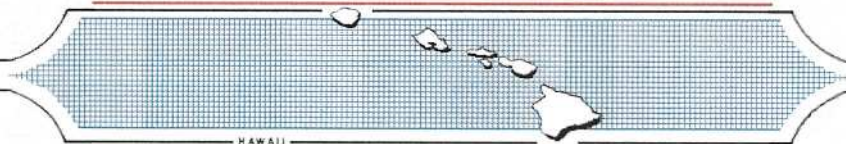


**AN ARCHAEOLOGICAL INVENTORY SURVEY REPORT  
FOR THE HO‘OHANA SOLAR FARM PROJECT IN KUNIA,  
WAIKELE AHUPUA‘A, ‘EWA DISTRICT,  
ISLAND OF O‘AHU, HAWAI‘I  
[TMK: (1) 9-4-002:052]**

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February 2015  
**FINAL**

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PETITIONER'S EXHIBIT 7

## ABSTRACT

At the request of Ms. Tracy Furuya of Group 70 International, Inc., Scientific Consultant Services (SCS), Inc. conducted an Archaeological Inventory Survey of a 161.023 acre parcel of land in preparation for the placement of a solar panel farm located in Kunia, Waikele Ahupua'a, 'Ewa District, Island of O'ahu, Hawai'i [TMK: (1) 9-4-002:052].

Fieldwork was conducted over a period of eight days by SCS archaeologists Guerin Tome, B.A., and Elizabeth Pestana, B.A., under the direction of the Principal Investigator Robert L. Spear, Ph.D. Archaeological work was performed in order to determine whether archaeological historic properties were present and, if so, to present their description, interpretation, and location. One new site (State Site 50-80-08-7671, a Historic road complex comprised of three features) was identified during the current survey. The surface survey and limited subsurface testing conducted produced archaeological cultural materials. All materials collected were subject to analysis. With the exception of three pre-Contact artifacts (a basalt adze perform and two basalt flakes with polished facets) collected during the surface survey, the materials from the subsurface testing are comprised of both Historic and Modern cultural materials.

The Archaeological Inventory Survey has been completed. No further archaeological work is recommended for the current project.

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## INTRODUCTION

At the request of Ms. Tracy Furuya of Group 70 International, Inc., Scientific Consultant Services (SCS), Inc. conducted an Archaeological Inventory Survey (AIS) of a 161.023 acre parcel in preparation for the placement of a solar panel farm located in Kunia, Ahupua'a of Waikele, 'Ewa District, Island of O'ahu, Hawai'i [TMK: (1) 9-4-002:052] (Figures 1, 2 and 3).

According to the City and County of Honolulu's Real Property Tax Assessment website ([www.honolulupropertytax.com](http://www.honolulupropertytax.com)) accessed on June 6, 2014, the current project area identified as TMK: (1) 9-4-002:052, 161.023 acres, is privately owned by Robinson Kunia Land LLC.

Fieldwork for this project was conducted over a period of ten days in April, May, and July (April 23, 24, 25, 28, and 30, May 1, 2, and 5, and July 17-18, 2014) by SCS archaeologists Guerin Tome, B.A., and Elizabeth Pestana, B.A., under the direction of the Principal Investigator Robert L. Spear, Ph.D. The Archaeological Inventory Survey was performed in order to determine whether archaeological historic properties were present and, if so, to present their description, interpretation, and location.

The current project area was previously part of a larger archaeological investigation. In the 1988 Archaeological Walk-Through Survey by Archaeological Consultants of Hawaii (Kennedy 1988), no archaeological sites were identified. During the current AIS fieldwork, one archaeological site (State Site Number 50-80-08-7671, a Historic plantation road complex consisting of three features) was identified. An artifact scatter (SCS Temporary Site TS-1) was initially considered to be a site but was eventually determined to lack sufficient integrity to be given a State Site Number. Limited subsurface testing was also conducted in the form of six Shovel Probes (SP-1 through -6) (ranging from 0.3 m by 0.3 m to 0.4 m by 0.5 m) placed in different locations within the property in order to examine the stratigraphy of the area as well as search for archaeological cultural material. Three pre-Contact lithic artifacts (a basalt adze preform and two basalt flakes) were found during the pedestrian survey while Historic and Modern material were found in the majority of the Shovel Probes. The results of the Archaeological Inventory Survey and recommended action are discussed below.

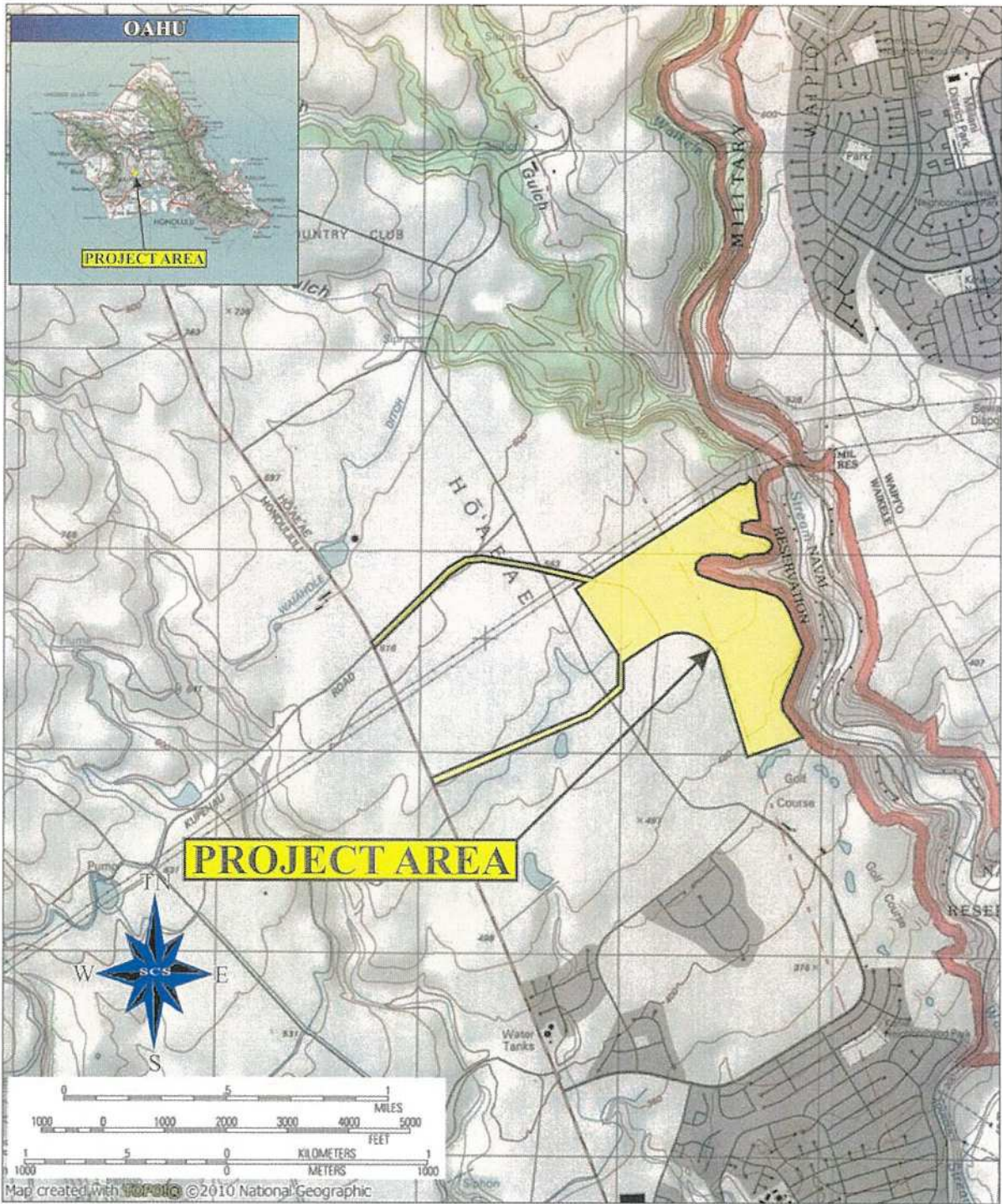


Figure 1: USGS 1998 Schofield Barracks Quadrangle Showing Project Area Location.



