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January 17, 2020

Jade Butay, Director
State Of Hawai'i
Department Of Transportation
869 Punchbowl Street
Honolulu HI 96813-5097

Dear Mr. Butay:

Subject: Comments on Draft Environmental Assessment (DEA) for YAMADA AND SONS ROCK QUARRY, Portion of TMK (3rd) 2-1-013:002, Waiākea, South Hilo District, Hawai'i Island

Thank you for your comment letter dated November 22, 2019. In answer to your specific comments:

Airports Division

1. Page 37 states that the proposed project does not appear to require a Notice of Proposed Construction or Alteration with the Federal Aviation Administration, and it involves no hazardous wildlife attractants, glint or glare hazards or aerial obstructions. No effect to the facilities or operation of Hilo International Airport (ITO) is anticipated. Although the project involves no hazardous wildlife attractants, if conditions such as standing water attracts wildlife, Yamada and Sons shall mitigate the wildlife attractant to ensure flight safety to ITO.

RESPONSE: The applicant understands these requirements, anticipates no wildlife attractants or other hazards, and the Final EA has been augmented to discuss the fact that the project will not involve standing water.

2. Please coordinate project development activities with Mr. Steven Santiago, ITO Airport District Manager, to ensure compliance with existing regulations.

RESPONSE: If and when Yamada and Sons receives its license to conduct quarrying on the property, they will conduct additional coordination with the airport manager. If another bidder obtains the license, they will be provided with this documentation.

Highways Division

1. Since the proposal is to continue an existing operation from roughly the same vicinity and make use of County roads for quarry operations between the applicant's quarry and their quarry base yard on Railroad Avenue, this activity will not impact State highway facilities.

RESPONSE: Thank you for this confirmation.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

Cc: Candace Martin, Harry Yada, Shellby Yamada

ENVIRONMENTAL ASSESSMENT

YAMADA AND SONS ROCK QUARRY

APPENDIX 2
Archaeological Report

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An Archaeological Assessment of a Proposed 37.882-Acre Yamada Quarry Site

TMK: (3) 2-1-013:002 (por.)

Waiākea Ahupua'a
South Hilo District
Island of Hawai'i

DRAFT VERSION

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September 2019

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ASM Project Number 32490.00

An Archaeological Assessment of a Proposed 37.882-Acre Yamada Quarry Site

TMK: (3) 2-1-013:002 (por.)

Waiākea Ahupua'a
South Hilo District
Island of Hawai'i

EXECUTIVE SUMMARY

At the request of Ron Terry of Geometrician Associates, LLC, on behalf of Yamada & Sons, Inc., ASM Affiliates (ASM) conducted an Archaeological Inventory Survey (AIS) of a proposed quarry and stockpiling site located within Waiākea Ahupua'a, South Hilo District, Island of Hawai'i. The current study was undertaken in accordance with Hawai'i Administrative Rules 13§13–284, and was performed in compliance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports as contained in Hawai'i Administrative Rules 13§13–276. Compliance with the above standards is sufficient for meeting the historic preservation review process requirements of both the DLNR–SHPD and the County of Hawai'i Planning Department. According to 13§13-284-5(b)(5)(A) when no archaeological resources are discovered during an AIS, the results of the AIS shall be reported through an Archaeological Assessment. This report contains background information outlining the study area's physical and cultural contexts, a presentation of previous archaeological work conducted in the vicinity of the study area, and current survey expectations based on that previous work. Also presented are an explanation of the project's methods and a description of the findings, followed by recommendations and a determination of effect for the proposed project.

Fieldwork for the current study was conducted on April 23, and July 9, 12, and 23, 2019 by 'Iolani K. Ka'uhane, B.A., Lauren Kepa'a, Lyle Auld, B.A., Johnny Dudoit, B.A., Ivana Hall, B.A., and Genevieve Glennon, B.A., under the direction of Matthew R. Clark, M.A. (Principal Investigator). Fieldwork consisted of an intensive (100% coverage) pedestrian survey of the entire study area. No archaeological sites or other historic properties of any kind were identified within the study area, and field observations of past ground disturbance, combined with the results of prior studies conducted in the area, indicate that subsurface archaeological resources are unlikely to be encountered in the area proposed for quarry development and expansion. Given the negative findings of the current study with respect to archaeological resources, it is concluded that the Yamada & Sons, Inc. quarry and stockpiling project will not impact any known historic properties. The determination of effect for the proposed project is "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 Yamada & Sons, Inc. proposed quarry and stockpiling site prior to or during project implementation. In the unlikely event that any unanticipated archaeological resources are unearthed during development activities, work in the immediate vicinity of the finds will be halted and DLNR-SHPD contacted in compliance with HAR 13§13-280-3.

CHAPTERS

FIGURES

TABLES

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1. INTRODUCTION

At the request of Ron Terry of Geometrician Associates, LLC, on behalf of Yamada & Sons, Inc., ASM Affiliates (ASM) conducted an Archaeological Inventory Survey (AIS) of a proposed quarry and stockpiling site located within Waiākea Ahupua'a, South Hilo District, Island of Hawai'i (Figure 1). The study area comprises a 37.882-acre, T-shaped portion of Tax Map Key (TMK): (3) 2-1-013:002, a 2,407.756-acre, agriculturally-zoned parcel that is owned by the State of Hawai'i and leased to the United States Department of Transportation (Figure 2). The proposed quarry site is located adjacent to (northeast of) the existing Yamada quarry (Figures 3 and 4), which was previously the subject of an archaeological field inspection conducted by Rechtman (2006). That adjacent field inspection did not identify any cultural resources, and resulted in a determination of "no historic properties affected" for the existing quarry site by the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD).

The current study was undertaken in accordance with Hawai'i Administrative Rules 13§13–284, and was performed in compliance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports as contained in Hawai'i Administrative Rules 13§13–276. Compliance with the above standards is sufficient for meeting the historic preservation review process requirements of both the DLNR–SHPD and the County of Hawai'i Planning Department. According to 13§13-284-5(b)(5)(A) when no archaeological resources are discovered during an AIS, the results of the AIS shall be reported through an Archaeological Assessment. This report contains background information outlining the study area's physical and cultural contexts, a presentation of previous archaeological work conducted in the vicinity of the study area, and current survey expectations based on that previous work. Also presented are an explanation of the project's methods and a description of the findings, followed by recommendations and a determination of effect for the proposed project.

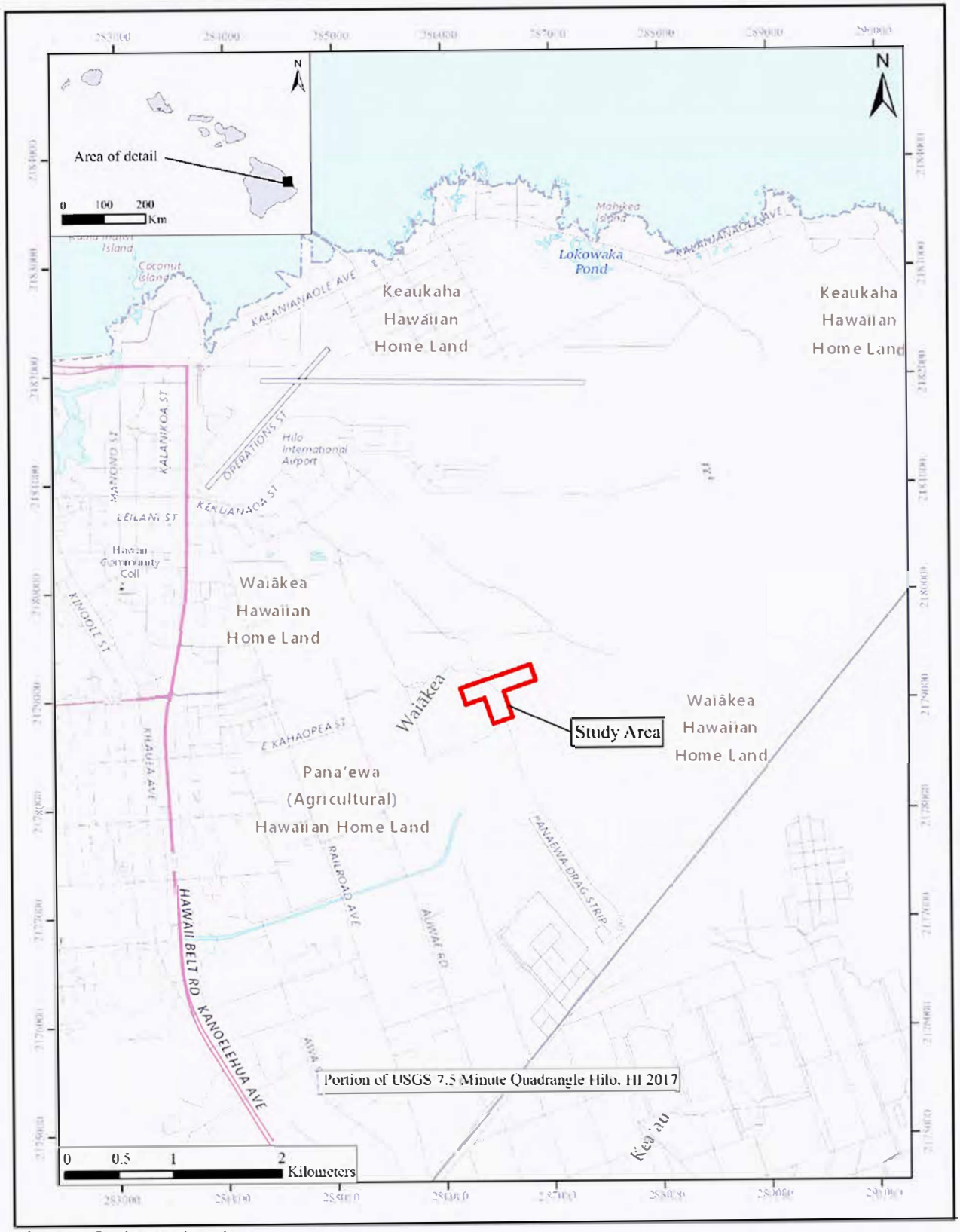

Figure 1. Study area location.

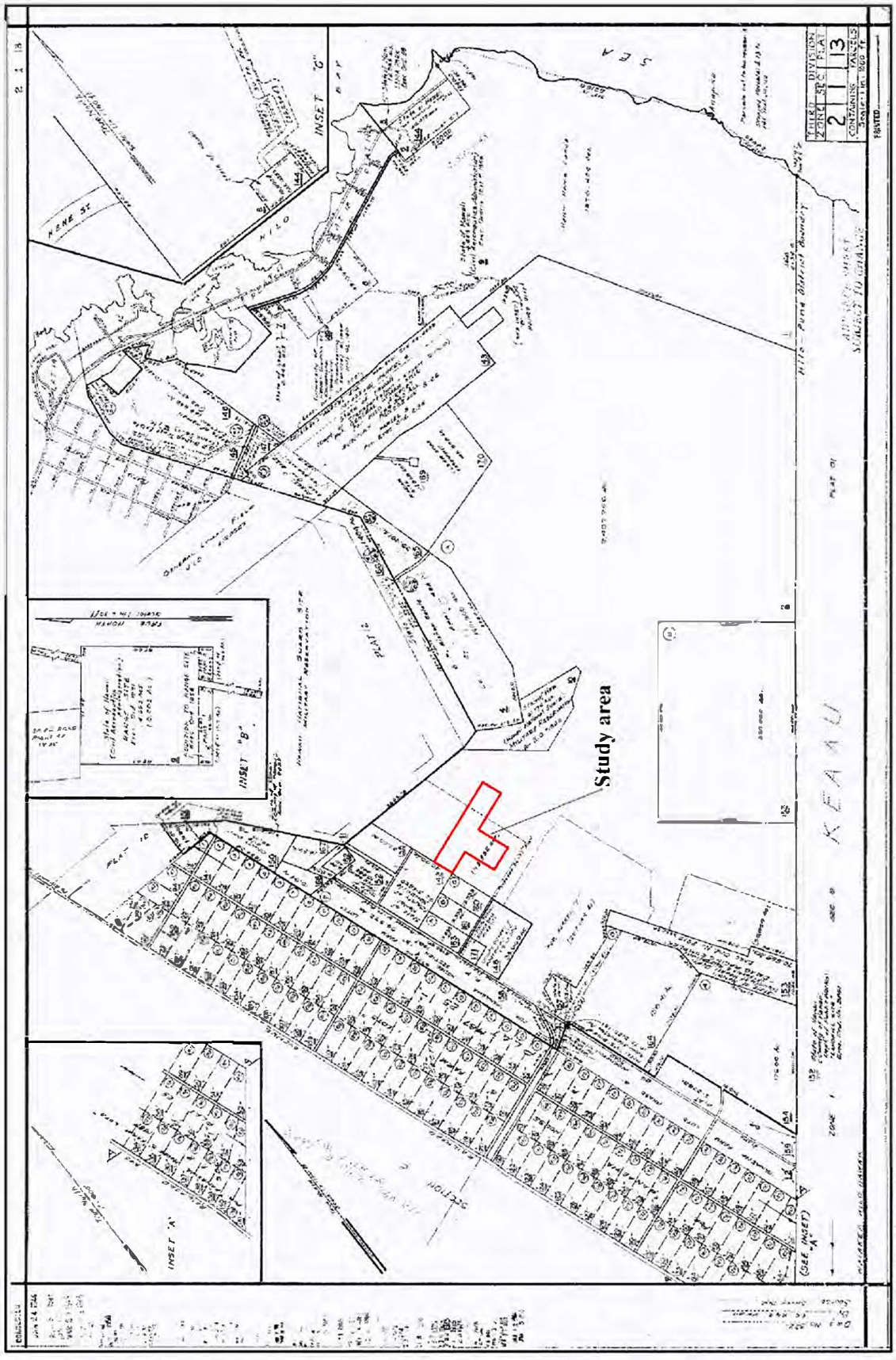

Figure 2. Tax Map Key (TMK) (3) 2-1-013 showing location of the current study area (portion of Parcel 002).

Figure 3. Google Earth ™ satellite image showing the current study area.

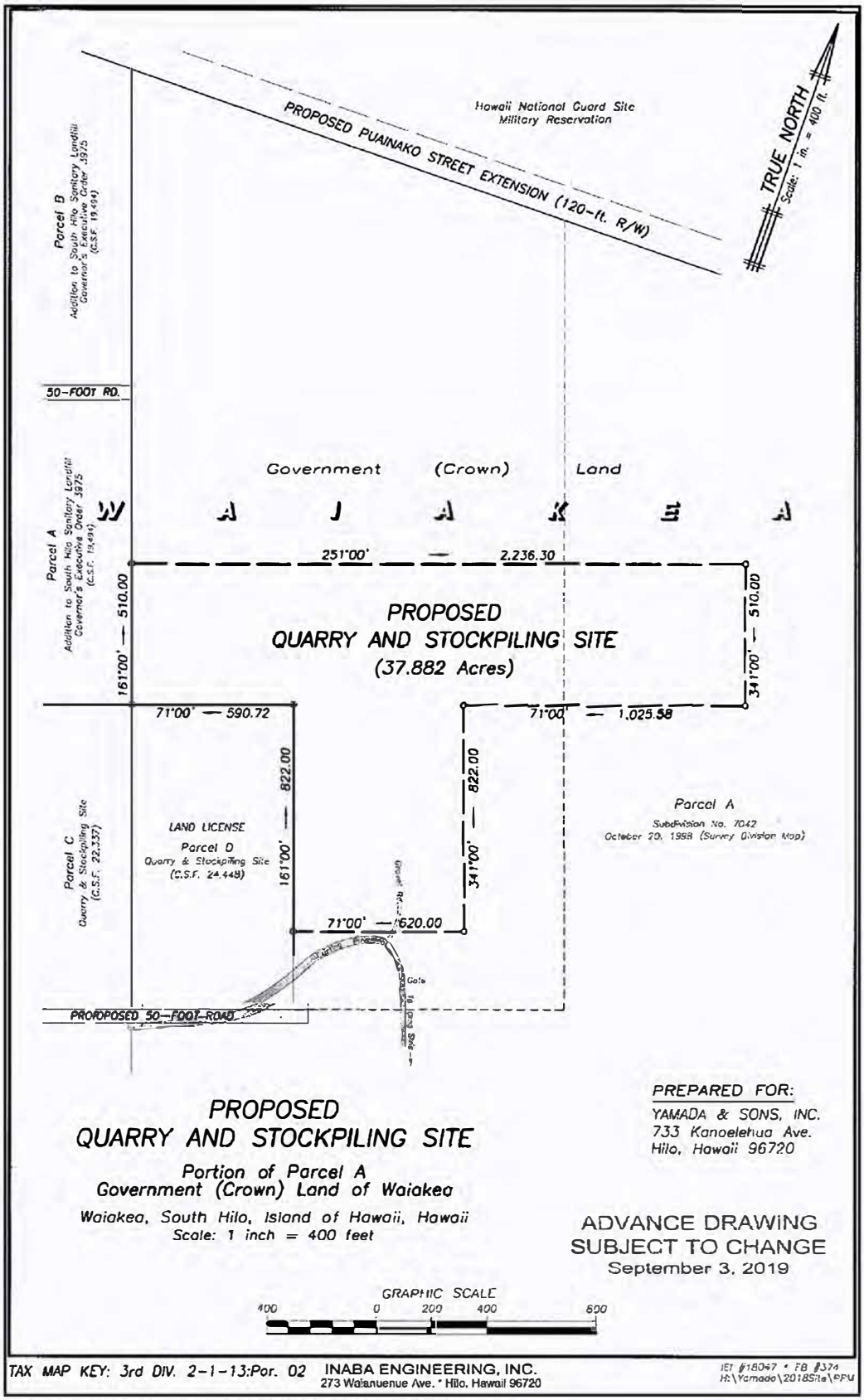

Figure 4. Map of the proposed quarry and stockpiling site.

STUDY AREA DESCRIPTION

The study area encompasses 37.882 acres within the Pana'ewa portion of Waiākea Ahupua'a, South Hilo District, Island of Hawai'i (see Figure 1). The study area is situated at elevations ranging from 80 to 100 feet (24 to 30 meters) above sea level, roughly 4 kilometers inland from the coast. The study area is accessed by a gated, paved road that extends northwest from the Pana'ewa Drag Strip road (see Figure 3). The access road extends northwest from the drag strip road (Figure 5), bisecting the southern portion of the study area into two equal halves (Figure 6), before turning to the northeast. Mechanically-created, earthen berms containing piles of gravel and scattered modern trash (e.g. rubber tires, glass/plastic bottles, car parts, and other assorted rubbish) are present along both of edges of the roadway (Figure 7). To the west, the study area is bounded by an existing 14.99-acre parcel (Parcel D) that is currently used for quarrying and stockpiling purposes by Yamada & Sons, Inc. (Figure 8), and by a section of Parcel A designated as part of the South Hilo Sanitary Landfill property. Large earthen berms, from prior mechanical disturbance, are present along the boundaries with these two properties. The northeastern corner of the existing quarry site (Parcel D) is marked by a metal pipe protected by concrete barriers (Figure 9). The study area is surrounded on the remaining sides by previously disturbed, but currently undeveloped, lands within TMK: (3) 2-1-013:002. The County of Hawai'i-Department of Parks and Recreation's Trap and Skeet Range is situated just to the north of the proposed quarry site (see Figure 3), and a large area in the northeastern portion of study area has been previously graded flat and covered with gravel (Figures 10). This graded area, which contains two corrugated aluminum storage sheds that are currently used for the storage purposes (Figure 11), are accessed by an offshoot of the primary paved access road that extends northeast (Figure 12). Other indications of previous disturbance within the study area include bulldozer cuts (Figure 13), berms (Figures 14), push piles, and modern rubbish (Figure 15 and 16), all of which are prevalent, especially within the western and northern portions of the proposed quarry site.

Geologically, the study area is situated on mixed *'a'ā* and *pāhoehoe* lavas flows that originated from Mauna Loa Volcano approximately 1,000 to 2,000 years B.P. (Figure 17). Collectively these lava flows have been designated by Trusdell and Lockwood (2017) as the Pana'ewa picrate flow. Soils that have developed on (and from) these lava flows are classified as Papai extremely cobbly highly decomposed plant material on 2 to 10 percent slopes (428), and Opihikao highly decomposed plant material on 2 to 20 percent slopes (664). The Papai soils are present across the majority of the study area, but a small area of the Opihikao soils, corresponding to the edge of a raised *'a'ā* flow, are present in the southwest corner of the proposed quarry site (Figure 18). Both are well-drained, thin, and extremely stony organic soils overlying cobbly substrates (Soil Survey Staff 2019), but the Papai soils are slightly thicker in profile (0-10 inches) than the Opihikao soils (0-3 inches). The terrain is characterized by mostly level to gentle to moderately undulating topography punctuated with the occasional small (culturally-sterile) lava blister, particularly within the more forested area that covers the southeastern portion of the study area. The study area is characterized by a cool climate with a mean annual temperature ranging from 70 to 73 degrees Fahrenheit throughout the year (Soil Survey Staff 2019). Mean annual rainfall in the area averages approximately 3346 millimeters (132 inches), with the majority of rainfall occurring in November and the least occurring in the summer months of May and June (Giambelluca et al. 2013).

Due to the prior mechanical disturbance, vegetation within the study area is comprised primarily of alien species mixed with a few indigenous species within a secondary forest setting (Figure 19). The overstory canopy is formed by such plant species as melochia (*Melochia umbellata*), bingabing (*Macaranga mappa*), autograph trees (*Clusia rosea*), strawberry guava (*Psidium cattleianum*), umbrella trees (*Schefflera actinophylla*), gunpowder trees (*Trema orientalis*), Albizia (*Falcataria Moluccana*) and *hala* (*Pandanus tectouris*), while the understory consists of various vines, ferns, and weeds such as Koster's curse (*Clidemia hirta*), philodendron (*Philodendron cordatum*), arthrostema (*Arthrostemma ciliatum*), *honohono* grass (*Commelina diffusa*), and various other grasses. The southeastern corner of the study area (generally corresponding to the location of the Opihikao soils; see Figure 18), where the least amount of mechanized clearing appears to have occurred in the past, contains the most intact section of native forest where species such as *'ōhi'a lehua* (*Metrosideros polymorpha*), *uluhe* (*Dicranopteris linearis*), and *hala* dominate (Figure 20). This vegetation pattern is more indicative of what the traditional landscape in the vicinity of the study area may have looked like prior to the widespread mechanical disturbances that occurred in the twentieth century.

Figure 5. Pana'ewa Drag Strip road with entrance to study area pictured on left, view to the northeast.

Figure 6. Paved roadway leading into study area from the Pana'ewa Drag Strip road, view to the southeast.

Figure 7. Berm extending along eastern edge of paved roadway that bisects the southern half of study area, view to the southwest.

Figure 8. Existing quarry site on Parcel D, view to the north with the current study area visible in the background (at the tree line).

Figure 9. Boundary marker at the northeastern corner of the existing quarry site (Parcel D), view to the southeast.

Figure 10. Graded area in the northeastern portion of study area, view to the east.

Figure 11. Modern corrugated aluminum storage sheds and equipment in northeastern corner of study area, view to the northeast.

Figure 12. Road accessing the northeastern portion of the study area, view to the east.

Figure 13. Bulldozer cut in eastern portion of study area, view to the northwest.

Figure 14. Typical bulldozer berm within the study area, view to the northeast.

Figure 15. Modern rubbish pile of glass bottles, overview.

Figure 16. Accumulation of modern rubbish in the northeastern corner of study area, view to the southwest.

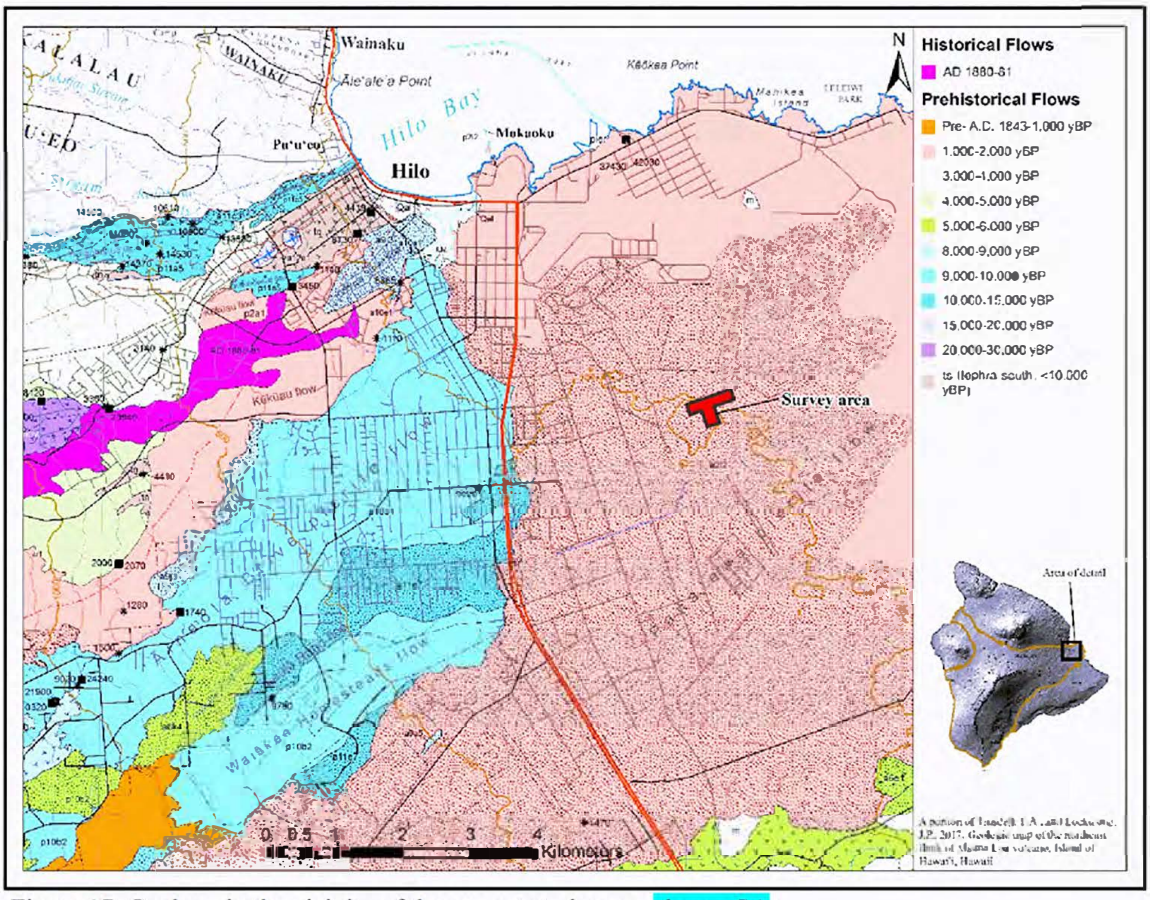

Figure 17. Geology in the vicinity of the current study area. change SA

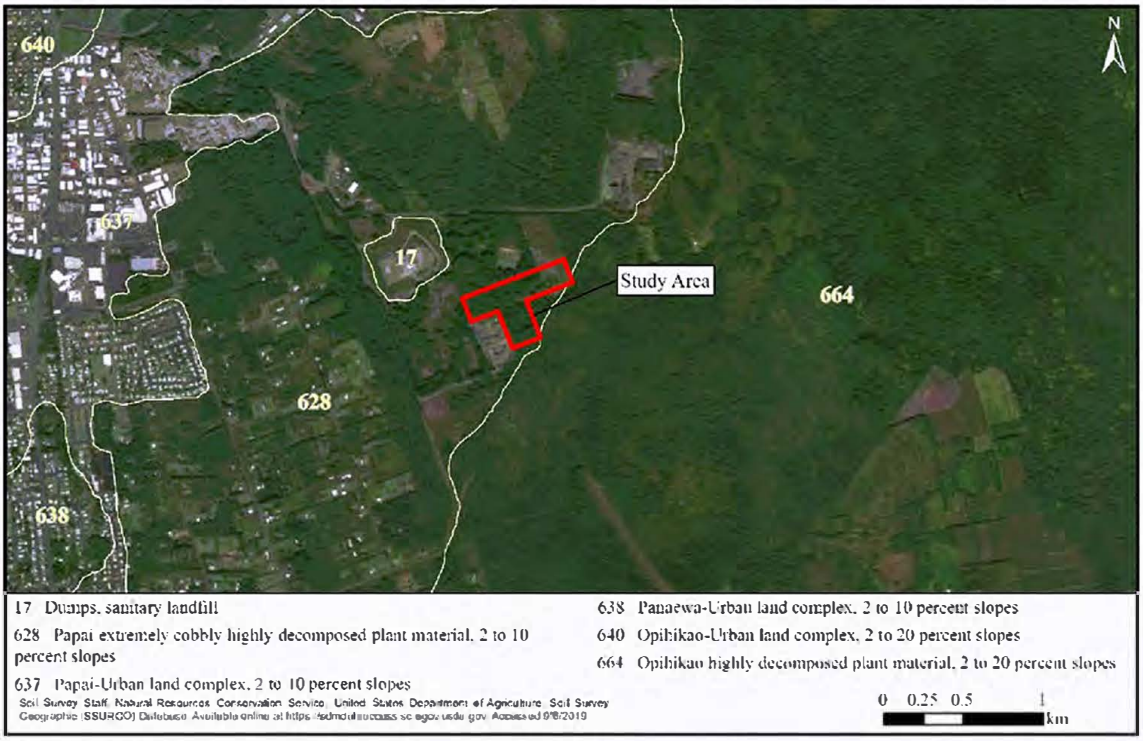

Figure 18. Soils in the vicinity of the current study area.

Figure 19. Typical vegetation in previously disturbed portions of the study area, view to the east.

Figure 20. Typical vegetation pattern within the more minimally disturbed, southeastern portion of the study area, view to the northeast.

2. BACKGROUND

To generate a set of expectations regarding the nature of archaeological resources that might be encountered within the current study area, and to establish an environment within which to assess the significance of any such resources, a general culture-historical context for the region is presented, and the results of previous archaeological studies conducted in the vicinity of the study area summarized.

CULTURE-HISTORICAL CONTEXT

The study area is situated in the Pana'ewa forested region in Waiākea Ahupua'a along the eastern coast of Hawai'i Island, within the present-day district of South Hilo, and the traditional *moku* (district) of Hilo, one of six *moku* of Hawai'i Island (Figure 21). As described by Handy and Handy:

> Hilo as a major division of Hawai'i included the southeastern part of the windward coast most of which was in Hamakua, to the north of Hilo Bay. This, the northern portion, had many scattered settlements above streams running between high, forested kula lands, now planted with sugar cane. From Hilo Bay southeastward to Puna the shore and inland are rather barren and there were few settlements. The population of Hilo was anciently as now concentrated mostly around and out from Hilo Bay, which is still the island's principal port. The Hilo Bay region is one of lush tropical verdure and beauty, owing to the prevalence of nightly showers and moist warmth which prevail under the northeasterly trade winds into which it faces. Owing to the latter it is also subject to violent oceanic storms and has many times in its history suffered semidevastation from tidal waves unleashed by earthquake action in the Aleutian area of the Pacific. (1991:538)

Traditionally, the *moku* of Hilo was divided into three *'okana* (land divisions) with place names that have their origins in legendary times. The three divisions are (from north to south): Hilo Palikū, Hilo One, and Hilo Hanakahi. The location of the current study area coincides best with Hilo Hanakahi or "Hilo [land of] chief Hanakahi" (Pukui and Elbert 1986:129), which extends from the Wailoa River to include Keaukaha. According to Pukui et al. (1974:220), the name Waiākea literally translates as "broad waters," likely a reference to the bays and freshwater streams and rivers that water this land. Theodore Kelsey, who conducted ethnographic research in Hilo in 1921, however, suggests (in Maly 1996:6) that "Waiākea was so named 'because you could dig anywhere and find water,'" but Maly (1996:11) alternatively suggests that "The lands of Waiākea were named for the high chief Waiākea-nui-kumuhonua, the brother of Pi'ihonua-a-ka-lani [k] and Pana'ewa-nui-moku-lehua [w]." Indeed, it was related to Kelsey by the surveyor Tom Cook, that the boundaries of this land were established when the sub-chief Waiākea was told by his superior to run around the tract of land that now bears his name (PBM SC Kelsey Box 1.5, July 2, 1921:2 Maly 1996:6).

