Archaeological Assessment of the Kaukonahua Solar Project Area

TMK: (1) 6-5-002:005 (por.)

Kamananui Ahupua'a
Waialua District
Island of O'ahu

DRAFT VERSION

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ASM Project Number 34420.00

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EXECUTIVE SUMMARY

At the request Kaukonahua Solar, LLC, ASM Affiliates (ASM) conducted an archaeological inventory survey of a roughly 60-acre portion of Tax Map Key (TMK): (1) 6-5-002:005 for the proposed Kaukonahua Solar Project located in Kamananui Ahupua‘a, Waialua District, Island of O‘ahu. The project area is situated within a larger 317.93-acre parcel owned by Villa Rose, LLC. Kaukonahua Solar, LLC proposes to develop a 6-Megawatt, ground-mounted solar energy and storage facility. Ground disturbance for the proposed project includes grading for the installation of solar arrays and equipment pads, as well as underground and above-ground utility lines.

Historical aerial photography indicates that the entire project area was subject to repeated mechanized plowing for commercial pineapple cultivation between the 1940s and the early 2000s. In addition to these prior disturbances, the Leileuha Plain is a geomorphologically erosional environment, which suggests a low likelihood of buried archaeological features beneath the plow zone. Prior archaeological studies in the vicinity of the project area generally indicate a lack of buried archaeological deposits beneath former pineapple fields.

Fieldwork for the current study was conducted over two days, on April 17, 2020 and June 10, 2020, by Kimberly Lauko, B.A., and Teresa Gotay, M.A., under the supervision of Benjamin Barna, Ph.D. (Principal Investigator). A total of 18 person-hours was expended to complete the inventory survey fieldwork. Fieldwork consisted of an intensive (100% coverage) pedestrian survey of the entire project area. The survey crew walked systematic pedestrian transects spaced no more than 10 meters apart. Ground visibility was excellent in the recently grazed pasture that covered the entire project area. Based on the negative results of prior subsurface testing near the current project area, no subsurface testing was conducted. No cultural material was collected. No archaeological historic properties of any kind were identified as a result of the current fieldwork.

Given the negative findings of the current study with respect to archaeological resources, it is concluded that the Kaukonahua Solar Project will not impact any known archaeological historic properties. The results of the current study support a determination of effect of “no historic properties affected.” With respect to the historic preservation review process of the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD), our recommendation is that no further work needs to be conducted within the project area prior to or during project implementation. In the unlikely event that significant archaeological resources are discovered during the proposed ground disturbing activity, work should cease in the area of the discovery and DLNR-SHPD should be contacted pursuant to HAR 13§13-280.

The current study was undertaken to inform a Hawai‘i Revised Statutes (HRS) Chapter 343 Environmental Assessment conducted in compliance with HRS Chapter 343. It was conducted in accordance with HAR 13§13–284 and was performed in compliance with the *Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports* as contained in HAR 13§13–276. Compliance with the above standards is also sufficient for meeting the historic preservation review process requirements of both DLNR–SHPD and the City and County of Honolulu Department of Planning and Permitting. No archaeological sites were identified within the project area during the inventory survey, and so in accordance with Hawai‘i Administrative Rules (HAR) 13§13-284-5-b(5)(A), the results of the current study are presented using the abbreviated report format of an Archaeological Assessment.

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1. INTRODUCTION

At the request of Kaukonahua Solar, LLC, ASM Affiliates (ASM) conducted an archaeological inventory survey of a roughly 80-acre portion of Tax Map Key (TMK): (1) 6-5-002:005 for the proposed Kaukonahua Solar Project located in Kamananui Ahupuaʻa, Waialua District, Island of Oʻahu (Figures 1, 2, and 3). The project area is situated within a larger 317.93-acre parcel owned by Villa Rose, LLC. Kaukonahua Solar, LLC proposes to develop a 6-Megawatt, ground-mounted solar energy and storage facility on approximately 60 acres of former pineapple fields (Figure 4).

The current study was undertaken to inform a Hawaiʻi Revised Statutes (HRS) Chapter 343 Environmental Assessment conducted in compliance with HRS Chapter 343. It was conducted in accordance with Hawaiʻi Administrative Rules (HAR) 13§13–284 and was performed in compliance with the *Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports* as contained in Hawaiʻi Administrative Rules 13§13–276. Compliance with the above standards is also sufficient for meeting the historic preservation review process requirements of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the City and County of Honolulu Department of Planning and Permitting.

No archaeological sites were identified within the project area during the inventory survey, and so in accordance with Hawaiʻi Administrative Rules (HAR) 13§13-284-5-b(5)(A), the results of the current study are presented using the abbreviated report format of an Archaeological Assessment. This report provides a description of the project area, a brief culture-historical background that includes the results of prior archaeological studies conducted within the vicinity of the current study area. A description of the methods used in the archaeological field survey and recommendations concerning effects on historic properties are also presented.

PROJECT AREA DESCRIPTION

The project area consists of roughly 60 acres of former agricultural fields currently used as pasture located at an elevation of approximately 920 feet above sea level. The project area lies between the eastern flank of the Waiʻanae Range and the western flank of the Koʻolau Range, approximately 8 kilometers inland (southeast) from Kaiaka Bay. The project area would be fenced and contain a continuous set of ground mounted solar panels and a Battery Energy Storage System (BESS) facility, with an overhead power grid connection (see Figure 4; Figure 5). This area is surrounded by former pineapple fields and bordered by Hawaiian Earth Recycling's main facility to the southwest. Kaukonahua Road extends near the northwestern boundary of the project area. Haleʻauʻau Gulch and Kaukonahua Stream are located 180 to 440 meters to the west and southwest of the project area, respectively.

Geology underlying the project area (Figure 6) is mapped as Koolau Basalt dating to 1.8 to 3 million years ago. Soils in the project area in (Figure 7) consist of Wahiawa silty clay, 0 to 3 percent slopes (WaA) (Soil Survey Staff 2020). These soils are very deep, well drained soils that formed in residuum and alluvium weathered from basalt and were used extensively for commercial sugarcane and pineapple farming during the twentieth century. The mean annual rainfall within the project area averages 978 millimeters, with the majority of the rainfall occurring between November to March, and the least occurring in July (Giambelluca et al. 2013). The climate is generally cool, with a mean annual temperature ranging from 67 to 74 degrees Fahrenheit (Giambelluca et al. 2014).

The terrain of the project area has been shaped by decades of commercial pineapple cultivation. The former fields are roughly level, with a few unpaved access roads nearby. The project area and surrounding fields are divided into grazing paddocks with barbed wire fences. A large, modern earthen berm (Figure 8) defines much of the west, north and east boundaries of the larger solar array section of the project area. Current vegetation is classified as Hawaiian Introduced Perennial Grassland (Giambelluca et al. 2014), and consists primarily of grazed pasture grasses mixed with herbaceous weeds.

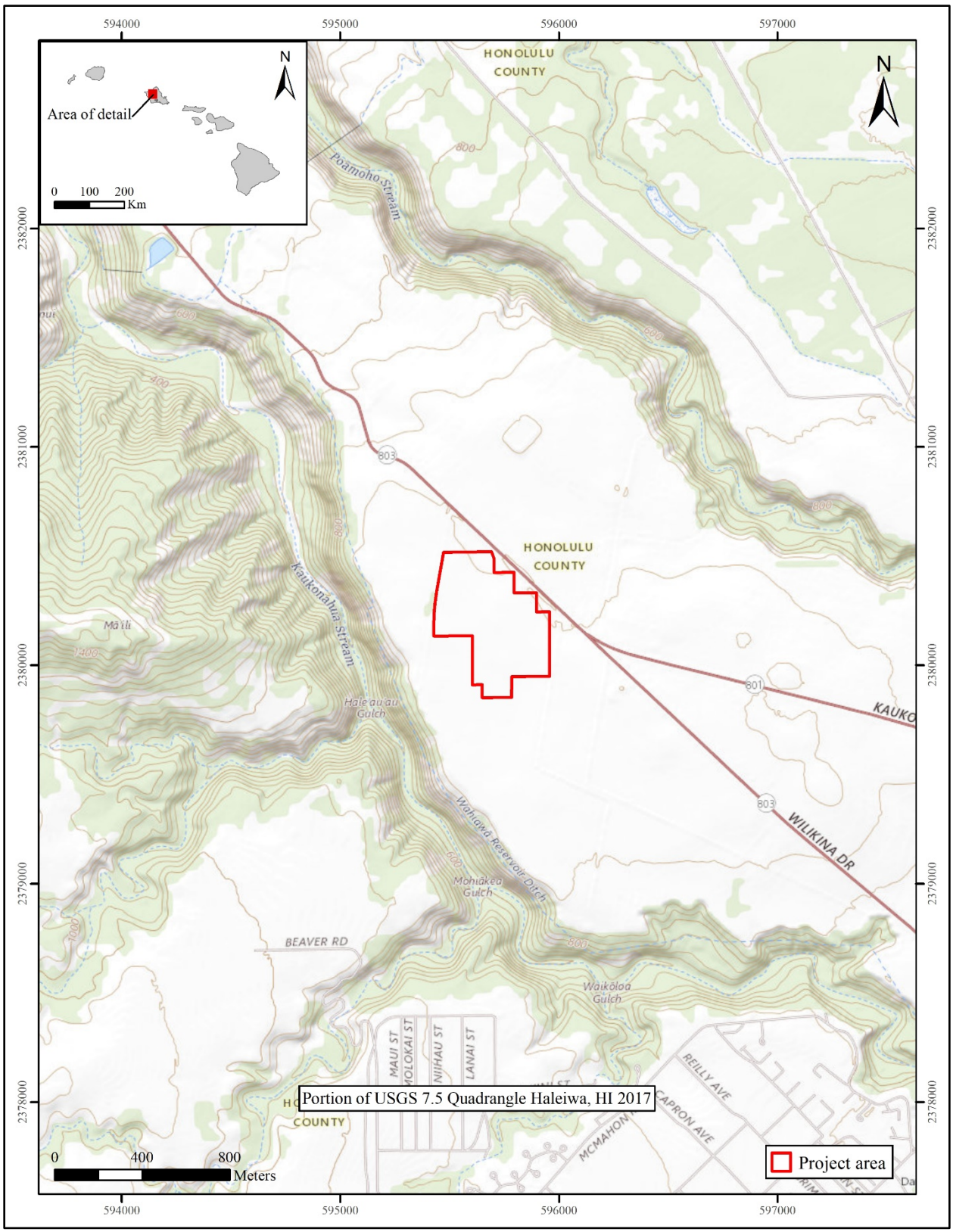

Figure 1. Project area location.