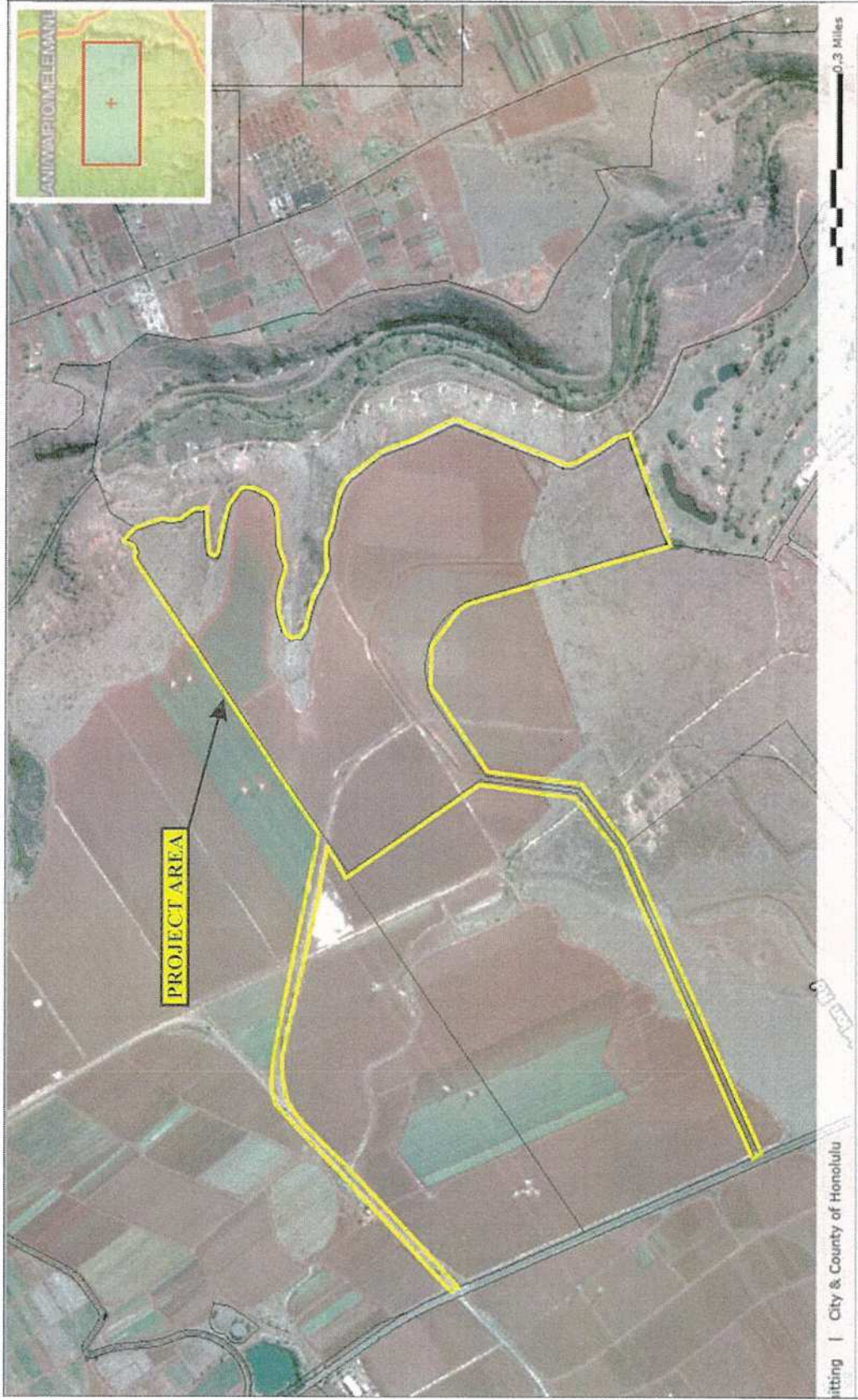


Figure 3: Aerial Photo (Source: City and County of Honolulu, Department of Planning and Permitting Honolulu Land Information System [HoLIS]) Showing Project Area Location.



## GEOGRAPHIC SETTING

The current project area is comprised of one property [TMK: (1) 9-4-002:052] situated within Kunia, Waikele *ahupua'a*, 'Ewa District, Island of O'ahu, Hawai'i. The project area falls within the *ahupua'a* of Waikele which extends from the Schofield Plateau into the West Loch of Pearl Harbor. Waikele is characterized by several different landforms which compose the topography of the area: coastal plains in the *makai* (towards the sea) portion by Pearl Harbor and slopes and gulches in the *mauka* (towards the mountains) portion towards Schofield Plateau. Waikele *ahupua'a* consists of developed and non-developed land, and extends from c. 3 feet to 1,000 feet above mean sea level (amsl) (Tomonari-Tuggle and Erkelens 1995:5).

The project area is located in the middle portion of the *ahupua'a*. The entire east portion of the project parcel is bounded by Waikakalaua Gulch. The rest of the project parcel is currently bounded by agricultural property: TMK (1) 9-4-003:001 to the north, TMK (1) 9-4-002:080 and TMK (1) 9-4-002:071 to the west, and TMK (1) 9-4-002:046 to the south. The project area is roughly L-shaped and fairly level with an elevation ranging from 460 to 560 feet above mean sea level (amsl).

### **SOILS**

According to Foote *et al.* (1972:78, 79, 96, 116; Map Sheet Number 42, 43) a total of five soil types are present within the current project area – Lahaina Series LaA, LaB, LaC, and LaC3, and Molokai silty clay loam (MuB). The Lahaina soils series consists of well-drained soils on uplands where the soils developed in material weathered from basic igneous rock. They are nearly level to steep with elevations from 10 to 1,500 feet. These soils are used for sugarcane, pineapple, truck crops, pasture, home sites, and wildlife habitat. Lahaina silty clay (LaA) with 0 to 3 percent slopes has slow runoff and slight erosion hazard. Lahaina silty clay (LaB) with 3 to 7 percent slopes has moderate permeability, slow runoff, and slight erosion hazard. Lahaina silty clay (LaC) with 7 to 15 percent slopes has medium runoff and moderate erosion hazard. Lahaina silty clay (LaC3) with 7 to 15 percent slopes is typically severely eroded. The soil profile I similar to LaC except that most of the surface layer and, in places, part of the subsoil have been removed by erosion. Runoff is medium and erosion hazard is severe.

Molokai silty clay loam (MuB) with 3 to 7 percent slopes has slow to medium runoff and slight to moderate erosion hazard. On Oahu, there are small areas of dark reddish-brown silty clay loams that overlie fine-textured, gravelly alluvium and small areas of dark reddish-brown

silty clay soils that have a mottled subsoil. This soil is used for sugarcane, pineapple, pasture, wildlife habitat, and home sites.

## **CLIMATE**

The area in which the project area lies is the semi-arid central region of Oahu. Waikele typically receives between 30 to 40 inches of rainfall a year most of which occurs in fall and winter (Price 1983:56). The project area is unlikely to receive much upland runoff given the lack of streams directly emptying onto the project area. The closest water feature to the project area was identified as the perennial Waikakalaua Stream (also known as Waikele Stream) located to the east and a reservoir to the southwest.

## **VEGETATION**

At present, the project area vegetation consists of both introduced and indigenous vegetation including *koa haole* (*Leucaena glauca*), broomweed (*Sida rhombifolia*), golden crown beard (*Verbesina encelioides*), *ilima* (*Sida fallax*), *uhaloa* (*Waltheria americana*), *ko 'oko 'olau* (*Bidens sp.*), lilikoi (*Passiflora edulis*), Flora's paintbrush (*Emilia fosbergii*), spiny amaranth (*Amaranthus spinosus*), Popping Amaranth (*Amaranthus sp.*), garden spurge (*Euphorbia sp.*), cactus (*Opuntia sp.*), pigweed (*Portulaca oleracea*), castor bean (*Ricinus communis*), cheeseweed (*Malva parviflora*), black wattle (*Acacia mearnsii*), tobacco plant (*Nicotiana sp.*), African tulip (*Spathodea campanulata*), albizia (*Albizia sp.*), cherry tomato (*Solanum lycopersicum*), hogweed (*Boerhavia sp.*), and camphorweed (*Pluchea sp.*).

## **PRE- AND POST-CONTACT BACKGROUND**

Recent re-evaluation of radiocarbon dates suggests that the Hawaiian Islands were first settled between A.D. 850 and 1100 by Polynesians sailing most likely from central East Polynesia (Kirch 2011:24). Archaeological settlement pattern data indicates that the initial colonization and occupation of the Hawaiian Islands first occurred on the windward shoreline areas of the main islands. Greater population expansion to inland areas and agricultural development on the leeward side of O'ahu was likely to have begun early in what is known as the Expansion Period (A.D.1200-1400) (Kirch 1985). Coastal settlement was still dominant, but populations began exploiting and living in the upland (*kula*) zones.

In general, several terms, such as *moku*, *ahupua'a*, *'ili* or *'ili 'āina* were devised to describe various traditional land sections and divisions. A district (*moku*) contained smaller land

divisions (*ahupua'a*), which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua'a* were, therefore, able to harvest from both the land and the sea. Since the Polynesian economy was based on agricultural production and marine exploitation, animal husbandry, and utilizing forest resources, this situation ideally allowed each *ahupua'a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *'ili 'āina*, or *'ili*, were smaller land divisions next in importance to the *ahupua'a* and were administered by the chief who controlled the *ahupua'a* in which the *'ili* were located (Lyons 1875:33; Lucas 1995:40). The *mo'o 'āina* were narrow strips of land within an *'ili*. The land holding of a tenant, or *hoa 'āina*, residing in an *ahupua'a* was called a *kuleana* (Lucas 1995:61).