The abundant marine resources of Hilo Bay, extensive spring-fed fishponds and waterfowl, and wetland and dryland agricultural resources sustained the population of the *moku* of Hilo, and it was to this general environmental setting that the first Polynesians in Hawai'i arrived. Over generations they shaped and utilized the natural environment to provide all they needed for sustenance and survival. In the process they created a uniquely Hawaiian culture that was wholly adapted to the environment. The chronological summary presented below begins with the peopling of the Hawaiian Islands and includes the presentation of a generalized model of Hawaiian Prehistory and a discussion of the general settlement patterns for South Hilo. The discussion of Prehistory is followed by a summary of Historical events in the district that begins with the arrival of foreigners in the islands and then continues with the history of land use in South Hilo after contact. The summary includes a discussion of the changing lifeways and population decline of the early Historic Period, a review of land tenure in the study *ahupua'a* during the *Māhele 'Āina* of 1848, and documentation of the transition to the commercial sugar industry from the last quarter of the nineteenth century into the twentieth century and the development of the Hawaiian Homestead community within Pana'ewa. A synthesis of the Precontact settlement patterns and the Historically documented land use, combined with a review of the findings of previously conducted archeological studies, provides a means for predicting the types of archaeological features that may be encountered within the study area, and forms a basis for assessing the function, age, and significance of any encountered archaeological sites.

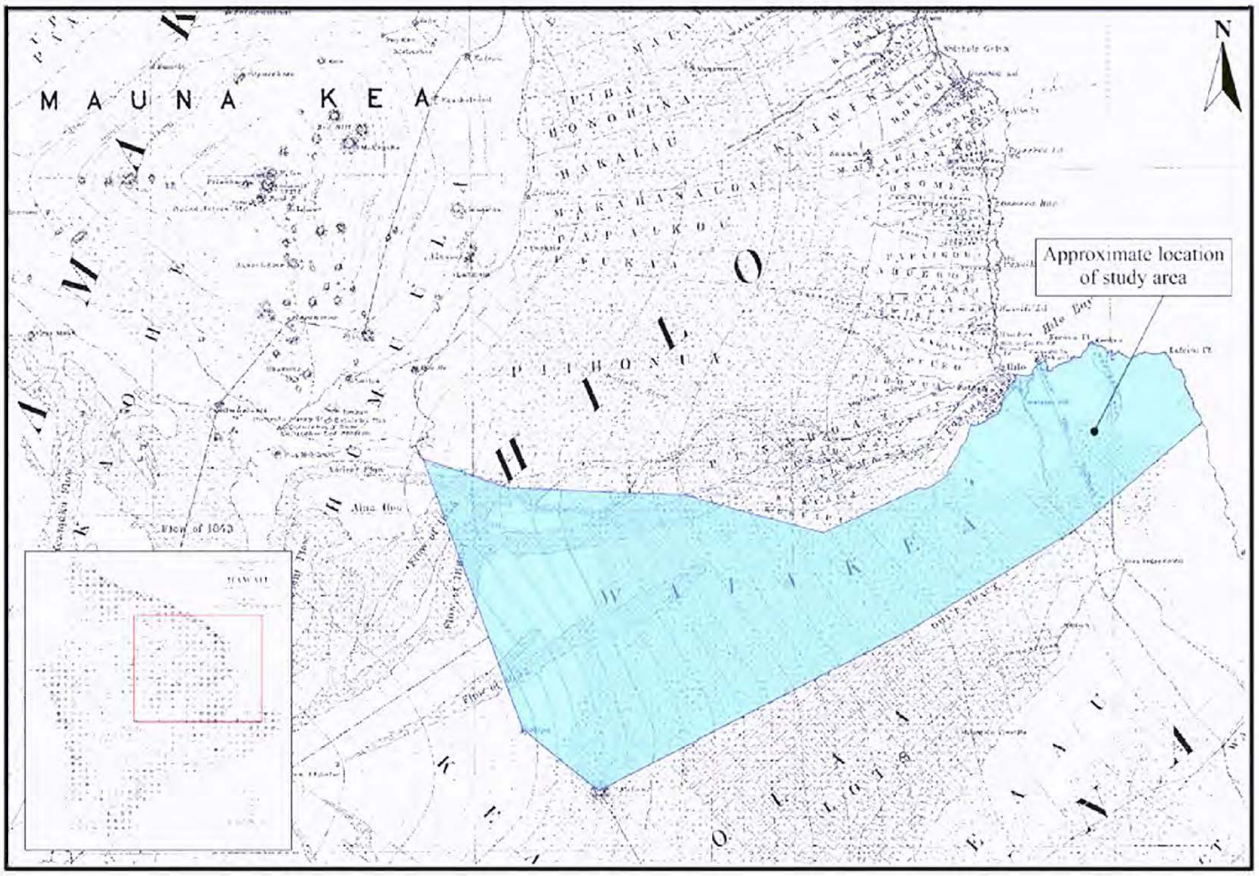

Figure 21. Portion of a 1901 Hawai'i Territory Survey Map showing the location of the study area within Waiākea Ahupua'a (shaded blue) and the South Hilo District.

A Generalized Model of Hawaiian Prehistory

This generalized cultural sequence is based on Kirch's (1985) model and is amended to include recent revisions offered by Kirch (2011) and Athens et al. (2014). The conventional wisdom has been that first inhabitants of Hawai'i Island probably arrived by at least A.D. 300, and focused habitation and subsistence activity on the windward side of the island (Burtchard 1995; Hommon 1986; Kirch 1985). Recent re-evaluation and syntheses of genealogical, oral historical, mythological, and radiometric data by Kirch (2011) and others (Athens et al. 2014; Duarte 2012; Wilmshurst et al. 2011) have convincingly argued that Polynesians may not have arrived in the Hawaiian Islands until at least A.D. 1000, but expanded rapidly thereafter. The implications of this on the currently accepted chronology would alter the timing of the Settlement, Developmental, and Expansion Periods, possibly shifting the Settlement Period to A.D. 1000 to 1100, the Developmental Period to A.D. 1100 to 1350, the Expansion Period to A.D. 1350 to 1650, and the Proto-Historic Period to A.D. 1650-1795. It has been generally reported that the sources of the early Hawaiian population—the Hawaiian Kahiki—were the Marquesas and Society Islands (Emory in Tatar 1982:16–18).

The Settlement Period was a time of great exploitation and environmental modification, when early Hawaiian farmers developed new subsistence strategies by adapting their familiar patterns and traditional tools to their new environment (Kirch 1985; Pogue 1978). Their ancient and ingrained philosophy of life tied them to their environment and kept order. Order was further assured by the conical clan principle of genealogical seniority (Kirch 1984, 2010). According to Fornander (1969), Hawaiians brought from their homeland certain universal Polynesian customs: the major gods Kāne, Kū, Kanaloa, and Lono; the *kapu* system of law and order; cities of refuge; the *'aumakua* concept; various epiphenomenal beliefs; and the concept of *mana*. Conventional wisdom suggests that the first inhabitants of Hawai'i Island focused habitation and subsistence activity on the windward side of the island (Burtchard 1995; Hommon 1986; Kirch 1985). Initial permanent settlements in the islands were established at sheltered bays with access to fresh water and marine resources. Communities shared extended familial relations and there was an occupational focus on the collection of marine resources.

As time passed a uniquely Hawaiian culture developed. The portable artifacts found in archaeological sites of the Development Period of the Hawaiian prehistory reflect not only an evolution of the traditional tools, but some distinctly Hawaiian inventions. The adze (*koʻi*) evolved from the typical Polynesian variations of plano-convex, trapezoidal, and reverse-triangular cross-section to a very standard Hawaiian rectangular quadrangular tanged adze. The two-piece fishhook and the octopus-lure breadloaf sinker are Hawaiian inventions of this period, as are *ʻulu maika* stones and *lei niho palaoa*. The later were status items worn by individuals of high rank, which indicates recognition of status differentiation (Kirch 1985). As population expanded in the Hawaiian Islands so did social stratification, which was accompanied by major socioeconomic changes and intensive land modification. Once most of the ecologically favorable zones of the windward and coastal regions of the major islands were settled, the more marginal leeward areas were developed. Migrations to Hawaiʻi from the Marquesas and Society Islands may have continued throughout the early Settlement and Development Periods (Kirch 1985, 2012). Over a period of several centuries the areas with the richest natural resources became populated and perhaps even crowded, and there was an increasing separation of the chiefly class from the common people. As the environment reached its maximum carrying capacity, the result was social stress, hostility, and war between neighboring groups (Kirch 1985). Soon, large areas of Hawaiʻi were controlled by a few powerful chiefs.

The Expansion Period is characterized by the greatest social stratification, major socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. Subsistence patterns intensified as crop farming evolved into large irrigated field systems and expanded into the marginal dry land areas. The greatest population growth occurred during the Expansion Period, and it was during this time that a second major migration settled in Hawaiʻi, this time from Tahiti in the Society Islands. According to Kamakau (1976), the *kahuna* Pāʻao settled in the islands during the 13th century. Pāʻao was the keeper of the god Kūkaʻilimoku, who had fought bitterly with his older brother, the high priest Lonopele. After much tragedy on both sides, Pāʻao was expelled from his homeland in Tahiti by Lonopele. He prepared for a long voyage and set out across the ocean in search of a new land. On board Pāʻaoʻs canoes were thirty-eight men (*kānaka*), two stewards (*kānaka ʻāʻīpuʻupuʻu*), the chief Pilikaʻaiea (Pili) and his wife Hinaʻaukekele, Nāmauʻu o Malaia, the sister of Pāʻao, and the prophet Makuakaʻūmana. Kamakau (1991:100–102) told the following story of their arrival in Hawaiʻi:

> Puna on Hawaiʻi Island was the first land reached by Pāʻao, and here in Puna he built his first heiau for his god Ahaʻula and named it Ahaʻula [Wahaʻula]. It was a luakini. From Puna, Pāʻao went on to land in Kohala, at Puʻuepa. He built a heiau there called Moʻokini, a luakini.
>
> It is thought that Pāʻao came to Hawaiʻi in the time of the aliʻi Laʻau because Pili ruled as moʻi after Laʻau. You will see Pili there in the line of succession, the moʻo kūʻauhau, of Hanalaʻanui. It was said that Hawaiʻi Island was without a chief, and so a chief was brought from Kahiki; this is according to chiefly genealogies. Hawaiʻi Island had been without a chief for a long time, and the chiefs of Hawaiʻi were aliʻi makaʻāinana or just commoners, makaʻāinana, during this time.
>
> ...There were seventeen generations during which Hawaiʻi Island was without chiefs—some eight hundred years...The lack ofa high chiefawas the reason for seeking a chief in Kahiki, and that is perhaps how Pili became the chief of Hawaiʻi. He was a chief from Kahiki and became the ancestor of chiefs and people of Hawaiʻi Island.

The Pili line's initial ruling center was likely in Kohala, but Cartwright (1933) suggests that Pili resided in and ruled from Waipiʻo Valley in the Hāmākua District. Ethnohistorical traditions (Fornander 1880) indicate that valley was associated with at least nine successive Pili line rulers of Hawaiʻi Island, from Kahaʻimoeleʻa to ʻUmi (from roughly A.D. 1460 to 1620). Prior to the establishment of these Pili rulers, Waipiʻo was the residential base for powerful local rulers dating back to at least the A.D. 1200s (Cartwright 1933).

Heiau construction flourished during the Expansion Period as religion became more complex and embedded in a sociopolitical climate of territorial competition. Monumental architecture, such as *heiau*, "played a key role as visual markers of chiefly dominance" (Kirch 1990:206). This pattern continued to intensify from A.D. 1500 to Contact (A.D. 1778), and evidence suggests that substantial changes were made to the political system as well. Within Kohala, for example, the Great Wall complex at Koaiʻe is organized with certain platforms in the complex physically separated from contemporaneous features. Griffin et al. (1971) interpret these separate spaces as symbolizing class stratification.

The period from A.D. 1300–1500 was characterized by population growth as well as expanded efforts to intensify upland agriculture. (Rosendahl 1972) has proposed that settlement in leeward Kohala at this time was related to

seasonal, recurrent occupation, and that coastal sites were occupied in the summer to exploit marine resources, while upland sites were being occupied during the winter months with a primary focus on agriculture. An increasing reliancet on agricultural products may have caused a shift in social networks as well, according to Hommon (1976). Hommon argues that kinship links between coastal settlements disintegrated as those links within the *mauka-makai* settlements expanded to accommodate exchange of agricultural products for marine resources. This shift is believed to have resulted in the establishment of the *ahupua'a* system. The implications of this model include a shift in residential patterns from seasonal, temporary occupation, to permanent dispersed occupation of both coastal and upland areas.

The earliest culture-historical knowledge of Hilo comes from legends written by Kamakau (1961) of a 16th century chief 'Umi-a-Līloa (son of Līloa) who at that time ruled the entire island of Hawai'i. Descendants of 'Umi and hist sister-wife were referred to as "Kona" chiefs, controlling Ka'ū, Kona, and Kohala, while descendants of 'Umi and his Maui wife were "Hilo" chiefs, controlling Hāmākua, Hilo, and Puna (Kelly et al. 1981:1). According to Kamakau (1961) both sides fought over control of the island, desiring access to resources such as feathers, *māmaki* tapa, andt canoes on the Hilo side; and *wauke* tapa, and warm lands and waters on the Kona side (c.f. Kelly et al. 1981:3).

According to Kirch's (1985) model, the concept of the *ahupua'a* was established sometime during the A.D. 1400s,t adding another component to an already well-stratified society. This land unit became the equivalent of a local community, with its own social, economic, and political significance. *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or lesser chiefs; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land, which was managed by a *konohiki*. *Ahupua'a* generally speaking, are wedge-shaped subdivisions of land that radiate out from the center of the island, typically extending from the mountain into the sea and several hundred yardst beyond, which afforded their inhabitant's unlimited access to a diverse subsistence resource base (Cordy 2000). Thet design of these land divisions ensured that residents could have access to all that they needed to live, with oceant resources at the coast, and agricultural and forest resources in the interior. As long as sufficient tribute was offeredt and *kapu* (restrictions) were observed, the common people (*maka'āinana*), who lived in a given *ahupua'a* had accesst to most of the resources from mountain slopes to the ocean. These access rights were almost uniformly tied tot residency on a particular land, and earned as a result of taking responsibility for stewardship of the natural environment, and supplying the needs of the *ali'i* (see Kamakau 1992; Malo 1951). Sometime near the end of the 16th century or early in the 17th century, the lands of Hilo were divided into *ahupua'a* that today retain their original namest (Kelly et al. 1981:3). Of the twenty plus *ahupua'a* that make up the Hilo district, only two approach this ideal includingt Waiākea, where the current study area is located. Waiākea, one of the largest *ahupua'a* in all the Hawaiian Islands, stretches from the eastern shores of Hilo Bay up the slopes oftMauna Loa to an elevation oft6,000 feet and is markedly broader than its neighboring *ahupua'a* to the north (see Figure 21).

Entire *ahupua'a*, or smaller portions of the land called *'ili* were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to an *ali'i-'ai-ahupua'a* (chief who controlled the *ahupua'a* resources). The *ali'i-'ai-ahupua'a* in turn answered to an *ali'i 'ai moku* (chieftwho claimed the abundance of the entiret district). Thus, *ahupua'a* resources supported not only the *maka'āinana* and *'ohana* who lived on the land, but alsot contributed to the support of the royal community of regional and/or island kingdoms. This form of district subdividingt was integral to Hawaiian life and was the product of strictly adhered to resource management planning. In this system,t the land provided fruits and vegetables and some meat for the diet, and the ocean provided a wealth of protein resourcest (Rechtman and Maly 2003). The *ahupua'a* were further divided into smaller sections such as the *'ili 'āina, mo'o 'āina, paukū 'āina, kīhāpai, kō'ele, hakuone*, and *kuakua* (Hommon 1986; Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mō'ī* (king).

Generally speaking, Waiākea Ahupua'a was included in a zone of agricultural productivity where scattered dwellings were sometimes present, and forest locations were selectively burned to create clearings for planting crops such as taro, bananas, sugarcane, breadfruit, and *kukui* (McEldowney 1979). Conversely, the Pana'ewa forest portion of Waiākea, in which the current study area is situate, was one of the few forests on the island to nearly reach the ocean in the 1800s (ibid.), supporting the supposition that small-scale agriculture was practiced in forest clearings, as opposed to the burning off of large areas as was practiced in other parts of the *ahupua'a*. Additionally, Maly (1996:4) relates that *waiākea* is the name of a native variety of taro, similar to the better known *lehua* variety, which further attests to the agricultural importance of the Waiākea region. Handy further describes the traditional agriculturalt landscape and cultivation practices of Waiākea, particularly as it relates to Pana'ewa, as follows:

> . . . I am told that farther seaward in Waiakea, taro is still grown by the ingenious method of heapingt up around a taro, which is submerged in water, and held upright by chunk of lava; the stonest

> presumably accumulate refuse enough to nourish the taro, along with the food taken in by the roots from lava and water.
>
> On the lava strewn plain of Waiakea and on the slopes between Waiakea and Wailuku River, dry taro was formerly planted wherever there was enough soil. There were forest plantations in Pana'ewa and in all the lower fern-forest zone above Hilo town along the course of the Wailuku River. (Handy 1940:125)

By the seventeenth century, large areas of Hawai'i Island (*moku āina* – districts) were controlled by a few powerful *ali'i 'ai moku*. There is island-wide evidence to suggest that growing conflicts between independent chiefdoms were resolved through warfare, culminating in a unified political structure at the district level. It has been suggested that the unification of the island resulted in a partial abandonment of portions of leeward Hawai'i, with people moving to more favorable agricultural areas (Barrera 1971; Schilt and Sinoto 1980). 'Umi a Līloa, a renowned *ali'i* of the Pili line who ruled from Waipi'o Valley, is often credited with uniting the island of Hawai'i under one rule (Cordy 1994). 'Umi's reign lasted until around a.d. 1620, and was followed by the rule of his son, Keawenui a 'Umi, and then his grandson, Lonoikamakahiki (Cordy 1994).

Kirch (1985) places the beginning of the Proto-Historic Period during the rule of Lonoikamakahiki. This was a time marked by both political intensification and stress and continual conquest by the reigning *ali'i*. Wars occurred regularly between intra-island and inter-island polities during this period. By the 1700s, rule of Hawai'i Island was divided among the chiefs of Kona and Hilo (Kamakau 1992). Keawe, a Pili line ruler and the son of Kanaloakapulehu, was the chief of Kohala, Kona, and Ka'ū. When Keawe died, he split the rule of his lands between two of his sons, further dividing the island's chiefdoms; Kalaninui'iamamao became the ruling chief of Ka'ū, and Ke'eaumoku became the ruling chief of Kona and Kohala (Kamakau 1992). Wars between the *ali'i* continued unabated through this transition. Alapa'inui, the son of former Kona war chief Kauauanui a Mahi, desired to take control of Hawai'i Island (Kamakau 1992), and successfully waged war against the chiefs of Kona and Kohala, and eventually took control of Ka'ū and Hilo as well. Alapa'inui ruled for many years, and appointed his son Keawe'ōpala ruler of the island upon his death in 1754 (ibid.: 1992). It was during this time of warfare that Kamehameha was born in the North Kohala District in the *ahupua'a* of Kokoiki, near the *heiau* of Mo'okini (ibid.: 1992). There is some controversy about the year of his birth, but Kamakau (1992:66–68) places the birth event sometime between A.D. 1736 and 1758, most likely nearer to the later date. This period was one of continual conquest by the reigning *ali'i*. In A.D. 1775 Kalani'ōpu'u and his forces, who had already conquered Hāna in eastern Maui, raided and destroyed the neighboring Kaupō District, then launched several more raids on Moloka'i, Lāna'i, Kaho'olawe, and parts of West Maui. It was at the battle of Kalaeoka'ilio that Kamehameha, a favorite of Kalani'ōpu'u, was first recognized as a great warrior and given the name of Pai'ea (hard-shelled crab) by the Maui chiefs and warriors (Kamakau 1992). During the battles between Kalani'ōpu'u and Kahekili (1777–1779), Ka'ahumanu and her parents left Maui to live on the island of Hawai'i (ibid.: 1992). Kalani'ōpu'u was fighting on Maui when the British explorer Captain James Cook first arrived in the islands.

History After Contact

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

The Arrival of Captain James Cook and the End of Kalani'ōpu'u's Reign (1778-1782)

British explorer Captain James Cook, in command of the ships *H.M.S. Resolution* and *H.M.S. Discovery*, landed in the Hawaiian Islands on January 18, 1778. The following January 17th [1779], on a return trip to Hawaiian waters, Cook anchored near Ka'awaloa along the north shore of Kealakekua Bay in the South Kona District to resupply his ships. This return trip occurred at the time of the annual *Makahiki* festival, and many of chiefs and commoners were gathered around the bay celebrating. It has been suggested that Captain Cook was understood to be the god Lono

himself returned, as men would not normally be allowed to paddle out during the *Makahiki* without breaking the *kapu* and forfeiting all of their possessions (Kamakau 1992). Kalani'ōpu'u, the reigning chief of Hawai'i Island, left a battle with Kahekili on Maui, and after arriving at Kealakekua Bay, visited Cook on board the *H.M.S. Resolution*, where they exchanged gifts. Kamehameha, the future ruler of all of Hawai'i, was present at this meeting (Jarves 1847). On February 4th, Cook set sail, but a storm off the Kohala coast damaged the mast of the *H.M.S. Resolution*, and both ships were forced to return to Kealakekua Bay to make repairs. With Cook's return many of the inhabitants of Kealakekua began to doubt that he actually was the physical manifestation of Lono (Kamakau 1992). Ten days later, a dispute over stolen nails escalated and after one of Cook's boats was stolen, the captain set ashore at Ka'awaloa with six marines to ask Kalani'ōpu'u for its return. When Kalani'ōpu'u denied any knowledge of the theft, Cook tried to take him captive (Kamakau 1992). A fight ensued, and Cook was killed along with four of his men and several natives. Kalani'ōpu'u and his retinue retreated inland. After offering the body of Cook as a sacrifice to the *akua*, some of his bones were returned to the British aboard the *Resolution* (Kamakau 1992), who shortly thereafter returned to sea.

After the death of Captain Cook and the departure of *H.M.S. Resolution* and *Discovery*, Kalani'ōpu'u moved to Kona, where he surfed and amused himself with the pleasures of dance (Kamakau 1992). While he was living in Kona, famine struck the district. Kalani'ōpu'u ordered that all the cultivated products of that district be seized, and then he set out on a circuit of the island. While in Kohala, Kalani'ōpu'u proclaimed that his son Kiwala'ō would be his successor, and he gave the guardianship of the war god Kūka'ilimoku to Kamehameha. However, Kamehameha and a few other chiefs were concerned about their land claims, which Kiwala'ō did not seem to honor (Fornander 1996; Kamakau 1992). The *heiau* of Moa'ula was erected in Waipi'o at this time (ca. A.D. 1781), and after its dedication Kalani'ōpu'u set out for Hilo to quell a rebellion by a Puna chief named 'Īmakakolo'a.

'Īmakakolo'a was defeated in Puna by Kalani'ōpu'u's superior forces, but he managed to avoid capture and hide from detection for the better part of a year. While the rebel chief was sought, Kalani'ōpu'u went to Ka'ū and erecteda a *heiau* called Pākini (Kamakau 1992). 'Īmakakolo'a was eventually captured and brought to the *heiau*, where Kiwala'ō was to sacrifice him. "The routine of the sacrifice required that the presiding chief should first offer up the pigs prepared for the occasion, then bananas, fruit, and lastly the captive chief" (Fornander 1996:202). However, before Kiwala'ō could finish the first offerings, Kamehameha, "grasped the body of Īmakakolo'a and offered it up to the god, and the freeing of the tabu for the *heiau* was completed" (Kamakau 1992:109). Upon observing this singlea act of insubordination, many of the chiefs believed that Kamehameha would eventually rule over all of Hawai'i. After usurping Kiwala'ō's authority witha a sacrificial ritual in Ka'ū, Kamehameha retreated to his home district of Kohala. While in Kohala, Kamehameha farmed the land, growing taro and sweet potatoes (Handy and Handy 1972). Kalani'ōpu'u died in April of 1782 and was succeeded by his son Kiwala'ō.

The Rule of Kamehameha I (1782-1819)

After Kalani'ōpu'u died, several chiefs were unhappy with Kiwala'ō's division of the island's lands, and civil war broke out. Kiwala'ō, Kalani'ōpu'u's son and appointed heir, was killed at the battle of Moku'ōhai, South Kona in July of 1782. Supporters of Kiwala'ō, including his half-brother Keōua and his uncle Keawemauhili, escaped the and laid claim to the Hilo, Puna, and Ka'ū Districts. According to 'I'i (1963), nearly ten years of almost continuous warfare followed, as Kamehameha endeavored to unite the island of Hawai'i under his rule and conquer the islands of Maui and O'ahu. Keōua became Kamehameha's main rival on the island of Hawai'i, and he proved difficult to defeat (Kamakau 1992). Around 1790, in an effort to secure his rule, Kamehameha began building the *heiau* of Pu'ukoholā at Kawaihae, which was to be dedicated to the war god Kūka'ilimoku (Fornander 1996). When Pu'ukoholā Heiau was completed in the summer of 1791, Kamehameha sent his two counselors, Keaweaheulu and Kamanawa, to Keōua to offer peace. Keōua was enticed to the dedication of the Pu'ukoholā Heiau by this ruse and when he arrived at Kawaihae he and his party were sacrificed to complete the dedication (Kamakau 1992). The assassination of Keōua gave Kamehameha undisputed control of Hawai'i Island (Greene 1993). Between 1792 and 1796, after the dedication of Pu'ukoholā, Kamehameha mostly resided at Kawaihae and worked the lands of the Waikōloa-Waimea region (Maly and Maly 2002). By 1796, Kamehameha had conquered all the island kingdoms except for Kaua'i. It wasn't until 1810, when Kaumuali'i of Kaua'i gave his allegiance to Kamehameha, thatthe Hawaiian Islands were unified under one ruler (Kuykendall and Day 1976). Kamehameha would go on to rule the islands for another nine years. He and his high chiefs participated in foreign trade, but continued to enforce the rigid *kapu* system.

In the twelve years following the death of Captain Cook, sixteen foreign ships (all British and American) called in Hawaiian waters (Restarick 1928). In 1790, two sister ships, the *Eleanora* and the *Fair American*, were trading in Hawaiian waters when a skiff was stolen from the *Eleanora* and one of its sailors was murdered. The crew of thea

Eleanora proceeded to slaughter more than 100 natives at Olowalu [Maui]. After leaving Maui, the *Eleanora* sailed to Hawai'i Island, where one of its crew, John Young, went ashore and was detained by Kamehameha's men. The other vessel, the *Fair American,* was captured by the forces of Kamehameha off the coast of North Kona, and in an act of retribution for the Olowalu massacre, they slaughtered all but one crew member, Isaac Davis. Guns and a cannon (later named "Lopaka") were recovered from the Fair American and were kept by Kamehameha as part of his fleet (Kamakau 1992). Kamehameha made John Young and Isaac Davis his advisors.

Hilo was one of the larger population centers on the Island of Hawai'i, and also an area frequented by the *ali'i* (Moniz 1994). Captain George Vancouver, an early European explorer who met with Kamehameha I at Waiākea in 1794, recorded that Kamehameha was there preparing for his invasion of the neighbor islands, and that Hilo was an important center because his *peleleu* fleet of 800 canoes were being built there (Moniz 1994:7). The people of Hilo had long prepared for Kamehameha's arrival and collected a large number of hogs and a variety of plant foods, to feed the ruler and his retinue. Kelly et al. (1981) surmise that the people of Hilo had actually prepared for a year prior to Kamehameha's visit and expanded their fields into the open lands behind Hilo to accommodate the increased number of people that would be present. Kelly et al. (1981) also speculate that many of the fish ponds in Waiākea were created to feed Kamehameha, his chiefs, and craftsmen. It was during this early Historic Period of Hawaiian history that Waiākea Ahupua'a became part of Kamehameha I's personal land holdings (Moniz 1994:11).

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

Upon returning to Kailua in 1812, Kamehameha resided at Kamakahonu, from whence he continued to rule the islands for another nine years. While in Kailua, He and his high chiefs participated in foreign trade, but also continued to enforce the rigid *kapu* system. He ordered men into the mountains of Kona to cut sandalwood and carry it to the coast, paying them in cloth, *kapa* material, food and fish (Kamakau 1992). This new burden added to the breakdown of the traditional subsistence system. Farmers and fishermen were ordered to spend most of their time logging, resulting in food shortages and famine that led to a population decline. Kamakau indicates that, "this rush of labor to the mountains brought about a scarcity of cultivated food. . . The people were forced to eat herbs and tree ferns, thus the famine [was] called Hi-laulele, Haha-pilau, Laulele, Pualele, 'Ama'u, or Hapu'u, from the wild plants resorted to" (ibid.: 1992:204). Once Kamehameha realized that his people were suffering, he "declared all the sandalwood the property of the government and ordered the people to devote only part of their time to its cutting and return to the cultivation of the land" (ibid.: 1992:204).

The Death of Kamehameha I and the Abolition of the Kapu System (1819-1820)

Kamehameha I died on May 8, 1819 at Kamakahonu, and the changes that had been affecting the Hawaiian culture since the arrival of Captain Cook in the Islands began to accelerate. Following the death of a prominent chief, it was customary to eliminate all of the regular *kapu* that maintained social order and the separation of men and women, elite and commoner. Thus, following Kamehameha's death, a period of *'ai noa* (free eating) was observed along with the relaxation of other traditional *kapu*. It was the responsibility of the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history traditional customs were altered (Kamakau 1992).

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

> eating followed the death of the ruling chief; after the period of mourning was over the new ruler placed the land under a new tabu following old lines. (Kamakau 1992:222)

Immediately upon the death of Kamehameha I, Liholiho (his son and to be successor) was sent away to Kawaihae to keep him safe from the impurities of Kamakahonu brought about from the death of Kamehameha. After purification ceremonies Liholiho returned to Kamakahonu. Instead of re-instating the traditional *kapu*, Liholiho ate the dog meat *kapu* to the women *ali'i*, entered the women's *lauhala* house, and did whatever he desired. While he may have done so during a time when he had not yet reinstituted the eating *kapu*, other chiefs present appear to have thought otherwise, and word spread that the *kapu* had been abandoned. Kekuaokalani, caretaker of the war god Kūka'ilimoku, was dismayed by his cousin's (Liholiho) actions and revolted against him, but was defeated.