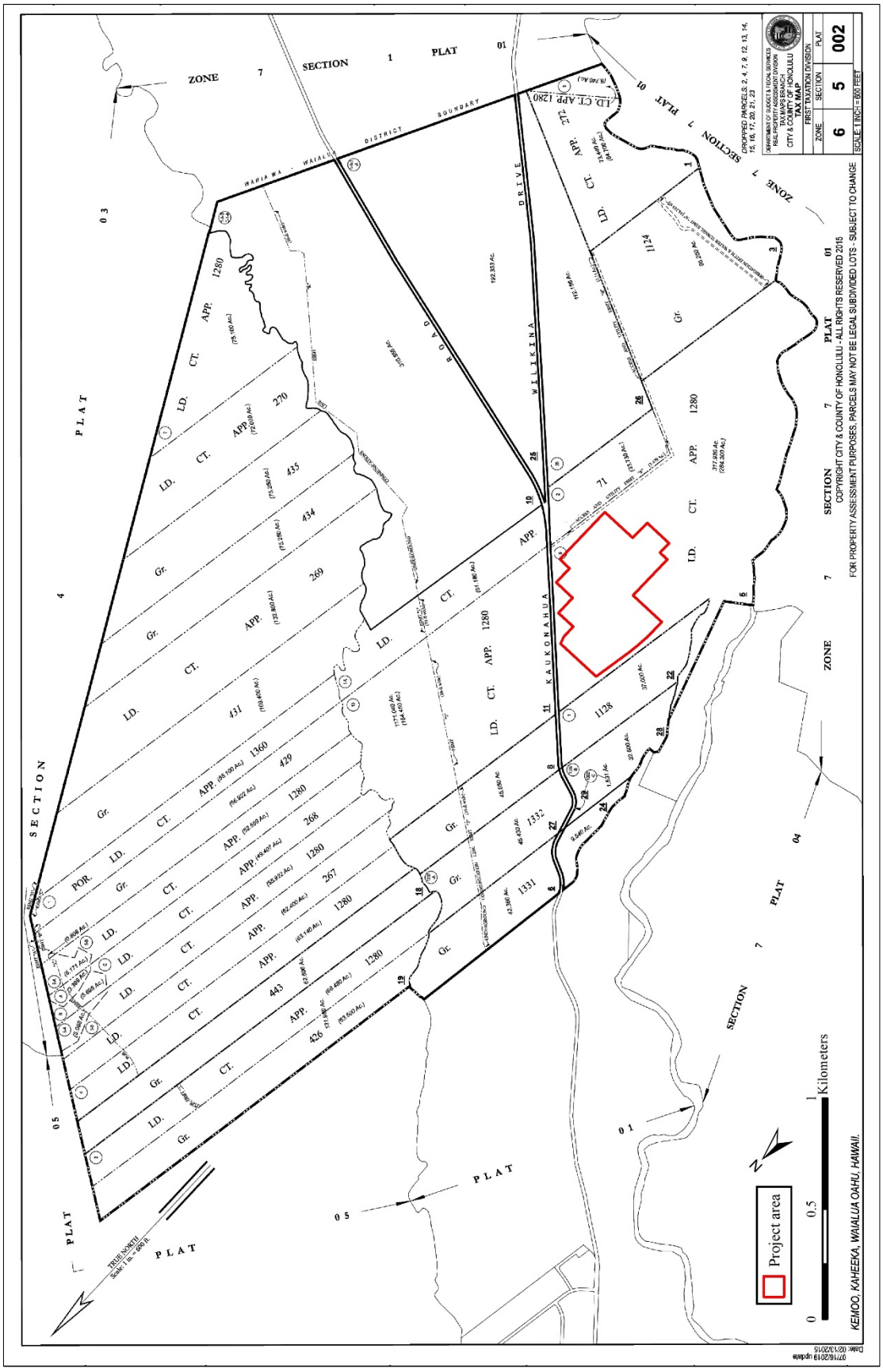

Figure 2. Tax Map Key plat (1) 6-5-002 showing location of current project area.

Figure 3. Recent satellite image of the project area.

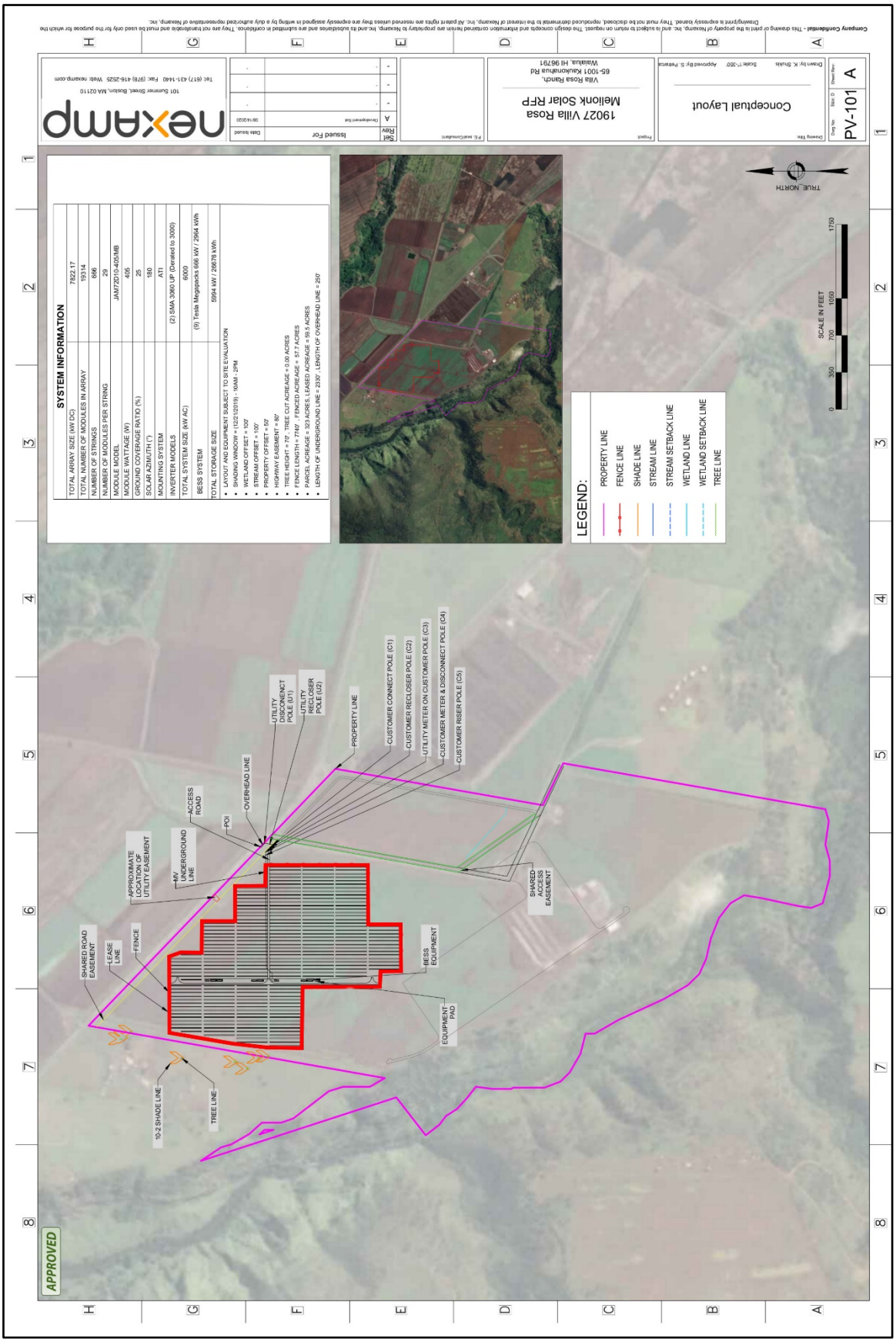

Figure 4. Conceptual layout of the Kaukonahua Solar Project.

Figure 5. Project area (main array portion), view to the west.

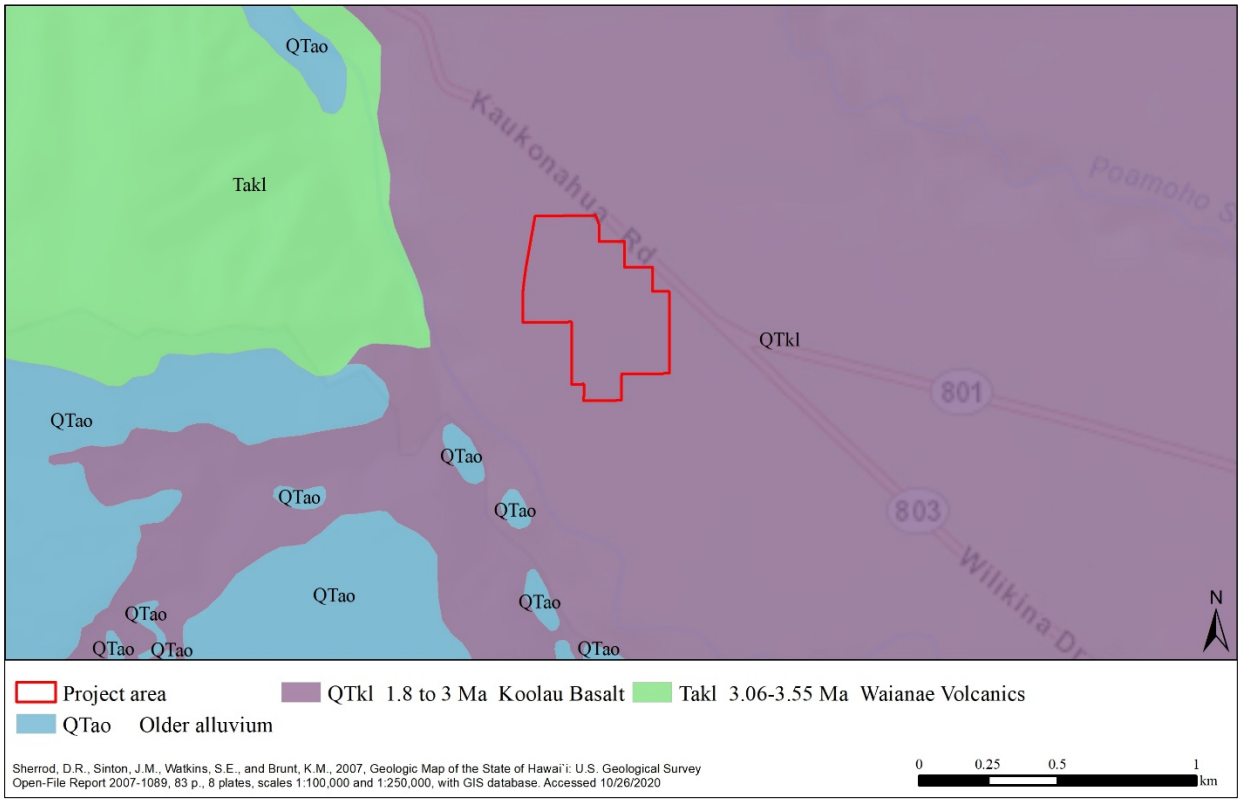

Figure 6. Geology in the vicinity of the project area.