The island of O'ahu ranks third in size of the eight main islands in the Hawaiian Archipelago. Oral history notes that the division of O'ahu's lands into districts (*moku*) and sub-districts (*'ili*) was performed by a ruling chief, the *ali'i nui* Mā'ili-kūkahi, during the early part of the 16<sup>th</sup> century (Kamakau 1991:53-56; Cordy 2002:23). It was Mā'ilikukahi who had the Island of O'ahu thoroughly surveyed, and permanently defined the boundaries between the different divisions and lands (Fornander 1969:89). Mā'ilikukahi created six districts and six district chiefs (*ali'i 'ai moku*). Land was considered the property of the king or *ali'i 'ai moku* (chief who rules a *moku*) (Pukui and Elbert 1986: 20), which he held in trust for the gods. The title of *ali'i 'ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka 'āinana* (commoners) worked the individual plots of land. It is said that Mā'ilikukahi gave land to *maka 'āinana* all over the island of O'ahu (*ibid*). The six districts of O'ahu were Wai'anae, 'Ewa, Waialua, Ko'olauloa, Ko'olaupoko, and Kona at the time of contact.

The settlement pattern, and timing of land utilization, may be divided into several general periods: the pre-Contact period, the Māhele, the post-Contact/Historic period, and the present land use. Together, these periods create a synthesis of land use in and near the project area as well as provide a basis on which archaeological researchers explored succinct research questions during reconnaissance and sampling work. These time periods are summarized below.

### **PRE-CONTACT PERIOD**

The commonly accepted paradigm of Hawaiian settlement is that the earliest settlements were located in the wet, windward regions. As population pressure increased or politics changed, populations began to branch out into leeward, less hospitable regions of Hawai'i, adapting their

cultivation strategies as they moved into drier climates (Cordy 2002:8). As mentioned above, the pre-Contact Hawaiian economy was based on agricultural production and marine resource exploitation, as well as raising animals (*i.e.*, dogs, pigs, chickens), and collecting wild plants and birds. During the pre-Contact Period (pre-1778), there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (taro, *Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinarum*) and *mai 'a* (banana, *Musa sp.*), were also grown and, where appropriate, such crops as *'uala* (sweet potato, *Ipomoea batatas*) were cultivated. This was the typical agricultural pattern seen during pre-Contact times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985).

The current project is located in Waikele Ahupua'a, 'Ewa District. Waikele means "muddy water" while 'Ewa translates to "crooked" (Pukui *et al.* 1974: 28, 223). 'Ewa District is a major leeward district and played an important role in Hawaiian history. Traditionally, the bays of 'Ewa District provided the most conducive location and ideal conditions in all of the Islands for the building of fishponds and fish traps (Handy and Handy 1972: 469-470). This in turn provided an abundant variety of marine resources and helped make 'Ewa an *ali 'i* stronghold.

In addition, runoff from the upland streams provided ample water for irrigation during the dry season making it an ideal locale for the cultivation of taro. 'Ewa District was renowned for its "rare and delicious taro" (*ibid.*). This particular type of taro, called *kai*, was native to 'Ewa District and surpassed the other taro varieties in terms of productivity and longevity. This *kalo* was said to be known throughout the Island as the *kalo* that visitors gnawed on and want to live until they died in 'Ewa (Sterling and Summers 1978:8). In addition, the upland valleys supported populations of avifauna which were prized for their feathers which were utilized in the making of lei and feathered capes and helmets (*ibid.*: 470).

Sterling and Summers (1978) relayed a legend involving Waikele in the 'Ewa District. According to the legend a supernatural stone called Pohakupili was set on the boundary between the *ahupua'a* of Waikele and Ho'ae'ae by the gods Kane and Kanaloa, who divided the lands of 'Ewa and established the boundaries of Waikele, which have remained the same since then (Sterling and Summers 1978:29).

Kamakau (1961:71-75) noted that Waikele was the home of chiefs and related accounts dealing with battles, sacrifice, and politics. It was the residence of Kamaka'imoku, the mother of Kalani'ōpu'u, who was the ruling chief of Hawai'i at the time of Western contact. It is said that Kalani'ōpu'u was begotten by Peleioholani, the ruling chief of O'ahu, "at the water of Alele just above Waipahu in Waikele" (Kamakau 1961:75).

In 1783, the Maui chief Kahekili invaded O'ahu, chasing the O'ahu chief Kahahana into the upland forests. With his wife and a friend, Kahahana spent 2-1/2 years in hiding. Their last place of refuge was in Waikele, where they were betrayed by a local resident (Kamakau 1961:136-137). After Kahahana's death, a plot was laid to murder Kahekili. Waipi'o was the center of the plot and got the name Waipi'okimopō, or "Waipi'o of secret rebellion." But the plot failed and "when Kahekili learned that Elani of 'Ewa was one of the plotters, the districts of Kona and 'Ewa were attacked, men, women, and children massacred, until the streams of Makaho and Niuhelewai in Kona and of Kahoa' ai'ai [Ho'ae'ae] in 'Ewa were choked with the bodies of the dead" (Kamakau 1961:138)

#### **THE POST-CONTACT PERIOD**

The post-Contact Period use of lands in Waikele differed between the *makai* and *mauka* portions. Much of the population of Waikele was concentrated around the *makai* portion of the *ahupua'a* due to the natural resources available. Some parts of the *mauka* portion of Waikele were also inhabited but the majority of the land was used for agricultural pursuits. Once land became available through the Māhele, large grants of land in Districts throughout the island were leased or sold to foreigners for commercial ventures such as ranching and agriculture. Ranching became an early commercial success once a 1794 *kapu* (prohibition) by Kamehameha I was lifted and cattle could be legally hunted for their skins, tallow, and meat. Providing these and other cultivated western resources to an ever-increasing foreigner population meant a great profit for those who took the opportunity.

In 1793, the ships of the Vancouver expedition anchored off the entrance to West Loch. Vancouver was told that in Waikele, "at a little distance from the sea, the soil is rich and all the necessaries of life are abundantly produced" (Sterling and Summers 1978:36). A member of Vancouver's party observed that "from the number of houses within the harbour [the area] should seem to be very populous" (Sterling and Summers 1978:36).

In the 1820s, Protestant missionaries began developing schools in Hawai'i. Levi Chamberlain visited Waikele in 1828 in a tour of O'ahu schools and an estimated 450 to 600 people gathered in two sessions to hear him. In an 1830 tour, Chamberlain was accompanied by Ka'ahumanu (Kamehameha's widow) and they were met by five other chiefs at Waikele.

Mid- 1800s land records indicate that the coastal plain of both Waikele and Waipi'o was intensively developed in taro pondfields fed by Waikele Stream and local springs. Land Commission award (LCA) parcels cover the coastal plain and can be clearly correlated with taro fields, as shown on an 1889 map of the area (Bishop 1889). At the mouth of Waikele Stream where it enters West Loch, as well as throughout Waipi'o Peninsula, there were numerous fisheries awarded as LCAs; almost all LCAs in this area are called *laka* ("pond") (Bishop 1889).

### **THE MĀHELE**

In the 1840s, traditional land tenure shifted drastically with the introduction of private land ownership based on western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Daws 1968:111; Kame'eleihiwa 1992:169-70, 176; Kelly 1998:4, 1983:45; Kuykendall 1938, Vol. I:145 footnote 47, 152, 165-6, 170).

Once Article IV of the Board of Commissioners to Quiet Land Titles was passed in December 1845, the legal process of private land ownership began. The Māhele of 1848 divided Hawaiian lands between the king, the chiefs, the *konohiki* (land/resource managers), and the government. The subsequently awarded parcels were called Land Commission Awards (LCAs). After this initial division and the establishment of private ownership, lands were made available for the *maka'āinana* (commoners) under the Kuleana Act of 1850 (so named because the land holding of a tenant residing in an *ahupua'a* was called a *kuleana* [Lucas 1995:61]). If the *maka'āinana* had been made aware of the procedures, they were able to claim the plots on which they had been cultivating and living. These claims did not include any previously cultivated but presently fallow land, *'okipu'u* (forest clearing), stream fisheries, or many other resources necessary for traditional survival (Kelly 1983; Kame'eleihiwa 1992:295; Kirch and Sahlins 1992). If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA and were issued a Royal Patent after which they could take possession of the property (Chinen 1961:16).

LCAs and Land Grants (lands that were made available for purchase) abound in ʻEwa District. At the time of the Māhele (1848), 124 LCAs were issued in Waikele. *ahupuaʻa*. A search of the Waihona ʻAina Database (2014) and archival research indicated that the subject property was associated with an LCA. The project property was part of LCA 4:1 (*Āpana* No. 1 of Mahele Award No. 4), Royal Patent 4486, 2829 acres, Waikele *ahupuaʻa*, Pouhala ʻili that was granted to Luluhiwalani (Indices of Awards 1929:168). The LCA was designated *kula* land which means that it was primarily used for open vegetation and cultivation in the form of dry land agricultural plots.