With an indefinite period of free-eating and the lack of the reinstatement of other *kapu* extending from Hawai'i to Kaua'i, and the arrival of the Christian missionaries shortly thereafter, the traditional religion had been officially replaced by Christianity within a year following the death of Kamehameha I. By December of 1819, Kamehameha II had sent edicts throughout the kingdom renouncing the ancient state religion, ordering the destruction of the *heiau* images, and ordering that the *heiau* structures be destroyed or abandoned and left to deteriorate. He did, however, allow the personal family religion, the *'aumakua* worship, to continue (Kamakau 1992; Oliver 1961).

With the end of the *kapu* system, changes in the social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O'ahu, lessening the burden of resource procurement for the chiefly class on the residents of Hawai'i Island. Some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods that they could trade with early Western visitors. Introduced foods often grown for trade included yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845).

Waiākea 1820-1848: A Land in Transition and Early Historical Accounts

In October of 1819, seventeen Protestant missionaries set sail from Boston to Hawai'i. They arrived in Kailua-Kona on March 30, 1820 to a society with a religious void to fill. Many of the *ali'i*, who were already exposed to western material culture, welcomed the opportunity to become educated in a western style and adopted their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government. During this period, the sandalwood trade wrought havoc on the lives of the commoners, as they weakened from the heavy production, exposure, and famine just to fill the coffers of the *ali'i*, who were no longer under any traditional constraints (Kuykendall and Day 1976; Oliver 1961). The lack of control of the sandalwood trade was to soon lead to the first Hawaiian national debt as promissory notes and levies were initiated by American traders and enforced by American warships (Oliver 1961) The Hawaiian culture was well on its way towards Western assimilation as industry in Hawai'i went from the sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar industry.

The early 1800s heralded a new era in the Hilo Bay area that was marked by numerous rapid changes. During the first two decades of the nineteenth century, sandalwood was harvested and shipped from Hilo Bay and whaling ships were a common sight as they stopped at Hilo for supplies. Some of the earliest written descriptions of Hilo come from the accounts of the first Protestant Missionaries to visit the island, and early Historic visitors to Hilo noted the beauty and fertility of the region. In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai'i seeking out communities in which to establish church centers for the growing Calvinist mission. Ellis recorded observations made during this tour in a journal, and described the environs of Waiākea as a well-watered place, with some of the heaviest rains and densest fog he had encountered on the island (Ellis 1963). He considered the inhabitants lucky because of their access to well-stocked fishponds, fertile soil, and to the nearby woods which provided a source of lumber. Ellis (1963) estimated that nearly 400 houses were present near the bay, with a population of not less than 2,000 inhabitants with houses clustered along the beach in the dry lowland areas (Cordy 2000:353–354). During his five-day stay, Ellis characterized Waiākea as:

> ...the most beautiful we have yet seen. . . The whole is covered with luxuriant vegetation, and the greater part of it formed into plantations, where plantains, bananas, sugar-cane, taro, potatoes, and melons, grow to the greatest perfection.
>
> Groves of cocoa-nut and breadfruit trees are seen in every direction loaded with fruit, or clothed with umbrageous foliage. The houses are mostly larger and better built than those of many districts

> through which we had passed. We thought the people generally industrious; for in several of the less fertile parts of the district we saw small pieces of lava thrown up in heaps, and potato vines growing very well in the midst of them, though we could scarcely perceive a particle of soil.
>
> There are plenty of ducks in the ponds and streams, at a short distance from the sea, and several large ponds or lakes literally swarm with fish, principally of the mullet kind. The fish in these ponds belong to the king and chiefs, and are tabued from the common people.
>
> Along the stone walls which partly encircle these ponds, we saw a number of small huts, where the persons reside who have the care of the fish, and are obliged frequently to feed them with a small kind of mussel, which they procure in the sands round the bay.
>
> ...There are 400 houses in the bay, and probably not less than 2000 inhabitants... (Ellis 1963:337–338)

Ellis eventually set up a mission station in Waiākea that lasted until 1825 before moving to Punahoa 2nd Ahupua'a (Moniz 1994). A large number of churches were commissioned by newly converted *ali'i*, and Missionary journals from this time period describe the growing congregations of people drawn to the Hilo missions. Also in 1825, the H.M.S. *Blonde*, bearing the bodies of Liholiho and his wife Kamāmalu who had both died of measles while in England, arrived in Hilo Bay. Ka'ahumanu declared Hilo Bay would henceforth by known as Byron's Bay in honor of Lord Byron, the Commander of the H.M.S. *Blonde*. During shore-leave Lord Byron stayed at Waiākea, at a large house appropriated by Ka'ahumanu. The officers onboard describe the river of Wailuku and Wailoa as convenient watering places for visiting ships (Kelly et al. 1981:33). Upon leaving Hilo Bay the ship logs neatly summarize the potential of Hilo Bay:

> Byron Bay will, no doubt, become the site of the capital of Hawaii. The fertility of the district of Hido [sic]...the excellent water and abundant fish-pools which surround it, the easy access it has to the sandal-wood district, and also commerce, and the facility it affords for refitting vessels, render it a place of great importance. (Kelly et al. 1981:35)

In June of 1825, an American Protestant missionary by the name of Charles Samuel Stewart visited Hilo. Stewart depicted Hilo as a well-populated residence for natives and missionaries alike:

> . . .The reef runs in a curved direction from the point at the channel, about half a mile to the east, where it joins a romantic little islet covered with cocoanut trees; from that fact, called "Cocoanut island." A small channel runs between this and the main land, which is low, and sweeps round to the western cliffs in a beautifully curved sandy beach of about two miles, making the form of the bay that of a flattened horseshoe. The beach is covered with varied vegetation, and ornamented by clumps and single trees of lofty cocoanut, among which the habitations of the natives are seen, not in a village, but scattered everywhere among the plantations, like farm houses in a thickly inhabited country. The mission houses were pointed out to us, pleasantly situated near the water, about the middle of the curvature forming the head of the bay. At a very short distance from the beach, bread-fruit trees were seen in heavy groves, in every direction, intersected with the pandanus and kukui, or candle-tree, the hibiscus and the acacia, &c. The tops of these rising gradually one above another, as the country gently ascends towards the mountains in the interior, presented for twenty or thirty miles in the southeast a delightful forest scene, totally different in extent from anything I had before witnessed on the islands. (1828:287)

Hilo Bay's protected waters and sandy shores provided a calm and safe alternative for landfall for ocean going vessels involved in whaling and the sandalwood trade. The sandalwood trade was initiated in the 1790s but did not become successful until 1812; Kamehameha held the monopoly on the trade and oversaw its management by his chiefs until his death. Thereafter, King Liholiho's favored chiefs mismanaged the trade, which lead to the depletion of the forests and the end of the sandalwood trade by 1830 (Kelly et al. 1981). According to Kelly et al. (1981), historic accounts about whaling suggest that Hilo Bay was not a preferred port for the whalers due to the missionary influence and the resultant lack of liquor and women; sailors preferred Honolulu and Lahaina as ports-of-call. Whaling declined through the mid to later 1800s and came to a halt in 1892. However, industrial development in Hilo did not cease. Sawmills and early sugar plantations provided milled woods and sugar for export. In an 1840 letter, Reverend Titus Coan, who was stationed in Hilo, remarked on the town's growth:

> Industry is increasing. Our ports and places of trade begin to put on the air of activity and life. Temporal improvements and comforts are fast increasing at Hilo, that is, near the station. Two stores of goods are opened here, and three sugar-mills have recently gone into operation near us. Sugar-

> cane is being planted to a considerable extent; business assumes more tone and energy, and many of the people are approximating towards industry and competence. Probably the amount of cloth worn by the people has increased ten or twenty fold during four years past. Labor is in better demand and wages are rising continually. (Kelly et al. 1981:49)

In 1840, Lieutenant Charles Wilkes, head of the U.S. Exploring Expedition, traveled to Hilo. His narrative provides a similar account to those written by others in earlier times, painting the Hilo settlement as a lush, verdant, and well-watered locale, and remarked upon the agricultural potential of the district, revealing that "the sugar-cane grows here in abundance, and of a large size; coffee succeeds well, as do indigo and the tacca, from which they make a quantity of arrow-root" (Wilkes 1845:223). In addition to mentioning the early commercial sugarcane enterprises that were just emerging in the district, Wilkes further expands on the environs of Hilo and provided an account of his journey from Hilo to Puna through the Pana'ewa forest:

> The scene which the island presents as viewed from the anchorage in Hilo Bay, is both novel and splendid: the shores are studded with extensive groves of cocoa-nut and bread-fruit trees, interspersed with plantations of sugar-cane; through these, numerous streams are seen hurrying to the ocean; to this succeeds a belt of some miles in width, free from woods, but clothed in verdure; beyond is a wider belt of forest, whose trees, as they rise higher and higher from the sea, change their characters from the vegetation of the tropics to that of polar regions; and above all tower the snow-capped summits of the mountains. . .
>
> Hilo is a straggling village, and is rendered almost invisible by the luxuriant growth of the sugar-cane, which the natives plant around their houses. A good road has been made through it for the extent of a mile, at one end of which the mission establishment is situated. This consists of several houses, most of which are of modern style, covered with zinc and shingles. One of them however, the residence of the Rev. Mr. Coan, was very differently built, and derived importance in our eyes, from its recalling the associations of home. It was an old-fashioned, prim, red Yankee house, with white sills and casements, and double rows of small windows. No one could mistake the birthplace of the architect, and although thirty degrees nearer the equator than the climate whence its model was drawn, I could not but think it as well adapted to its new as to its original station.
>
> The whole settlement forms a pretty cluster; the paths and roadsides are planted with pine-apples; the soil is deep and fertile, and through an excess of moisture, yields a rank vegetation. . .
>
> The church is of mammoth dimensions, and will, it is said, accommodate as many as seven thousand persons. It is now rapidly falling into decay, and another is in progress of erection. Many of the native houses are surrounded with bread-fruit and cocoa-nut trees, and have a fine view of the bay.
>
> Six miles from Hilo we entered the first wood, and at 6 P.M. we passed, at eight miles distance, the chasm that divides the Hilo from the Puna district. As the darkness set in, we began to experience the difficulties we had anticipated from our late start: the bustle and noise became every moment more audible along the whole line as the night advanced: what added not a little to our discomfort, was the bad road we now had to encounter, rendered worse as each native passed on in the tracks of those preceding him, until at last it became in places quite miry.
>
> (1845:114–118)

The Legacy of the *Māhele 'Āina* of 1848

By the mid-nineteenth century, the ever-growing population of Westerners in the Hawaiian Islands forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership. By 1840 the first Hawaiian constitution had been drafted and the Hawaiian Kingdom shifted from an absolute monarchy into a constitutional government. Convinced that the feudal system of land tenure previously practiced was not compatible with a constitutional government, the King (Kamehameha III) and his high-ranking chiefs decided to separate and define the ownership of all lands in the Kingdom (King n.d.). This change was further promoted by missionaries and Western businessmen in the islands who were generally hesitant to enter business deals on leasehold lands that could be taken from them at any time. After much consideration, it was decided that three classes of people each had one-third vested rights to the lands of Hawai'i: the King, the chiefs and *konohiki*, and their tenants (the *maka'āinana* or common people). In 1845 the legislature created the "Board of Commissioners to Quiet Land Titles" (more commonly known as the Land Commission. All land claims, whether by chiefs for entire *ahupua'a*

or by tenants for their house lots and gardens, had to be filed with the Land Commission within two years of the February 14, 1846, but the deadline was extended several times for chiefs and *konohiki* (Soehren 2005).

The King and some 245 chiefs (Kuykendall 1938) spent nearly two years trying unsuccessfully to divide all the lands of Hawai'i amongst themselves before the whole matter was referred to the Privy Council on December 18, 1847 (King n.d.). Once the King and his chiefs accepted the principles of the Privy Council, the *Māhele 'Āina* (Land Division) was completed in just forty days (on March 7, 1848), and the names of all of the *ahupua'a* and *'ili kūpono* (nearly independent *'ili* land division within an *ahupua'a*, that paid tribute to the ruling chief and not to the chief of the *ahupua'a*) of the Hawaiian Islands and the chiefs who claimed them, were recorded in the *Māhele* Book (Soehren 2005). As this process unfolded King Kamehameha III, who received roughly one-third of the lands of Hawai'i, realized the importance of setting aside public lands that could be sold to raise money for the government and also purchased by his subjects to live on. Accordingly, the day after the division with the last chief was recorded in the *Buke Māhele* (*Māhele* Book), King Kamehameha III commuted about two-thirds of the lands awarded to him to the government (King n.d.). Unlike the King, the chiefs and *konohiki* were required to present their claims to the Land Commission to receive their awards (LCAw.). The chiefs who participated in the *Māhele* were also required to provide to the government commutations of a portion of their lands in order to receive a Royal Patent giving them title to their remaining lands. The lands surrendered to the government by the King and chiefs became known as "Government Land," while the lands retained by Kamehameha III became known as "Crown Land," and the lands received by the chiefs became known as "*Konohiki* Land" (Chinen 1958:vii, 1961:13). All lands awarded during the *Māhele* 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.

During the *Māhele*, native tenants of the lands that were divided up among the Crown, *Konohiki*, and Government could claim, and acquire title to, *kuleana* parcels that they actively lived on or farmed. The Board of Commissioners oversaw the program and administered the *kuleana* as Land Commission Awards (LCAw.). Claims for *kuleana* had to be submitted during a two-year period that expired on February 14, 1848 to be considered. All of the land claimants were required to provide proof of land use and occupation, which took the form of volumes of native registry and testimony. 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. The work of hearing, adjudicating, and surveying the claims required more than the two-year term, and the deadline was extended several times for the Land Commission to finish its work (Maly 2002). In the meantime, as the new owners of the lands on which the *kuleana* were located began selling parcels to foreigners, questions arose concerning the rights of the native tenants and their ability to access and collect the resources necessary for sustaining life. The "Enabling" or "*Kuleana* Act," passed by the King and Privy Council on December 21, 1849, clarified the native tenants' rights to the land and resources, and the process by which they could apply for fee-simple interest in their *kuleana*. The work of the Land Commission was completed on March 31, 1855. A total of 13,514 *kuleana* were claimed by native tenants throughout the islands, of which 9,337 were awarded (Maly 2002).

Historically, the entire *ahupua'a* of Waiākea was treated as personal land by Kamehameha I and passed on to his son Liholiho. Waiākea was later inherited by chiefess Kaunuohua, a grand-daughter of Keawemauhili and *kahu* of Alexander Liholiho (Kame'eleihiwa 1992), who later relinquished the *ahupua'a* during the *Māhele 'Āina*. As a result of the *Māhele*, Waiākea Ahupua'a was then set aside as Crown Lands for Kamehameha III. Twenty-six *kuleana* claims, or Land Commission Awards (LCAw.), were registered within Waiākea for house lots and cultivated areas. Mostof the LCAw. were located along major inland roads, or centered around the fishponds at the inland edge of Hilo Bay (Devereux et al. 1997; Moniz 1994); none were in the vicinity of the current study area

In 1862, the Boundary Commission was established to set the legal boundaries of the *ahupua'a* that were awarded during the *Māhele*. The commissioners were authorized to certify the boundaries in 1874. The primary informants for the boundary descriptions were older native residents of the specific areas in question. Many times the boundaries of particular *ahupua'a* were established through the testimony regarding neighboring *ahupua'a*. Such was the case for Waiākea; informants, many of whom were born in the late 1700s, provided boundary data for Kea'au in Puna, Keauhou in Ka'u, Kukuau in South Hilo, and Humu'ula in North Hilo, all of which border Waiākea. In describing the *ahupua'a* boundaries, references are made to coastal landmarks, then current and former residential areas, planting areas (none extending above about 2,000 feet), locations of woods where trees for canoes were acquired (above Hilo at a place called Nehuiki), and areas deep in the forest for bird catching. A point at the summit of Pu'u Kūlani marks the southwestern corner of Waiākea Ahupua'a.

Commercial Sugar Enterprises in Waiākea, Railroad Development, and Later Historic Accounts

The written history of the late nineteenth to the early twentieth century largely reflects news of new settlers, religious endeavors, and commercial agricultural pursuits in the region. In the decades following the *Māhele*, when land became a commodity, Hawaiians were often forced off their house lots (and livelihoods) simply because they lacked the cash with which to make the purchase (of land) or pay the property tax. The creation of private property also resulted in a shift away from the traditional *mauka*-to-*makai* management of whole *ahupua'a* and conventional transportation methods, as certain industries moved into large swaths of land such as livestock ranching and commercial sugar pursuits in the *mauka* lands of Waiākea. As a result, Hawaiian culture was well on its way towards Western assimilation as industry in Hawai'i transitioned from the boom-and-bust sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar and cattle industries.

One of the primary industries that emerged in Waiākea during the mid to late nineteenth century was commercial sugar cultivation. The Polynesian-introduced *kō* (sugarcane; *Saccharum officinarum*) was grown on all islands, and stands as perhaps the most widely developed and extensively cultivated crop in Precontact Hawai'i. Cultivation of sugar for commerce purposes has had the unfortunate effect of diluting the distinguishing characteristics of Hawaiian cane varieties due to the hybridization of traditional and introduced species. prior to its exploitation for profit, *kō* served as a fixed element in Hawaiian horticulture that served a variety of important uses. *Kō* was traditionally planted in the lowland plains, and Neal (1965) relates that there were approximately 40 named varieties cultivated by the Hawaiians. Included in these is the most common *kō kea* (white cane) which was a typically planted near old homesteads. In general, *kō* is purported to grow well in almost all locales, and was "planted at *kihapai* of sweet potato, dry taro and *wauke*, and on the banks of *lo'i* taro patches; and fields of cultivated plants were beautified by plantings of cane along their banks and borders" (Kamakau 1976:39).

Of great curative value, *kō* was considered especially therapeutic and was included as an essential component of medicinal tonics and compounds (Handy 1940). Aside from its role as an active ingredient in medicines, Abbott (1992) opines that it was sometimes used not as a primary constituent, but rather as a flavoring agent to sweeten distasteful bitter herbs in curative compounds. Alternatively, its sweet juice could also be used in a more insidious manner to conceal and accelerate the effects of various poisons (Lincoln 2017). The juice of the *kō* was considered as a very effective remedy for healing deep cuts and wounds, fractured limbs, and severed body parts, healing the skin leaving no evidence of scar tissue (Kaaiakamanu and Akina 1922; Krauss 1993). It also served chiefly as sustenance, and was eaten as a snack, condiment, and a famine food. The juice of the *kō* could be toasted over the fire and fed to nursing babies, and was used to strengthen children's teeth by chewing (Handy and Handy 1991). From a more utilitarian aspect, *kō* could be used to thatch the interior of houses when *pili* grass or *lauhala* (pandanus) were not abundant (Handy 1940; Malo 1951).

It was not until 1835 that sugar became established commercially in the islands, replacing the waning sandalwood industry, and early sugar enterprises were attempted in South Hilo as early as the 1840s (Kuykendall and Day 1976; Oliver 1961; Wilkes 1845). During the 1860s, Kamehameha IV leased large portions of Waiākea for pastureland and sugarcane cultivation (Moniz 1994). The majority of the eastern portions of Waiākea however, remained outside the region of sugar cultivation, most likely due to the shallow soils therein. Commercial sugarcane cultivation had a profound impact on the *ahupua'a* as a whole, and the declining population of Waiākea began to increase as a result of the industrial and economic growth brought about by the sugar industry (Wolforth 2007). By 1857, there were three sugar mills producing sugar for export in the Hilo area. With the Kingdom-wide economic depression that occurred as a result of the U.S. whaling fleet pulling out of the Hawaiian Islands in 1859, the focus of commercial cultivation shifted from general agriculture to sugarcane (McEldowney 1979). The 1860s not only saw an increase in the appropriation of land by foreigners for commercial sugar cultivation, but additionally in 1861 S. Kipi leased the Crown Lands of Waiākea at the rate of $600 dollars a year to be used as pasture land for a term of five years (Kelly et al. 1981; Maly 1996). During this time, the study area and lands in the immediate vicinity in Pana'ewa appeared to have been spared by these enterprises, remaining as undeveloped forest lands. One of the earliest maps of Waiākea drawn by W.M. Webster in 1851 shows the boundaries of the Pana'ewa forest in addition to two thoroughfares: the "Road from Olaa to Hilo" west of the study area, and the "Road to Puna" directly to the east of the study area, both of which provided access from Puna to Hilo (Figure 22).

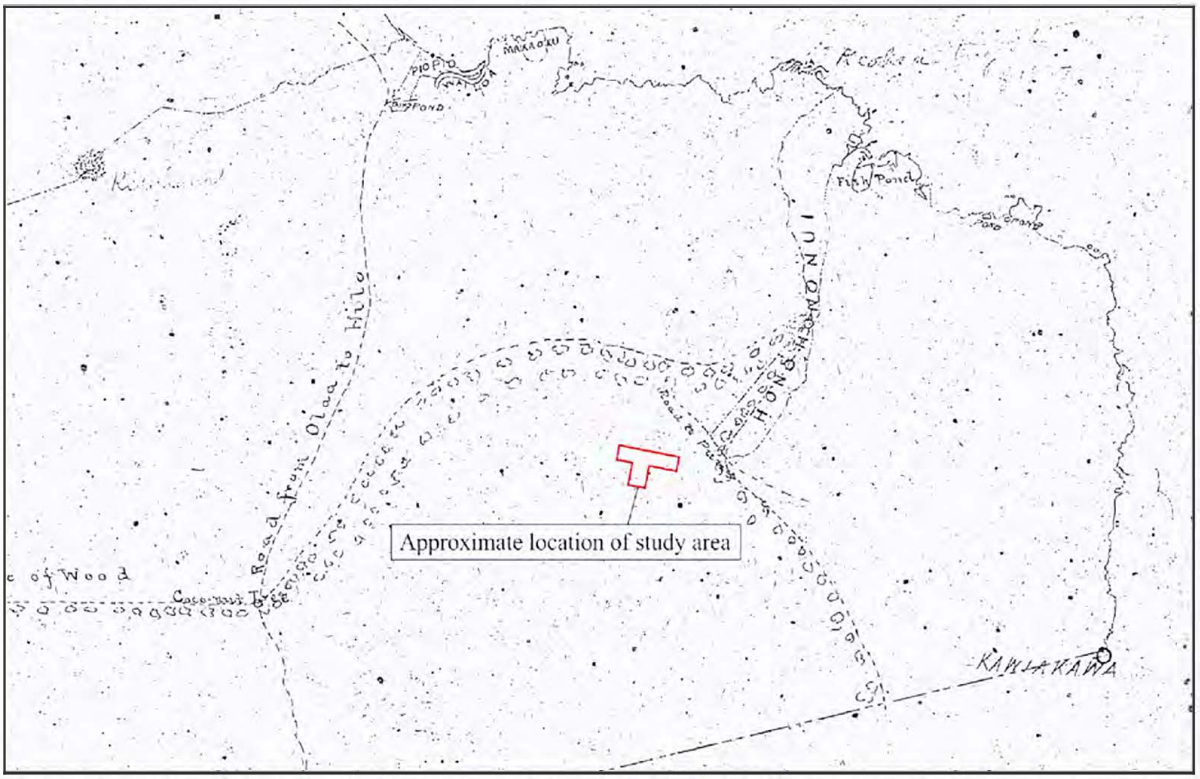

Figure 22. Portion of 1851 Hawai'i Registered Map No. 705 by W.M. Webster showing the eastern portion of Waiākea and study area location (outlined in red) relative to the bounds of the Pana'ewa forest.

Although the commercial cultivation of sugar had commenced roughly thirty years prior in South Hilo, it hadn't quite begun to dominate the district yet. Isabella Bird visited Hilo in 1873 and published her experiences in *The Hawaiian Archipelago: Six Months Among the Palm Groves, Coral Reefs, & Volcanoes of the Sandwich Islands* (Bird 1882). Her firsthand accounts of Hilo are dreamy and romanticized: perhaps the most vivid of all foreign accounts regarding the environs of Waiākea and Pana'ewa. In the following excerpt, she describes the region as thickly vegetated, but makes no mention of sugarcane or burgeoning industrialization in the vicinity of the study area. She does, however, note that "above Hilo, broad lands sweeping up cloudwards, with their sugar cane, *kalo*, melons, pine-apples, and banana groves suggest the boundless liberality of Nature" (Bird 1882:36). Bird also provide a colorful depiction of her journey from Puna to Hilo through the 4-mile-wide Pana'ewa forest, on either the old Puna Trail or the road to 'Ōla'a (see Figure 22; Figure 23) in the vicinity of the study area:

> . . . We had a delicious gallop over the sands to the Waiakea river, which we crossed, and came upon one of the vast lava-flows of ages since, over which we had to ride carefully, as the *pahoehoe* lies in coils, tortuosities, and holes partially concealed by a luxuriant growth of ferns and convolvuli. The country is thickly sprinkled with cocoanut and breadfruit trees, which merge into the dense, dark, glorious forest, which tenderly hides out of site hideous, broken lava, on which one cannot venture six feet from the track without the risk of breaking one's limbs. All these tropical forests are absolutely impenetrable, except to axe and billhook, and after a trail has been laboriously opened, it needs to be cut once or twice a year, so rapid is the growth of vegetation. This one, through the Puna woods, only admits of one person at a time. It was really rapturously lovely. Through the trees we saw the soft steel-blue of the summer sky: not a leaf stirred, not a bird sang, a hush had fallen on insect life, the quiet was perfect, even the ring of our horses hoofs on the lava was a discord. There was a slight coolness in the air and fresh mossy smell. It only required some suggestion of decay, and the rustle of a fallen leaf now and then, to make it an exact reproduction of a fine day in our English October. The forest was enlivened by many natives bound for Hilo, driving horses loaded with cocoanuts, breadfruit, live fowls, *poi* and *kalo*, while others with difficulty urged garlanded pigs in the same direction, all as presents for the king. (Bird 1882:129–130)

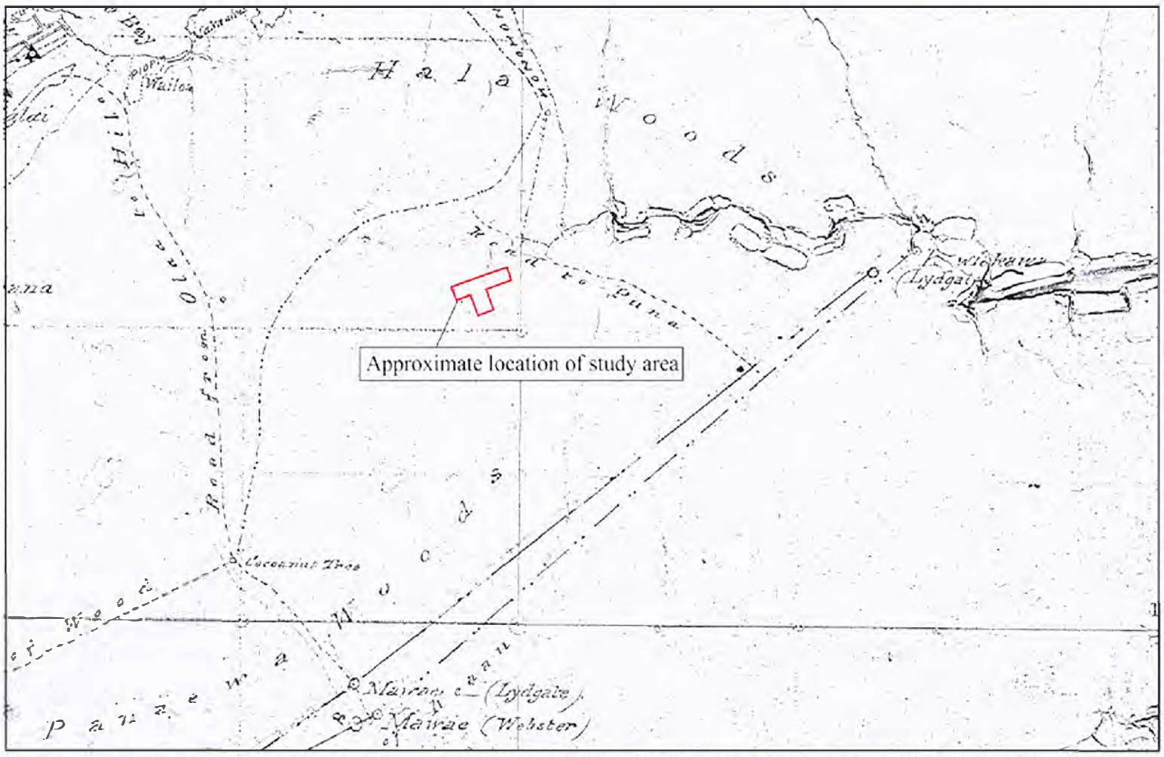

Figure 23. Portion of Hawai'i Registered Map No. 571 by C.J. Lyons (ca. 1870s) of "Central Hawaii Hilo and Hamakua" showing the "Road to Puna" in relation to the current study area within the Pana'ewa forest and the current study area.

Not long after Bird's visit to Waiākea, and following the signing of the 1875 Treaty of Reciprocity, a free-trade agreement between the United States and the Kingdom of Hawai'i which guaranteed a duty-free market for Hawaiian sugar in exchange for special economic privileges for the United States, commercial sugarcane cultivation and sugar production became the central economic focus for the Hilo area. By 1874, Hilo already ranked as the second largest population center in the islands and within a few years the fertile uplands, plentiful water supply, and port combined to make Hilo a major center for sugarcane production and export. In that same year, the first lease for sugarcane cultivation in Waiākea was granted to Rufus A. Lyman for a term of 25 years. The lease granted him all the privileges of the land including the use of the fishponds and the cutting of firewood (Maly 1996). This lease was eventually transferred to the Waiākea Mill Company, founded by Alexander Young and Theo H. Davies, and the Waiākea sugar plantation was established.