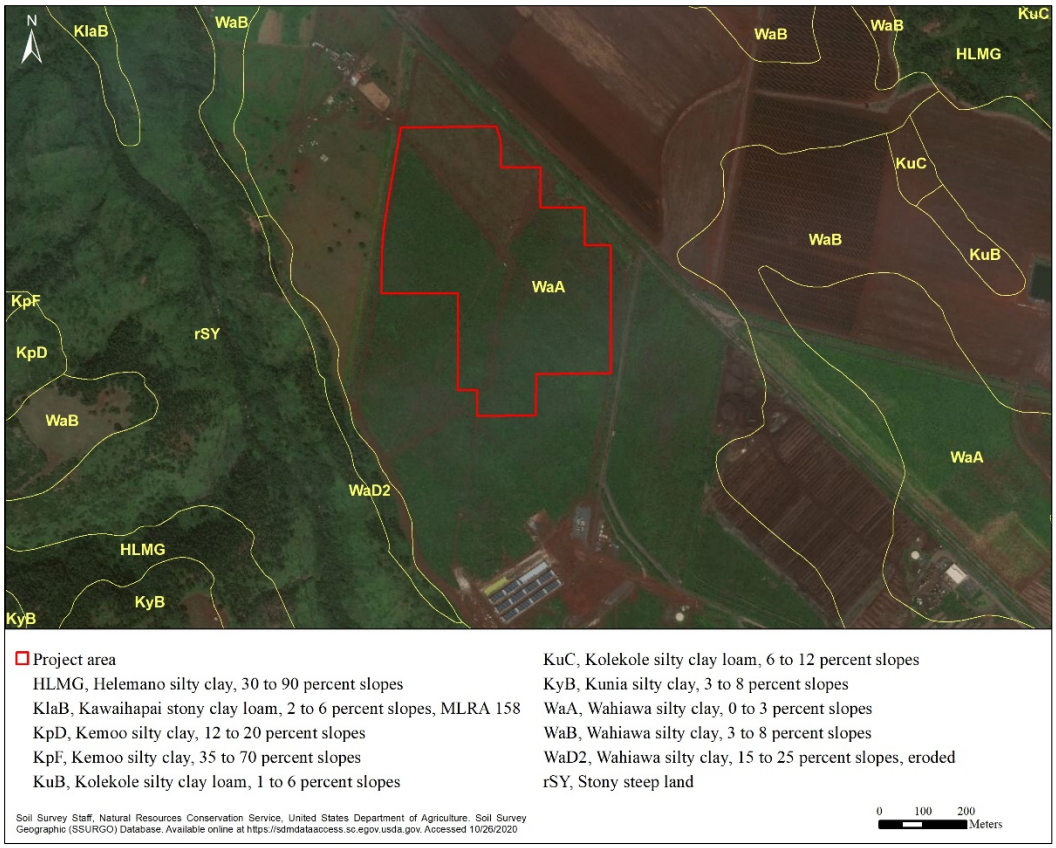

Figure 7. Soils in the vicinity of the project area.

Figure 8. Earthen berm along eastern edge of the project area, view to the west.

2. BACKGROUND

To generate a set of expectations regarding the nature of the archaeological resources that might be encountered within the current project area, and to establish an environment within which to assess the significance of any such resources, a brief culture-historical context for Waialua District, Kamananui Ahupuaʻa, and the project area is presented. A more thorough discussion of traditional and cultural use of the project area vicinity can be found in the Cultural Impact Assessment (Ishihara and Rechtman 2020) prepared as a companion document to this Archaeological Assessment. Also included is a summary and discussion of relevant prior archaeological studies conducted in the vicinity of the project area.

BRIEF CULTURE-HISTORICAL CONTEXT

The current project area is located within the *ʻili* of Kemoʻo, which is a portion of Kamananui Ahupuaʻa located within the *moku* (District) of Waialua. Kamananui, which Pukui et al. (1974:80) translates as "the large branch," is located on the Leilehua Plain/Plateau between the Koʻolau and Waiʻanae mountains. This region in the center of Oʻahu traditionally held a degree of political and geographic importance that transcended the boundaries of individual *ahupuaʻa* and *moku* (Desilets et al. 2011). Hawaiian historian Samuel Kamakau (1964:3) describes Waialua as the birthplace of the first ruling chief of Oʻahu: "Kapawa was the first chief to be set up as a ruling chief. This was at Waialua, Oahu; and from then on, the group of Hawaiian Islands became established as chief-ruled kingdoms." According to legend, Kapawa was born at one of Oʻahu's most sacred sites, Kūkaniloko (Fornander 1880; Thrum 1911). Kūkaniloko is located approximately 2.5 miles southeast of the current project area and has been designated State Inventory of Historic Places (SIHP) Site 50-80-04-218. Many other important chiefs were born there, including, Māʻilikūkahi, to whom Kamakau (1991) attributes the creation of the *ahupuaʻa* system of land management on Oʻahu.

The traditional significance of Waialua was in part due to the fertility of the land. Sahlins (1992) states that Waialua characteristically comprised centrally located richer lands with ecologically marginal land along the periphery. In the case of Waialua, the fertile lands of Paʻalaʻa, Kamananui, and Kawailoa Ahupuaʻa comprised the ecological center of Waialua as Sahlins (1992:20) describes:

> Geographically this heartland of Waialua consisted of the area around the neighboring bays—they are about a mile apart—of Kaiaka and Waialua. Into these bays, from their origins in narrow gorges deep in the mountains flowed four major streams. Dense settlements of people and large complexes of irrigated taro fields were situated on the floodplains of these streams. At Kamananui, the lowland fields were watered by means of a ditch some two miles long, the longest such waterway on Oʻahu (Handy and Handy 1972:466; McAllister 1933:133). Irrigation on a smaller scale extended for a considerable distance up the river valleys, while rainfall agriculture was practiced on the adjoining slopes, upland plains (*kula*), and forest clearings in the higher gulches. Around Waialua Bay were two large and famous brackish water fish ponds ʻUkoʻa and Lokoea. Fish were also raised in the many smaller ponds of the same area as well as in taro pondfields (*loʻi*). Given such intensive production, the core region must have supported the substantial majority of the Waialua population, which was probably on the order of 6,000 to 8,000 people just before the coming of the Haole.

Handy (1940:85-86) describes the extent of traditional agricultural use of Kamananui Ahupuaʻa as follows:

> **Kamananui.** Formerly there were large terrace areas along the flatlands between the junction of Helemano and Poamoho Streams and the flatland west of Poamoho. There were also small terrace areas up in the lower flats of Poamoho and Kaukonahua Valleys. There were small flats in the bottom of Kaukonahua Canyon for several miles above its junction with Manawai Stream. Poamoho is probably too narrow for taro terraces. It is likely that in these gulches, as at Waimea, sweet potatoes and bananas were planted around home sites along the ridge and near taro parches at the bottom of the gulch. Wild taro and bananas grow in Manawai Valley and presumably also in the other five valleys that run up towards Puu Kane.

From the time of Māʻilikūkahi until the era of Kākuhihewa (A.D. 1640-1660), Oʻahu remained an independent chiefdom, however, over the next three generations, political power gradually reverted to the district chiefs (Fornander 1880). A new ruling chief, Kualiʻi, came to power in about A.D. 1720 after defeating the island's district chiefs. He expanded Oʻahu's political realm by acquiring influence over windward Kauaʻi and initiating a war on the windward parts of Molokaʻi and Hawaiʻi Island (Cordy 2002). The political expansion through warfare was complimented by the forging of kinship links with outer islands polities through frequent intermarriage among the nobility of the different islands (Cordy 2002). This period of inter-island warfare and unions through marriages continued until the

time of European contact in the late 1700s. The population continued to expand and permanent residences were established in the upper and lower valleys of Oʻahu (Green 1980). At the time of European contact, Oʻahu and its estimated population of 43,000 to 60,000 people were under the rule of Peleihōlani (Schmitt 1971).

With the arrival of foreigners such as British explorer Captain James Cook, in command of the ships *H.M.S. Resolution* and *H.M.S. Discovery* beginning in A.D. 1778, the Hawaiian culture and economy underwent drastic changes. Demographic trends during the late Precontact and early Historic periods indicate population reduction in some areas, due to war and disease, yet increase in others, with relatively little change in material culture. At first there was a continued trend toward craft and status specialization, intensification of agriculture, *aliʻi*-controlled aquaculture, the establishment of upland residential sites, and the enhancement of traditional oral history (Kent 1983; Kirch 1985). The Kū cult, *luakini heiau* (sacrificial Precontact places of worship), and the *kapu* (taboo) system were at their peaks, although western influence had already begun to alter the cultural fabric of the Hawaiian Islands (Kent 1983; Kirch 1985). After the death of Peleihōlani in about 1779, Oʻahu's kingdom began to collapse and control of the island waivered as the Maui chiefs seized control. By 1795, the Maui forces that had gained control of Oʻahu but were ultimately defeated in the battle of Kalelekaʻānae in Nuʻuanu, by the forces of Kamehameha, the Hawaiʻi Island chief. Foreigners very quickly introduced the concept of trade for profit, and by the time Kamehameha I had conquered Oʻahu, Maui and Molokaʻi, the archipelago had been exposed to a market system economy (Kent 1983). As early foreigners continued to visit Kaiaka Bay, Kamananui Ahupuaʻa became the political center of the *moku* of Waialua (Sahlins 1992).