### **THE LATE NINETEENTH AND THE TWENTIETH CENTURY**

During the middle to late 19<sup>th</sup> century and into the 20<sup>th</sup> century, sugarcane and pineapple became dominant cash crops in Hawaiʻi. The beginning of the sugar industry in the Hawaiian Islands came in 1835, when Peter Allan Brinsmade, William Ladd, and William Hooper—all New Englanders with missionary connections who had come to Honolulu in 1833 to establish a mercantile trading house—decided that the greatest commercial opportunities in the islands lay in agriculture (Hussey 1962). The establishment of the Oahu Railway and Land (OR & L) Company in 1889 and subsequent construction of railroads allowed the agricultural areas to connect to processing facilities and market places, enabling the easier transportation of agricultural products. ʻEwa District and Waikele *ahupuaʻa* played an active role in the sugar industry as part of the Oahu Sugar Company. The 1927 USGS Waipahu Quadrangle Map shows plantation structures including ditches, roads, rail lines, reservoirs, and plantation camps in and around the project area, one road/rail corridor is marked “Oahu Sugar Co” (Figure 4). In general, the Plantation Era on Oʻahu extended from ca. 1835 through the early to mid-1900s.

In the early to mid-1900s, with the advent of World War II, ʻEwa District saw a portion of its lands turned into military facilities, including large portions of the West Loch of Pearl Harbor to the south, Waikakalaua Gulch to the east, and Schofield Plateau to the north of the current project area. In the vicinity of the project area military development appears to be restricted to Waikakalaua Gulch, which lies immediately to the east of and adjacent to the project area, although roads or rail lines in the project area may well have been used by the military.

### **SELECTED PREVIOUS ARCHAEOLOGICAL WORK**

Several archaeological surveys have been conducted within the vicinity of the project area as well as within the project area. These surveys are summarized below (Figure 5).

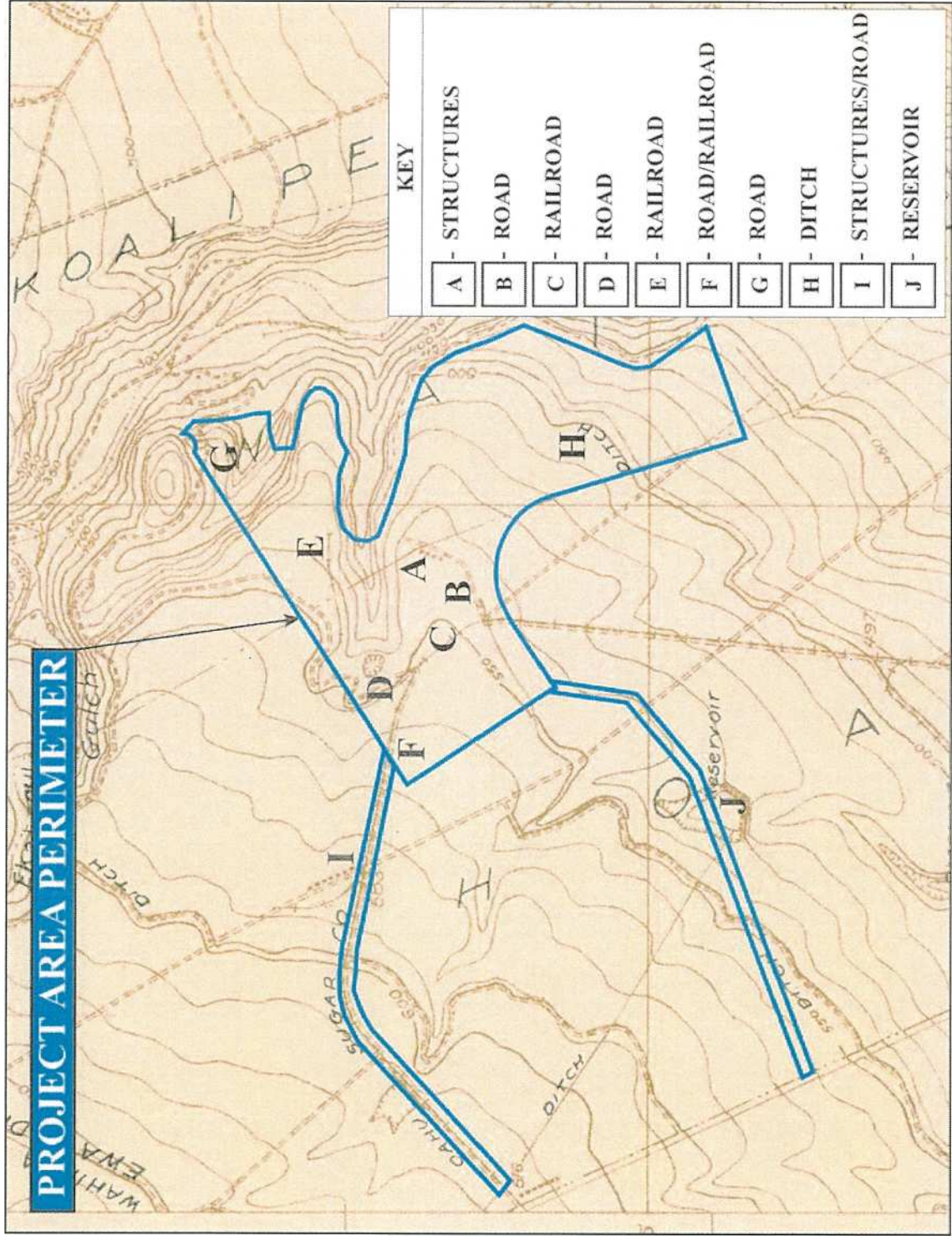


Figure 4: 1927 USGS Waipahu Quadrangle Map Showing Numerous Plantation-Related Structures in and Around the Project Area.



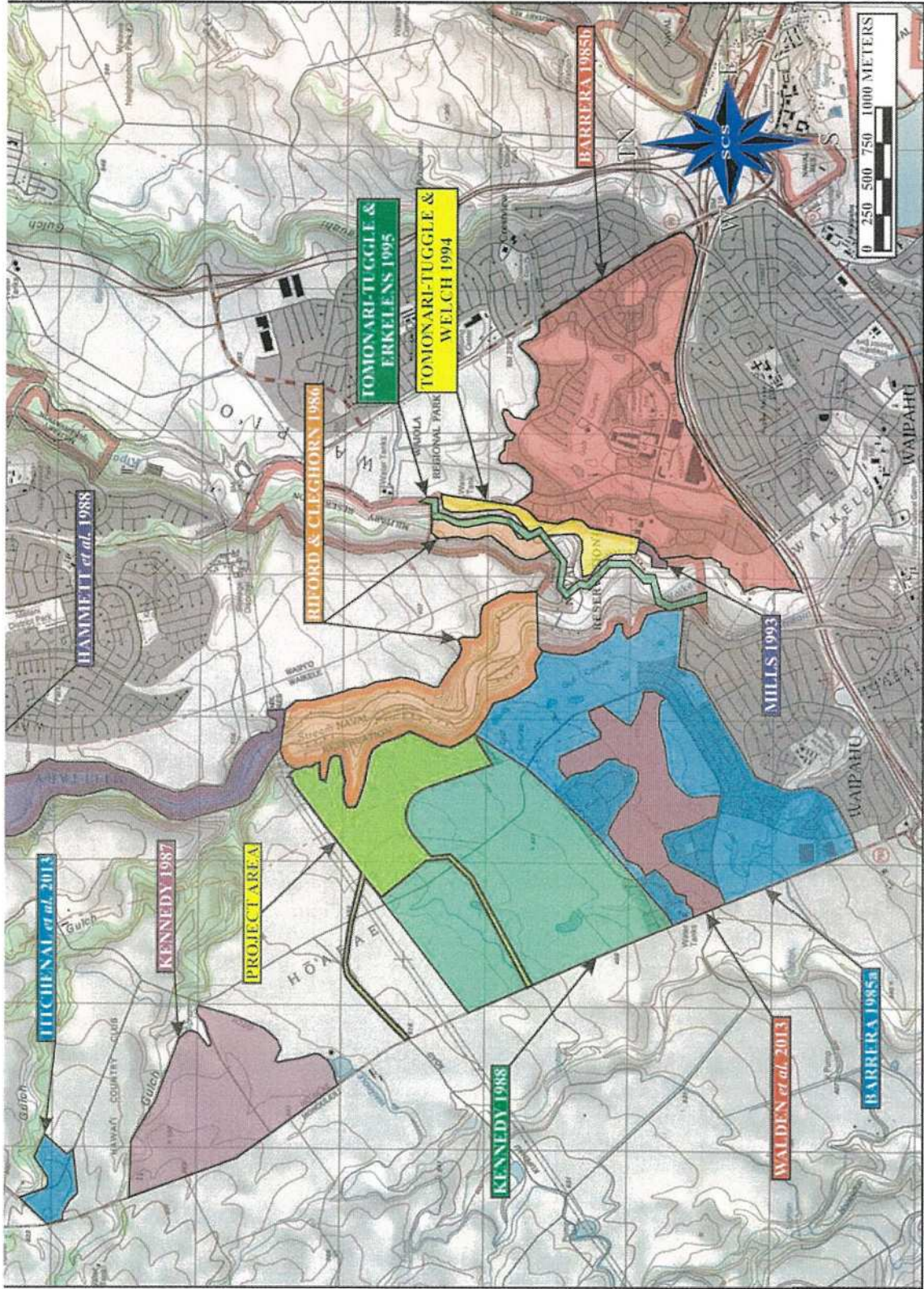


Figure 5: Map of Previous Archaeology Showing Project Area Location.

