiki Homesteads in the next parcel east of the project area. Three of these homesteads were recommended for preservation by previous archaeological work there (Wolforth 2005) and if not directly affected by development of that parcel, their viewplane has the potential to be affected by development of the project area.

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 project area on the slope immediately overlooking the park, there is a potential cumulative effect.

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 341 sites in the project area, a total of eighty (80) sites be subjected to a program of data recovery to address scientific and informational concerns and a total of seventy-two (72) sites be preserved (Table 11). 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 of preserve areas.

The remaining 189 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.

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.

Table 11. Mitigation measures recommended for each parcel

Recommendation	TMK 17		TMK 25		TMK 26		TMK 28		All 4 TMKs	
	No.	%	No.	%	No.	%	No.	%	No.	%
Preservation	3	5.1	18	14.9	38	30.8	13	31.7	72	21
Data Recovery	19	32.2	29	24.0	23	19.2	8	19.5	80	23
No Further Work	37	62.7	74	61.2	60	50.0	20	48.8	189	56
Total (total %)	59 (17%)		121 (36%)		120 (35%)		41 (12%)		341 (100%)	

Data Recovery

A total of eighty (80) sites are slated for data recovery and should be subjected to further documentation and, if feasible, 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.

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), agricultural areas, trails, activity areas (i.e., water collection in lava tubes), and sites deemed to have good excavation potential. 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.

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. One lava tube within the project area contains some potentially significant paleoenvironmental remains that should also be considered during data recovery. 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.

Although the eighty sites designated for data recovery can be wholly or partially mitigated through this measure, 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.

Site Preservation

There are a total of seventy-two (72) sites in the project area that are recommended for preservation in whole or in part. A large percentage of these sites are recommended for preservation based on the presence of a burial (confirmed or probable) and/or association with a burial. Burials are especially common in lava tubes within the project area and special consideration will need to be given to the preservation in place of burials, especially when remains are located far from the lava tube entrances. 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. Several of the non-burial preserve sites are major intact trail systems that run for several hundred meters, and two sites are *ahupua'a* walls that are recommended for preservation with breaches allowed. Other preserve sites include ceremonial enclosures and platforms (possible *heiau*), excellent examples of habitation complexes (some of which utilize both surface and sub-surface areas), and a few petroglyph panels.

It is recommended that considerations for the preservation of these sites be detailed in a burial treatment plan and preservation plan to be approved by the State Historic Preservation Division.

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. While a relatively small number of artifacts were collected given the size of the project, some items were retrieved during the inventory survey due to concern over possible looting. Some artifacts and midden were collected as part of the test excavations conducted. 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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