The chiefly system of Waialua District increased in complexity during the early years of the occupation of Oʻahu by the conquerors from Hawaiʻi Island. As Sahlins (1992:45) writes, "At the conquest of Oʻahu, Waialua became the spoils of the powerful Hawaiʻi and Maui chief, the senior Keʻeaumoku." Keʻeaumoku, however, left the island with Kamehameha in 1796 and died of the *ʻōkuʻu* pestilence in 1804; his eldest child Kaʻahumanu "effectively controlled and heavily taxed Waialua for decades thereafter" (Sahlins 1992:45). Kaʻahumanu, along with her siblings, including Kahekili Keʻeaumoku (also known as Governor George Cox), maintained "de facto rule of the Hawaiian kingdom, at least until the 1850s" and retained possession of Waialua District until 1866 (Sahlins 1992:45).

In the early 1790s, a period of intense sandalwood exploitation and attendant social and environmental changes began when early foreign merchants began trading the fragrant wood with merchants in Canton (Cottrell 2002). There was a shortage in the supply of "white sandalwood" (*Santalum album*) from India and the East Indies, which was used to make ornate cabinets and chests, incense, perfumes, and medicines. Among other sources, the European, American, and Cantonese traders looked to Hawaiʻi, where they found supplies of sandalwood controlled by the *aliʻi* within the lands they held (Merlin and VanRavenswaay 1990). Before long, however, Kamehameha I wrested exclusive control of the sandalwood trade from the *aliʻi*, and used the commodity to acquire luxury goods on credit with foreign merchants (Cottrell 2002). The debts that Kamehameha and other *aliʻi* accrued engulfed Hawaiians in a boom-and-bust industry that nearly eradicated the prized *ʻiliahi* (Rock 1916). For example, in November of 1815, a Russian warship attempted to take over Oʻahu, and Kamehameha called for people across the island to come to Honolulu and help build a fort to defend the island from invaders (Kamakau 1992). However, "the district chief of Waialua, Kahekili Keʻe-au-moku [George Cox] was so busy collecting sandalwood that his district alone failed to respond to the call" (Kamakau 1992:206).

Following the death of Kamehameha I in 1819, the Hawaiian religious and political systems began a radical transformation. Kaʻahumanu proclaimed herself "*Kuhina nui*" (Prime Minister), within six months the ancient *kapu* system was overthrown, and within a year, Protestant missionaries arrived from America (Fornander 1969; Ii 1993; Kamakau 1992). In 1820, American missionary Hiram Bingham and members of the American Board of Commissioners for Foreign Missions toured the island of Oʻahu seeking out communities in which to establish church centers for the growing Calvinist mission. Bingham (1848) recorded observations made during his twenty-one-year residence in the Hawaiian Islands in a journal, which offers a rare glimpse at the project area vicinity during the early 1800s. Of Waialua, Bingham (1848:295-296) wrote that "a very large concourse of people assembled on the Lord's day, for public worship in the open air." Bingham (1848:296) continues,

> After the Sabbath we examined and encouraged, and partially supplied with books, the incipient schools established there under the particular patronage of Lydia Namahana and Gideon Laanui, to whom the district belonged. There were found under Maiao and his assistant teachers, four hundred and ninety-five male and female pupils, and under Kaoo, one hundred and sixty-four, amounting together to six hundred and fifty-nine pupils, chiefly men and women.

The profound religious, socioeconomic, and demographic changes that took place in the early 1800s resulted in the establishment of a Euro-American style of land tenure, and the *Māhele ʻĀina* of 1848 was the vehicle used to

divide the land between the crown, government, *konohiki*, and native tenants. Prior to this land reformation, all the land and natural resources of Hawai‘i were held in trust by the *ali‘i* who, in concert with *konohiki* land agents, meted out use rights to the native tenants at will. During the *Māhele* all lands were placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, or *Konohiki* Lands; all three types of land were subject to the rights of the native tenants therein. The *ali‘i* and *konohiki* were required to present their claims to the Land Commission to receive a Land Commission Award (LCAw.) for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission and subsequent land transfers (Chinen 1961). Under the Enabling Act of 1850 (also known as the Kuleana Act of 1850), native commoners could also register claims for land with the Land Commission, and if substantiated, they would receive a Land Commission Award (LCAw.) and acquire title to *kuleana* parcels that they actively lived on or farmed. All *kuleana* claimants were required to provide proof of land use and occupation, which took the form of volumes of native registry and testimony. Upon confirmation of a claim, a survey was required before the Land Commission could issue a *kuleana* award. The claims and awards were numbered, and the LCAw. numbers, in conjunction with the volumes of documentation, remain in use today to identify the original owners and their use of the *kuleana* lands. Only one *kuleana* parcel—Land Commission Award No. 248 to Mr. Joseph Thomas—was awarded in Kamananui. It was located near modern-day Waialua Town, northwest of the current project area. As a result of the *Māhele,* Kamananui Ahupua‘a was returned by Victoria Kamāmalu (after four *‘ili ‘āina* within the *ahupua‘a* held by Gideon La‘anui were consolidated with her lands (Buke Māhele 1848); then set aside as Government Land by the king.

Following the *Māhele*, the Hawaiian kingdom initiated a grant program in an effort to encourage more native tenants to engage in fee-simple ownership of parcels of land. These parcels consisted primarily of Government lands-those lands given outright by the King or commuted to the Government by the *ali‘i* in lieu of paying the commutation fees on the parcels awarded them during the *Māhele*. The stated goal of this program was to enable native tenants, many of whom were insufficiently awarded or not awarded land through the *Kuleana* Act to purchase lands of their own (Van Dyke 2008). Despite the stated goal of the land grant program, this provided the mechanism that allowed many foreigners to acquire large tracts of the Government Lands and was a direct result of the passing of the heavily debated Alien Land Ownership Act of July 10, 1850. As noted by Van Dyke (2008), although most of the individual purchasers were Hawaiians, foreigners had managed to acquire nearly two-thirds of the total land area.

Kamananui Ahupua‘a was divided into 245 Land Grants that were subsequently sold to various individuals and businesses (OHA 2018). The current project area was among approximately a dozen long rectangular parcels within the *‘ili* of Kemo‘o; and occupies a portion of four of these grant parcels listed in Table 1, and their locations are depicted in Figure 9.

Table 1. Government land grants with portions in the project area.

Land Grant	*Awardee*	*Year Awarded*	*Total acreage*
845	Polu	1852	88
849	Kekela	1852	98
850	Lauhulu and Keuwai	1852	92.5
1127	Kuemanu	1853	88

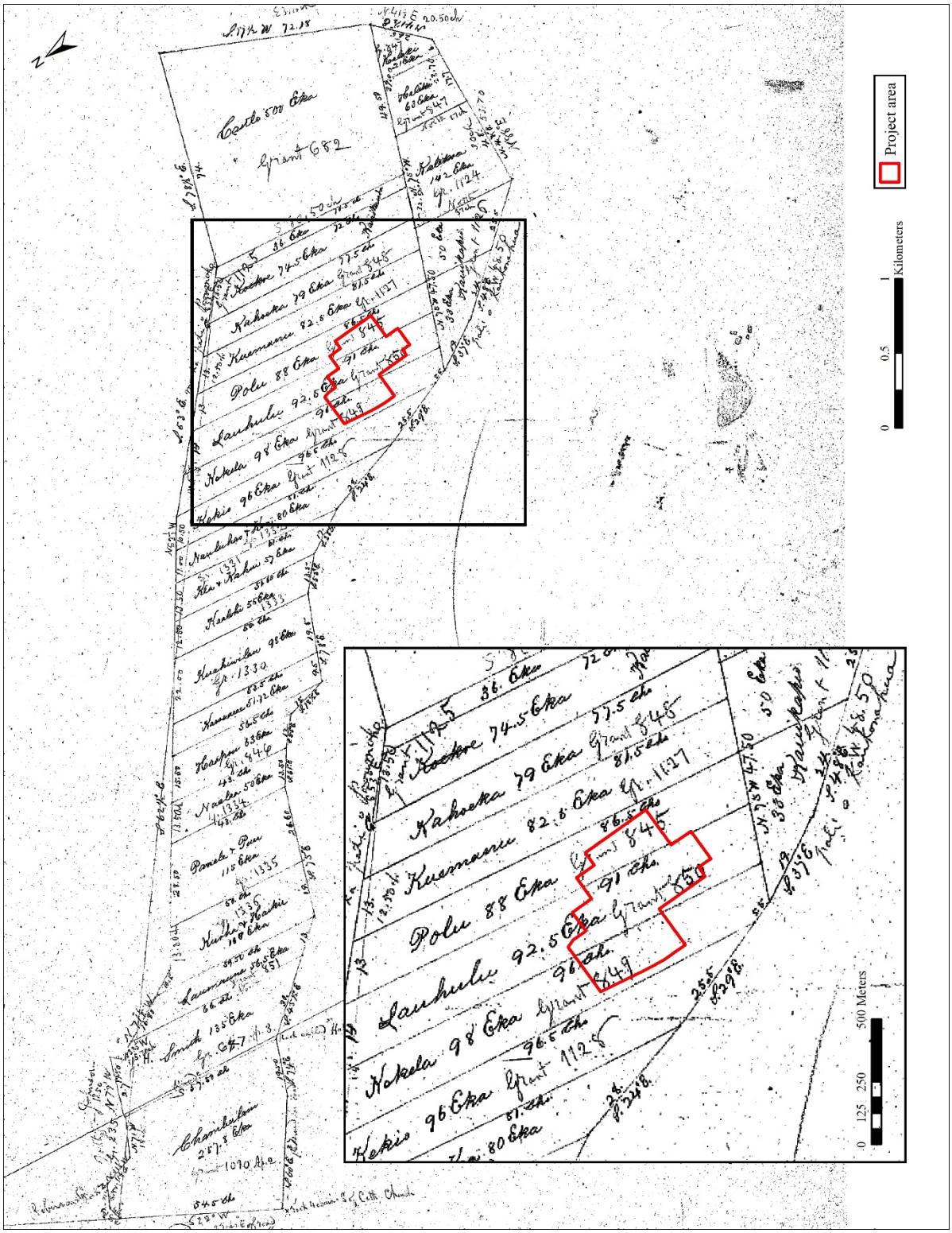

Figure 9. Portion of Hawai'i Registered Map No. 74 depicting Land Grants near the current project area (Emerson 1852).