In 1933 McAllister reported on the locations of Mokoula Heiau (State Site No. 50-80-09-127) and Hapupu Heiau (State Site No. 50-80-09-129) in the Waipahu area and relayed that both *heiau* had been destroyed (McAllister in Sterling and Summers 1978:25, and McAllister 1933:106). Also in the Waipahu area, the Bishop Museum identified a Traditional Hawaiian petroglyph site displaying human figures and dogs; this particular site was designated as Bishop Museum Site No. OA-B5-12 (Cox and Stasack 1970:96-97; Sterling and Summers 1978:25). The location of this site is unclear, the entry in Sterling and Summers simply notes, “Waikele Petroglyphs on the cliff boulders, north side of Waikele Stream, west edge of Waipahu. Human figures, triangular (arms curved downward, dogs. ±12 units. Cox and Stasack, Hawaiian Petroglyphs, p 97”.

In July of 1985, Barrera conducted an archaeological reconnaissance survey located at TMK: (1) 9-4-002: portion of parcel 001, Village Park, Waipahu. The survey was conducted on approximately 692 acres of land under sugarcane cultivation. The project area was adjacent to Waikele Gulch on the east, Kunia Road on the west, the existing Village Park subdivision on the south, and sugarcane field to the north. The two-day surface survey yielded negative findings (Barrera 1985a).

In August 1985, Barrera conducted an archaeological reconnaissance of a property located at TMK: (1) 9-4-002:012 and 013 in Waikele. The project area consisted of approximately 586 acres of land under sugarcane cultivation that was bounded on the west by Waikele Gulch, on the south by the H-1 Freeway, on the northeast by Kamehameha Highway, and on the north by pineapple fields. The two-day surface survey yielded negative findings (Barrera 1985b).

In 1986, Riford and Cleghorn conducted an archaeological survey of portions of the Waikele Branch of the Lualualei Naval Magazine. The survey consisted of 264 acres of land within Waikakalaua Gulch and Kipapa Gulch. Five sites were identified along Waikakalaua Gulch – State Sites 50-80-09-2919 through -2923 (Figure 6). State Site 50-80-09-2919 consisted of a pre-Contact rockshelter with cultural materials scattered on the interior surface of the site. State Site 50-80-09-2920 consisted of three caves and was described as a pre-Contact temporary habitation site. Likewise, State Site 50-80-09-2921 consisted of a cave and crawl space with surface cultural material. State Site 50-80-09-2922 is a probably historic basalt rock quarry located in and on the edge of a 3.5 m deep ravine of an intermittent tributary of Waikakalaua Stream. The site contained basalt flakes with some boulders displaying negative flake scars

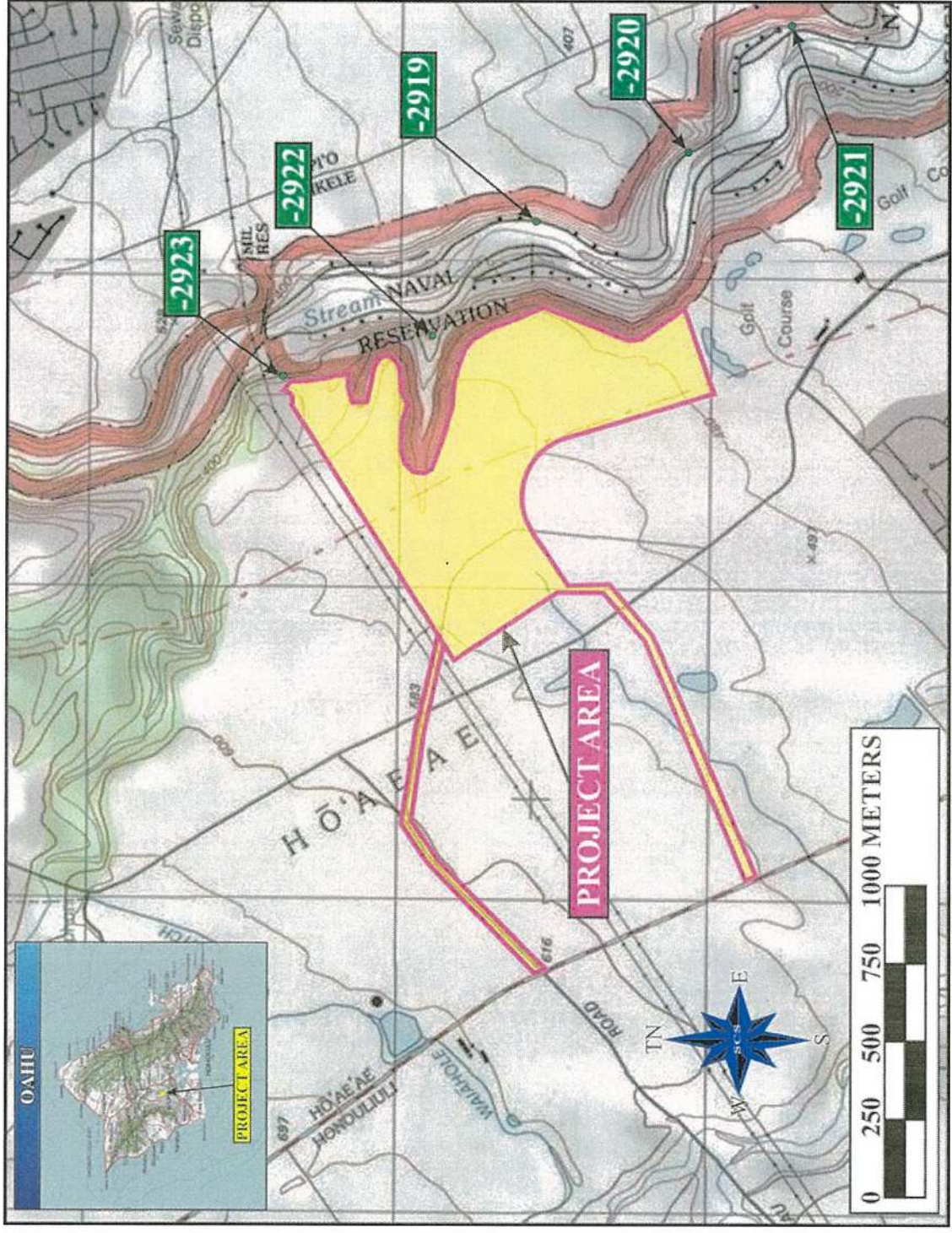


Figure 6: USGS 1998 Schofield Barracks Quadrangle Map Showing the Location of State Sites 50-80-09-2919 through -2923 in Waikakalaua Gulch to the East of the Project Area.

(Riford and Cleghorn 1986: 38, 48). State Site 50-80-09-2923 is a stone wall located at the top of Waikakalaua Gulch. The wall is constructed of stacked, angular, basalt boulders with angular, cobble-sized, flake core fill. The wall probably functioned as a road facing and vehicle retaining wall (*ibid*: 48). The survey also noted that Historic features were observed on both sides of Waikakalaua Stream and at the top of the Gulch. Of these, both State Sites -2922 and -2923 are historic in age and are located just beyond the east boundaries of the project area.

In 1987, Archaeological Consultants of Hawaii (Kennedy 1987) conducted a walk-through reconnaissance of a 203.171-acre parcel located in TMK: (1) 9-4-004. The property was used for sugarcane cultivation and included the existing Waiahole Ditch and two reservoirs. These historic features were associated with the late Historic period and associated with plantation activities. The survey concluded with negative findings for above ground archaeological sites; although today the ditch and reservoirs would be evaluated as archaeological historic properties.

In 1988, Cultural Surveys Hawaii (Hammatt *et al.* 1988) conducted an archaeological survey of approximately 422 acres along Waikakalaua Stream in Waikakalaua Gulch (also known as Waikele Gulch). The survey was conducted for the Waikakalaua Storage Tunnels. Two small terraces associated with post-contact sugar cultivation and a rail road berm were observed, but were determined not archaeologically significant.

In 1993, Mills conducted an archaeological inventory survey of two transmission line realignments totaling approximately 2,000 linear feet on the edge of Waikele Gulch. The study had negative findings for archaeological sites and artifacts.

In 1994, International Archaeological Research Institute, Inc. (IARII) reported on an Archaeological Inventory Survey conducted in preparation for the Navy Family Housing at the Waikele Branch of Naval Magazine Lualualei (Tomonari- Tuggle and Welch 1994). Two historic properties were identified: State Site 50-80-09-4935 (pre- contact rock shelter and adjacent cave containing traditional Hawaiian artifacts) and State Site 50-80-09-4936 (20th century railroad bed).

In 1995, IARII conducted an archaeological survey of a 46kV Sub-Transmission Line through NAVMAG-Waikele (Tomonari-Tuggle and Erkelens 1995). Two sites were located. State Site 50-80-09-4936, a rockshelter and adjacent cave containing cultural materials, was located just north of the intersection of Coleman Road and Upper Charlie Road. State Site 50-80-

09-4936, a 50 m long, narrow terrace, was found on the north bank of Kipapa Stream below Prime Road.