In 1879 the Waiākea Mill Company (Figure 24) incorporated and began a commercial sugar operation on about 350 acres of land in Waiākea that they acquired from Lyman northeast of the current study area. The Waiākea sugar mill, also built in 1879, was located at the inland end of Waiākea fish pond, and the company lands extended south from the mill to the uplands of Waiākea Ahupua'a, but did not include the study area. Rather, the lands in and around the study area remained forested and mostly utilized by individuals traversing between Puna and Hilo on the old Puna Trail. an 1883 account by D.H. Hitchcock paints the route as a "miserable muddy trail to the Panaewa woods, and through these woods on a narrow trail, for most of the time overgrown with ai and guava bushes, until the cocoanut grove was reached" (Hitchcock 1897). The thick density of vegetation in the Pana'ewa forest was also noted in an account from the following year:

> . . . little to be seen along the route [to Hilo from Puna], except the luxury of the tropical forest, the beauty of which increases steadily as we approach the town. It is doubtful if its luxuriance can be surpassed by that of any other country in the world.
>
> . . . The approach from Hilo is the most difficult of all, because it involves the necessity of traversing the belt of forest which lies between the middle slopes of the mountain and the sea. No one can imagine the density and exuberance of tropical vegetation until he has seen it. In truth, the forest

> can be penetrated only by hewing a way through it or by traversing a route which has already been cut by main force. (Report of the Director of the United States Geological Survey 1883)

Over the course of the next few years, the Pana'ewa forest remained as it was, but the sugar industry continued to progress. By 1887, railroads operating on steam and animal power were built on some plantations, although some utilized flumes or cable railways to transport cane from the fields to the coast mills. One year later in 1888, the Waiākea Mill Company further increased its land holdings by acquiring a 30-year lease for additional lands in Waiākea. These lands were systematically cleared and planted in sugarcane in the years to come. In 1889, J. Cumming Dewar voyaged on the SS *Nyanza* from Kawaihae to Hilo to meet with the manager of the Waiākea Mill, and succinctly described Hilo and its fields of cane:

> After a delightfully fine evening and a smooth passage during the night, we arrived and anchored in Hilo Bay at 10 A.M. on Sunday, January 6. From daybreak till the time of our reaching the port, the scenery as we steamed along the coast was exceedingly attractive. Numerous waterfalls were to be seen precipitating themselves over the cliffs into the sea, whilst ever and anon we passed large plantations of sugar-cane. (Dewar 1892:260–261)

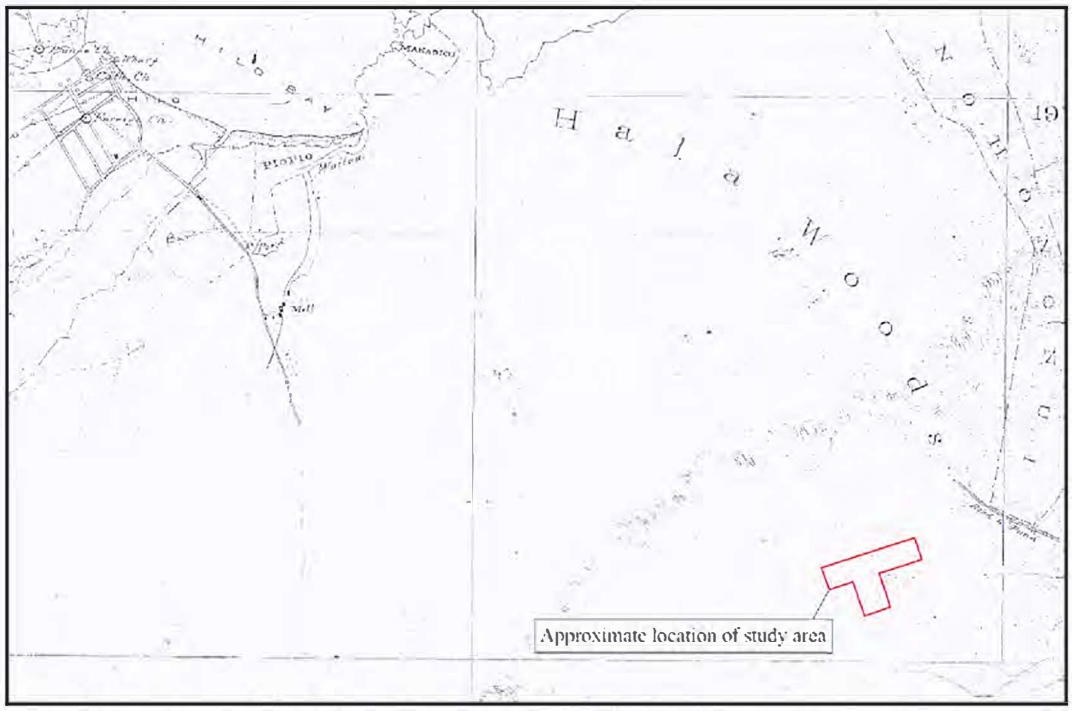

Figure 24. Portion of undated Hawai'i Registered Map No. 842 by Lyons and Covington of showing "Lands of Hilo Hawaii" showing Hilo Bay and Waiākea Mill in relation to study area (outlined in red).

With the annexation of Hawai'i to the United States in 1898 and the granting of Territory status in 1900, Hilo was designated the center of county government in 1905 and remained the second most populated city in the newly formed Territory of Hawai'i. Railroad construction was one of the most important elements of governmental and private sector planning following the Treaty of Reciprocity, as crops and product were still being transported by beast and cart (Dorrance and Morgan 2000). On the Island of Hawai'i, the first major line to be constructed was in North Kohala District, which operated as the Hawaiian Railroad Company. The North Kohala line, however, was envisioned as only the first step toward a much larger system connecting the cane fields of Kohala, Hāmākua, and Hilo with Hilo Harbor, the only protected deep-water port on the island. Beginning in 1899, railroad lines began transporting sugar to the harbor for marine transport, thus Hilo became an important shipping and railroad hub. It was in during this year that the Waiākea Mill Company established a railroad system to carry the cane from the fields to the mill for processing and the Hilo Railroad Company had begun building tracks from Waiākea through the Pana'ewa forest to the 'Ōla'a Sugar Company Mill in the district Puna (Kelly et al. 1981), which would later become part of the Hawai'i Consolidated Railway (HCR). By the early twentieth century, the Waiākea Mill Company had increased the area under sugarcane cultivation in Waiākea to nearly 7,000 acres.

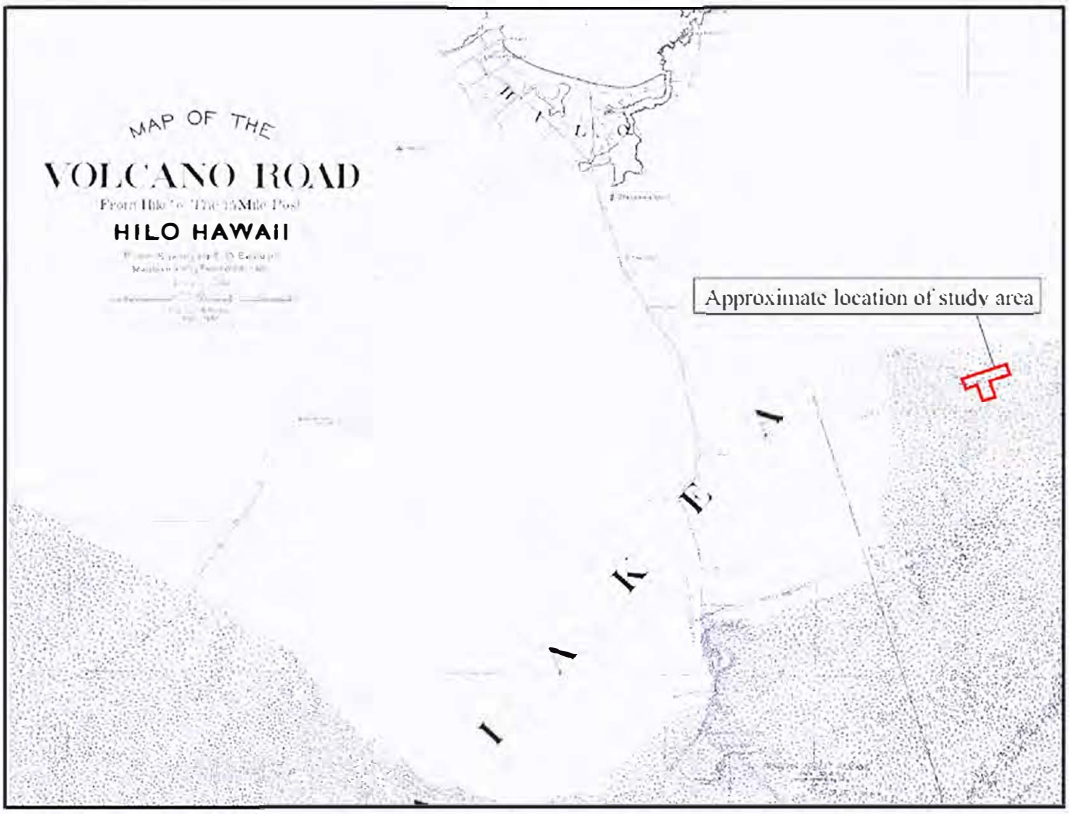

Figure 25. Portion of Hawai'i Registered Map No. 1713 from 1893 by E.D. Baldwin showing the northern extent of the Pana'ewa Woods and approximate location of the study area (outlined in red).

The commercial sugar industry provided most of the cargo transported by HRC, but suffered a sharp decline between the years of 1904-1907, which caused a halt of development in Hilo (Thurston 1913). In response, HRC worked with 'Ōla'a Sugar Company to send a representative to Washington D.C. in 1907 to secure funding for the construction of a breakwater that would allow Hilo Bay to accommodate larger ocean-going vessels. Construction on the breakwater began in 1908 and was still ongoing at the time of Thurstons' writing (ca. 1914); the breakwater was finally completed in 1929. In exchange for construction of a breakwater in Hilo Bay, the Hilo Railroad was required to build a new wharf, a one-mile rail extension from Waiākea, and a 50 mile rail extension north to Honoka'a Mill (the Hāmākua Division). The funding of the breakwater by HRC resulted in the extension of the railroad through the populated section north of Hilo all the way to Hakalau and Hāmākua (Figure 27):

> When the breakwater project was pending before Congress, opposition was made to the appropriation on account of the limited commerce then being transacted through Hilo harbor.
>
> Assurances were thereupon made by the Hilo Railroad Company, that if the breakwater were constructed, a railroad would be built into the country north of Hilo and suitable wharf facilities provided under the lee of the breakwater. Such assurances had a material effect in securing the appropriation. (ibid.:145)

The extension to Honoka'a would finally connect the sugar mills of South Hilo, North Hilo, and Hāmākua with Hilo's protected harbor. Between June 1909 and December 24, 1911, HRC built 12.7 miles of rail extending from Hilo to Hakalau Mill, crossing many deep gulches and valleys along its route.

Ultimately, the cost of the Hāmākua Division ruined HRC and as a result, they were forced to sell out and reorganize under the name Hawaii Consolidated Railway (HCR) in 1916. Two years later in 1918, the Waiākea Mill Company's lease of Waiākea Ahupua'a expired, and the land fell under new homesteading laws that required the government to lease portions of it to individual homesteaders who would be willing to grow sugarcane. Some of the most fertile lands in Waiākea, to the southwest of the Hawai'i Consolidated Railway right-of-way (and the study area) were subsequently subdivided by the Territory of Hawai'i into house lots, homesteads, and cane lots of various sizes for lease and purchase. It was during this time that the state of the Puna Trail fell into deterioration, and by 1919 it

was said to be largely unutilized, particularly with the advent of automobiles, the development of more accommodating and direct thoroughfares, and increasing industrialization in surrounding areas (Figure 26). The following account chronicles the decaying condition of the trail during this time period, details its construction methods and significance prior to its abandonment, and reveals that in the face of burgeoning urbanization of the area that traditional lifeways persisted nevertheless:

> There is, for instance, the old Puna trail—or what is left of it. Few have passed that way since automobiles came into general use, yet it leads through charming ways along the coast beyond the Seaside Club. It is no ordinary trail and bears evidence even in the partial decay of being constructed to withstand much traffic. The sides are carefully walled and the footway set with small stones. It is a picturesque relic and with a complementary compilation of the rich legendry which must be identified with it would make an additional showplace for visitors. The trail winds through primitive and riotous jungle, touches secluded bits of shore and discovers here and there tiny huts in which dwell native Hawaiians who appear to be quite happy in knowing little of the world and caring less.
>
> It is not likely that the lands through which this old trail winds will soon be required for commercial use, as most of it is roughly piled aa or pahoehoe full of pukas, but whatever is done with it there should be a strip reserved by the Government to include portions at least of the old Puna trail. It would be a shame to permit its entire obliteration. (Hilo Daily Tribune 1919)

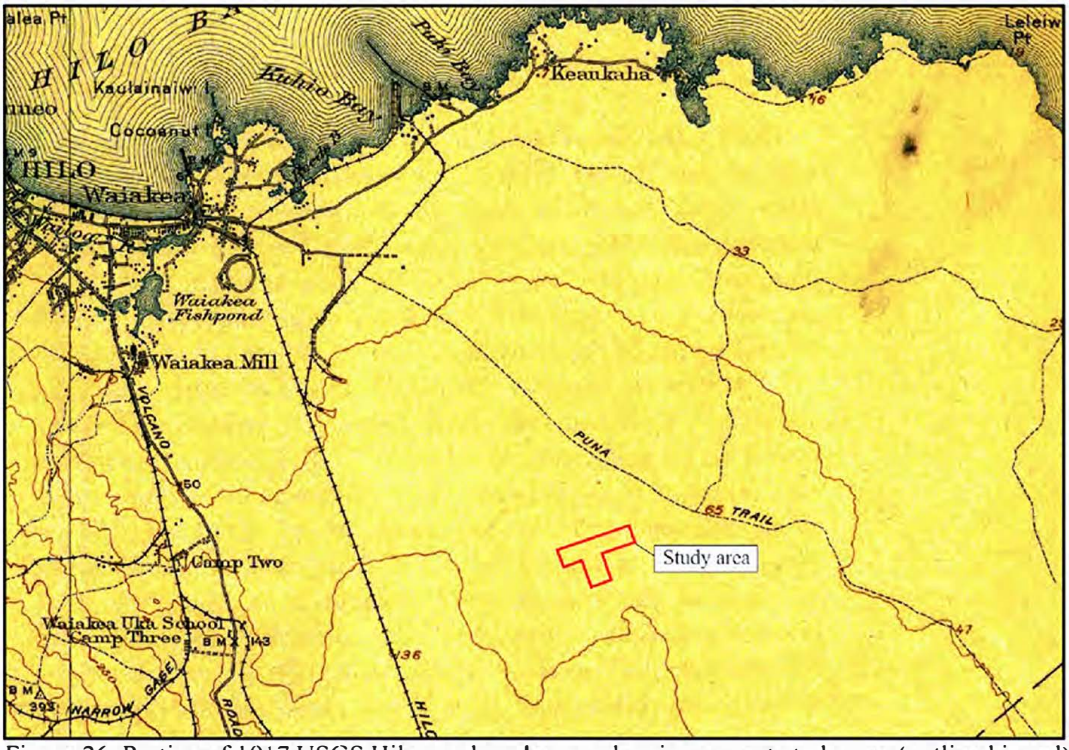

Figure 26. Portion of 1917 USGS Hilo quadrangle map showing current study area (outlined in red) in relation to the "Puna Trail" alignment, Hilo railroad, and Waiākea Mill.

By 1921, the large tracts of land within and below the Pana'ewa forest were being recognized for their potential as "an agricultural and pastoral region" and it was opined that "in time to come great enterprise will be built up among the kipukas found all through the Panaewa and Puna sections of this island" (Hilo Daily Tribune 1921). Following the establishment of the Waiākea Homesteads (Figure 28), and in an effort to help Native Hawaiians maintain their traditional ties to the land, the federal government of the United States passed the Hawaiian Homes Commission Act and set aside approximately 200,000-acres in the Territory of Hawai'i as a land trust for homesteading by native Hawaiians (administered by the Hawaiian Homes Commission). Included in this initial distribution of land were two tracts in the Pana'ewa portion of Waiākea (totaling 2,000 acres) to the west of the current study area. The first awarding of these Hawaiian homestead lots (the Pana'ewa farm lots) occurred in the 1940s. By the mid-1940s, contractual and legal problems combined with a declining sugar market and the devastating *tsunami* of 1946 led the Waiākea Mill Company to cease operation the following year in 1947.

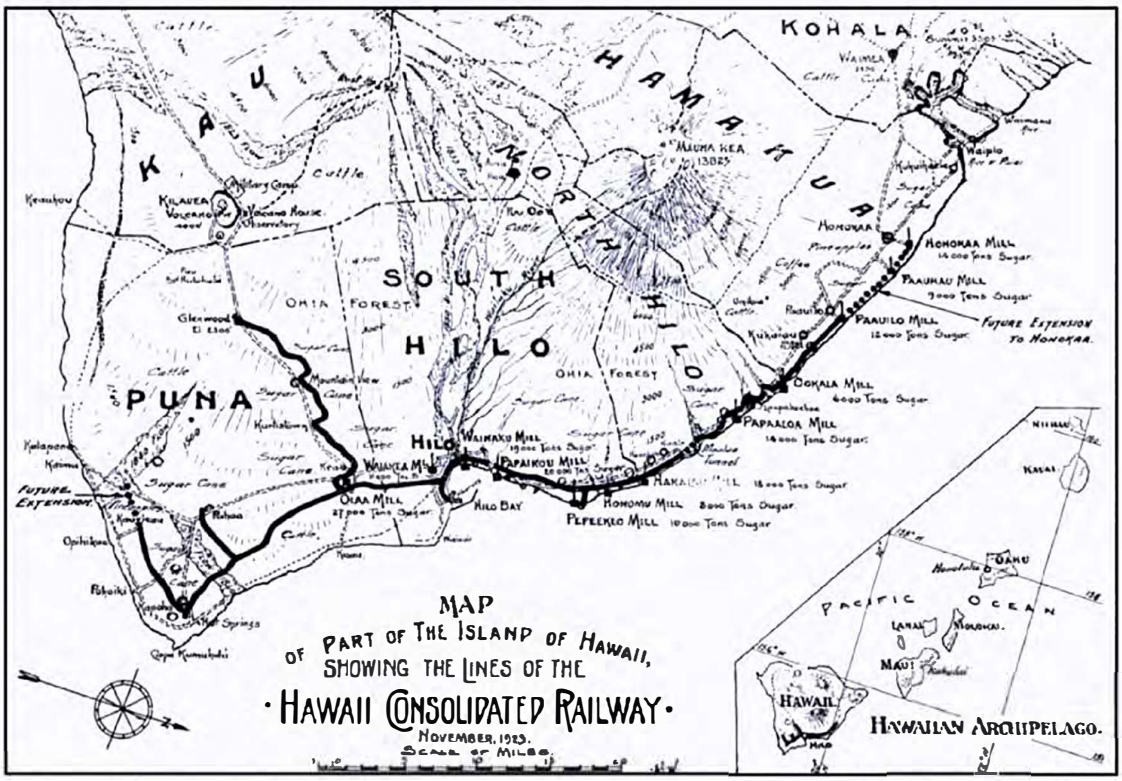

Figure 27. Hawai'i Consolidated Railway Map of rail system as of November 1923 (Annual Report 1926).

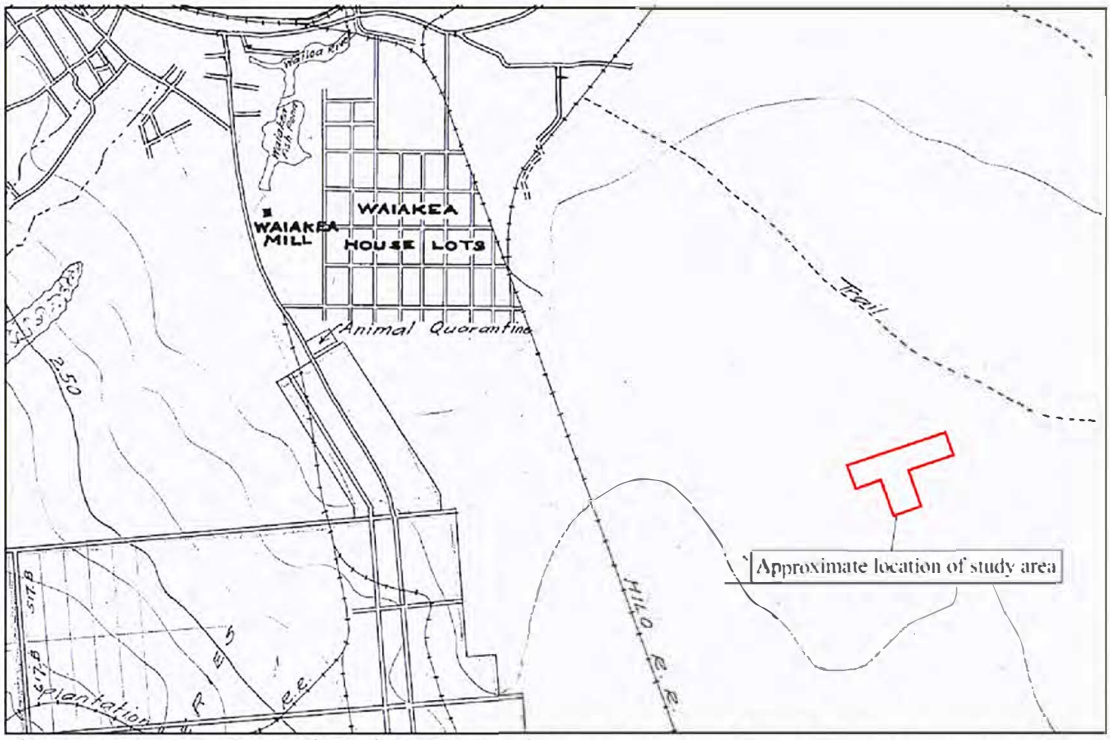

Figure 28. Portion of Hawai'i Territory Survey plat No. 787 by Jos. Iao ca. May 1920 showing study area (outlined in red) in relation to the Hilo Railroad, Puna Trail, Waiākea House Lots, and Waiākea Mill.

The sugar industry brought widespread changes to the Hilo area and drastically altered the traditional landscape of the district. As part of the late nineteenth century development of the sugar plantations and related infrastructure, some of Hilo's largest fishponds (Hanalei, Kalepolepo, Mohouli, Waiāhole, and Hoakumau) were filled in, and many old residences, burial sites, trails, *heiau*, formerly located in the cane fields were destroyed as a result. Throughout the 68 years of its operation, the Waiākea Mill Company was a major force in shaping the economic and social growth of Hilo, and certainly left its mark on both the cultural and physical landscapes of the area.

The *Tsunami* of 1946 and 1960 and the Lands of the Current Study Area During the 20th Century

On April 1, 1946, a *tsunami* triggered by a 7.1 magnitude earthquake in the Aleutian Islands slammed into the north-facing shores of Hawai'i Island. It claimed the lives of 159 people, destroyed more than 500 buildings, and caused millions of dollars in property damage (Figure 29). The coastal community of Waiākea was decimated by the *tsunami* and associated flooding, which inundated an area spanning from central Hilo eastward to Keaukaha. The waves crushed numerous structures and lifted others off their foundations and swept them inland. The *tsunami* dealt a fatal blow to the already struggling HCR. Tracks around the waterfront were entirely washed out and the Hilo Station was wrecked. An entire span of the Wailuku Bridge was torn out and washed out, and Waiākea Town never recovered from the devastation and was never rebuilt.

Figure 29. Aftermath from the 1946 *tsunami* with Waiakea Mill standing near back of Waiākea fishpond, study area vicinity in background (Hawaii Tribune-Herald 2017).

Nine year later in 1955, Robert Yamada leased roughly 380 acres of Honohononui Ahupua'a, *mauka* of Kalaniana'ole Avenue and south of the Hilo airport, as pasture land. Just five years later, on May 23, 1960, a devastating series of eight major *tsunami* waves triggered by an 8.3 earthquake in Chile, South America, swept through Hilo. One year later in 1961, most of Yamada's leased land was chain-dragged, and between 1962 and 1963 the County of Hawai'i exercised eminent domain to acquire numerous parcels of land in the *tsunami* affected areas of Hilo as part of the Hawai'i Redevelopment Agency's Kaiko'o Project. The goal of this project was to "designate lands…for such reuse as will minimize the danger of loss of life or damage to property in areas subject to possible inundation and flooding from future seismic waves" (Hawaii Redevelopment Agency 1965:3). Project activities

included not only the acquisition of property, but relocation assistance for affected residents and business owners, property management, demolition and building removal, re-zoning of land use and preparation (clearance, grading, and filling) for new development, and disposition of acquired lands by sale or lease at a fair price for new development. The portion of TMK: (3) 2-1-013:002 that contains the current study area was designated as a 113.382-acre "Borrow Pit Site" as a result of the Hawai'i Redevelopment Agency's Kaiko'o Project. Yamada & Sons, Inc. and the County of Hawai'i also had 40-acre borrow pit sites located to the southwest of the current study area, adjacent to a roughly 192-acre strip of land that was deeded to the Department of Hawaiian Home Lands (DHHL) by the State of Hawai'i on January 8, 1962. Another 40-acre parcel of land adjacent to the northern edge of the borrow pit site eventually became the location of the South Hilo Sanitary Landfill.

By 1965, quarrying activities within the Hawai'i Redevelopment Agency borrow pit had commenced, and had intruded slightly into the northern portion of the current study area (Figure 30). Additionally, extensive quarrying activities were being conducted within the original 40-acre Yamada & Sons, Inc. borrow pit site (west of the study area on TMKs: (3) 2-1-013:160, 161, and 163) at this time. Between 1965 and 1970, the leased lands were also used to stockpile sugarcane bagasse. Five years later in 1975, Yamada & Sons, Inc. reduced the amount of leasehold lands to encompass only 180 acres, of which 150 acres was used for agricultural purposes with 30 acres being used as a quarry site. During that year, most of the leased lands were mechanically cleared and turned to pastureland. In a seven-year span between 1970 and 1977, much of the study area appears to have been cleared of vegetation, and a 1977 orthographic photo-quadrangle indicates that quarrying activities occurring on the original borrow pit had expanded into the southwestern corner of the study area and also across Parcel D (Figure 31). Additionally, the road that bisects the current study area is evident, as is a connector road that extends northwest to southeast across the northern portion of the area of the proposed quarry site. Although activities associated with quarrying of the current study area appear to have ceased by the early 1990s, as evidenced in a 1992 USGS aerial photograph (Figure 32), quarrying activities at the adjacent borrow pit site to the west have continued to this day. Additionally, that operation expanded its scope in 2007 to include the 14.99-acre "Parcel D" situated directly adjacent to the currently proposed quarry and borrow pit site also to the west.

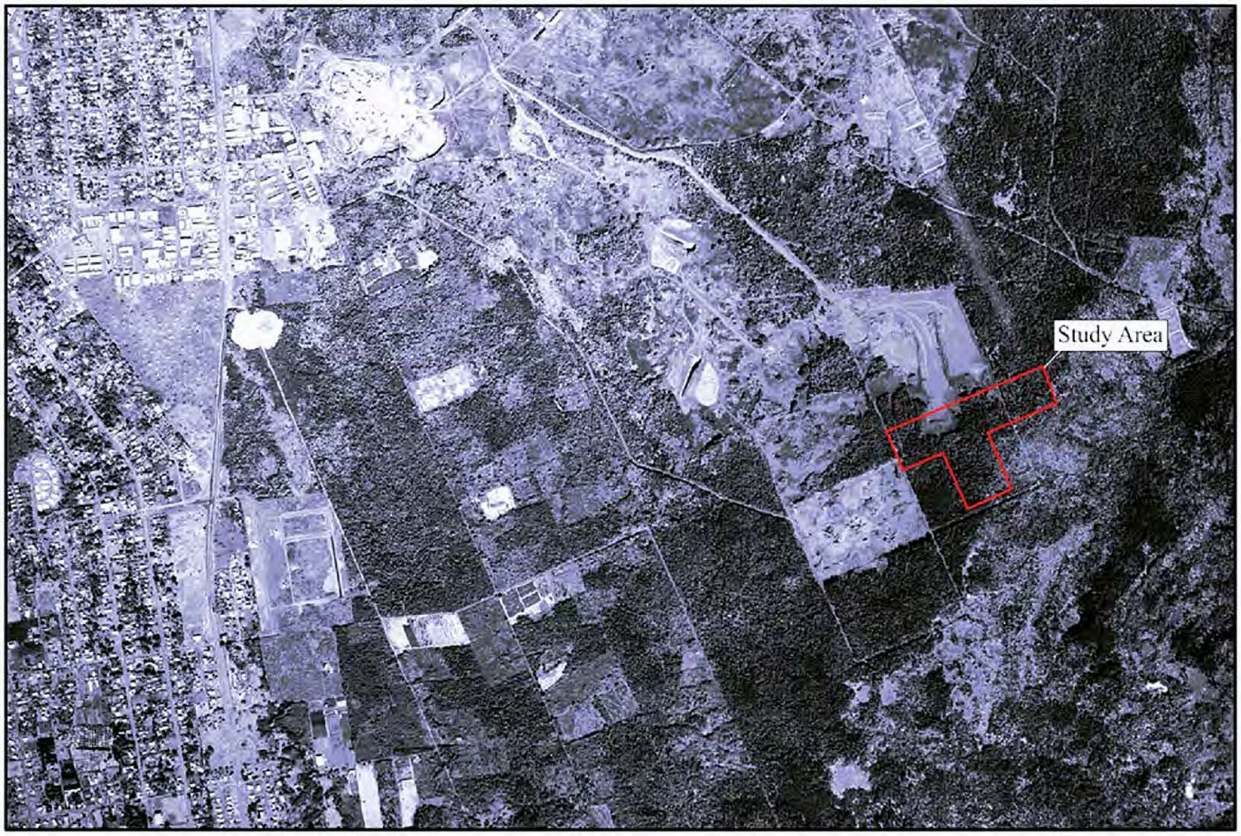

Figure 30. January 16, 1965 USGS aerial photo showing quarry intruding into northern portion of study area (outlined in red).

Figure 31. Portion of a 1977 orthophotoquad showing quarry expansion and network of quarry roads within study area (outlined in red).

Figure 32. Portion of a September 23, 1992 USGS aerial photo showing active quarry site in relation to current study area (outlined in red).

PREVIOUS ARCHAEOLOGICAL STUDIES

A number of archaeological studies have been previously conducted within Waiākea and the general Hilo region over the years, most of which have occurred north and west of the current study area and concentrated primarily in coastal environs. Collectively, site types previously documented within Waiākea include but are not limited to fishponds, Historic-era military structures, the Puna Trail, temporary and permanent habitation sites, lava tubes, modified sinks, overhang shelters, and Historic sugarcane infrastructure. Numerous archaeological studies specifically conducted within the Pana'ewa section of Waiākea, however, have generally reported a lack of findings (Carson 1999; Escott 2013a, 2013b, 2015, 2016; Hammatt and Tulchin 2007; Haun and Henry 2002; Rechtman 2003, 2006, 2009a, 2009b; Rosendahl 1988a, 2002; Wheeler et al. 2014a). There have been no prior archaeological studies conducted that have included the current study area. The most proximate studies conducted within Waiākea either within or in close proximity to Pana'ewa are presented in Table 1 and Figure 33 and those that have identified findings are discussed in detail below.

Table1. Previous archaeological studies conducted in the vicinity of the current study area.

Year	*Author*	*Type of Study*
1974	Ching and Stauder	Reconnaissance Survey
1979	Bonk	Archaeological Survey
1997	Devereux et al.	Reconnaissance Survey
1999	Carson	Inventory Survey
2000	Hammatt and Bush	Inventory Survey
2001	Godby and Tolleson	Data Recovery
2002	Escott and Tolleson	Inventory Survey
2002	Haun and Henry	Inventory Survey
2002	Rosendahl	Reconnaissance Survey
2003	Rechtman	Archaeological/Limited Cultural Impact Assessment
2006	Rechtman	Archaeological Assessment
2006	Wolforth	Inventory Survey
2007	Tulchin and Hammatt	Archaeological Literature Review and Field Inspection
2009a	Rechtman	Archaeological Survey
2009b	Rechtman	Archaeological Assessment
2013a	Escott	Archaeological Assessment
2013b	Escott	Archaeological Assessment
2014	Wheeler et al.	Inventory Survey
2015	Escott	Archaeological Assessment
2016	Escott	Archaeological Assessment

Thrum and his associates, W.T. Brigham and J.F. Stokes of the Bishop Museum, compiled information on over 130 *heiau* on Hawai'i Island (Thrum 1908a). However, one must take into consideration that Thrum included data on *heiau* that had already been destroyed prior to his data collection efforts in the early 1900s. Regarding the *heiau* of the Hilo district, Thrum stated: "little evidence of their existence now remains, so complete has been their destruction, but though their stones are scattered, much of their history is yet preserved" (1908b:55).