In the decades following the *Māhele*, more visitors and foreigners who settled in Hawai‘i, as well as Hawaiian Historians began recording their observations of daily life in the Hawaiian Islands. For instance, in *Fragments of Hawaiian History*, Hawaiian Historian John Papa ‘Ī‘ī recounts details of the extensive trail networks throughout leeward O‘ahu as he had experienced them in the early 19th century. ‘Ī‘ī (1993:98) described a major trail connecting coastal Waialua with inland Kamananui adjacent to the current project area (Figure 10):

> From the stream of Anahulu and from Kamani, above the houses and taro patches, a trail stretched along in front of Kuokoa's house lot and the church. This trail went on to meet the creeks of Opaeula and Halemano, the sources of the stream of Paalaa, on down to the stream of Poo a Moho, and on to the junction where the Mokuleia trail branched off to Kamananui and Keawawahie, to Kukaniloko, the birthplace of chiefs.

By the turn of the century, this trail had been replaced by a road suitable for wagon travel (Thrum 1901:9).

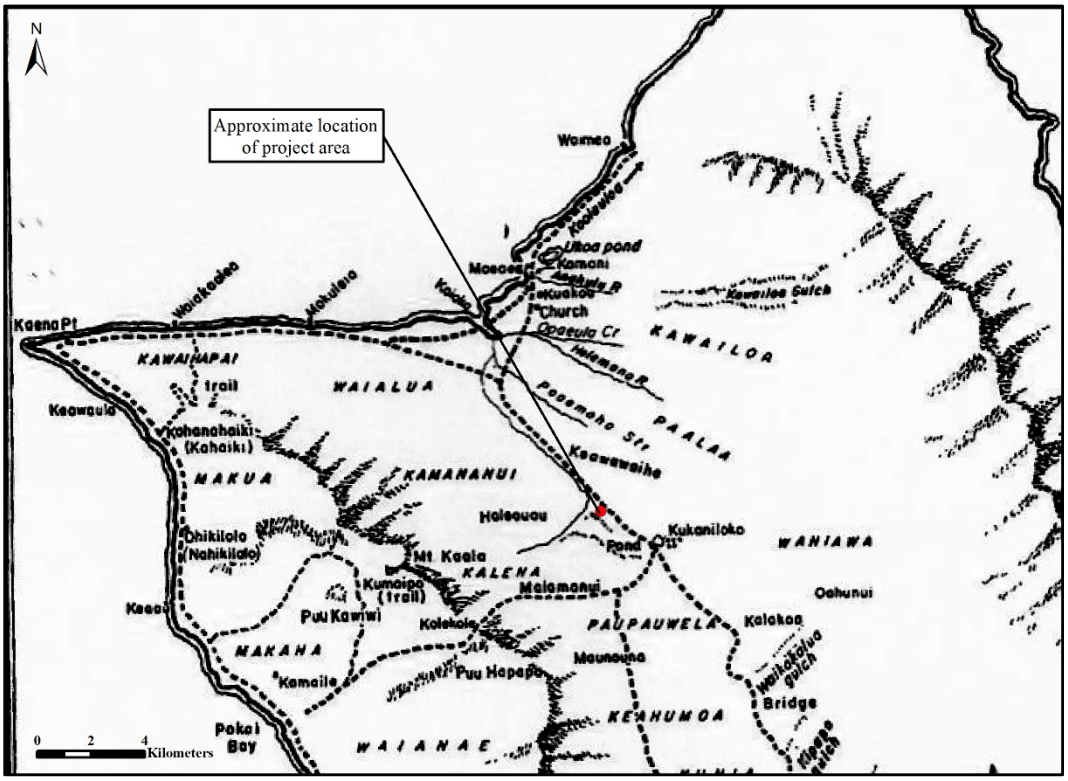

Figure 10. Portion of a map by Paul Rockwood based on narratives by John Papa ‘Ī‘ī (1993:96).

Major changes to the fertile lands of Kamananui Ahupua‘a and the *moku* of Waialua began in the late 1800s. Entrepreneurs B.F. Dillingham, of the Oahu Railway and Land Company, and Samuel Northrup Castle and Amos Starr Cooke of Castle & Cooke expanded their industrial agriculture ventures across Waialua. In October of 1898, shortly after the United States annexation of Hawai‘i, Castle & Cooke formed Waialua Agricultural Company, Ltd. (WAC) at the behest of Dillingham and acquired 10,000 acres of land for sugar cultivation and another 12,000 acres at higher elevations that would prove more suited for pineapple cultivation (Taylor et al. 1976). WAC acreage comprised Halstead Brothers Plantation, lands sublet from Dillingham, and lands leased from Bishop Estate, in addition to lands leased and purchased from private owners (Dorrance and Morgan 2000).

James Drummond Dole, who would become known as "the Pineapple King" arrived in O‘ahu in November of 1899. Shortly after, a 61-acre tract of Wahiawā homestead land went up for public auction in 1900 and Dole along with other settlers from the mainland acquired the land and set up the Wahiawa Colony. When pineapple flourished, Dole organized the Hawaiian Pineapple Company or HAPCo (Taylor et al. 1976). The initial pineapple harvests had been intended for sale in the fresh market, but fresh pineapples could not be shipped over long distances without spoiling. As a result, Dole concentrated on canning as a means of making pineapple available and profitable year-round. Thus, HAPCo became dedicated to the production and canning of the fruit for export (Coulter 1933).

In the early 1900s, WAC leased "3,000 acres of land not suitable for sugar" to HAPCo "and other pineapple operators" for commercial pineapple cultivation, including the proposed project area; and by 1913, more than 6,000

acres of Waialua land was planted in pineapple (Taylor et al. 1976:165). In 1922, Dole gave WAC one-third ownership of HAPCo in exchange for another 12,000 acres of WAC lands (Taylor et al. 1976:165). In their 1931 annual report, HAPCo reported a record output of 4.9 million cases (Dole and Porteus 1990:93). In 1932, Castle & Cooke invested in HAPCo "to save Jim Dole's depression-plagued firm from going bankrupt and to keep controlling ownership in island hands" (Dole and Porteus 1990:161); subsequently, WAC owned thirty-seven percent of HAPCo. Within a few years, Castle & Cooke staff were running HAPCo and handling the insurance and shipping needs. Also, in 1932, a survey of cultivation areas across the Hawaiian Islands was conducted and it was determined that O'ahu had the largest percentage of land area in cultivation: 21.63 percent; of which, 42.45 percent was dedicated to pineapple, while 51.86 percent was planted in sugarcane, and 5.69 in other crops; much of the pineapple land was concentrated in the project area vicinity of Waialua and neighboring Wahiawā (Coulter 1933:53).

The current project area appears to have been uncultivated as late as 1913 (Figure 11). During the 1920s, however, agricultural fields and structures associated with Kemoo Farm were developed within the project area (Figure 12). Kemoo Farm, Ltd. was founded in 1909 and originally focused on producing cattle, hogs, and chicken, but in the 1930s had opened a retail market adjacent to Schofield Barracks (Honolulu Star-Bulletin). By 1944, the buildings associated with Kemoo Farm had been dismantled, and the entirety of the current project area was incorporated into the surrounding pineapple fields (Figure 13). For the next six decades the project area was exclusively used for pineapple cultivation (Figures 14 and 15). Pineapple production, however, began to decline by the late 1960s, and over the following decade canned produce became less profitable. As HAPCo, later known as Dole, shifted its focus to lower-volume fresh fruit production, many of the pineapple fields were retired (Bartholomew et al. 2012; Gomes 2009). The current project area was kept in pineapple into the early 2000s but has been used most recently for livestock grazing.