In 2013, Pacific Consulting Services (PCSI), Inc. (Titchenal *et al.* 2013) conducted an archaeological inventory survey of 37 acres of land situated on a plateau east of Kunia Road and bordered by Huliwai Gulch on the north and 'Ekahanui Gulch on the south, and Waihole Ditch on the east. Other than Modern debris and agricultural features such as water irrigation components, no archaeological sites or cultural materials were found during this archaeological investigation. The results were reported as an archaeological assessment.

In 2013, PCSI (Walden *et al.* 2013) conducted an archaeological inventory survey of approximately 152 acres located within the Royal Kunia subdivision area. This area was first surveyed in 1985 by Barrera which was discussed above. The study found several modern features within the property but concluded that no historical or traditional cultural features or artifacts were present. The results were reported as an archaeological assessment.

#### **PREVIOUS ARCHAEOLOGICAL WORK IN THE PROJECT AREA**

Archival research indicated that the subject property was included in an Archaeological Walk-Through Survey conducted in November 1988 by Archaeological Consultants of Hawaii. This survey covered 670 acres of TMK: (1) 9-4-002: portion of 001 and 091 (Kennedy 1988). Due to the intensive sugarcane cultivation at the time of survey, Kennedy suggested that the prospect of identifying archaeological sites remaining above ground were remote. This investigation yielded negative findings and Kennedy suggested that the subject property offered little opportunity for subsurface recovery. Kennedy's 670 acre survey overlapped the current project area.

#### **EXPECTED FINDINGS WITHIN THE PROJECT AREA**

Due to the massive landscape modifications that have taken place in the area during the Plantation-Era and recent times, traditional Hawaiian surface structures and/or artifacts are not expected to be recovered within the project area. In addition, subsurface contexts are not expected to yield traces of agricultural and habitation activities and/or artifacts associated with traditional Hawaiian land use, this also is due to modern landscape modifications. Further, intact subsurface contexts are unlikely to be encountered based on previous geotechnical boring, stratigraphic profiles, and other subsurface data recorded by previous archaeological studies.

The 1927 USGS Waipahu Quadrangle Map (see Figure 4) shows extensive plantation-related development in and around the project area, including roads, railways, ditches, reservoirs, and structures. Based on this 1927 USGS map, it is very likely that cultural deposits, historic sites or features, or artifacts associated with Plantation-Era activities are present in the project area.

## **FIELD METHODS**

### **FIELD METHODS**

Multiple field tasks were completed during the current Archaeological Inventory Survey. First, a 100% surface coverage pedestrian survey was conducted in order to assess the proposed project area geographical/physiographical features and to identify and document any archaeological historic properties present. Transect spacing of ten to fifteen meters (32.8 to 49.2 feet) intervals was employed as ground visibility was fair to good. Once archaeological sites were located, they were marked with two types of biodegradable flagging tape: white with blue and red and white stripes.

During the pedestrian survey, results were compiled on standard graphing paper as well as with digital photography. Each site was given a SCS temporary site designation (*e.g.*, TS-1) and plotted on a United States Geological Survey (USGS) map with a handheld Garmin GPS Map 60CSx global positioning system (GPS) unit. The datum and coordinate system used for the GPS unit was NAD83 and UTM (Universal Transverse Mercator). Magnetic north compass orientation was also employed. All measurements were recorded in metric. Individual sites were also documented in plan view. Site boundaries were primarily determined by feature architecture boundaries or artifact scatter concentration.

Limited excavation was conducted during the current Archaeological Inventory Survey in the form of six Shovel Probes that were placed in different parts of the project area property. Pre-Contact artifacts were found during surface survey while Historic and Modern cultural materials were found during the surface survey and within the Shovel Probe test units.

### **LABORATORY METHODS**

All field notes and digital photographs are curated at the SCS laboratory in Honolulu. Representative plan view sketches showing location and morphology of identified sites/features/deposits were illustrated. Pre-Contact, Historic and Modern cultural materials were collected during surface survey and excavation. Analysis was conducted for this project at the SCS O'ahu office. All data are clearly recorded on standard laboratory forms that included

numbers and weights (as appropriate) of each constituent category. The final disposition of all project materials will be determined in consultation with the landowner and SHPD per HAR §13-284- and HAR §13-276-6(a).

### **CURRENT ARCHAEOLOGICAL INVENTORY SURVEY RESULTS**

The current Archaeological Inventory Survey was conducted on approximately 161 acres of and in Kunia, Waikele Ahupua‘a, ‘Ewa District, Island of O‘ahu, Hawai‘i [TMK: (1) 9-4-002:052] (see Figures 1 and 2). As stated elsewhere in this report, the current project area was previously subjected to an Archaeological Walk-Through Survey by Archaeological Consultants of Hawaii (Kennedy 1988) which found no surface archaeological features. Although the 1927 USGS Waipahu Quadrangle Map showed a number of plantation structures in the project area, the only such features observed in the project area or vicinity were remnants of historic roads and rail alignments. None of the historic structures, ditches, and reservoirs documented on earlier maps were observed during the survey.

Two possible archaeological sites in the project area were initially identified and documented with temporary site numbers. Temporary Site 1 (an artifact scatter along a modern dirt road) was later determined by SHPD to lack sufficient site integrity to be assigned a State Site number. Temporary Site 2 (a historic road complex) has been designated as State Site 50-80-08-7671. It consists of an alignment (Feature 1), a wall (Feature 2), and paved segments of a road and railroad alignment (Feature 3).

Much of the project area has been mechanically impacted and subjected to modern modifications due to agricultural activity. This is evidenced through the mechanical scarring on basalt cobbles and basalt boulders in a large push pile, pieces of mortared ditch sections, agricultural irrigation systems, and active, wooden telephone posts along the north/northwest side of the project area. An earthen berm above 2 m high and approximately 3.6 m wide has been pushed into place in the southern half of the project area. Additionally Historic and Modern debris such as black plastic agricultural irrigation lines, thin black plastic agricultural covering for moisture retention, white PVC pipe fragments and associated black plastic pipe fittings, basalt gravel, ferrous metal railroad spikes, mortar with angular basalt gravel, and shaped basalt blocks were scattered on the project area surface.

Three traditional Hawaiian artifacts (a basalt adze perform and two basalt flakes with polished facets) were found on a road surface in the southern portion of the project area, on the

north side of a berm that separated active agricultural lands from fallow lands. Shovel probes were excavated in the road where the artifacts were found (and on the other side of the berm as well) to test for buried cultural remains associated with these surface artifacts.

#### **STATE SITE 50-80-08-7671 (SCS TS-2) ALIGNMENT/WALL/PAVED SEGMENTS**

GPS Coordinates: Feature 1: East 600100 North 2368768;  
Feature 2: East 600073 North 2368799

Number of Features: 3

Feature Type: Feature 1: Alignment

Feature 2: Wall

Feature 3: Paved Segments

Feature Function: Road

Feature Structural Integrity: Fair

Feature Age Association: Historic

Candidate for Preservation: No

Archaeological Recommendations: No further work

State Site 50-80-08-7671 is a Historic road complex comprised of three features located in the western portion of Tax Map Key 9-4-002:052 (Figures 9 through 16). Features 1 and 2 are located on a slight (about 2-3 degree) southwest to northeast downslope on the east shoulder of a dirt road (Feature 3). Feature 1 appears to be a remnant feature which has either been partially destroyed or buried by mechanical means. As such, the former number of courses could not be assessed. The feature's end to end axis was orientated northwest- southeast (147°/ 327° magnetic). Modern cultural material, such as thin, black plastic for agriculture, was observed on and around the ground surface of the site. Some marine detritus was also observed.

Feature 2 is a linear feature that consists of three components: a mortar and basalt block wall located subsurface but exposed in profile, a concrete pipe, and angular basalt cobbles and boulders. The wall has at least five courses of basalt blocks some of which are not mortared. Angular basalt cobbles have been employed in the wall as chinking. The northwest portion of the two upper courses of basalt block does not have mortar and employs a greater amount of chinking than the rest of the wall. Closer towards the southeast end of the mortar and basalt block wall is a near 90 degree bend where the wall used to go over the concrete pipe. The concrete pipe is reinforced with 4 mm diameter ferrous metal wire. The interior diameter of the concrete pipe is 60 cm with a wall thickness of 4 cm. The last component of the feature is a cluster of angular basalt cobbles and small boulders located on the east side of the concrete pipe. This portion of the feature is not mortared but piled.