During the early 1930s, A.E. Hudson (Hudson 1932), working under the aegis of the Bernice Pauahi Bishop Museum, also conducted archaeological investigations in East Hawai'i. He found little in the region surrounding the current area of study, although he noted that "there was an important village and trading center around Hilo Bay" (1932:20), but stated that, "no archaeological remains are to be found within the town of Hilo itself except a few stones which are said to have been taken from heiaus..." (1932:226). Hudson also relates the following account of a previously existing *heiau* in Waiākea near Coconut Island (Mokuola) and another one near the route of the present Kīlauea Avenue:

> Of the several heiaus known to have existed in and around Hilo, that at Cocoanut Island was also a puuhonua.

There is some reason to think that the island itself was the place of refuge and that the heiau was situated on the mainland opposite. Thrum (65-c, p. 40) locates it on the shore opposite the island. Elsewhere (65-d, p. 56) he says:

> "Occasional reference is made to Cocoanut Island (Mokuola) as the place of refuge of the Hilo district, hence its name, Life Island." Careful inquiry shows that the area of this puuhonua included also a portion of the mainland adjoining. The heiau connected with it, named Makaoku, was of the Luakini class. Its dimensions are unknown though it is said to have had a pyramid of stone 30 feet high as if for a place of observation. The remaining stones were taken by Captain Thos. Spencer for a boat landing about 1860. The northern part of Mokuola is known as Kaulaineiwi, being the place where the bones were placed to dry or for airing".
>
> The present archaeological remains consist of a few single stones in the park opposite the island. Mr. Levi Lyman tells me that although they were found on the mainland they have all been moved in making the park. Quite probably they had also been moved several times previously so they are of no use in reconstructing the outlines of the site. Their only significance is in indicating that the structure was built, at least in part, of large lava blocks, rather than beach boulders. (Hudson 1932:256–257)

Hudson also identified one of the inland *heiau* as being in Waiākea, along the old Hilo/ʻŌlaʻa trail (not far from the route of modern-day Kīlauea Avenue):

> There was a heiau named Kapaieie near Honokawailani in Waiakea. Bloxam who passed the site on his way from Hilo to the volcano say that its center was marked by a single coconut tree. At the time of his visit nothing remained but ruined walls choked with weeds. He was told that the priests would lie in wait for passersby and dispatch them with clubs. Thrum [1908:40] states that the site was famed in the Hilo-Puna wars but its size and class are unknown. No remains of any kind could be found and no Hawaiians with whom I talked had ever heard of it. (1932:240)

It wasn't until the Hawai'i Island portion of the Statewide Inventory of Historic Places (SIHP) conducted during the early 1970s that detailed recording of archaeological sites in the general vicinity of the current study area began. Records on file at the State Historic Preservation Division reveal that as a part of that study, three sites, all dating to the Historic Period, were recorded to the west/northwest of the study area These sites included the Hawai'i Consolidated Railway's eight-stall roundhouse, or locomotive garage (Site 7432) located on Kalanikoa Street adjacent to what is currently the County of Hawai'i swimming pool; the "*Tsunami* Clock" (Site 7452) located along Kamehameha Avenue, and the Wailoa River Bridge (Site 7484).

In 1974, the Archaeological Research Center Hawai'i (ARCH; Ching and Stauder 1974) conducted a reconnaissance survey for the proposed 2 $^{1/2}$-mile alignment of a road extending between Keaukaha and the South Hilo/Puna District boundary, located to the southeast of the current study area (Figure 33). As a result of the study, four archaeological sites were identified adjacent to the South Hilo/Puna boundary including a "stacked *pāhoehoe* wall. . . platform/monument burial, animal enclosure and habitation site" (Wheeler et al. 2014a). It was recommended that an Archaeological Inventory Survey (AIS) be undertaken of the proposed development area and that the projected alignment be shifted in an effort to protect archaeological resources.

Five years later in 1979, William Bonk (1979) of the University of Hawai'i at Hilo conducted an archaeological survey of a 39-acre portion of Tract 1 of the Pana'ewa Hawaiian Home Lands located to the northwest of the current study area (Figure 33). As a result of the survey, two modern features were documented: a segment of a stone wall and a fragment of a wire fence. Additionally, a 15 to 20-foot-wide section of a roadway was identified, which was intermittently marked by short stone alignments. It was concluded by Bonk (1979) that no further work be the recommended treatment.

By the time the 1980s rolled around, stricter environmental regulations led to an increased number of archaeological and cultural studies being conducted in Hilo. In 1981, at the request of the U.S. Army Corps of Engineers, the B.P. Bishop Museum Department of Anthropology prepared a chronological history of Hilo Bay in an effort to assist in future environmental planning (Kelly et al. 1981). Aside from a limited amount of survey work (Clark and Rechtman 2016; McEldowney 1979; Rechtman 2001) previously conducted in the upper forest area of Waiākea, most of the major previous (and more recent) archaeological studies in the *ahupua'a* were conducted within the vicinity of Hilo town (Carson 1999; Hammatt et al. 1993; Hunt et al. 1993; Jennings 1991; Maly 1994; Maly et al. 1994; Rechtman and Henry 1998; Walker 1994)

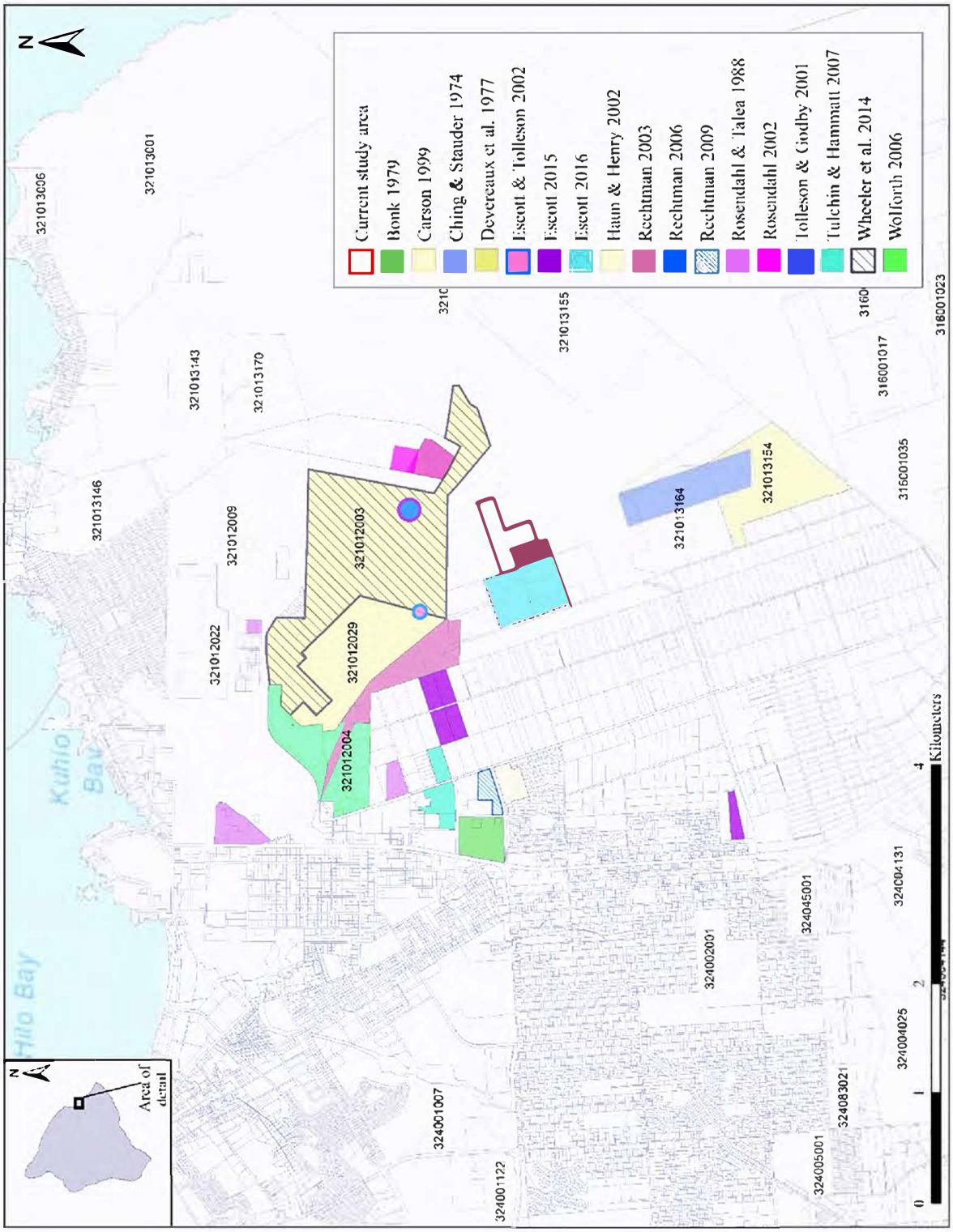

Figure 33. Previous archaeological studies conducted in the vicinity of the current study area.

Collectively, these studies document the ravages that Historic Period land use associated with ranching and sugarcane cultivation (during the 1860s-1940s) and increasing housing development associated with a growing population (from the 1950s through the present) had on the Precontact archaeological record. With an increasing population comes a need for increased infrastructure. The acquisition of local building materials (rock and fill) and solid waste disposal are paramount among the infrastructural needs, and by 1950 the vicinity of the current study area became the focal point for both of these activities.

Since the late 1980s, archaeological studies conducted in close proximity to the current study area have concentrated largely on the development and continual expansion of the Hilo Industrial area, north of the study area. These studies focused primarily revolved around proposed implementation and development of rock quarrying and stockpiling sites, waste sorting locales, industrial plants, and the expansion of the Keaukaha Military Reserve (KMR), (Bush et al. 2000; Devereux et al. 1997; Escott 2013b, 2013a; Escott and Tolleson 2002; Rechtman 2006; Rosendahl 1988a, 1988b, 2002; Tolleson and Godby 2001; Wheeler et al. 2014a)

There have been several archaeological studies conducted within the lands of the Keaukaha Military Reserve (KMR), situated north of the current study area beginning in 1996 when Cultural Surveys Hawai'i, Inc. (CSH; Devereux et al. 1997) conducted a selective archaeological reconnaissance survey of a 500-acre parcel within KMR. Portions of their survey area bordered the current study area to the west, south, and east (Figure 33). As a result of their study, two archaeological sites were identified; however, one of these was subsequently reinterpreted to be a modern bulldozer push pile. The other, temporary site CSH-1, is a C-shaped enclosure located near a Jeep road that was interpreted to have served as a temporary habitation shelter. Devereux et al. (1997) suggested that the Jeep road may have been a remnant of the old Puna Trail (Site 18869), and that the C-shaped shelter may have been an ancillary feature of the trail. In addition to the C-shape, Devereux et al. (1997) also recorded ten historic buildings associated with KMR. No further work was the recommended treatment for the historic buildings. However, it was recommended that a more intensive archaeological inventory survey be conducted within the undisturbed forested areas along what they believed to be the old Puna Trail alignment, located to the northeast of the current study area.

Three years later in 2000, CSH (Bush et al. 2000) returned to the KMR and subsequently conducted a Phase II AIS in forested areas and other sectors that were determined during Phase I fieldwork to have been only minimally impacted by previous disturbance. As a result of their revisit, they fully documented the previously identified C-shape as Site 21657 and interpreted it as being military in origin. Additionally, they identified two new sites: Site 21658, a complex comprised of five *ahu* (rock mounds) interpreted as a location marker for a water source or temporary shelter; and Site 21659, a modified lava blister interpreted as a traditional Hawaiian agricultural feature. Bush and Hammatt (2000) also documented a section of the previously recorded Puna Trail (Site 18869). These sites were re-identified by SCS in 2002 (Escott and Tolleson 2002) during an additional AIS of the KMR (see Figure 33).

One year later in 2001, Scientific Consultant Services, Inc. (SCS; Tolleson and Godby 2001) conducted a survey of a 100 square meter portion of the KMR, north of the current study area (Figure 33) resulting in the identification of a newly identified site complex (Site 21771) consisting of four features (a platform, an enclosure, a possible *imu*, and a meadow) dating to the late 1800s. It was determined that Site 21771 was associated with the construction and maintenance of the Puna Trail, which Tolleson and Godby (2001) opined was widened from a foot trail to a Government Road during this time in order to accommodate horses and wagons. Limited data recovery (excavation of two test units) was undertaken at Site 21771.

In 2006, Scientific Consultant Services, Inc. (Wolforth 2006) conducted an AIS of a 147-acre industrial subdivision for the proposed development of the Mana Industrial Park project situated immediately west of KMR to the northwest of the current study area (Figure 33). Four WWII-era sites were identified within the study area including Site 25538, a Historic breakwater quarry and railroad line and Naval Air Station fuel station; Site 25539, a fuel station road; Site 25540, the southern end of the airport parking area; and Site 25541, a warehouse area. All of the identified sites were found to be characteristic with the known U.S. Navy and Army occupation of the area. No further work was the recommended treatment for all of the sites.

In 2014, Cultural Surveys Hawai'i, Inc. (Wheeler et al. 2014a) conducted an AIS of a 405.3-acre portion of the KMR situated to the north of the current study area, roughly 600 meters north of the study area's northeastern boundary (Figure 33). While it was determined that the majority of KMR had been subject to intensive previous disturbance, the survey fieldwork primarily focused on areas which had been subject to minimal disturbance. As a result of the survey, a total of eleven archaeological sites (Sites 18869, 21657, 21658, 21771, 23273, 30008-30012, and 30038) were documented: four of which were previously identified during the inventory survey conducted by Bush and

Hammatt (2000) and one (Site 21771) that was previously identified by Godby and Tolleson (2001). Specific site types identified during the Wheeler et al. (2014a) study included two segments of the Puna Trail (Site 18869 and Site 30038); a C-shaped enclosure (Site 21657); a complex comprised of five *ahu* (Site 21658); a complex of twelve features associated with potential temporary habitation or agriculture (Site 21771); a remnant segment of a secondary Precontact/early Historic trail (Site 23273); a modified lava tube (Site 30008); a complex comprised of three temporary habitation features associated with a modified outcrop (Site 30009); a complex comprised of five features associated with temporary habitation or agriculture (Site 30010); a two-feature complex of indeterminate function (Site 30011); and a 15-meter-long segment of another secondary kerbed trail (Site 30012). The trail segment designated Site 30038 was interpreted as an intact remnant of the Puna Trail alignment and was assigned a separate site number because it diverts from the modern Jeep road alignment that had been assigned the earlier Puna Trail designation (Site 18869).

Collectively, all of the sites identified during the Wheeler et al. (2014a) study were interpreted either as ancillary features of the Puna Trail or associated with possible intermittent agricultural activities. It was concluded that the section of Waiākea in which KMR was situate was only marginally inhabited during Precontact and Historic times, with traditional settlements being concentrated mostly along the coast. As a result of extensive military-associated modification throughout the twentieth century within KMR, many of the previously extant archaeological sites had been obliterated. While no further work was the recommended treatment for seven of the identified sites, including the segment of the Puna Trail, Wheeler et al. (2014a) did recommend preservation through avoidance (conservation) as the proposed treatment for three sites (Sites 21658, 21771, and 30038) and proposed future subsurface testing for Sites 21771 and 30010. Archaeological monitoring was recommended as a mitigation measure for all ground-disturbing activities, and a subsequent archaeological monitoring plan was prepared (Wheeler et al. 2014b).

3. STUDY AREA EXPECTATIONS

The culture-historical context presented above for the *ahupua'a* of Waiākea and the South Hilo District, combined with the summary of previous archaeological research conducted in the vicinity of the study area, provides a basis for predicting the type and location of archaeological resources that may still be present within the current study area. The study area is situated within what was once known as the Pana'ewa forest, a particular section of Waiākea thick in cultural history and rich in traditional lore, where forest resources would have been collected, and scattered gardens and residences may have been found, during the Precontact Period, but not in large numbers. Development of the lands near the study area accelerated during the late nineteenth century, however, as the commercial sugar industry grew and rail transportation was developed in an effort to facilitate and expand this economic growth. Development within and around the current study area occurred primarily during the mid to late twentieth century following the 1960 *tsunami*, when the land was designated as a borrow site. Previous archaeological studies conducted in the general vicinity of the current study area have shown that while examples of Precontact archaeological resources have been identified within Pana'ewa, features relating to sugarcane cultivation and railway transportation are much more likely to be encountered further inland, and are seldom found within the disturbed lands surrounding the quarry sites. It is highly unlikely that any evidence of Precontact such as ancient foot trails, habitation sites, or agricultural features, or early Historic sites such as house foundations, roads railroad spurs, or sugarcane related infrastructure will be encountered within the proposed quarry sites, as these lands have been extensively modified by prior grubbing, grading, and quarrying activities.

4. FIELDWORK

Fieldwork for the current study was conducted on April 23, and July 9, 12, and 23, 2019 by ʻIolani K. Kaʻuhane, B.A., Lauren Kepaʻa, Lyle Auld, B.A., Johnny Dudoit, B.A., Ivana Hall, B.A., and Genevieve Glennon, B.A., under the direction of Matthew R. Clark, M.A. (Principal Investigator). Fieldwork consisted of an intensive (100% coverage) pedestrian survey of the entire study area. The survey crew walked systematic transects across the study area from the existing paved roadway in both an easterly and westerly direction, with spacing between crew members of no more than 15 meters. Garmin 76s handheld GPS units (set to the NAD 83 datum) were utilized by the survey crew to determine the study area boundaries and track transect coverage and spacing. While the vegetation cover was moderately thick in some areas, the ground visibility was generally adequate across the entire study area for identifying any cultural features that may have been present.

FINDINGS

As a result of the current study, no archaeological sites or other historic properties of any kind were identified within the study area, and field observations of past ground disturbance, combined with the results of prior studies conducted in the area, indicate that subsurface archaeological resources are unlikely to be encountered in the area proposed for quarry development and expansion.

5. DETERMINATION OF EFFECT

Given the negative findings of the current study with respect to archaeological resources, it is concluded that the Yamada & Sons, Inc. quarry and stockpiling project will not impact any known historic properties. The determination of effect for the proposed project is "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 Yamada & Sons, Inc. proposed quarry and stockpiling site prior to or during project implementation. In the unlikely event that any unanticipated archaeological resources are unearthed during development activities, work in the immediate vicinity of the finds will be halted and DLNR-SHPD contacted in compliance with HAR 13§13-280-3.

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ENVIRONMENTAL ASSESSMENT

YAMADA AND SONS ROCK QUARRY

APPENDIX 3
Cultural Impact Assessment

Note: The CIA was prepared on the basis of a quarry size of 51.92 acres, which was subsequently reduced to 37.882 acres, all within the 51.92-acre footprint. The action was undertaken in part because of recommendations of the CIA to avoid the area of partially intact native forest. It was not necessary to adjust most of the text of the CIA, but the conclusions section on Page 64-65 was adjusted to reflect the reduced area and impact of the project.

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A Cultural Impact Assessment for a Proposed 50.192-acre Yamada Quarry Site

TMK: (3) 2-1-013:002 por.

Waiākea Ahupua'a
South Hilo District
Island of Hawai'i

Prepared By:
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ASM Project Number 32490.00

A Cultural Impact Assessment for a Proposed 50.192-acre Yamada Quarry Site

TMK: (3) 2-1-013:002 por.

Waiākea Ahupua'a
South Hilo District
Island of Hawai'i

ASM affiliates

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CHAPTERS

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APPENDIX

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1. INTRODUCTION

At the request of Ron Terry of Geometrician Associates, LLC on behalf of Yamada & Sons, Inc. (the applicant), ASM Affiliates (ASM) has prepared this Cultural Impact Assessment (CIA) to inform a Hawai'i Revised Statues (HRS) Chapter 343 Environmental Assessment (EA) for a proposed 50.192-acre quarry and stockpiling site located within a portion of State owned lands (Tax Map Key: (3) 2-1-013:002 por.) in Waiākea Ahupua'a, South Hilo District, Island of Hawai'i (Figures 1 and 2). The proposed quarry site comprises a portion of a 2,407.756-acre agriculturally-zoned parcel currently owned by the State of Hawai'i (leased to the United States Department of Transportation) and is located within a 113.382-acre portion of the subject parcel that was designated as a "Borrow Pit Site" during the early 1960s. The proposed project area is situated directly east of a 14.99-acre parcel (Parcel D) that is currently used by Yamada & Sons, Inc. for quarrying and stockpiling purposes (Figures 3 and 4).

This CIA study is intended to inform an HRS Chapter 343 Environmental Assessment (EA) conducted in compliance with HRS Chapter 343; pursuant to Act 50 and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawai'i, on November 19, 1997. Act 50, which was proposed and passed as Hawai'i State House of Representatives Bill No. 2895 and signed into law by the Governor on April 26, 2000, specifically acknowledges the State's responsibility to protect native Hawaiian cultural practices. Act 50 further states that environmental assessments . . . should "assess the effects of a proposed action on the cultural practices of the community and State" and that . . . "native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the 'aloha spirit' in Hawai'i." Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on governmental agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups. Article IX, section 9 of the state constitution gives the State the power to "preserve and develop the cultural, creative and traditional arts of the various ethnic groups." While Article XII, section 7 of the state constitution requires the State to "protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights."

This report is divided into five main sections, beginning with an introduction and a general description of the project area location, followed by a detailed culture-historical background for Waiākea Ahupua'a and a presentation of prior studies that have been conducted within the vicinity of the proposed project area; all of which combine to provide a physical and cultural context for the proposed quarry site. The results of the consultation process are then presented, along with a discussion of potential impacts as well as appropriate actions and strategies to mitigate any such impacts. Lastly, section five contains a post-study update that details the actions taken by the applicant following the submission of the draft CIA, which resulted in a reduction of the size of the proposed quarry site from 51.192 acres to 37.882 acres. The applicant's decision to reduce the size of the proposed quarry site is a mitigative action to avoid adversely impacting a seemingly healthy portion of intact *'ōhi'a* forest as well as the Drag Strip road; the former of which was found to be a valued cultural resource. This section also includes a revised discussion of findings and conclusions.

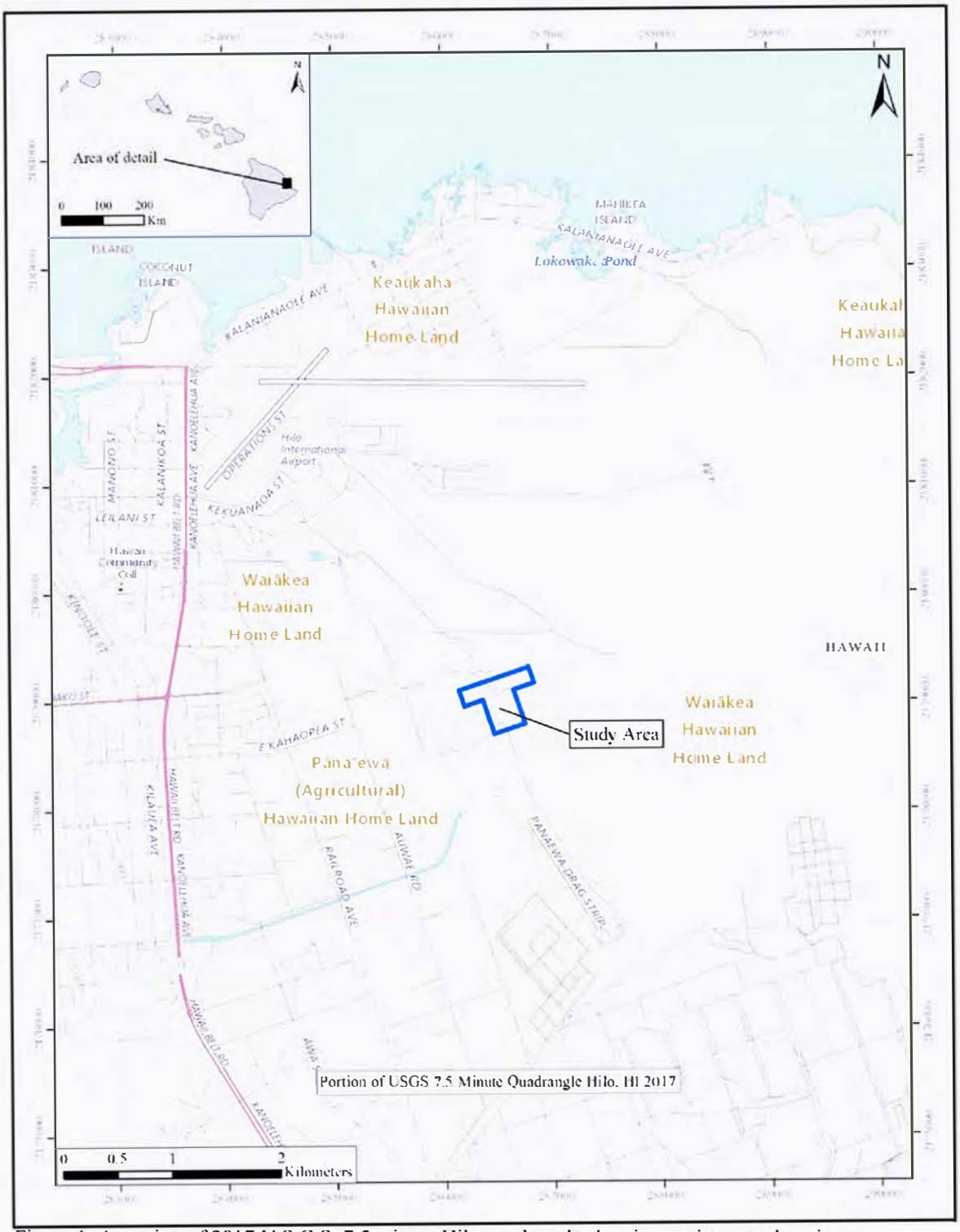

Figure 1. A portion of 2017 U.S.G.S. 7.5 minute Hilo quadrangle showing project area location.

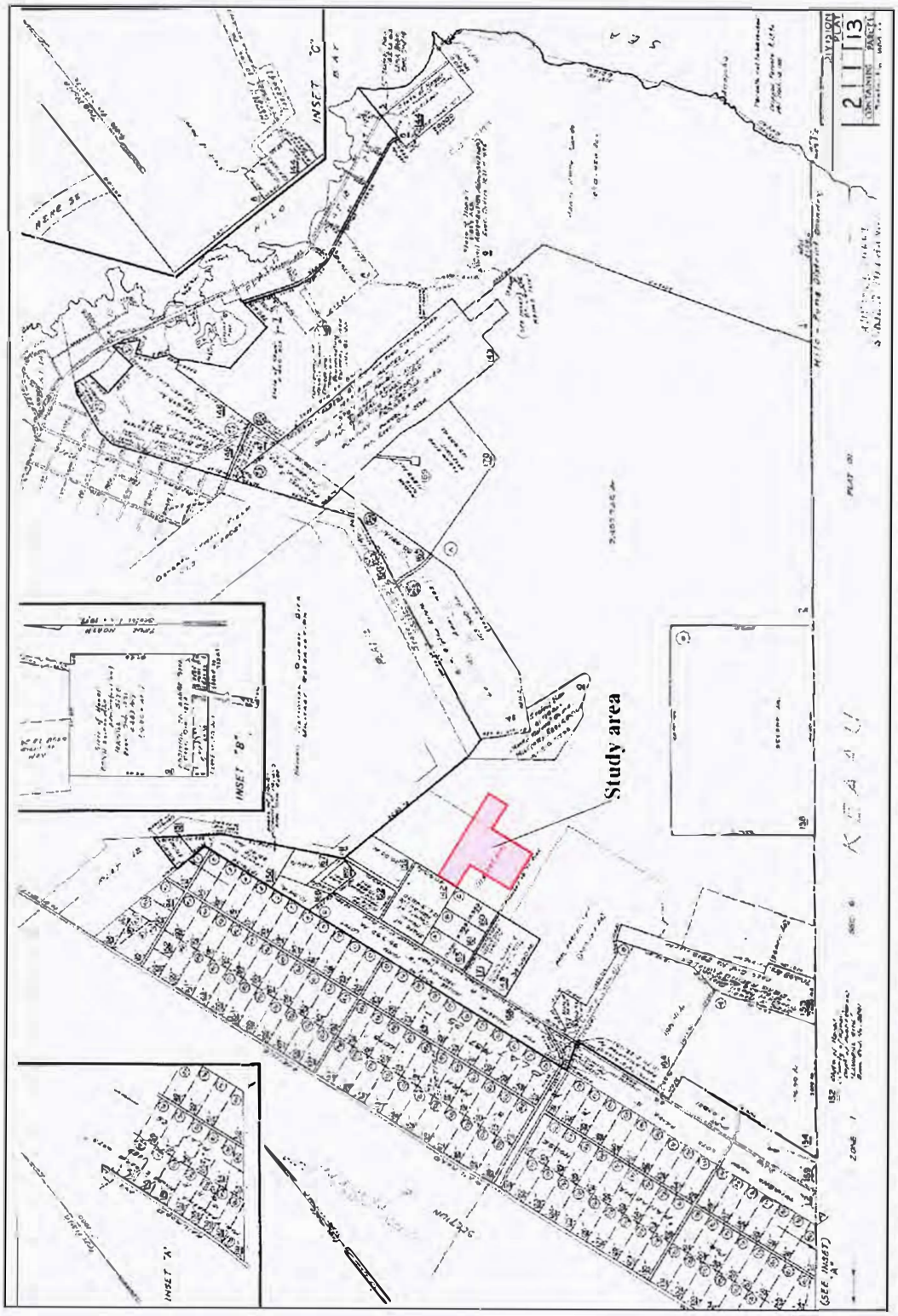

Figure 2. Tax Map Key (3) 2-1-013 showing the location of the current study parcel (002).

Figure 3. Google Earth™ satellite image showing the study area location (outlined in red).