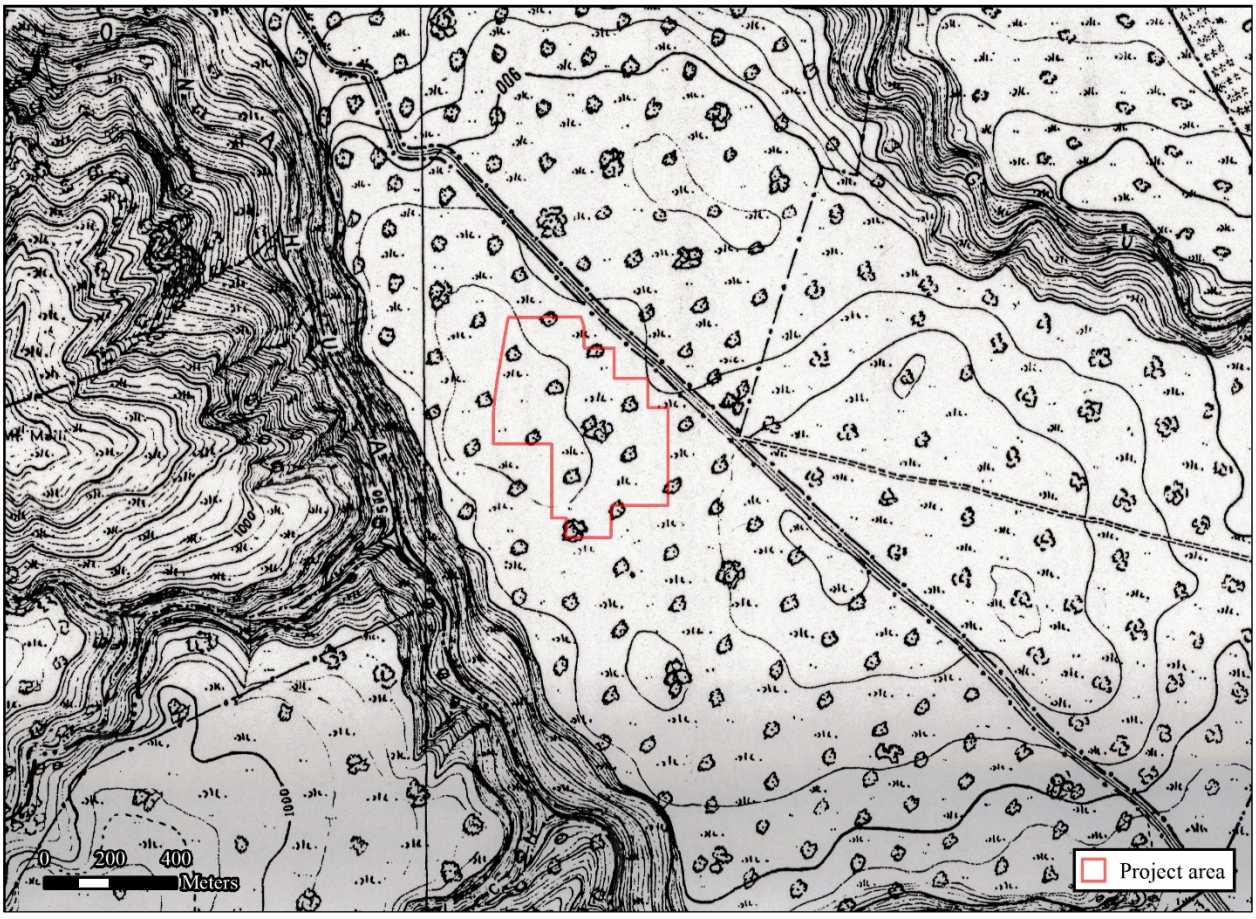

Figure 11. Portion of a map depicting the current project area in 1913 (Cos. A. G. and I. Engineers 1913).

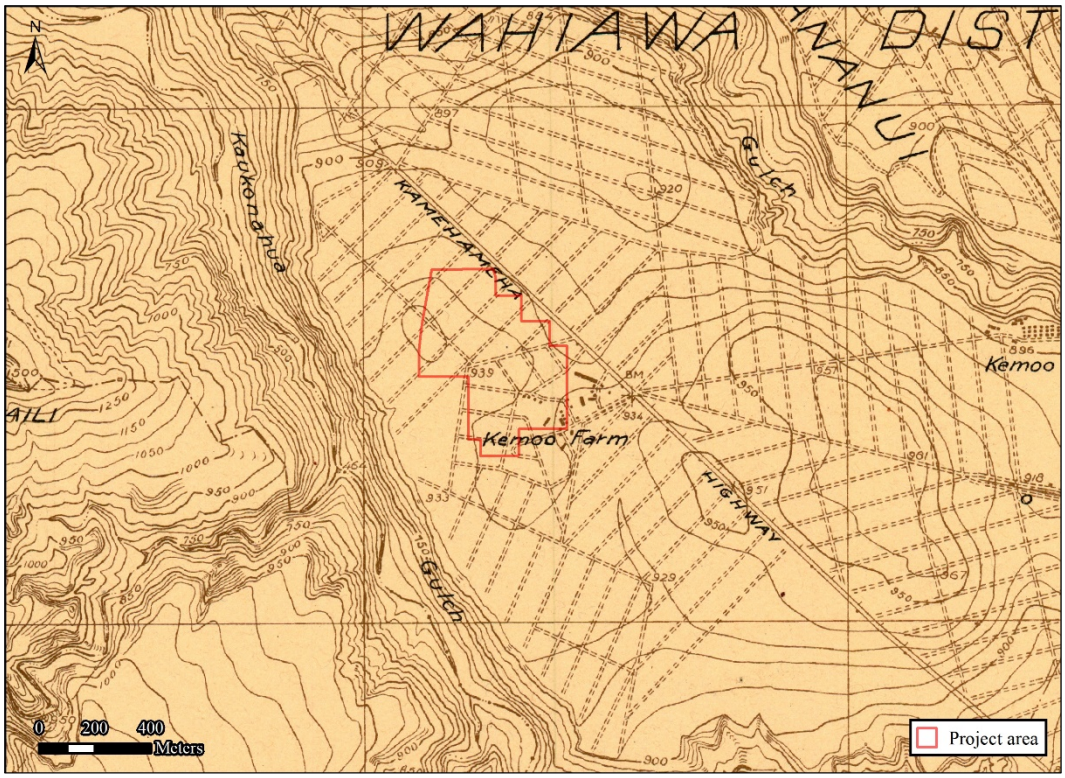

Figure 12. Portion of a1928 topographic map depicting the project area within agricultural fields (USGS 1928).

Figure 13. Aerial photograph of the current project area in 1944 (64th Engineer Topographic Battalion 1944).

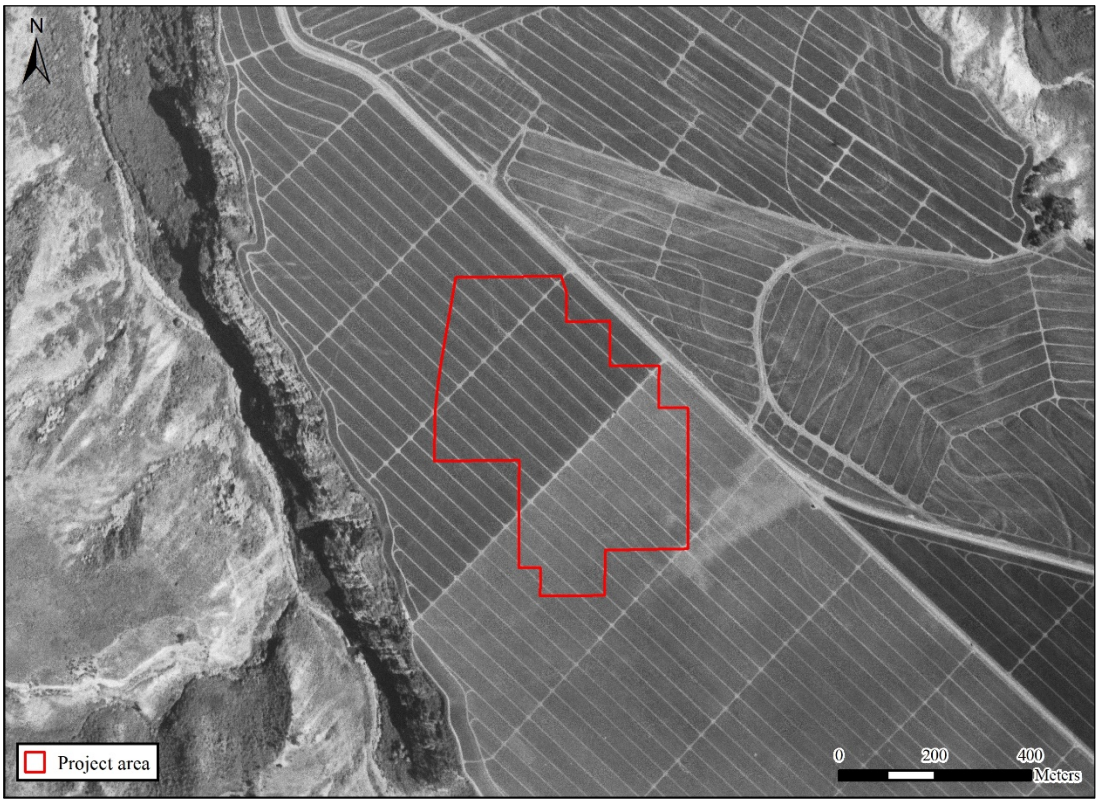

Figure 14. Aerial photograph of the project area in 1953 (USGS 1953).

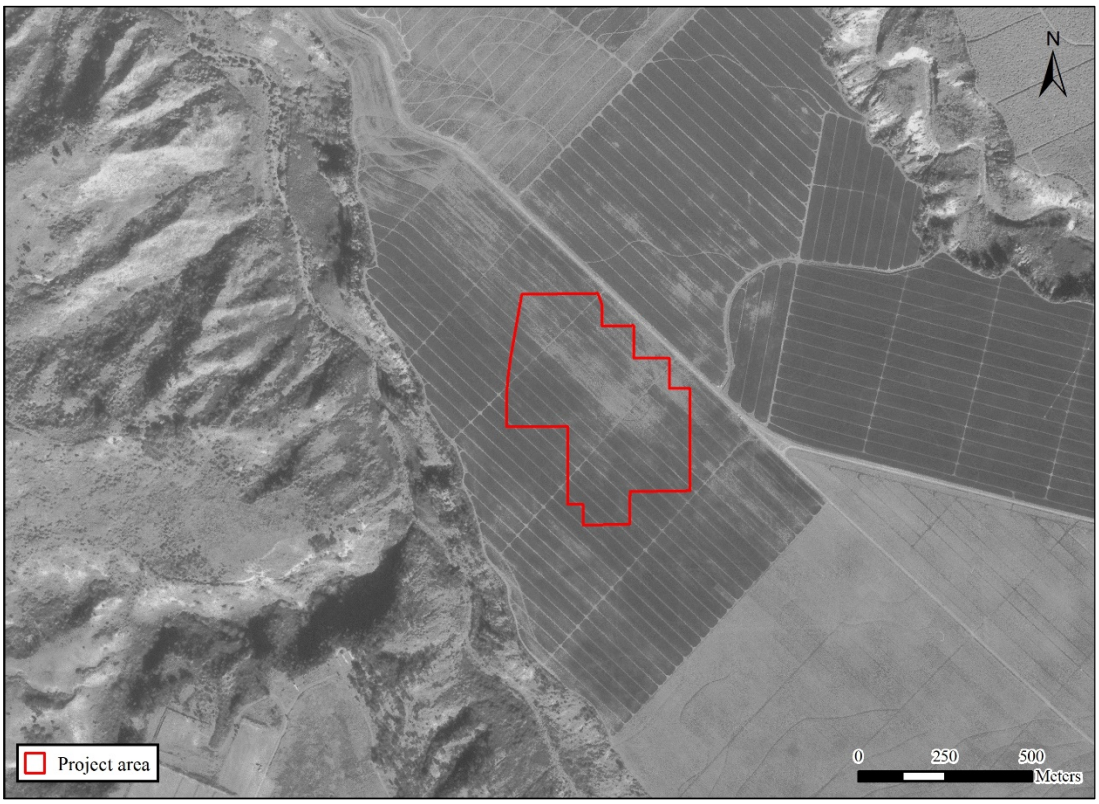

Figure 15. Aerial photograph of the current project area in 1977 (Hawaii Statewide G. I. S. Program 2017).