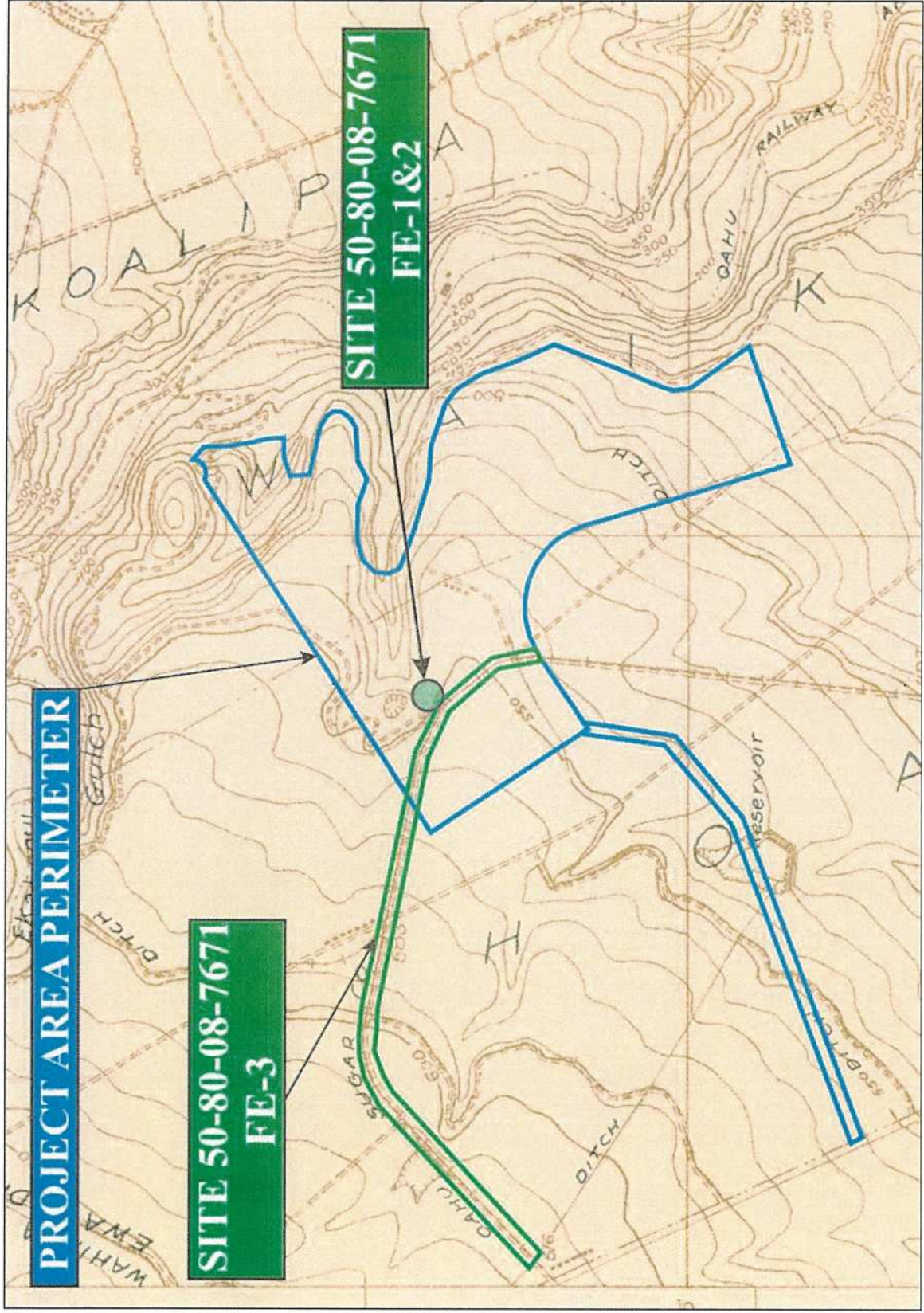
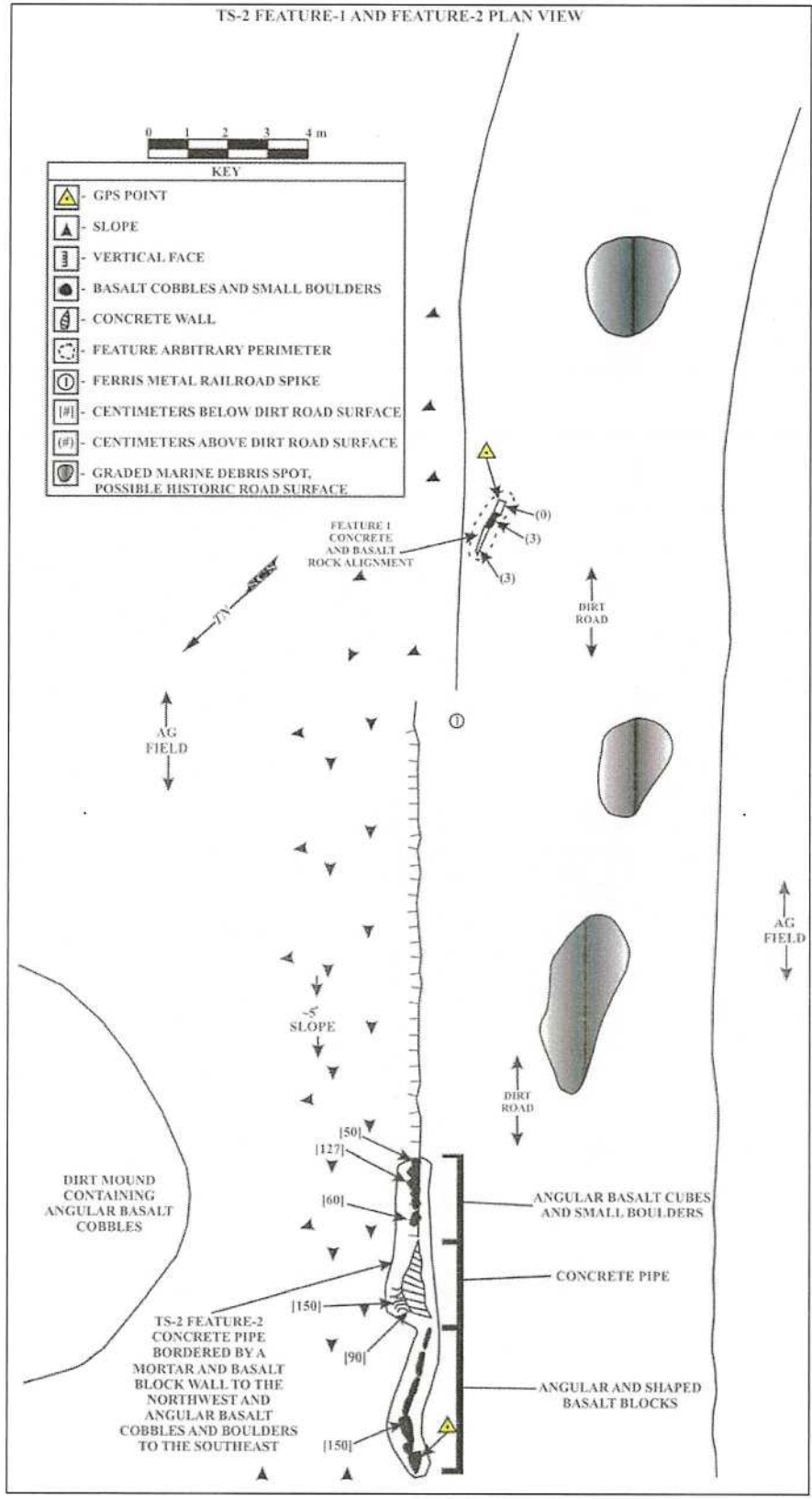


Figure 7: Portion of USGS Waipahu Quadrangle Map Showing the Location of Historic Features Identified During the Current Survey.



**Figure 8: Plan View of State Site 50-80-09-7671 (TS-2).**



Figure 9: Site TS-2 Feature 1, Concrete and Basalt Rock Alignment. View to Northwest.