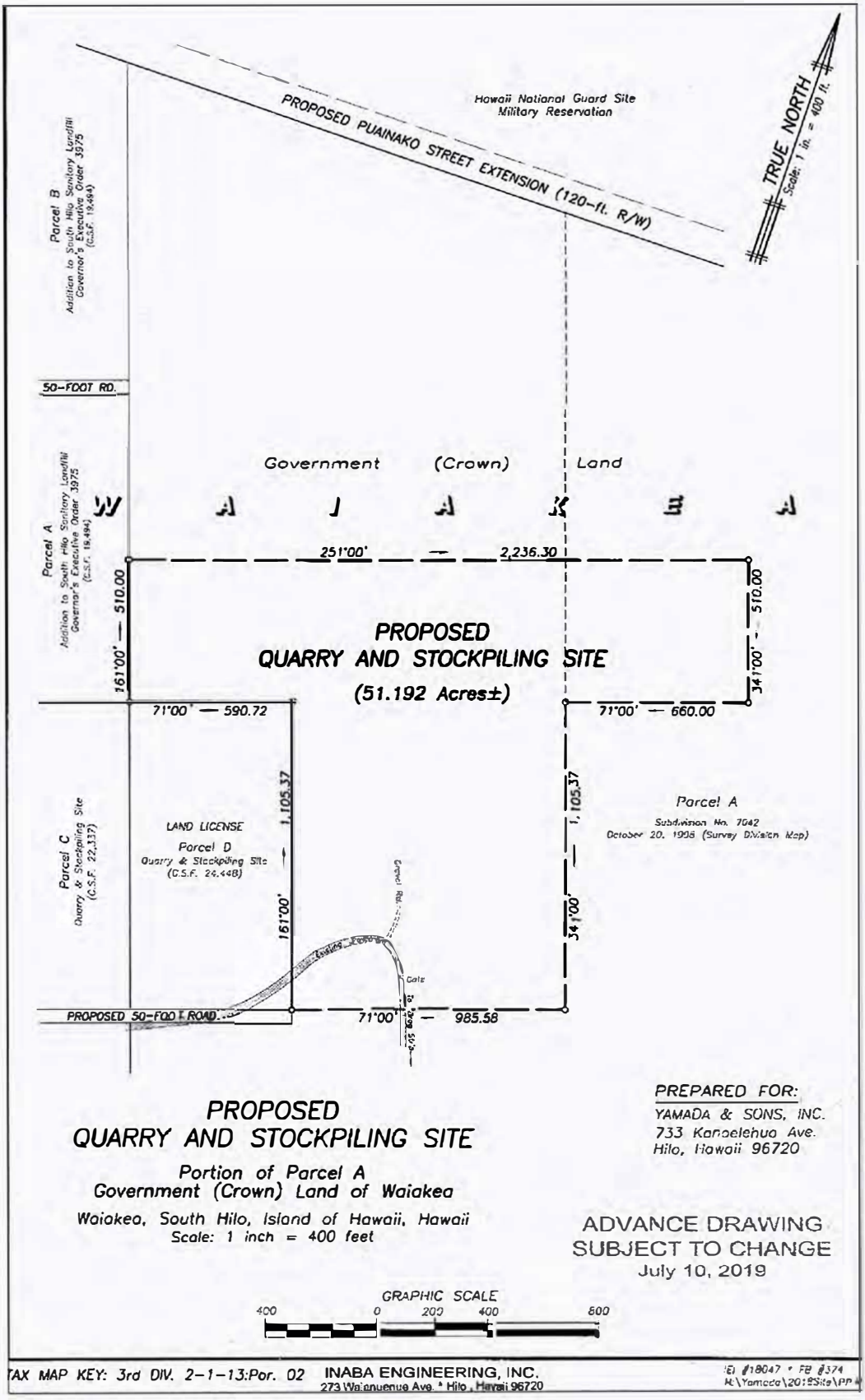

Figure 4. Proposed site plan for quarry and stockpiling site.

PROJECT AREA DESCRIPTION

The project area encompasses 50.192-acres situated in the Pana'ewa portion of Waiākea Ahupua'a, South Hilo District, Island of Hawai'i (see Figure 1). It is situated on the eastern flank of Mauna Loa Volcano at elevations ranging from 80 to 100 feet (24 to 30 meters) above sea level and is roughly four kilometers inland from the coast (see Figure 1). The project area is accessed by a gated, paved road that extends northwest from the Pana'ewa Drag Strip road (see Figure 3). The access road extends northwest from the drag strip road (Figure 5), bisecting the southern portion of the project area into two equal halves (Figure 6), before turning to the northeast. Mechanically-created, earthen berms containing piles of gravel and scattered modern trash (e.g. rubber tires, glass/plastic bottles, car parts, and other assorted rubbish) are present along both of edges of the roadway (Figure 7). To the west, the project area is bounded by an existing 14.99-acre parcel (Parcel D) that is currently used by Yamada & Sons, Inc. for quarrying and stockpiling purposes (Figure 8), and by a section of Parcel A designated as part of the South Hilo Sanitary Landfill property. Large earthen berms, from prior mechanical disturbance, are present along the boundaries with these two properties. The northeastern corner of the existing quarry site (Parcel D) is marked by a metal pipe protected by concrete barriers (Figure 9). The project area is surrounded on the remaining sides by previously disturbed, but currently undeveloped, lands within TMK: (3) 2-1-013:002. The County of Hawai'i-Department of Parks and Recreation's Trap and Skeet Range is situated just to the north of the proposed quarry site (see Figure 3), and a large area in the northeastern portion of project area has been previously graded flat and covered with gravel (Figure 10). This graded area, which contains two corrugated aluminum storage sheds that are currently used for the storage purposes (Figure 41), are accessed by an offshoot of the primary paved access road that extends northeast (Figure 41). Other indications of previous disturbance within the study area include bulldozer cuts (Figure 41), berms (Figure 41), push piles, and modern rubbish (Figures 15 and 16), all of which are prevalent, especially within the western and northern portions of the proposed quarry site.

Figure 5. Pana'ewa Drag Strip road with entrance to study area pictured on left, view to the northeast.

Figure 6. Paved roadway leading into study area from the Pana'ewa Drag Strip road, view to the southeast.

Figure 7. Berm extending along the eastern edge of a paved roadway that bisects the southern half of project area, view to the southwest.

Figure 8. Existing quarry site on Parcel D, view to the north with the project study area visible in the background (at the tree line).

Figure 9. Boundary marker at the northeastern corner of the existing quarry site (Parcel D), view to the southeast.

Figure 10. Graded area in the northeastern portion of project area, view to the east.

Figure 11. Modern corrugated aluminum storage sheds and equipment in northeastern corner of project area, view to the northeast.

Figure 12. Road accessing the northeastern portion of the project area, view to the east.

Figure 13. Bulldozer cut in eastern portion of project area, view to the northwest.

Figure 14. Typical bulldozer berm within the project area, view to the northeast.

Figure 15. Modern rubbish pile of glass bottles, overview.

Figure 16. Accumulation of modern rubbish in the northeast corner of project area, view to the southwest.

Vegetation

Due to the prior mechanical disturbance, vegetation within the project area is comprised of numerous alien species mixed with a few indigenous and endemic species within a secondary forest setting (Figure 17). The overstory canopy is formed by plant species such as melochia (*Melochia umbellata*), bingabing (*Macaranga mappa*), autograph trees (*Clusia rosea*), strawberry guava (*Psidium cattleianum*), umbrella trees (*Schefflera actinophylla*), gunpowder trees (*Trema orientalis*), Albizia (*Falcataria Moluccana*) and *hala* (*Pandanus tectouris*). The understory consists of various vines, ferns, and weeds such as Koster's curse (*Clidemia hirta*), philodendron (*Philodendron cordatum*), arthrostema (*Arthrostemma ciliatum*), *honohono* grass (*Commelina diffusa*), and various other grasses. The southwestern corner of the project area (generally corresponding to the location of the Opihikao soils; see Figure 21), where the least amount of mechanized clearing appears to have occurred in the past, contains the most intact section of native forest where species such as *ʻōhiʻa lehua* (*Metrosideros polymorpha*), *uluhe* (*Dicranopteris linearis*), and *hala* dominate (Figures 18 and 19). This vegetation pattern is indicative of what the landscape in the vicinity of the study area would have looked like prior to the widespread mechanical disturbances that occurred in the 20th century.

Soils and Geology

Geologically, the project area is situated on mixed *ʻaʻā* and *pāhoehoe* lavas flows originating from Mauna Loa Volcano approximately 1,000 to 2,000 years B.P. (Figure 20). Collectively these lava flows have been designated by Trusdell and Lockwood (2017) as the Panaʻewa picrate flow. Soils that have developed on (and from) these lava flows are classified as Papai extremely cobbly highly decomposed plant material on 2 to 10 percent slopes (428), and Opihikao highly decomposed plant material on 2 to 20 percent slopes (664). The Papai soils are present across the majority of the project area, but a small area of the Opihikao soils, corresponding to the edge of a raised *ʻaʻā* flow, are present in the southwest corner (Figure 21). Both are well-drained, thin, and extremely stony organic soils overlying cobbly substrates (Soil Survey Staff 2019), but the Papai soils are slightly thicker in profile (0-10 inches) than the Opihikao soils (0-3 inches). The terrain is characterized by mostly level to gentle to moderately undulating topography punctuated with the occasional small culturally-sterile lava blister, particularly within more forested sections in the eastern half of the study area. Mean annual rainfall in the area averages approximately 3346 millimeters (132 inches), with the majority of rainfall occurring in November and the least occurring in the summer months of May and June (Giambelluca et al. 2013). The project area vicinity is characterized by a cool climate with a mean annual temperature ranging from 70 to 73 degrees Fahrenheit throughout the year (Soil Survey Staff 2019).

Figure 17. Typical vegetation in previously disturbed area consisting of non-native species, view to the east.

Figure 18. Typical native-dominant vegetation pattern in minimally disturbed areas, view to the northwest.

Figure 19. Typical undergrowth of *uluhe* in a minimally disturbed area, view to the northeast.

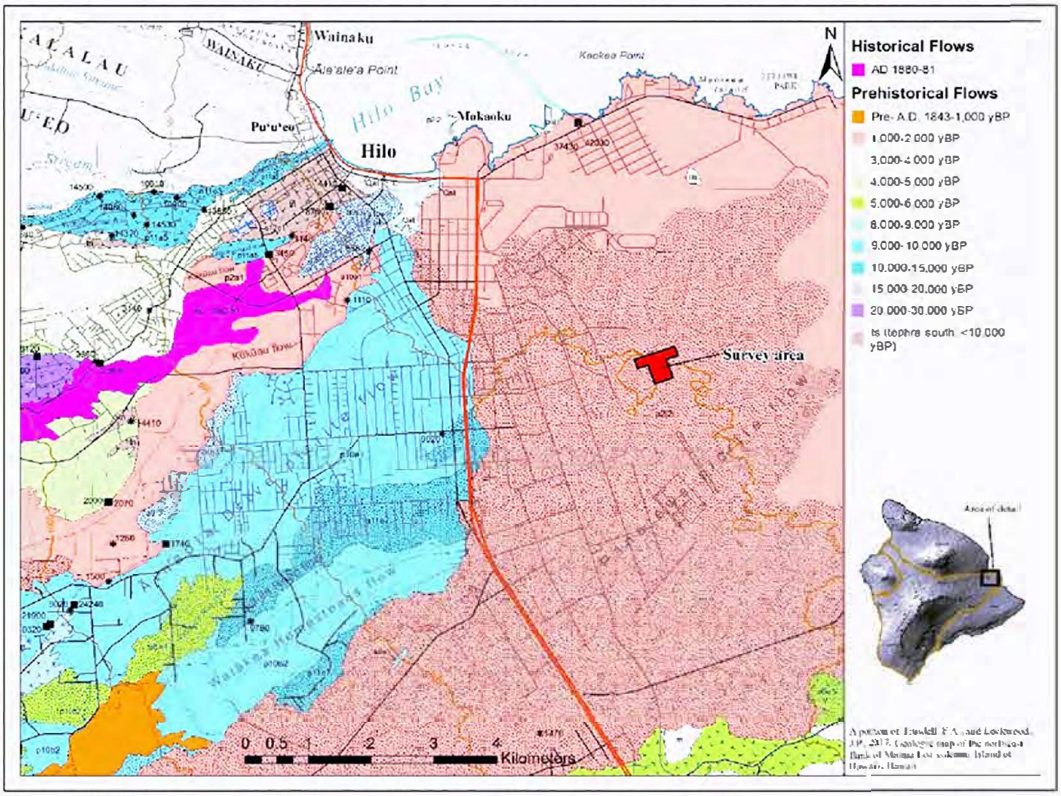

Figure 20. Geology of current project area with parcel outlined in red.

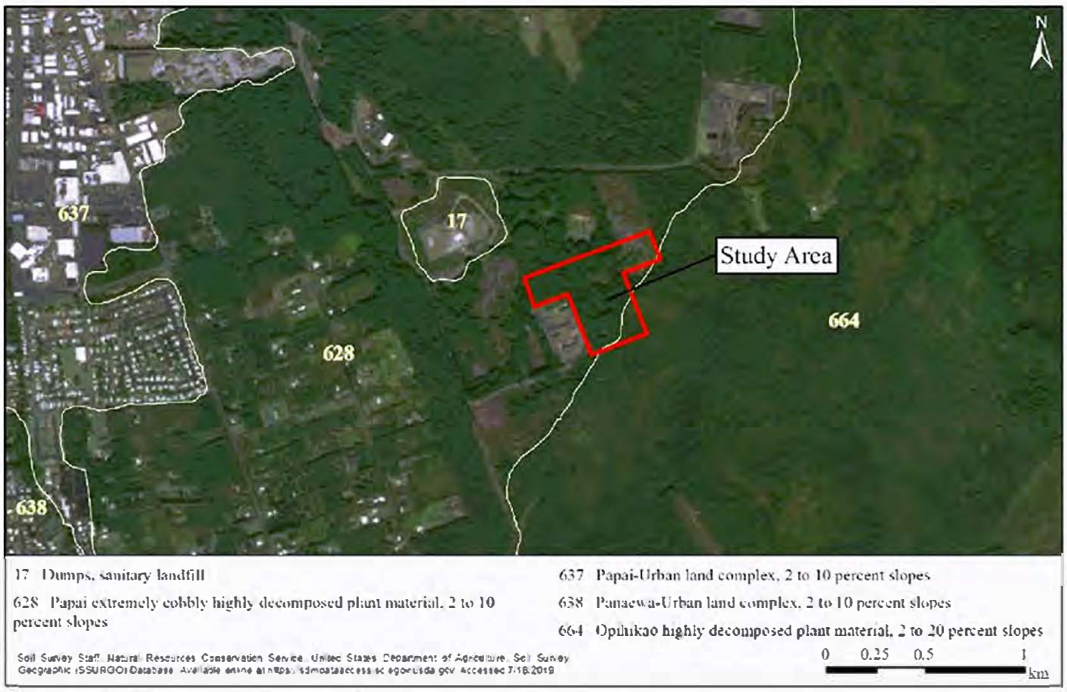

Figure 21. Soils in the vicinity of the current project area.

2. BACKGROUND

This section of the report includes a discussion of the culture-historical background for the project area and a synthesis of relevant prior research. This information is presented to provide a comprehensive understanding of the cultural significance of the study area and general vicinity and to establish an analytical basis for the assessment of any potential cultural impacts. The ability to assess the cultural significance of the current study area parcel is contingent upon developing (at a minimum), a comprehensive understanding of the *ahupua'a* in which the study area is located. As will be demonstrated in the ensuing section and particularly with the traditional Hawaiian legendary accounts, a consideration of the broader region and island landscape is also required at times. The culture-historical context presented below for Waiākea Ahupua'a is based on original research conducted by ASM at various online repositories as well as physical repositories including the University of Hawai'i at Hilo Mo'okini Library, State Historic Preservation Division library, and the Hawai'i State Archives.

CULTURAL-HISTORICAL CONTEXT

The chronological summary presented below begins with the peopling of the Hawaiian Islands and a generalized model of Hawaiian Prehistory followed by a summary of Historic events in the Hawaiian Islands after the arrival of foreigners. The discussion continues with a presentation of legendary and historical references to Waiākea Ahupua'a. This summary includes oral traditions and first-hand Historic accounts recorded by visitors and missionaries related to Waiākea and at times the culturally significant Pana'ewa forest. Land use practices and significant historical events in the study area vicinity are also presented, including commercial sugar cultivation, the development of the railroad, and the establishment of the nearby Hawaiian Homestead community of Keaukaha and Pana'ewa, as well as the construction of the Hilo Airport and the quarry site. A synthesis of previous relevant archaeological and cultural studies are also discussed.

A Generalized Model of Hawaiian Prehistory

While the question of the timing of the first settlement of Hawai'i by Polynesians remains unanswered, several theories have been offered that derive from various sources of information (i.e., genealogical, oral-historical, mythological, radiometric). However, none of these theories is today universally accepted (c.f., Kirch 2011). What is more widely accepted is the answer to the question of where Hawaiian populations came from and the transformations they went through on their way to establish a uniquely Hawaiian culture. The initial settlement in Hawai'i is believed to have

originated from the southern Marquesas Islands (Emory in Tatar 1982). During these early times, Hawai'i's inhabitants were primarily engaged in subsistence-level agriculture and fishing (Handy and Handy 1991). This was a period of great exploitation and environmental modification when early Hawaiian farmers developed new subsistence strategies by adapting their familiar patterns and traditional tools to their new environment (Kirch 1985; Pogue 1978). Their ancient and ingrained philosophy of life tied them to their environment and kept order; which was further assured by the conical clan principle of genealogical seniority (Kirch 1984). According to Fornander (1880), the Hawaiians brought from their homeland certain universal Polynesian customs and belief: the major gods Kāne, Kū, and Lono; the *kapu* system of law and order; cities of refuge; the *'aumakua* concept; and the concept of *mana*. The initial permanent settlements were established at sheltered bays with access to freshwater and marine resources. These communities shared extended familial relations and there was an occupational focus on the collection of marine resources. Over a period of a few centuries, the areas with the richest natural resources became populated and perhaps even crowded, and there was increasing separation of the chiefly class from the common people. As populations increased so did societal conflict, which resulted in war between neighboring groups (Kirch 1985). Soon, large areas of Hawai'i were controlled by a few powerful chiefs.

As time passed, a uniquely Hawaiian culture developed. The portable artifacts found in archaeological sites of this next period reflect an evolution of the traditional tools and distinctly Hawaiian inventions. The adze (*ko'i*) evolved from the typical Polynesian variations of plano-convex, trapezoidal, and reverse-triangular cross-section to a very standard Hawaiian rectangular quadrangular tanged adze. The two-piece fishhook and the octopus-lure breadloaf sinker are Hawaiian inventions of this period, as are *'ulu maika* stones and *lei niho palaoa* (ivory pendant). The latter was a status item worn by those of high rank, indicating a trend toward greater status differentiation (Kirch 1985). As the population continued to expand so did social stratification, which was accompanied by major socioeconomic changes and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands were settled and the more marginal leeward areas were being developed. During this expansion period, additional migrations to Hawai'i occurred from Tahiti in the Society Islands. Rosendahl (1972) has proposed that settlement at this time was related to seasonal, recurrent occupation in which coastal sites were occupied in the summer to exploit marine resources, and upland sites were occupied during the winter months, with a focus on agriculture. An increasing reliance on agricultural products may have caused a shift in social networks as well; as Hommon (1976) argues, kinship links between coastal settlements disintegrated as those links within the *mauka-makai* settlements expanded to accommodate the exchange of agricultural products for marine resources. This shift is believed to have resulted in the establishment of the *ahupua'a* system sometime during the A.D. 1400s (Kirch 1985), which added another component to an already well-stratified society. The implications of this model include a shift in residential patterns from seasonal, temporary occupation, to the permanent dispersed occupation of both coastal and upland areas.

Adding to an already well-stratified society was the development of the *ahupua'a*—the principle land division that functioned for both taxation purposes and furnished its residents with nearly all of the fundamental necessities from which they sustained themselves. The *ahupua'a* became the equivalent ofa local community, with its own social, economic, and political significance and served as the taxable land unit during the annual *Makahiki* procession (Kelly 1956). During this annual procession, the highest chiefofthe land sent select members of his retinue to collect tribute in the form of goods from each *ahupua'a*. The *maka'āinana* (commoners) who resided in the *ahupua'a* brought their share of tribute and offerings to an *ahu* (altar) that was symbolically marked with the image ofa *pua'a* (pig). *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or chiefs who controlled the *ahupua'a* resources; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land (Malo 1951). *Ahupua'a* lands were in turn, managed by an appointed *konohiki* or lesser chief-landlord (ibid.). The *ali'i- 'ai-ahupua'a*, in turn, answered to an *ali'i 'ai moku* (chief who claimed the abundance of the entire district) (ibid.). Thus, *ahupua'a* resources supported not only the *maka'āinana* and *'ohana* (families) who lived on the land but also contributed to the support of the royal community of regional and/or island kingdoms. *Ahupua'a* are land divisions that typically incorporated all of the eco-zones from the mountains to the sea and for several hundred yards beyond the shore, assuring a diverse subsistence resource base (Hommon 1986). Although the *ahupua'a* land division typically incorporated all of the eco-zones, their size and shape varied greatly (Cannelora 1974). This form of district subdividing was integral to Hawaiian life and was the product of resource management planning that was strictly adhered to. In this system, the land provided fruits and vegetables and some meat for the diet, and the ocean provided a wealth of protein resources (Rechtman and Maly 2003). In communities with long-term royal residents, divisions of labor (with specialists in various occupations on land and in the procurement of marine resources) were also strictly enforced.

By the 17th century, large areas of Hawai'i Island were controlled by a few powerful *ali'i 'ai moku*. There is island-wide evidence to suggest that growing conflicts between independent chiefdoms were resolved through

warfare, culminating in a unified political structure at the district level. It has been suggested that the unification of the island resulted in a partial abandonment of portions of leeward Hawai'i, with people moving to more favorable agricultural areas (Barrera 1971; Schilt and Sinoto 1980). 'Umi a Līloa, a renowned *ali'i* of the Pili line, is often credited with uniting the Island of Hawai'i under one rule during the Precontact Period (Cordy 1994). 'Umi-a-Līloa is also credited with formalizing the land division system on Hawai'i Island and separating the various classes of chiefs, priests, and laborers (Beamer 2014; Cordy 2000; Kamakau 1992). Upon the death of 'Umi-a-Līloa, Hawai'i Island came under the control of his eldest son Keli'iokāloa-A-'Umi (Cordy 2000), whose reign is marked by his mistreatment of the lesser chiefs and commoners. His reign was short-lived and by the early-18th century, Hawai'i Island fell under the control of Alapa'inui, who assembled a robust army and assigned his closest potential usurpers (his nephews Keawema'uhili, Kalani'ōpu'u, and Keōua) as generals in his militia. The prodigious 'Ī clan, spread across the districts of Ka'ū, Puna, Hilo, and portion of Hāmākua was also a powerful force and threat to Alapa'i campaign (Cordy 2000). As Alapa'i gathered his forces to strike back at Kekaulike, the *ali'i nui* of Maui, the high ranking *ali'i wahine* (chiefess) Keku'iapoiwa made her way to Kokoiki, Kohala and give birth to Pai'ea, the birth name of Kamehameha (ibid.). Kamehameha was reared in the traditions and customs of the ancient chiefs and trained under some of the most skilled warriors of that time including Kekūhaupi'o. Upon Alapa'i's death, his eldest son Keawe'ōpala was named heir to his father's kingdom.

By the mid-18th century, the young and determined Kamehameha directed his efforts toward consolidating Hawai'i Island under his rule. To accomplish this monumental task, Kamehameha continued his training under his more experienced kin namely Kalani'ōpu'u, who was the *ali'i nui* of Hawai'i Island ('Ī'ī 1959). During Kalani'ōpu'ū's reign, the first foreign vessels arrived in Hawaiian waters captained by the British explorer, James Cook. Cook first landed at Waimea, Kaua'i in 1778 and in 1779, he anchored just off the shore of Kealakekua Bay, Kona, Hawai'i. Aboard these ships were innovative technologies and diseases unknown to the inhabitants of these islands. Items such as metal, nails, guns, canons, and the large foreign vessels themselves stirred the interest of the *ali'i* and *maka'āinana* alike. Acquisition of these technological advancements came through barter. This resulted in the *ali'i* gaining possession of such items that ultimately set traditional Hawaiian warfare in new trajectory; one that would be forged by none other than Kamehameha. Wars occurred regularly between intra-island and inter-island polities during this period. It was during this time of warfare that Kamehameha, who would eventually rise to power and unite all the Hawaiian Islands under one rule (Kamakau 1992).

A Brief History of Hawai'i After Western Contact

Hawaiians first significant encounter with Europeans marked the end of the Precontact Period and the beginning of the Historic Period. With the arrival of foreigners, Hawai'i's culture and economy were drastically altered. Demographic trends during this period indicate population reduction in some areas, due to war and disease, yet increases in others, with relatively little modification of material culture. There was a continued trend toward craft and status specialization, intensification of agriculture, *ali'i* controlled aquaculture, upland residential sites, and the enhancement of traditional oral history. The traditions associated with Kū including *luakini heiau*, and the *kapu* system were at their peaks, although Western influence was already altering the cultural fabric of the Islands (Kent 1983; Kirch 1985). Foreigners very quickly introduced the concept of trade for profit, and by the time Kamehameha I had conquered O'ahu, Maui, and Moloka'i, in 1795, Hawai'i saw the beginnings of a market system economy (Kent 1983). This marked the end of an era of uniquely Hawaiian culture. Some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods that they could trade with early visitors. Introduced foods often grown for trade with Westerners included yams, coffee, melons, potatoes, corn, beans, figs, oranges, guava, and grapes (Wilkes 1845).

On May 8th, 1819, Kamehameha, who had seen the impacts brought about by foreign introductions, died at his royal residence at Kamakahonu in Kailua-Kona and named his son 'Iolani Liholiho heir to his kingdom (Kamakau 1992). By May 21st 'Iolani Liholiho (Kamehameha II) at the age of twenty-one began his rule. As traditional custom dictated and to allow for all people to rightfully mourn the loss of their chief, all *kapu* were relaxed following the death of a chief (ibid.). It was the responsibility of the new ruler to conduct the proper rituals and ceremonies to reinstate all *kapu*. However, Liholiho's attempts to reinstate the long-standing *kapu* system was futile and the future of the *kapu* system stood in a state of uncertainty. *Kuhina Nui* (Premier), Ka'ahumanu (the wife of Kamehameha and the *hānai* (adopted) mother of Liholiho) and his biological mother Keōpūolani lured the young chief back to Kona and the *kapu* system was symbolically abolished when Liholiho ate in the presence of his mothers. While Liholiho, his mothers and other chiefs favored the complete abolishment of the *kapu* system, others including Kekuaokalani and his followers prepared to wage war, determined to have the ancient laws reinstated. After several failed attempts at negotiation, Liloliho's army led by Kalaimoku went head-to-head against the forces of Kekuaokalani in the Battle of

Kuamo'o (Fornander 1918–1919). Western weaponry had already permeated traditional Hawaiian warfare and Kekuaokalani, who stood behind the ancient laws of the land was killed by gunfire on the battlefield alongside his wife Manono, thereby extinguishing the last public display of resistance. The abolishment of the *kapu* system in 1819, began to undermine the very foundations upon which traditional Hawaiian culture was formed. Adding to an already socially and politically fractured society was the arrival of Protestant missionaries who saw it to be their destiny to fill the spiritual void of the Hawaiian people.

In October of 1819, just five months after the death of Kamehameha, the first American Protestant missionaries aboard the Brig. *Thaddeus* left Boston, Massachusetts and by March 30th, 1820, they sailed to Kawaihae on the northwest coast of Hawai'i Island (Hawaiian Mission Children's Society 1901). Having heard of the overturning of the ancient *kapu* system, these early missionaries formed close alliances with some of Hawai'i's royalty, including Ka'ahumanu who held a tremendous amount of political power. Starting in 1823, these early missionaries, one of which included William Ellis (1917) set out into the remote parts of the islands in search of suitable locations for future mission stations and within a few short years, mission stations were being constructed outside of the main town centers. Christian beliefs quickly spread and soon established a firm foothold in the islands. The missionaries quickly discovered that many Hawaiians were selective about what aspects of Christianity they were willing to adopt. In striving for complete conversion, the missionaries with the help of the *ali'i* implemented laws that enforced Euro-American beliefs on the Hawaiian people. To an extent, this furthered the efforts of the missionaries. Despite these massive cultural changes, many Hawaiians continued to hold to their ancient beliefs, especially those associated with their relationship to the land. Throughout the remainder of the 19th century, introduced diseases and global economic forces continued to degrade the traditional life-ways of the Hawaiian people.

WAIĀKEA AHUPUA'A, PANA'EWA, AND THE GREATER HILO DISTRICT

The current project area is within the traditional *ahupua'a* of Waiākea, whose name has been literally translated by Pukui et al. (1974:220) as "broad waters." Noted Hawaiian Historian and Ethnographer Kepā Maly (1996a:A-5) adds to this translation, noting that the name can also be translated to mean "expansive—much water." Maly (ibid.:A-5) goes on to explain that "in Hawaiian culture, water was the source of wealth"...and that reference to *wai* (fresh water) figuratively expresses the traditional value of these lands. The *ahupua'a* of Waiākea extends from the coast and is bounded on the north by Kūkūau 1st Ahupua'a. Waiākea shares its southern boundary with two *ahupua'a* of the Puna District, Kea'au at its southeast end and 'Ōla'a at its southwest end. Waiākea is bound as its westernmost end by Humu'ula Ahupua'a (located in the Hilo District) and Keauhou Ahupua'a (located in the Ka'ū District).

Waiākea Ahupua'a is one of the many *ahupua'a* that together comprise the traditional *moku* (district) of Hilo, which is one of six *moku* on Hawai'i Island. The Hawaiian *'ōlelo no'eau* (proverbial saying), "*Hilo, mai Mawae a ka pali o Maulua*" (Pukui 1983:108) details the extent of the Hilo District spanning from Māwae, a large fissure and boundary marker separating Hilo from the Puna District at the south end and Maulua, a gulch separating Hilo from the Hāmākua District at its north end. Handy and Handy (1991:538) provides a general description of the district and describes the principle settlement areas of the district:

> Hilo as a major division of Hawai'i included the southeastern part of the windward coast most of which was in Hamakua, to the north of Hilo Bay. This, the northern portion, had many scattered settlements above streams running between high, forested kula lands, now planted with sugar cane. From Hilo Bay southeastward to Puna the shore and inland are rather barren and there were few settlements. The population of Hilo was anciently as now concentrated mostly around and out from Hilo Bay, which is still the island's principal port. The Hilo Bay region is one of lush tropical verdure and beauty, owing to the prevalence of nightly showers and moist warmth which prevail under the northeasterly trade winds into which it faces. Owing to the latter it is also subject to violent oceanic storms and has many times in its history suffered semidevastation from tidal waves unleashed by earthquake action in the Aleutian area of the Pacific.