PREVIOUS ARCHAEOLOGICAL STUDIES

No prior archaeological study has included the current project area, but other studies (Table 2, Figure 16) conducted to the east on the Leilehua Plain suggest that the likelihood of encountering surface and subsurface archaeological properties is very low. Thomas G. Thrum's (1906:47-48) list of *heiau* in the District of Waialua included five located within five miles of the current project area: Onehana, Kalakiki, Hekili, Lonoakeahu, and Kapkapuakea. Only the first two of these were still extant at the time of his writing, and these were located beyond and to the north of the current project area on high ground facing the ocean. The earliest formal archaeological survey of O'ahu was conducted by J. Gilbert McAllister (1933:135) on behalf of the Bishop Museum in 1930. The nearest site described by McAllister as intact is the aforementioned Kūkaniloko birthstones (Site 218), located roughly 2.5 miles southeast of the current project area. At the time, Kūkaniloko was noted as being "the only ancient site on Oahu that is being officially preserved" (McAllister 1933:135). McAllister (1933:135) described the site as "an enclosed area about one-half acre in size, with many large stones, some just visible, others protruding to a height of 3 to 4 feet, scattered about on a well-kept lawn." Kūkaniloko (SIHP Site 50-80-04-218) was listed in the National Register of Historic Places in 1973. The site was further recorded during subsequent studies by Henry et al. (1992), Yent (1995), and Stasack and Stasack (2010). McAllister also noted the former location of Hoʻolonopahu Heiau (Site 219), which had been planted in pineapple at the time of his survey. Another *heiau* located in Poamoho Gulch, to the northeast of the current project area, was reported by Saifuku (1987), who remembered seeing it in the 1940s. Henry et al. (1992), however, were unable to find any evidence of the *heiau* forty-five years later.

More recent compliance-driven archaeological studies conducted near the current project area have largely resulted in negative findings (Hammatt and Shideler 2010; Novell et al. 2019; West 2005; West and Donaldson 2004; Wilson and Spear 2010). As might be expected in heavily-plowed agricultural fields, surface sites are very rare. Henry et al. (1992) reported the presence of a stacked stone wall (Site 50-80-04-4571), and Tulchin and Hammatt (2006) identified a Historic railroad trestle (Site CSH-1). Both sites are a considerable distance away from the current project area.

Cultural material suggesting the possibility of subsurface deposits was reported in only two prior studies near the current project area. Sims et al. (2011) conducted archaeological and cultural monitoring between Schofield Barracks and Helemano Military Reserve during construction activities associated with the Helemano Trail Construction for the Stryker Brigade Combat Team. One subsurface charcoal lens (SIHP 50-80-04-7173) was identified near the north edge of the plateau above Kaukonahua Gulch, more than 2 kilometers to the east of the current project area (see Figure 16). A radiocarbon date of 1440 and1640 cal A.D. was obtained from a sample of *ʻulei* (*Osteomeles anthyllidifolia*) charcoal and 1430 and 1630 cal A.D. from a sample of *ʻulu* (*Artocarpus altilis*) charcoal were obtained from the feature. Although not associated with any cultural material, the lens was interpreted as a Precontact thermal feature. Subsurface testing conducted by McElroy et al. (2015) identified culturally sterile soils beneath the former pineapple fields. This included their Trenches 3 and 4 (Figure 17), located closest to the current project area (see Figure 16). The only cultural material reported by McElroy et al. (2015) was a deposit of Historic-period bottle glass and ceramics in recently disturbed soil approximately 4 kilometers to the east of the current project area at Reservoir 3 (see Figure 16).

Table 2. Relevant previous studies.

Year	*Author*	*Type of study*	*Location*	*Findings*
1987	Saifuku	Location map	Kamananui	Poamoho *heiau* (50-80-04-1605)
1992	Henry et al.	Archaeological Inventory Survey (AIS)	Kamananui/ Wahiawā	Stacked stone wall (50-80-04-4571), Kūkaniloko (50-80-04-218)
1995	Yent	Site report	Kamananui	Kūkaniloko (50-80-04-218)
2004	West and Donaldson	AIS	Wahiawā	None
2005	West	Addendum AIS	Wahiawā	None
2006	Tulchin and Hammatt	Field inspection	Kamananui	Historic railroad trestle
2010	Hammatt and Shideler	AIS	Kamananui	None
2010	Stasack and Stasack	Site report	Kamananui	Kūkaniloko site
2010	Wilson and Spear	AIS	Wahiawā	None
2011	Sims et al.	Archaeological monitoring	Kamananui	Subsurface charcoal lens (50-80-04-7173)
2015	McElroy et al.	AIS	Wahiawā, Kamananui, Waialua	No subsurface deposits; Historic artifacts in disturbed soil
2019	Novell et al.	Historic Properties Inventory Survey	Wahiawā	No archaeological sites. 21 historic buildings

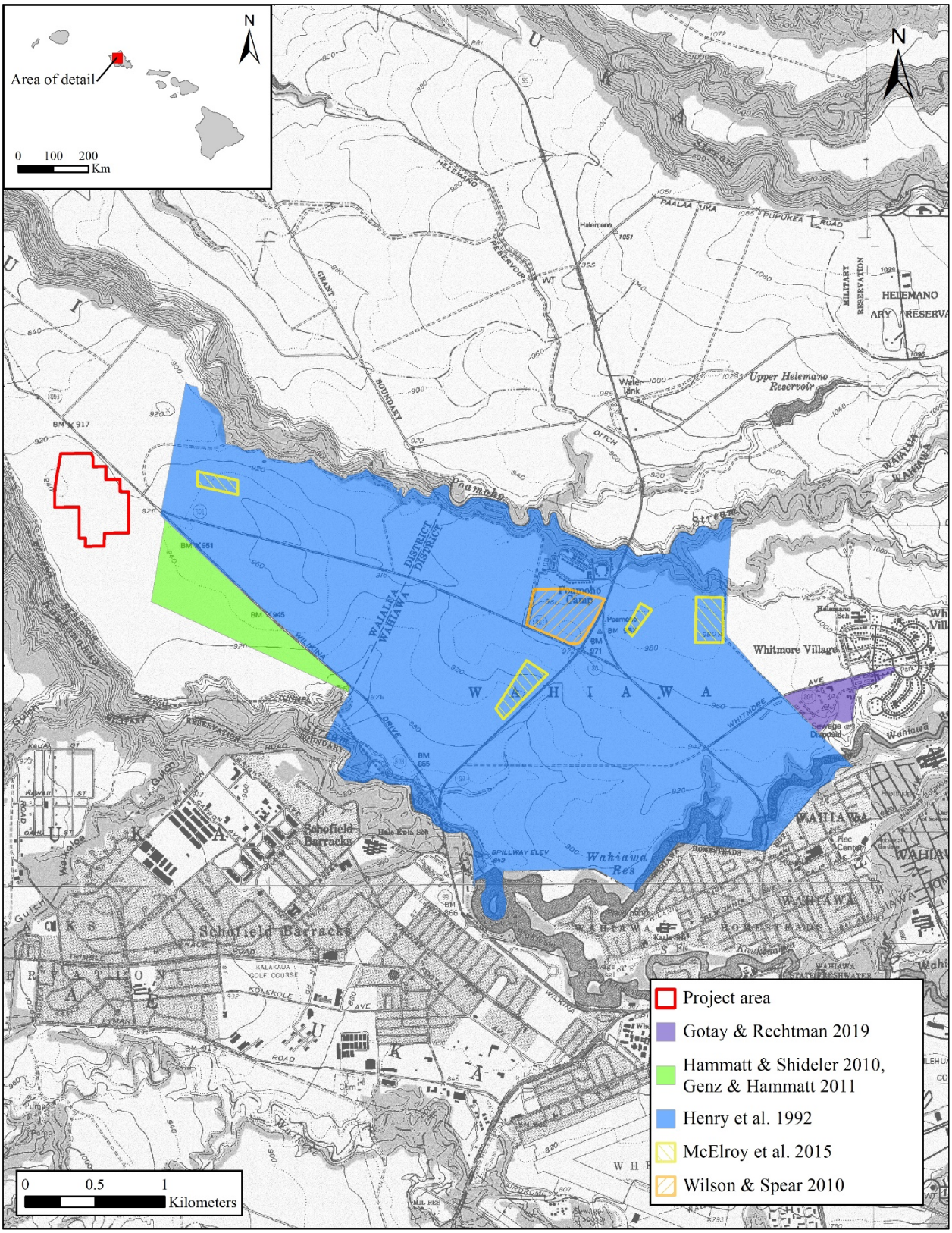

Figure 16. Locations of previous archaeological studies conducted in the vicinity of the project area and sites mentioned in the text.