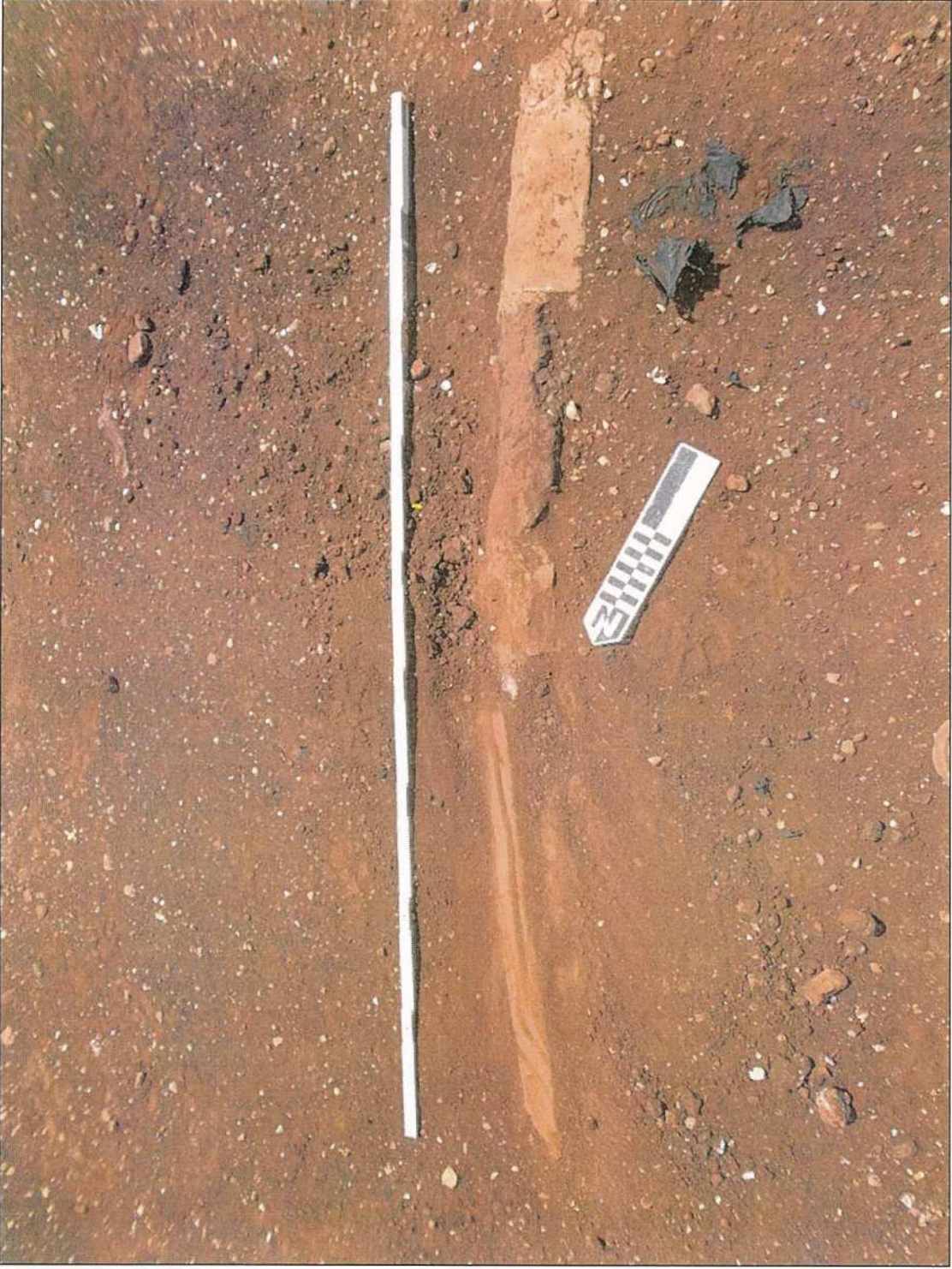


Figure 10: Site TS-2 Feature 1, Concrete and Basalt Rock Alignment. View to Northeast.



Figure 11: Site TS-2, Feature 2, Angular Basalt Cobbles and Small Boulders, Concrete Pipe, and Basalt Block and Mortar Wall. View to Southwest.



Figure 12: Site TS-2, Feature 2, Angular Basalt Cobbles and Small Boulders. View to Southwest.

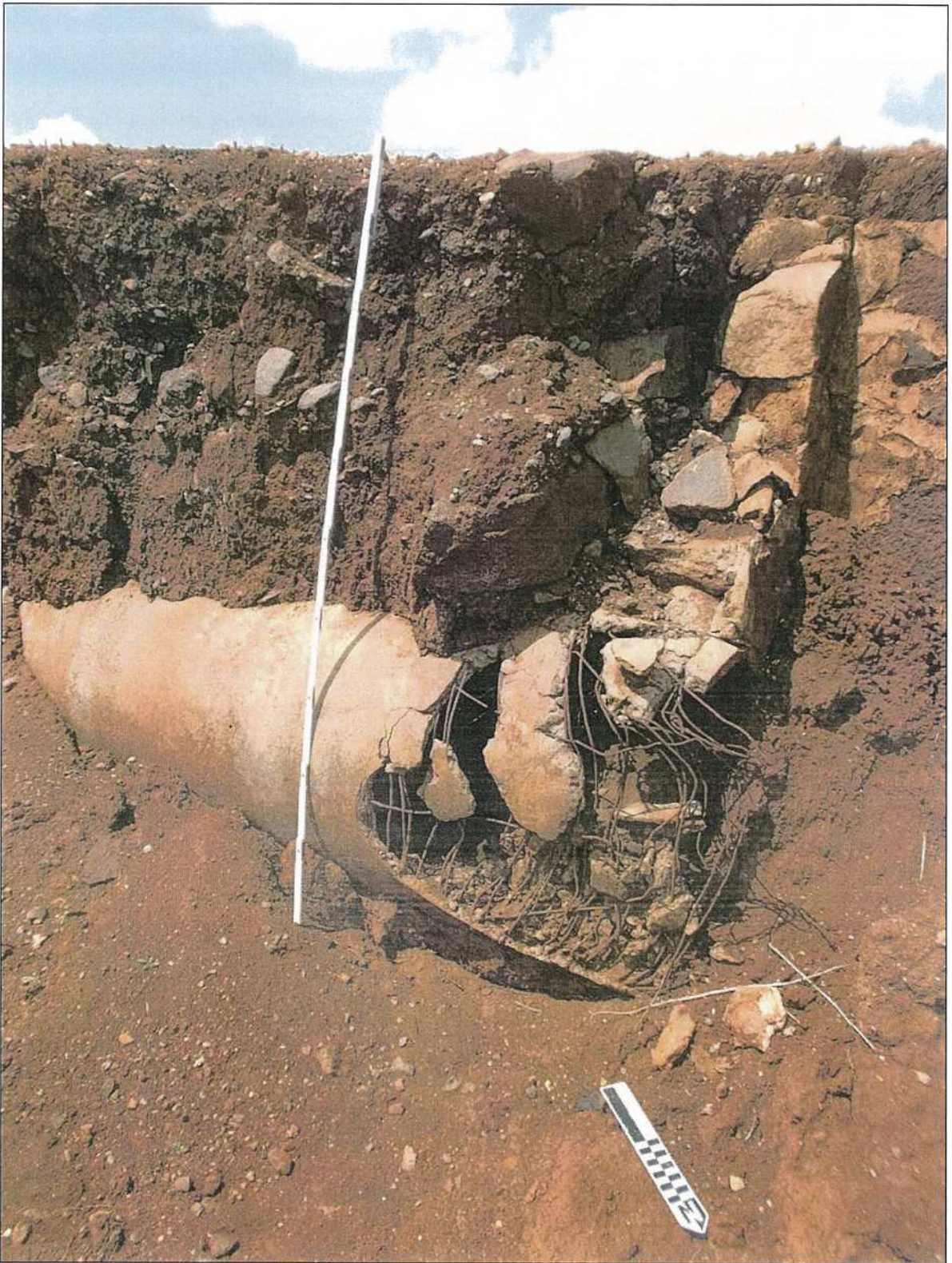


Figure 13: Site TS-2, Feature 2, Concrete Pipe. View to Southwest.



Figure 14: Site TS-2, Feature 2, Concrete Pipe and Basalt Block and Mortar Wall. View to Northwest.



All three components of Feature 2 occur below the surface of the existing dirt road. The entire feature is approximately 8 m long. The feature's end to end axis was oriented northwest-southeast (122°/ 302° magnetic). Portions of Feature 2 have been destroyed and displaced to create an earthen depression for water drainage. Feature 2 is located roughly 15 m northwest of Feature 1. Some modern cultural material in the form of thin, black agricultural plastic was observed along with historic marine detritus.

Feature 3 consists of portions of a Historic plantation road and former railway route, much of which has been mechanically impacted and subjected to modern modifications (this corridor is still actively used as an access road into and across the project area). This former transportation corridor is clearly visible in the 1927 USGS map of the area (see Figure 4). Based on the results of the survey the road and rail alignment were paved with a tamped layer of crushed coral and dredged marine and reef detritus, visible today either as segments of coral pavement or as coral pebble remnants embedded in the current dirt roadbed (Figures 17-19). While no railroad track segments, timbers, or track accessories (such as switches, stops, or signals) were identified during the survey, heavily corroded iron railroad spikes were recovered from the surface of the former rail corridor (Figure 18, Figure 19). Feature 3 is in poor condition and lacks integrity.

## **SHOVEL PROBES**

To supplement the surface pedestrian survey, a total of six Shovel Probes (SP-1 through SP-6) were manually excavated within the project area (Figure 20). Following the finding of three traditional Hawaiian artifacts (a basalt adze preform and two basalt flakes with polished facets, Figure 21), four shovel probes were excavated to test for buried cultural remains associated with these artifacts on a road surface in the southern portion of the project area and on the north side of a berm that separated active agricultural lands from fallow lands. Two additional shovel probes were excavated in a valley on the east edge of the project area, testing for buried rubbish deposits or former road segments.

SP-1 was excavated near the location of the adze preform, and SP-2 was excavated next to the location of the first basalt flake. Because the original provenience of the three stone artifacts was unclear (since they were discovered on the surface of an active agricultural road), two shovel probes were excavated to the south of the berm to test for buried cultural remains in a potentially less-disturbed context. No traditional Hawaiian artifacts were found in Shovel Probes 1-4.



Figure 15: Crushed Coral embedded in Dirt Road Surface near the Eastern End of TS-2 Feature 3, View to Northwest.