Traditionally, the *moku* of Hilo was divided into three *'okana* (sub-districts) with place names that have their origins in legendary times. The three *'okana* are (from north to south): Hilo Palikū-—characterized by its upright cliffs, this area of Hilo extends north of the Wailuku River to Ka'ula Gulch. The *'ōlelo no'eau*, "*Hilo iki, pali 'ele'ele*" describes this sub-district noted for its greenery, rain, and mists (Pukui 1983:107). The second *'okana* is Hilo One—or sandy Hilo, which extends along the shoreline of Hilo Bay between the Wailoa and Wailuku rivers; and finally, Hilo Hanakahi—the land region extending south of Wailoa River to include Keaukaha and Pana'ewa (Edith Kanaka'ole Foundation 2012; Pukui 1983). The current study area is within the *'okana* of Hilo Hanakahi, a subdistrict often celebrated in many *mele* (song) composed for Hilo, with the infamous line "*Hilo Hanakahi, i ka ua Kani-lehua*" translated as "Hilo [land of] chief Hanakahi and of the rain that gives drink to *lehua* flowers" (Pukui and Elbert

1986:129). Another *ʻōlelo noʻeau* describing Hanakahi and the rains of Hilo reads, "*Luʻuluʻu Hanakahi i ka ua nui*"o translated as "[w]eighted down is Hanakahi by the heavy rain" (Pukui 1983:219). Pukui (ibid.) expands on this saying,o noting that "Hanakahi, Hilo was named for a chief of ancient times. This expression was much used in dirges too express heaviness of the heart, as tears pour like rain." The source of these *ʻokana* are found in the legendary accounto titled "*Kaʻao Hoʻoniua Puʻuwai no Ka-Miki*" ("The Heart Stirring Story of Ka-Miki") published in Hiloʻs Hawaiiano language newspaper *Ka Hōkū O Hawaiʻi* between January 8th, 1914, through December 6th, 1917. Maly, who compiledo and translated this lengthy account explains that:o

> The narratives were written by John Wise and J.W.H.I Kihe, noted Hawaiian scholars of the late 1800s and eartly 1900s, historians who also collaborated on the translations of Abraham Fornanderʻso collection. The authors used place names as the line with which to tie together fragments of site-specific stories that had been handed down over the generations. Thus, while in many cases, theo personification of individuals and their associated place names may not be "ancient," the siteo documentation within the story is of great value. (Maly 1996a:A-4)o

In that portion of the legend that references the Hilo area, Ka-Miki and his companions, Maka-ʻiole and Kealiialaka, continue their journey circumnavigating Hawaiʻi Island coming out of the Puna District into Hilo. In drawing from this legendary account, Maly (1996a:A-2) notes that Waiākea Ahupuaʻa was named in honor of the high chief Waiākea-kumu-honua, a brother of Panaʻewa-nui-moku-lehua (female) and Piʻihonua-a-ka-lani (male). While the aforemention accounts provide a possible origin of the naming of Waiākea, Maly (1996a:A-2), in relating a personal account from Clarence Mokuʻōhai Medeiros, mentions that *waiākea* "is also a native variety of taro, similar to the better known *lehua*, but with black streaks along the edges of the stalks.ō Maly also provides the following translation of ethnographic notes taken by Theodore Kelsey during an interview with Mrs. Kamakakuikalani in 1921 that explains how the *ahupuaʻa* of Waiākea was established:

> Kapapala and Waiakea were sub-chiefs who were told by their superior to run around the tracts of land bearing their names (from Tom Cook, surveyor) (BPBM SC Kelsey Box 1.5, July 2, 1921:2 in Maly 1996a:A-11)

Kelsey also related that "Waiākea was so named 'because you could dig any where [sic] and find waterō" (Maly 1996a:A-11). The names of the legendary people of this area are commemorated in the place names for several lando units (both the *ahupuaʻa* and their components including *ʻili*) that comprise portions of the Hilo District. The lands ofo Hilo was further divided into *ahupuaʻa* that today retain their original names (Kelly et al. 1981). These lands includeo but are not limited to the subject *ahupuaʻa* of Waiākea—which forms the southernmost boundary of the Hilo Districto in addition to Punahoa, Ponahawai, Kūkūau, and Piōihonua, all ofowhichare found between Waiākea and the massiveo Wailuku River (Figure 22).o

Waiākea Ahupuaʻa: A Center of Chiefly Occupation

According to legendary and historical accounts, the rich and fertile lands of Waiākea were deeply cherished by the chiefs. Several traditional accounts make passing reference to Waiākea as the birthplace and residence of chiefs. In Fornanderʻs (1916–1917) the *Legend of Kapuaokaoheloai*, Kū and Hina, who are recognized as paramounts gods, had two children, their son Hookaakaaikapakaakaua and their daughter Kapuaokaoheloai. Fornander (ibid.:540-541) writes, "*O Waiakea, i Hilo ka aina, o ka mua ke kaikunane, o ka muli ke kaikuahine, he mau alii lakou no Hilo*" to which he translated as "The brother was the first born and the sister the last. These people were of high chief rank of Hilo." Various historical accounts also expound on this with multiple references to select places within Waiākea as royal residences.Sometime after the rule of the late 16th century chief, ʻUmi-a-Līloa, select portions ofoWaiākea, where bodies of freshwater are ever-present, were set aside as semi-automonous land units known as *ʻili kūpono* or *ʻili kū* (Brandt 2017; Cordy 2000:200). These *ʻili kūpono* (independent land divisions) paid tribute directly to an *aliʻi nui* (high chief) rather than to the *aliʻi-ʻai-ahupuaʻa* (chief who controlled the *ahupuaʻa* resources) and required its inhabitants to pay a labor tax (Beamer 2014). Curtis J. Lyons, who worked as surveyor for the Hawaiian Kingdom government during the late 19th century and early 20th century further expounds on the political implication of this unique type of land division, writing:

> The *ili kupono*, on the contrary, was nearly independent. The transfer of the ahupuaa to a new chief did not carry with it transfer of the *ili kupono* contained within its limits. The chiefs previously holding the ili kupono continued to hold them, whatever the change in the ahupuaa chief, having their own koeles (chiefs' patches,) worked by their retainers. There was however, a slight tribute of work due to the ahupuaa chief; sometimes one or two days in the month; sometimes even less, or only certain days in the year. (Lyons 1875:119)

Within Waiākea are three *ʻili kūpono*, namely Piʻopiʻo, Makaokū, both of which are adjacent to Hilo Bay and located further east is Honohononui (see Figure 41) (Brandt 2017; Edith Kanakaʻole Foundation 2012). The proposed quarry site is located approximately 0.4 miles (0.7 kilometers) southwest of the *ʻili kūpono* of Honohononui, which in itself has a rich history and is associated with the powerful ʻĪ chiefs that ruled over Hilo and its adjacent districts during the 15th century (Cordy 2000; Edith Kanakaʻole Foundation 2012). Similarly, Piʻopiʻo has a long history of being a royal residence as Stephen Desha (2000:76), who was a prolific writer, senator, and pastor during the early 19th century refers to Piʻopiʻo as "a place of residence of chiefs from ancient times", and mentiond that Keawemauhili's wife, Ululani had her residence there. During Alapaʻinui's reign, Keōua (Kamehameha I's father) died at Piʻopio in 1752, and later Keōuaʻs brother, Kalaniʻōpuʻu also lived and died at Piʻopiʻo (Kamakau 1992). Kamakau (1992), Thrum, and Fornander also makes reference to Piʻopiʻo in the account of ʻUmi-a-līloa where they describes a gathering at Kanukuokamanu, the northeastern point of Piʻopiʻo. It was at Kanukuokamanu that the chiefs and people gathered for a celebration where "there was hula dancing, games of hiding stones (*papuhene*), tossing a half-coconut at a mark (*kilu*), and *loku*... (Kamakau 1992:15) It was at Kanukuokamanu that ʻUmi-a-līloa had his encounter with his wife, ʻIʻiwalani, the fine daughter ofaKulukulua, the chief of Hilo (Thrum 1923). After the night's festivities had come to an end, ʻUmi-a-līloa approached his wife and inquired about her royal pendant necklace that was made of *wiliwili* (*Erythrina sandwicensis*) wood. In an act to demonstrate his disapproval of the material from which her necklace was made, ʻUmi-a-līloa broke ʻIʻiwalaniʻs necklace and with deep sadness and regret, the woman told her father about her husband's insulting actions. This incident eventually led to a war between the two chiefs and ʻUmi-a-līloa of Hāmākua became acknowledged as the chief of Hilo. a

According Kamakau (1961) ʻUmi's conquest began with his defeat of the Hilo chiefs and that his reign lasted until around ca. A.D. 1620, and was followed by the rule of his son, Keawenui a ʻUmi, who ruled Hamākua, Puna, and Hilo from his royal residence in Hilo. ʻUmi's descendants continued to rule until Alapaʻinui, a descendant of the Mahi family of Kohala, conquered the island in the early 1700s (Cordy 2000). During the reign of Alapai, Johna Papa ʻĪʻī, a Hawaiian historian who served in the royal court of Kamehameha recounts:

> Alapai, ruler of Hawaii [from c. 1730-1754] and great uncle of Kamehameha, and his wife Keaka took charge of him [Kamehameha]. Some years later, Alapai and his chiefs went to Waiolama [a river separating Waiākea from Kukuau Ahupuaʻa] in Hilo, where Keoua Kupuapaikalani, the father of Kamehameha, was taken sick and died. Before Keoua died he sent for Kalaniopuu, his older half brother and the chief of Kau, to come and see him. Keoua told Kalaniopuu that he would prosper through Kamehameha's great strength and asked him to take care of the youth, who would have no father to care for him. Keoua warned Kalaniopuu, saying, "Take heed, for Alapai has no regard for you or me, whom he has reared." After this conversation, Keoua allowed his brother to go, and Kalaniopuu left that night for Puaaloa [situated in the Panaʻewa portion of Waiākea].
>
> As Kalaniopuu neared Kalanakamaa [in Waiākea], he heard the death wails for Keoua and hastened on toward Kalepolepo [near Piʻopiʻo] where he had left his warriors. There they were attacked by Alapai's men, who had followed Kalaniopuu from Hilo. First the warriors from the lowland gained, then those from the upland . . . Kalaniopuu continued his journey and at midnight reached Puaaloa, where he arranged for the coming battle. The next day all went as he had planned. His forward armies led the enemy into the forest of Paicie, where there was only a narrow trail, branchy on either side and full of undergrowth. There his men in ambush rose up against the enemy warriors, and his rear armies closed in behind them.
>
> When news reached Alapai that his warriors had been destroyed, he sent another company of warriors to meet Kalaniopuu at Mokaulele on the outer road, which was an ancient road, known from the time of remote antiquity. (ʻĪʻī 1959b:3–4)

Kamakau also relates the following account which makes reference to Waiākea being the choice lands for the late 18th century Hawaiʻi Island chiefs. Kamakau (1992:152) writes that after the battle ofaKoapapa between Kamehameha and Keoua, in which neither side was victorious:

> Keoua retired to Hilo; Kamehameha went back to Waipiʻo and Kohala. At Hilo Keoua divided the land among his chiefs and warriors; the fat mullet of Waiakea and Piʻopiʻo became theirs.

The following year, Keoua was killed and Kamehameha retained the fertile lands of Waiākea in addition to Piʻihonua, and Punahoa. Kamehameha later passed Waiākea to his son and heir, Liholiho (Kamehameha II), which he retained until his death in 1824 at which point the lands were passed to Kaunuohua, the granddaughter of the Hilo chief, Keawemauhili (Maly 1996a). Kaunuohua held these lands until the 1848 Māhele ʻĀina, which is discussed in a later section of this report.

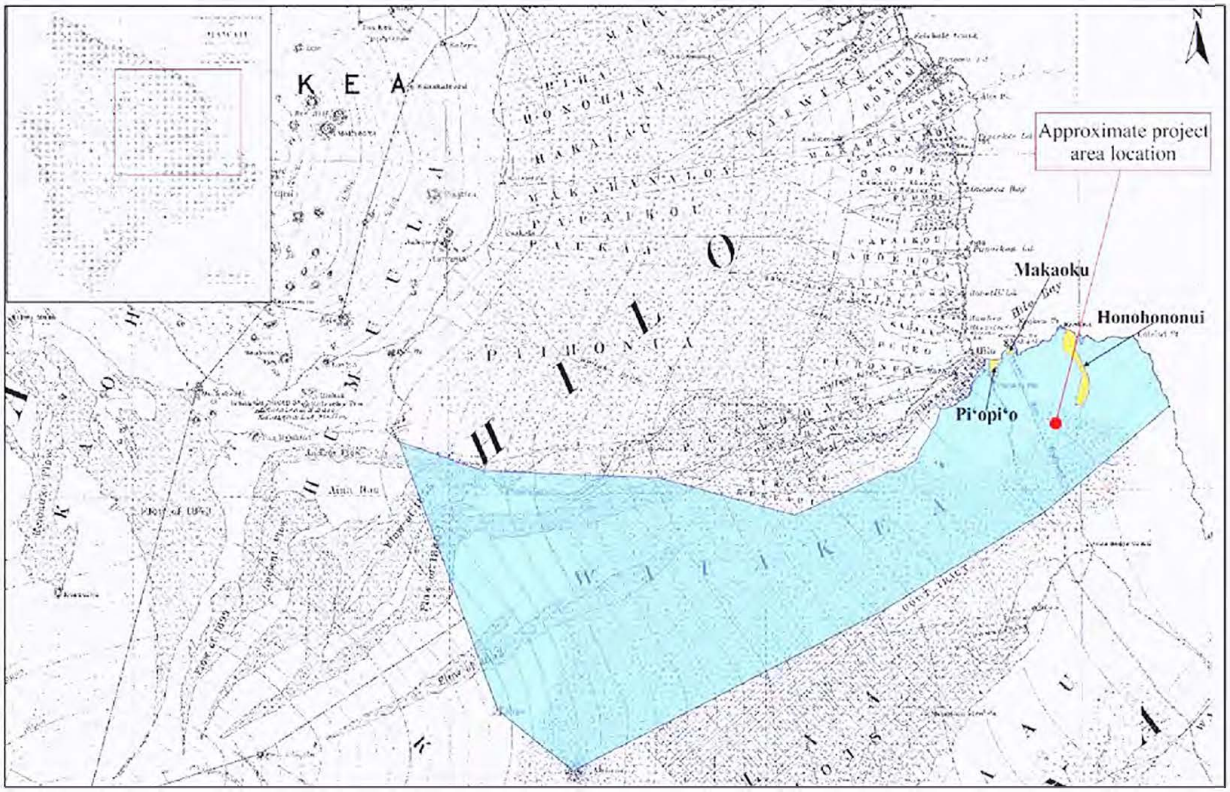

Figure 22. A portion of Hawai'i Registered Map No. 2060 by J. M. Donn in 1901, showing Waiākea Ahupua'a (shaded blue) within the moku of Hilo with the approximate location of the study area and 'ili kūpono lands.

Captain George Vancouver, an early European explorer who met with Kamehameha I at Waiākea in 1794, recorded that Kamehameha was there preparing for his invasion of the neighbor islands and that Hilo was an important center because his *peleleu* fleet of 800 canoes were being built there (Moniz 1994; Tolleson and Godby 2001). The people of Hilo had long prepared for Kamehameha's arrival and collected a large number of hogs and a variety of plant foods, to feed the ruler and his retinue. Kelly et al. (1981) surmised that the people of Hilo had actually prepared for a year prior to Kamehameha's visit and expanded their fields into the open lands behind Hilo to accommodate the increased number of people that would be present. It was during this early Historic Period that Waiākea Ahupua'a became part of Kamehameha I's personal land holdings after which time the *'ili kūpono* of Pi'opi'o appears to have been given to Ka'ahumanu (Moniz 1994). A residence for the Chiefess Ruth Ke'elikolani is shown at Pi'opi'o on an 1891 map (Figure 23).

As recounted above, the coastal portion Waiākea surrounding Hilo Bay served as a chiefly residence from at least the sixteenth century and well into the turn of the 19th century. The low-lying coastal areas of Waiākea where fishponds and near and offshore fisheries were easily accessible thrived as a traditional habitation area. Just inland of Hilo Bay, the marshy lands fed by fresh spring water was extensively cultivated while the forested areas situated further *mauka* provided the *ahupua'a*'s early inhabitants with access to hardwoods, and other important flora and fauna. The traditional staple crop, *kalo* (taro), was cultivated in irrigated terraces along the stream edges while *'uala* (sweet potato), *mai'a* (banana) and *kō* (sugarcane) were grown in the wet *kula* lands of the lower forest zone (Handy and Handy 1991). These lands had an abundance of *kukui* (candlenut), *'ulu* (breadfruit), and *niu* (coconut) groves and was also rich in marine resources, easily accessible from the sheltered bay. Although settlements were prominent in these areas the increase in population and agricultural production, settlements spread into the upland *kula* regions. Handy and Handy (1972), provide yet another description of the fertile landscapes of Hilo:

> The light and fertile soil is formed by decomposing lava, with a considerable portion of vegetable mould. The whole is covered with luxuriant vegetation, and the greater part of it formed into plantations, where plantains, bananas, sugar-cane, taro, potatoes and melons, come to the greatest perfection. Groves of cocoa-nut and bread-fruit trees are seen in every direction, loaded with fruit, or clothed with luxuriant foliage. (Ellis in Handy and Handy 1972:539)

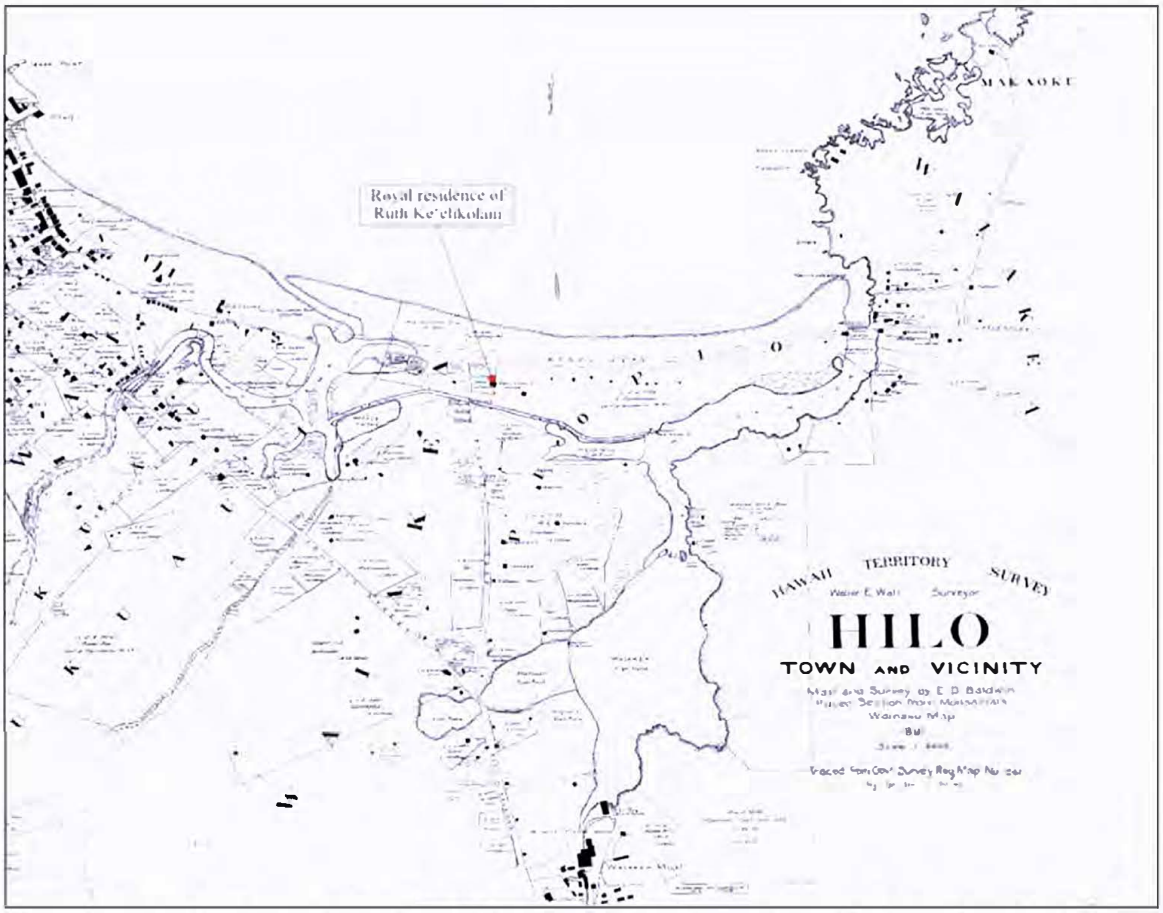

Figure 23. A portion of Hawai'i Registered Map No. 1561 from Baldwin in 1891 shows the extensively settledcoastal lands of Waiākea with the royal residence of Ruth Ke'elikōlani in the *'ili kūpono* of Pi'opi'o. Project area not depicted on map.

Marine Resources, Fishponds, and Agricultural Practices of Waiākea

Of the Hilo *ahupua'a* located south of Wailuku River, only Pi'ihonua and Waiākea provided access to the full range of resources stretching from the sea up to 6,000 feet along the slopes of Mauna Kea and Mauna Loa respectively. The abundant marine resources of Hilo Bay, extensive spring-fed fishponds and waterfowl, and wetland and dryland agricultural resources helped to sustain the population of the *moku* of Hilo. Marine-based subsistence was strongly linked to social organization. Strict *kapu* were enforced, which dictated when and where certain varieties of fish such as *'ōpelu* and *aku* could be caught. A dedicated *aku* fishing ground or *ko'a* known as Maka-o-Kū was located on the shore of the Waiākea Peninsula, near present-day Mokuola, also known as Coconut Island (Maly 1996b).

As with other areas in Hawai'i, the fishponds in this *ahupua'a* were carefully managed and restricted for *ali'i* use only. Theoretically, access rights to fishing areas and ocean resources were defined by *ahupua'a* boundaries, with residents of a specific *ahupua'a* only taking fish within their own land division. However, in the case of Waiākea Ahupua'a, the Waiākea fishery extended straight across Hilo Bay, allowing residents of the adjacent *ahupua'a* only limited rights to the fishery (Kelly et al. 1981). Kelly et al. (ibid.) note that historically, the ocean resources of Hilo Bay were vital to everyday subsistence, and citing Kamakau (1976:59–60), describe various fishing techniques:

> ... with basket traps; with hook and line... by drugging. A man could also fish with his hands, or with crab or shrimp nets, or with a pole from a ledge or the seashore or catch fish in tide pools with a scoop net, or go along the seashore with a net, or set a fishline; or search for fish with a small basket trap or draw a net over sandy spots in the sea or up onto the shore; or drive fish into nets by splashing; or with a pole. But these were not expert ways of fishing; they were just for the taking of fish to make living more pleasurable...

The traditional fishing methods of Waiākea that were used to snare small fish, shrimps, and crabs are also noted in a poetical saying recorded by Pukui (1983:318):

> *Waiakea pepeiao pulu ʻaha.*
> Waiakea of the ears that hold coconut-fiber snares.
> Snares for small fish, shrimp, or crabs were made of coconut midrib and the fiber from the husk of the nut. When not in use the snare was sometimes placed behind the ear as one does a pencil. This saying is applied to one who will not heed—he uses his ears only to hold his snare.

Fornander (1918–1919) associates this poetical expression to Kulukulua, a chief that ruled over Hilo during the time of ʻUmi-a-līloa as described in the *Legend of Kuapakaa.* In this legend, the young Kuapakaʻa of Molokaʻi insultingly calls out to the various chief of Hawaiʻi Island. In one such chant, Kuapakaʻa verbally degrades Kulukulua, by challenging his status as a chief and associating him with the task of commoners including the catching of shrimp with snares. Kuapakaʻa called out to the Hilo chief in the following manner:

O ua ʻlii o makou o Hilo, o Kulukulua,	Our chief of Hilo, Kulukulua, is not a
aohe alii	chief [by birth];
He pahelehele opae no Waiakea;	He is a snarer of the shirmps of Waiakea;
A pau ke pahelehele ana,	After the snaring,
Kau ae la i ka pulu niu i ka	He places the outside covering of the coconut on his
pepeiao.	ears.
O ke kee no hoi ia o ia aina,	This is the fault of the land;
O ka ai ana ia Hilo,	But since he became possessed of Hilo.
Olele ia ai he ʻlii.	He is called a chief.
(Fornander 1918–1919:85)	(ibid.:84)

Extensive fishponds were cultivated in the vicinity of Hilo Bay, where spring-fed and walled-off inland ponds whose yields were reserved solely for the highest of *aliʻi.* Kamehameha I was known to send runners from Kawaihae, Kohala and Kailua, Kona to fetch live mullet from Waiākea. Fornander elaborated on this relating that Kamehameha sent his fastest runners, Makoa and Kāneakaʻehu to "Hilo to get mullet from the pond of Waiākea, on the boundary adjoining Puna" (Fornander 1918–1919:490). The largest of these ponds, Waiākea is located to the northwest of the current study and is fed by Waiākea and Wailoa River (see Figure 23). Religious rituals accompanied the creation and maintenance of these fishponds, which according to a historic account from 1823, were surrounded by small huts for their caretakers (Kelly et al. 1981). Caretakers had small huts alongside the fishponds, from where they guarded the fish against theft or being killed by pigs and dogs (Kamakau 1976). In 1846, early missionary, Chester Smith Lyman recorded the following scenes at the fishponds in Waiākea:

> June 30. Just after leaving the village we passed the royal fish ponds on the left. These are connected with the bay and contain the finest mullet in large quantity... July 30. P.M. ... They are of brackish water, rise and fall with the tide... They are generally shallow, but in places of considerable depth. The fine mullet with which they are filled are tabu to all but Royal hooks or nets, and thoʻ they are innumerable and large, neither natives nor foreigners can often get a taste of them. (Lyman 1846 citedainaKellyætaal. 1981:14)

The delicious fish of the Waiākea fishpond are referred to in various early accounts, such as a story concerning Kamehameha, who intended to make war on Keawemauhili. In response, Keawemauhili in an attempt to avoid war sent Kamehameha the "...sweet-tasting *ʻanae* of Waiākea pond and the fat *awa* in the center of the fishpond..." (Desha 2000:161). In Westervelt's (1915:191) story of Keaunini, he tells of how "the people feasted on the mullet of Lolakea and the baked dogs of Hilo and the humpbacked mullet of Waiakea..." Waiākea's fishponds were also said to be favorites of Hiʻiakaikapoliopele and her elder sister Pele. These two sisters are also figured in a story that describes why the goddess Hiʻiakaikapoliopele caused the deadly ash fall that killed Keōua's army when they passed near the volcano. According to a seer at the time, "the goddess was angry at Keōua for not offering her some of the "fat mullet of Waiākea" (Desha 2000:279).

Agricultural resources were essential to the residents of Waiākea. The Hawaiian proverb "*Hilo ʻai lūʻau*" makes reference to the significance of taro consumption and according to Pukui (Pukui 1983:107) when storms made it impossible to obtain fish, the people of Hilo depended on cooking the entire taro plant. Historical accounts analyzed by McEldowney (1979) indicate that much of Waiākea was in a zone of agricultural productivity. Pukui et al. (1974) relates the following account of a legendary man named ʻUlu, who lived in Waiākea when a bout of famined came over the land. He died of starvation and was laid to rest near a stream. The following morning, there was an *ʻulu* (breadfruit) tree filled with fruits growing where he was buried, thereby ending the famine (1974:219–220). Thrum

(1923) also related this same account, which was reported to him by early Hilo missionary, Henry M. Lyman, and provides additional details. Thrum reports that a large deluge known as Kahinalii swept over the land which left the earth bare of fruits with only *koa* and *ʻōhiʻa* remaining. Thrum adds:

> But, during the reign of the second king after the flood, there lived at Waiakea a man by the name of Ulu, and he had a young son named Mokuola. This child was small and sickly; and his parents felt great sorrow for the pains which he suffered in consequence of eating the gross food which nature had so scantily furnished for their sustenance. Every morning his father would paddle out in his little canoe, and draw the fish-net through the still waters of the bay, if perchance he might catch a tender mullet or an opelu for his dear son; while at evening the kind mother would wrap her boy in a sheet of yellow kapa, and, when the sea-breeze gave way to the cool mountain wind, go down to the wet rocks on the sea-beach in search of limpets and mussels for her child's supper. In spite, however, of their fondest attention, little Mokuola grew thinner and weaker from day to day, so that his parents quite began to despair of his life. (Thrum 1923:235–236)

Unable to bear their son's condition, ʻUlu spoke with his wife and told her that he would seek the help of the gods Kāne and Kanaloa. The following morning, ʻUlu made his way before dawn to Puʻueo to pray and offer sacrifices at a temple. During the ritual, ʻUlu learned from the gods how the child of Wākea (sky father) was buried outside of their home and from which sprouted a *kalo* plant. Inspired by this, ʻUlu returned home and informed his wife of his desire to be laid to rest near their home. ʻUlu then provided instructions to his wife:

> When the breath is all gone from my body, and my spirit has departed to the realms of Milu, carefully bury my head near the spring of running water. Plant my heart and entrails before the door of the house. My feet, my arms and legs, hide away in the same manner. Then lie down upon the couch where we two have so often reposed, and listen during the watches of the night; but go not forth before the sun has reddened the morning sky. If, in the silence of the night, you shall hear sounds as of falling leaves and flowers, and afterward as of heavy fruit dropping to the ground, know then that my prayer has been granted, and that the life of our son shall be saved. (ibid.:238-239)

The woman lamented at her husband's request and after ʻUlu took his last breaths, she fulfilled his request and the following morning, she was woken by the sound of falling fruit, which she used to restore life back to their son, Mokuola.

The productivity of the land is described by missionary William Ellis while visiting Waiākea in 1823. In describing the scene that lay before him, Ellis relates the following for Waiākea:

> ...the most beautiful we have yet seen....The whole is covered with luxuriant vegetation, and the greater part of it formed into plantations, where plantains, bananas, sugar-cane, taro, potatoes, and melons, grow to the greatest perfection.
>
> Groves of cocoa-nut and breadfruit trees are seen in every direction loaded with fruit, or clothed with umbrageous foliage. The houses are mostly larger and better built than those of many districts through which we had passed. We thought the people generally industrious; for in several of the less fertile parts of the district we saw small pieces of lava thrown up in heaps, and potato vines growing very well in the midst of them, though we could scarcely perceive a particle of soil.
>
> There are plenty of ducks in the ponds and streams, at a short distance from the sea, and several large ponds or lakes literally swarm with fish, principally of the mullet kind. The fish in these ponds belong to the king and chiefs, and are tabued from the common people.
>
> Along the stone walls which partly encircle these ponds, we saw a number of small huts, where the persons reside who have the care of the fish, and are obliged frequently to feed them with a small kind of mussel, which they procure in the sands round the bay.
>
> ...There are 400 houses in the bay, and probably not less than 2000 inhabitants... (Ellis 1963:337–338)

In addition to the cultivation of dry taro, wet taro was cultivated on mounds built into the existing marshlands along the Wailoa River behind the sand dunes of Hilo Bay using the *kipi* or *kipikipi* method, which resulted in a landscape of raised islands and ditches (Maly 1996b). The development of *kipi kalo* originates from Hilo in the swamps of Waiākea Handy and Handy (1972). Handy and Handy (1972) describe how the *kipi* method was implemented by:

> ...heaping up, above the surface of the water, long mounds (*kipi* or *kipikipi*) of soil upon the tops and sides ofawhich the cuttings were planted. (1972:91)

Handy and Handy (1972:539) also describe the general region of Waiākea and the forested areas of Pana'ewa as an agricultural area:

> On the lava strewn plain of Waiakea and on the slopes between Waiakea and Wailuku River, dry taro was formerly planted wherever there was enough soil. There were forest plantations in Panaewa and in all the lower fern-forest zone above Hilo town along the course of the Wailuku River.

Maly (1996b:A-2) also makes reference to a 1922 article from the Hawaiian Language newspaper, *Ka Nūpepa Kū'oko'a*, where planting on *pāhoehoe* lava flats in the Pana'ewa forest is described:

> There are *pahoehoe* lava beds walled in by the ancestors in which sweet potatoes and sugar cane were planted and they are still growing today. Not only one or two but several times forty (*mau ka'au*) of them. The house sites are still there, not one or two but several times four hundred in the woods of the Panaewa. Our indigenous bananas are growing wild, these were planted by the hands of our ancestors.

The Forested Lands of Pana'ewa

The project area is situated in an inland zone of Waiākea known as Pana'ewa characterized by its dense forest that blankets the eastern part of the *ahupua'a* and extends towards the Puna District. The extent of this massive forest is depicted in several historical maps. These maps situate the project area at the northeast edge of the Pana'ewa forest. Figure 41, below is a map from 1851 drafted by W. M. Webster showing the route of the old volcano road (located to the west of the project area) in addition to a "Road to Puna" which passed along northeast corner of the study area into the Puna District, and includes notes about the "woods." A second map from 1891 prepared by C. J. Willis (Figure 25)eshows the project area situated between the "Hala Woods" to the north and "Panaewa Forest" to the south. Figuresc 41 and 25 also shows the relative location of the three *'ili kūpono* (Pi'opi'o, Makaokū, and Honohononui) decribede above to the study area. A third map from 1893 prepared by E. D. Baldwin (Figure 26) shows the route of the olde Volcano Road and makes reference to the "Panaewa Woods" and the upper Waiākea Forest.c

Maly (1996a:A-6) translates the name Pana'ewa to mean "crooked or unjust place" and describes its location to be "a land section of Waiākea, on the Puna side of Kāwili." McEldowney (1979) notes that the Pana'ewa forest was one of the few forests on the island to reach the ocean. The following Hawaiian proverbs recorded by Pukui (1983) poetically expresses how the *'ōhi'a lehua* (*Metrosideros polymorpha*) blossoms from the Pana'ewa forest would fall into the ocean in great numbers, indicating that this celebrated forest extended to the coast.