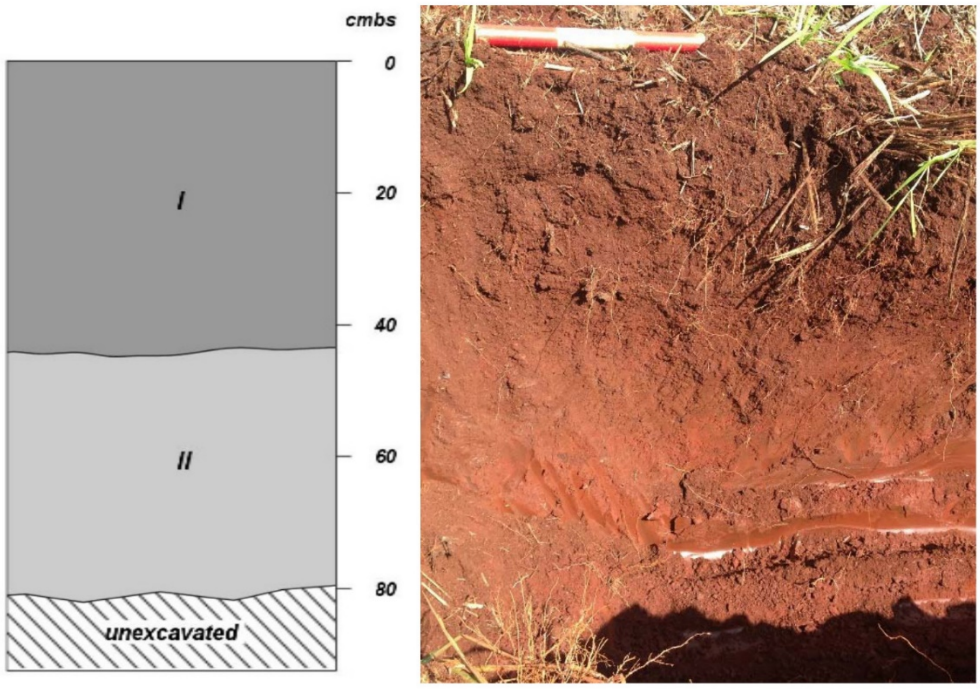

Figure 16. TR 3 northwest face profile drawing (left) and photo (right).

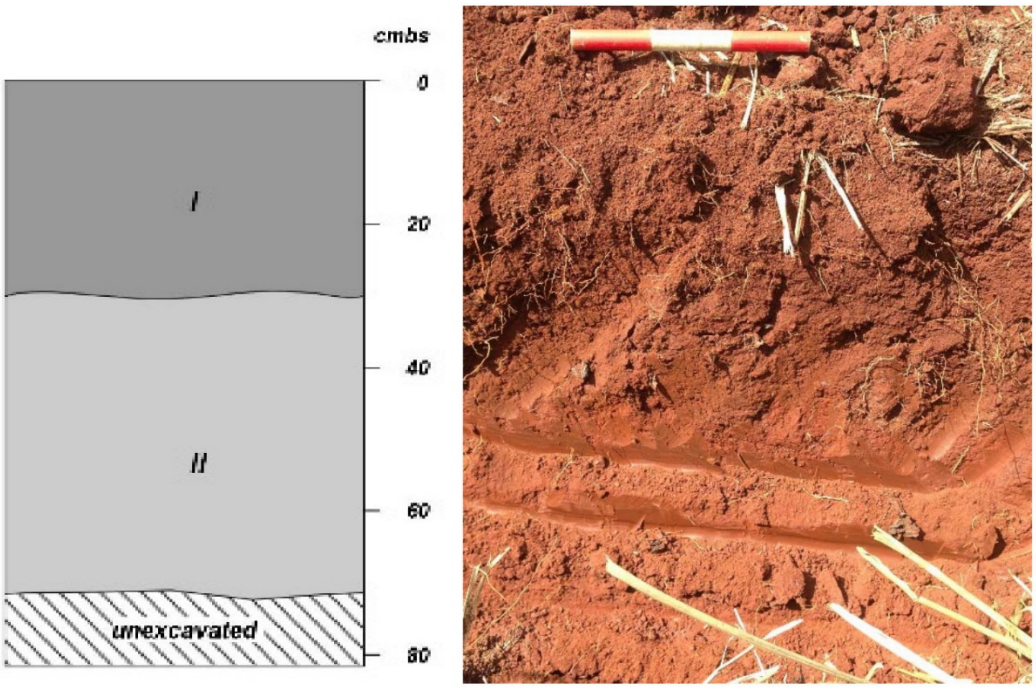

Figure 17. TR 4 southwest face profile drawing (left) and photo (right).

Figure 17. Profiles of Trenches 3 and 4 excavated to the east of the project area (McElroy et al. 2015:34).

3. STUDY AREA EXPECTATIONS

Nearly a century of intensive commercial agricultural activity (e.g., pineapple cultivation and livestock ranching) in the project area has resulted in substantial alteration of the landscape. The results of prior archaeological studies conducted on Oʻahu's former pineapple and sugarcane fields find them to be markedly disturbed by chaining, grading, and deep plowing associated with commercial agriculture. Occasionally, remnants of Historic plantation irrigation systems or other infrastructure are identified. With the exception of a stacked stone wall (SIHP 50-80-04-4571) and the Kūkaniloko Birthstones site (SIHP 50-80-04-218) recorded by Henry et al. (1992), no above-ground historic properties have been identified as a result of prior archaeological studies conducted near the current project area.

Historical aerial photography (Figure 18) indicates that the entire project area was subject to repeated mechanized plowing throughout the twentieth century. In addition to these prior disturbances, the Leileuha Plain is a geomorphologically erosional environment, which suggests a low likelihood of buried archaeological features beneath the plow zone. Prior archaeological studies in the vicinity of the project area generally indicate a lack of buried archaeological deposits beneath former pineapple fields. The disturbed Historic bottle dump reported by McElroy et al. (2015) and the charcoal lens (Site 50-80-04-7173) reported by Sims et al. (2011) appear anomalous for the project area vicinity. Thus, the likelihood of encountering archaeological historic properties above or below ground is considered low for the current project area.

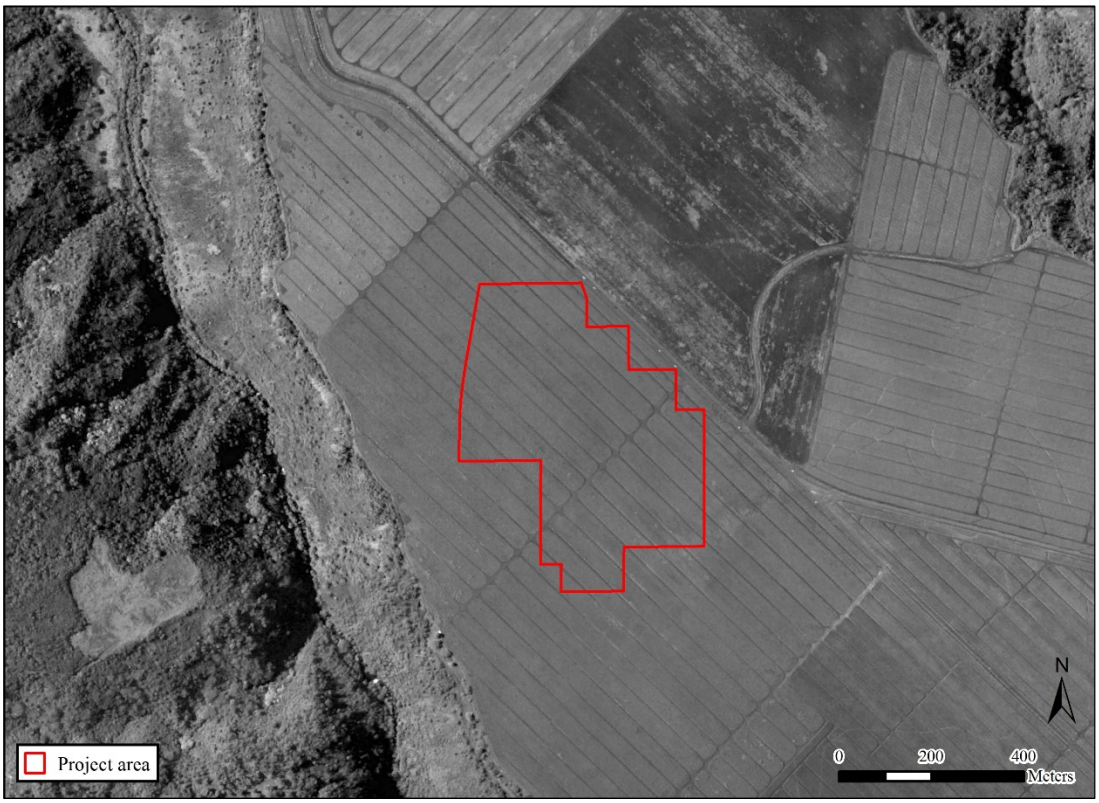

Figure 18. Satellite image of the current project area in 2000 (image source Google Earth).

4. FIELDWORK, DETERMINATION OF EFFECT, AND RECOMMENDATIONS

Fieldwork for the current study was conducted over two days, on April 17, 2020 and June 10, 2020, by Kimberly Lauko, B.A., and Teresa Gotay, M.A., under the supervision of Benjamin Barna, Ph.D. (Principal Investigator). A total of 18 person-hours was expended to complete the inventory survey fieldwork.

FIELD METHODS AND RESULTS

Fieldwork consisted of an intensive (100% coverage) pedestrian survey of the entire project area. The survey crew walked systematic pedestrian transects spaced no more than 10 meters apart. Ground visibility was excellent in the recently grazed pasture that covered the entire project area. The boundaries of the project area were not physically marked in the field; however, maps of the proposed project area (see Figures 3 and 4) and GIS shapefiles uploaded to handheld GPS units were used along with landmarks on the parcel to determine the extent of the project area. During the survey, Garmin GPSMap64 handheld GPS units (set to the WGS84 Zone 5 North datum) were available to plot the locations of potential archaeological features on a map of the current project. Areas of previous disturbance, conspicuous landforms, and vegetation patterns were noted. Based on the negative results of prior subsurface testing near the current project area (see discussion in Chapter 2), no subsurface testing was conducted.

No cultural material was observed or collected, and no archaeological historic properties of any kind were identified as a result of the current fieldwork.

DETERMINATION OF EFFECT AND RECOMMENDATIONS

Given the negative findings of the current study with respect to archaeological resources, it is concluded that the Kaukonahua Solar Project will not impact any known archaeological historic properties. The results of the current study support a determination of effect of “no historic properties affected.”

With respect to the historic preservation review process of the DLNR–SHPD, our recommendation is that no further work needs to be conducted within the project area prior to or during project implementation. In the unlikely event that significant archaeological resources are discovered during the proposed ground disturbing activity, work should cease in the area of the discovery and DLNR-SHPD should be contacted pursuant to HAR 13§13-280.

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