> *He kai lū lehua ko Pana'ewa.*
> Pana'ewa shakes down the lehua fringes into the sea.
> Once, when the forest of Pana'ewa extended to the sea, fringes of *lehua* blossoms were seen floating about in the water. (ibid.:74)

> *Ke kai kua'au lehua o Pana'ewa.*
> The sea where lehua fringes float about in the shallows.
> Long ago, when *lehua* tree grew down to the shore at Puna dn Hilo, the fringes of the flower often fell into the sea, reddening the surface. (ibid.:186)

Fornander (1918–1919) also notes that Waiākea was known for a specific type of *'ōhi'a* known as the *'ōhi'a puakea* (white-blossom *lehua*), which was named after a beautiful maiden, Puakea who lived in Waiākea. In describing the characteristics and traditional uses of this unique type of *'ōhi'a*, Fornander (1918–1919:621–622) writes:

> This tree has white flowers, and its fruit is also white when it is ripe; it is palatable when eaten. It has one round seed split in two parts; the birds are fond of the nectar of its flowers. The bird snarers used the branches on which the flowers were thick to put their gum on, and when a bird was caught the snarer would call out, "Snared, snared is my bird." The bird must be secured as quickly as possible. Its trunk, as also its branches, is used for firewood.

Although renowned for its extensive and tall stands of *'ōhi'a lehua*, Pana'ewa is also celebrated in many traditional poetic compositions for its *maile* (*Alyxia stellata*), *hala* (*Pandanus tectorius*), and *'awa* (*piper methysticum*) that grew in the trees, and an array of native birds. Pukui (1983) enumerates on the endemic taxa of this area that were utilized by the people, writing:

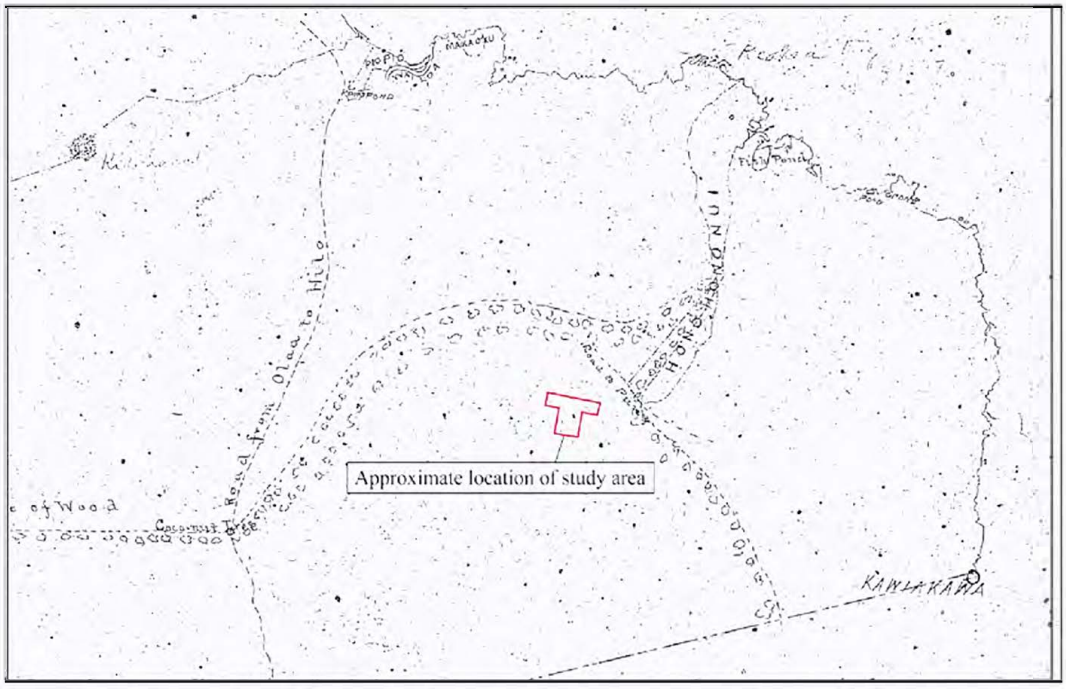

Figure 24. Portion of 1851 Hawai'i Registered Map No. 705 by W.M. Webster showing the eastern portion of Waiākea and the study area location (outlined in red) realtive the *'ili kūpono* of Honohononui, Pi'opi'o and Makaokū within the bounds of the Pana'ewa forest.

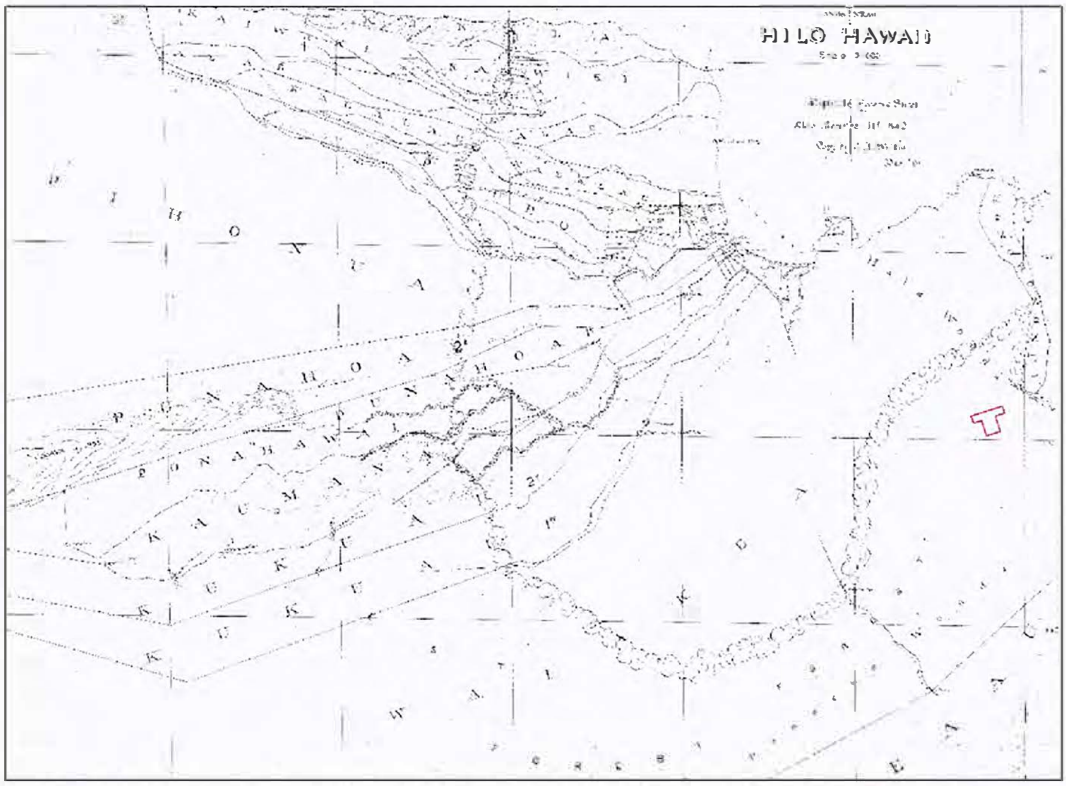

Figure 25. Hawai'i Registered Map No. 842 by C. J. Willis in 1891, showing the study area (outlined in red) and the extent of the Pana'ewa Forest with notes on the "hala woods" and "Panaewa Woods." The three *'ili kūpono* are also depicted.

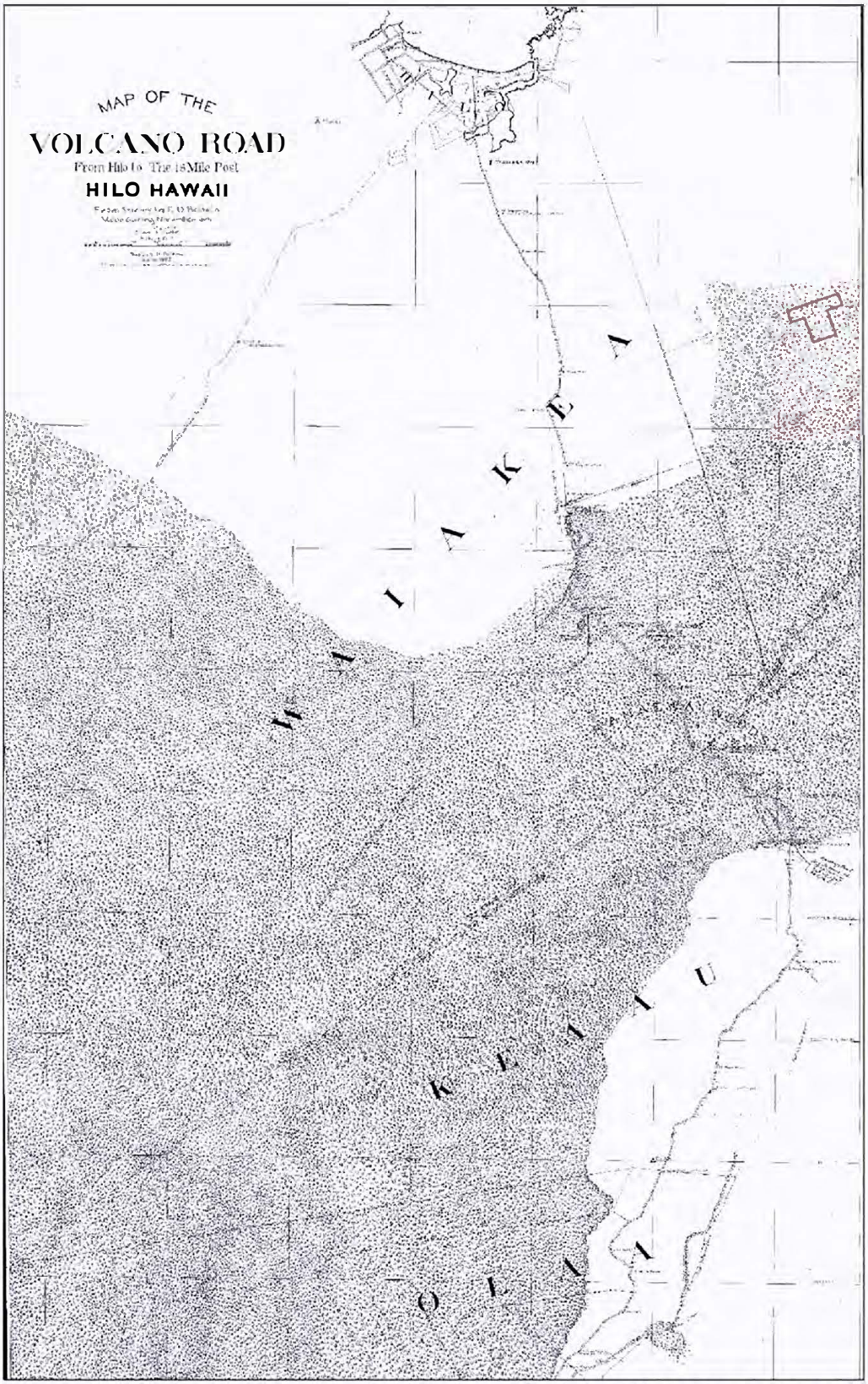

Figure 26. Hawai'i Registered Map No. 1713 by E. D. Baldwin in 1893 showing the extent of the Pana'ewa and upper Waiākea forest.

Lei Hanakahi i ka ʻala me ka onaona o Panaʻewa.

Hanakahi is adorned with the fragrance and perfume of Panaʻewa.

The forest of Panaʻewa was famous for its *maile* vines and *hala* and *lehua* blossoms, well liked for making *lei*, so Hilo (Hanakahi) was said to be wreathed with fragrance. (ibid:212)

Na manu leo nui o Panaʻewa.

Loud-voiced birds of Panaʻewa.

Loud talkers. Panaʻewa, Hilo, was famous for its *lehua* forests that sheltered the honey-sucking birds. Here people went to gather *lehua* and *maile*. (ibid.:247)

Reference to the mystical and potent *ʻawa* of Panaʻewa is described in the account of Keaunini (Westervelt 1915). After receiving orders from his brother, Ke-au-miki was sent to fetch small black and white pebbles from Hāʻena in Keaʻau, Puna and *ʻawa* from Panaʻewa. In describing the ʻawa of Panaʻewa, Ke-au-miki's brother explained:

> Get thirteen stones—seven white and six black. Make them fast in a bundle, so they cannot be lost, then come back by Panaʻewa and get awa...which man did not plant, but which was carried by the birds to the trees and planted there.

Ke-au-miki then with his supernatural powers, hastened over the lands of Hāmākua and arrived at Wailuku River where he defeated the *kupua* (demigod) that attempted to block his pathway over the river. Having arrived at Pa-ai-ie [Pāʻieʻie] in Waiākea, Ke-au-miki began his search for the objects that were requested by his brother.

> Then Ke-au-miki rushed over the river and up the precipices, speeding along to Pa-ai-ei, where the long ohia point of Pana-ewa is found, then turned toward the sea and went to Haena, to the place where the little stones aala-manu are found. He picked up the stones and ran to Pana-ewa and got the awa hanging on the tree, tied up the awa and stones and hurried back.

A traditional legendary account titled "*He Kaao no Pikoiakaalala, ke Keiki Akamai i ka Pana*" describes the traditional practice of bird catching which took place in the Panaʻewa forest. Published in a series of articles printed in the Hawaiian language newspaper, *Ka Nūpepa Kūʻokoʻa*, between December 16, 1865, through March 10, 1866, the author S. M. Kaui provides insight into this practice. Born to ʻAlalā and Koukou on the island of Kauaʻi, their son Pīkoiakaʻalalā becomes adept at *pana pua* (shooting with bow and arrow) and was able to shoot rats and birds from great distances. As a preamble to the telling of this story, Maly and Maly (2004:8) writes:

> The tradition is set is the late 1500s when Keawe-nui-a-ʻUmi, the king of Hawaiʻi Island, was in need of an expert to shoot some supernatural *ʻelepaio* birds that continually interrupted the work of his canoe makers in the uplands of ʻŌlaʻa and Hilo.
>
> Keawe-nui-a-ʻUmi learned ofeMainele, a champion in the sport of *pana pua*, who resided on Oʻahu, and promised him that if he could rid the forest of the enemy *ʻelepaio*, he could wed his daughter, the beautiful Keakalaulani.

Although Mainele boasted greatly of his skill, it was soon learned that could not kill the birds. As this story unfolded, Waiākea, a steward of Keawe-nui-a-ʻumi befriended the great shooter, Pīkoiakaʻalalā. The skilled Pīkoiakaʻalalā requested that Waiākea not tell anyone who he was and the two began their work ridding the upland forest of the mischevious birds. That portion of the story naming the birds that were caught by Pīkoiakaʻalalā in the lands of Panaʻewa and in the uplands of ʻŌlaʻa reads:

> *Eia na inoa pakahi o na manu a Pikoiakaalala i pana ai i mea ai no ka wa maka pahu o Hilo. O ka Oo, ka liwi, ka Ou, ka Akakane, ka Amakihi, a me ka Mamo, o na manu ai-lehua no a pau o ka uka i Olaa a me ka nahele laau loloa o Panaewa; oia mau manu ka ke keiki Pikoiakaalala i panai, a o ka Waiakea hoi ia e haawi aku ai i ke alii nui me na lii malalo iho, na kaukaualii, na puali, me na koa a me na kanaka hoi o ke alii.*
>
> Here are the names of the birds which Pikoi-a-ka-ʻalalā shot during his time in Hilo; the ʻŌʻō, ʻIʻiwi, ʻŌʻū, ʻAkakane, ʻAmakihi, and the Mamo, the birds which eat of the lehua blossoms in the uplands of ʻŌlaʻa, and the long-treed forest of Panaʻewa. Those were the birds shot by Pīkoi-a-ka-ʻalalā, and given to Waiākea to the king, the chiefs below him, the attendant chiefs, the warriors and the men of the chief. (Maly and Maly 2004:9)

The abundance and frequency of rain in Panaʻewa is another celebrated natural feature that is enumerated in several traditional expressions:

Ka ua kinai lehua o Panaʻewa.

The rain that bruises the lehua blossoms of Panaʻewa.

Both *lehua* and rain are commonly found in Pana'ewa. (Pukui 1983:169)

Ka ua lū lehua o Pana'ewa.
The lehua-shedding rain of Pana'ewa.
The heavy rain of the *lehua* forests of Pana'ewa in Hilo, Hawai'i. Famed in chants of old. (ibid.:172)

It is through these resources and natural wonders that Kānaka Maoli constructed their relationship to the lands of Pana'ewa. According to native scholars both of whom live in Pana'ewa, Pualani Kanaka'ole-Kanahele and the late Edward Kanahele in their report, *Pana'ewa: Cultural Description Of Indigenous Hawaiian Life*, all literary sources describe the healthy condition of the forest, which was comprised predominately of large *'ōhi'a lehua* trees. Such an understanding is derived from the traditional terms used to refer to this forests. Mr. and Mrs. Kanahele enumerate on these descriptions noting:

> Pana'ewa is synonymous with [the terms] uliuli, moku lehua and ulu lehua o Pana'ewa. Uliuli translates as dark, dense and very green that again translates as healthy. Moku lehua and ulu lehua reveals that Pana'ewa's dominate canopy is 'ōhi'a lehua. The poetic description of Pana'ewa as a lehua grove or a island is visually correct. (Kanahele and Kanahele n.d)

Furthermore, the many *mo'olelo* describing the *'ōhi'a lehua* in Pana'ewa are closely associated with Pele, the deity of lava and creator of earthly matter and her younger sister, Hi'iakaikapoliopele, whose divine energy is associated with revegetating the barren lava flows created by her sister and other volcanic siblings (Kanahele 2011). According to Mr. and Mrs. Kanahele, the Pana'ewa forest lies within the domain of these two goddesses.

> It [*'ōhi'a lehua*] is the first hardwood tree to grow on fresh lava and it acts as an agent to break down the lava, making it palatable for other forest plants to grow around or under it beginning the cycle of life for flora and fauna. It is considered at almost the same level of the creation cycle as Pele and Hi'iaka because it is an initiator. (Kanahele and Kanahele n.d)

In addition to this forest's close association with Pele and Hi'iaka, this forest is also said to the boundary between the domain of Pele and her rival lover, Kamapua'a. After engaged in a tumultuous relationship with Kamapu'a, the pig deity, he and Pele establish land boundaries as a means to end their feud. Kamapua'a was given domain over the lush northern part of the island, and Pele the southern, volcanically active section (Fornander 1918–1919). Westervelt (1916:53) relates that during his tumultuous relationship with Pele, "the islands were divided between the two demi-gods, and an oath of divine solemnity was taken by them." Westervelt goes on to explain that "they set apart a large portion of the island of Hawaii for Pele, and the eastern shore from Hilo to Kohala and all the island northwest of Hawaii as the kingdom over which Kamapuaa might establish rulers" (ibid.).

Other traditional accounts also relate the naming of this forest after the infamous *mo'o* deity, Pana'ewa, who resided in the thick forest grove. In explaining the nature of traditional *mo'o* deities and its association to fresh water, Mr. and Mrs. Kanahele writes::

> The imagery of this mo'o or lizard is the equivalent of a large dragon-type character. The mo'o is considered a water creature who lives in or is part of a watery landscape. The relevance of the mo'o and forest adds another descriptive dimension to this forest and that is, this forest is wet and soggy. (ibid.)

Kanahele and Kanahele (n.d) provided the following chant that describes the Pana'ewa forest and tells of the origins of its name. That portion of the chant reads:

I ka ulu lehua o Pana'ewa	In the lehua grove of Pana'ewa
He ulu lehua Kaulana kēia no Hilo	This is indeed a famous lehua grove of Hilo
A, ua loa'a mai kona inoa	And its name was obtained
Ma muli o kekahi kupua	From a demigod
Nona ka inoa o Pana'ewa	From him was the name, Pana'ewa
A, 'o ia ke kia'i o ua wahi nei.	And, he is the guardian of this forest

While the accounts presented above details the many celebrated resources and features of this forest, its namesake is derived from a malevolent *mo'o* (lizard-like deity) Pana'ewa that inhabited and kept close guard over this forest (Ho'oulumāhiehie 2006a). The following section presents the various *mo'olelo* that makes reference to Pana'ewa as well as the greater Waiākea Ahupua'a.

Select Mo'olelo for Pana'ewa and the Waiākea Ahupua'a

Traditional *mo'olelo* (stories, tales, and myths) and *mele* (songs) aids in understanding the cultural landscape. Such accounts often tell of traditional land use and practices of an area and provides narratives to articulate the values and expressions of the people's relationships to their lands and environment. While an abundance of native and historical accounts exists for the greater Waiākea region, this section of the study will focus primarily on Pana'ewa as it is that land areas in which the proposed quarry site is located. Associated *mo'olelo* include, the battle between Hi'iaka and the *mo'o* Pana'ewa, *Ka'ao Ho'oniua Pu'uwai no Ka-Miki* (Heart Stirring Story of *Ka-Miki*), and *Ke Kānāwai Māmalahoe* (the Law of the Splintered Paddle).

The Battle Between Hi'iakaikapoliopele and the Mo'o, Pana'ewa

In legendary accounts, *mo'o* are often depicted as fearsome and meddlesome, while in other accounts they are portrayed as friendly and even helpful (Beckwith 1970). According to Kamakau, the *mo'o* most commonly referred to in Hawaiian folklore differ from the typical house or rock lizard. Kamakau notes that the bodies of mythical *mo'o* were "extremely long and terrifying" (Kamakau 1964:82). In *Pele and Hi'iaka A Myth From Hawaii*, Hi'iaka, the heroine of the journey slays numerous malevolent *mo'o* throughout the island chain while en route to Kaua'i to retrieve her sister's lover (Emerson 1997). Hi'iaka's connection to Pana'ewa is most explicit in *Ka Mo'olelo O Hi'iakaikapoliopele*, authored by Ho'oulumāhiehie Ho'oulumāhiehie's version was initially published in the Hawaiian language newspaper *Ka Na'i Aupuni* between the years 1905-1906. Throughout the early 21st century, Hawaiian language scholar, Puakea Nogelmeier compiled the individual chapters written by Ho'oulumāhiehie, translated each page of text, and published it in a double volume (one in Hawaiian and the other in the English) (Ho'oulumāhiehie 2006b, 2006a). Nogelmeier notes that Ho'oulumāhiehie's version is one of twelve known published accounts of *Ka Mo'olelo O Hi'iakaikapoliopele*, of which select portions specific to Pana'ewa are summarized and presented below.

The story begins with Pele and her siblings who traveled from their home-land of Kahiki until reaching Hawai'i island where Pele had made her permanent home in Puna. After settling on Hawai'i Island, Pele and her siblings ventured down to Hā'ena in Kea'au to bathe in the sea. While there, Pele was overcome with the desired to sleep. She informed her youngest sister, Hi'iaka not to allow any of their siblings to awaken her. Hi'iaka consented to her sister's commands. In her dream state, Pele followed the sound of a *pahu* (drum), which carried her spirit to the island of Kaua'i, where she saw and met a striking man named Lohi'au. The two met and fell madly in love, however, given that Pele was in her spirit form, she made it clear to Lohi'au that she must return to her home but would send someone to fetch him. Pele's long sleep was cause for concern and although tempted to awaken her sister, Hi'iaka held true to her sister's commands.

Finally, Pele roused from sleep and called upon each of her sisters where she made a proposition, asking which one of them would fetch her dream lover Lohi'au from Kaua'i. Knowing Pele's tempestuous temper, each feared possible repercussions and refused to go. After being denied by all but one sister, her youngest sister, Hi'iaka appeared to her. The irascible Pele demanded that Hi'iaka travel to Kaua'i to fetch Lohi'au, and sent her on her way with strict instructions. Hi'iaka was not to take him as her husband, she was not to touch him, and she was to take no longer than forty days on her journey. While Hi'iaka agreed to her sister's demands, she realized that in her absence, Pele would become incensed with a burning and vehement fury and destroy whatever she desired. So Hi'iaka set forth two stipulations; her beloved *'ōhi'a lehua* grove was to be spared from destruction, and Pele was to protect her dear friend Hōpoe in her absence. In this version of the story, Hōpoe is described as a young girl from Kea'au that was skilled at riding the surf of Hā'ena, and the one who taught Hi'iaka the art of *hula*. Pele agreed to Hi'iaka's requests, and Hi'iaka departed on her journey to retrieve Pele's lover. In a sympathetic act, Pele bestowed supernatural powers upon Hi'iaka so that she would be protected against the dangers she would undoubtedly meet along the way. In preparing for her journey, Hi'iaka left for the uplands of Puna to perform a ceremony at Kīlauea. While there, Hi'iaka met Wahine'ōma'o, who ended up joining Hi'iaka on her journey.

After departing Puna, Hi'iaka and her traveling companion Wahine'ōma'o reached Kuolo in Kea'au, Puna District—a place that boarded the Pana'ewa forest. Having learned her from her parents that Pana'ewa was a place of certain death for travelers, Wahine'ōma'o turned to Hi'iaka and expressed her concern and offered a second route of travel along the coast. Aware of the potential dangers that loomed ahead, Hi'iaka insited that they pass through the "lehua groves of Pana'ewa" (Ho'oulumāhiehie 2006a:50). Upon reaching Kūkulu, a high place in the Pana'ewa forest, the two women were observed by Kūkulukukui and Kapuakoai'a, the guardian birds for the chiefly *mo'o* Pana'ewa. The two guards quickly went to Pana'ewa to report the presence of Hi'iaka, "the champion, the dynamic one of the

lightning skirt from Kīlauea" (ibid.:51). After hearing the news of Hi'iaka's presence in the forest, Pana'ewa retorted the following:

> "What matter would be the doom she might bring, if it truly is she who had entered the lehua groves here in Pana'ewa.
>
> She and her people should know that the chiefs of Hilo have no regard for them.
>
> And my kapu, my sacred law, is firmly set, that no man or woman may arrogantely tread amid the lehua trees of Pana'ewa without my consent. But as to those stone-eating, land-eating, lehua-grove eating women, I would never allow them to enter here into Pana'ewa. If it turns out that is not Hi'iaka, but some local women from up by the shoreside of Hilo, then say nothing and you two can allow her to go along this road to get to Waiākea." (ibid.:52)

Just as Kapuakoai'a finished speaking to Pana'ewa, Hi'iaka's voice was heard echoing through the forest, where she recited the following chant requesting permission from Pana'ewa to pass through his forest:

'O Pana'ewa nui moku lehua	Great Pana'ewa of the lehua groves
'Ōhi'a kupu hāo 'eo 'e	'Ōhi'a that reach upwards in spikeso
I ka ua lehua 'ula	In the red lehua raino
Hō mai ana ho'i ua alanui	Grant us the pathwayo
No'u nei, no Hi'iakaikapoliopele	For me, indeed, Hi'iakaikapoliopeleo
E aloha mai! E uē kāua.	Offer us welcome! Let us share our tears of joy.o
(Ho'oulumāhiehie 2006b:54)	(Ho'oulumāhiehie 2006a:52)o

Angered by Hi'iaka's request, Pana'ewa sharply responded:

> "You have no pathway here in Pana'ewa. You are an arrogant woman, coming down from inland Puna, a marginal land used up by the gods, and you proudly assume this to be your road to travel. Certainly you know that Pana'ewa is a sacred forest, not to be wantonly traversed by the stone-eaters. There is no road here. As though your eyes didn't see that the road for travel is seaward of Hā'ena." (Ho'oulumāhiehie 2006a:52)

Having heard Pana'ewa's discourteous remarks, Wahine'ōma'o turned to Hi'iaka and again reminded her of the coastal trail which would be easy to travel but Hi'iaka remained firm and insisted they pass through the forest. Having hear the mighty growl and harsh retorts of Pana'ewa, Hi'iaka prepared herself and her companion for the impending danger that the merciless Pana'ewa would unleash on them. Here Pana'ewa:

> Then devoured all of the cooked taro corms and the broiled taro leaves that the sentinels had brought. When sated, the mo'o commanded the two sentinels, Kūkulukukui and Kapuakoai'a, to go and cut the heads of all of the flying ghost (spirits) in Pana'ewa and to flood the path that Hi'iaka and company were advancing upon with their blood. (ibid.:53)

Hi'iaka then prepared Wahine'ōma'o for the imminent danger stating:

> "Listen, hold fast to my skirt. Hold on tight, and don't let your grip loosen, or you will be swept away by the tide of blood from Pana'ewa. Wherever I go, you must come along. We will know defeat in the dawn hours, but Pana'ewa will lose in the twilight of evening. As we go along, if you hear the roar of voices echoing through Pana'ewa forest, recognize that the red tide of the mo'o, Pana'ewa, had begun to flow. This will tempter my skirt, once it's been soaked in the red waters."

In a short time, the women found themselves caught in the red flood of Pana'ewa with nothing more than their chins bobbing above the red waters. Fearful of whether they would survive, Wahine'ōma'o cried out to her companion. Hi'iaka quickly replied, "hold your breath my friend…I shall call upon our elder sister, our brothers and our ancestors." Responding to their sister's cries, Pele and their brother Lonomakua began to stoke the fires of Kīlauea and in no time, thick smoke blanketed the slopes of Maunaloa, Maunakea, and Hualālai and darkness fell over the *lehua* filled forest of Pana'ewa. Clinging on to life, Hi'iaka again called out in chant:o

Pana'ewa nui moku lehua	Pana'ewa, wildwood of lehua
'Ōhi'a kupu hāo 'eo 'e i ka lani	'Ōhi'a that grows jaggerdly toward the heaveno
I ka ua, lehua 'ula i ka ua	In the rain, scarlet lehua in the raino
I ka wī a ka manu, ua pō ē	At the twitter of the birds, night has comeo
Pō wale Hilo i ka uahi o kū (ku'u) 'āina	Hilo is darkened by the smoke ofmy lando
Ola ia kini, ke 'ā maile ke ahi.	Those multitudes will survive, for the fires are ablazeo
(Ho'oulumāhiehie 2006b:58)	(Ho'oulumāhiehie 2006a:56)o

Pele sent billows of smoke to her sister and informed her to summon the help of their brothers. Knowing that to defeat Pana'ewa would require more than what Hi'iaka was capable of, she cried out her powerful brothers, Kauilanuimaka'ehaikalani, Kamohoali'i, Kahuilaokalani, Ka'ekaokalani, and to Kāneikawaiola to send down their clouds and water. As Hi'iaka beconed her siblings for help, they responded by sending torrential rain from the heavens, flashing their lightining across the sky, and violently shaking the earth. As the waters rushed into the domain of Pana'ewa, the trees were pushed over and the mightly waters swept over the pitiless *mo'o*. Unable to withstand the powerful torrents, Pana'ewa shapeshifted, transforming himself into a *lehua* tree and later into an *'ama'uma'u* fern to no avail. Pana'ewa could not fight back against the raging waters and his body and spirit grew weak. Recognizing that the only way out of this disaster was to reconcile with Hi'iaka, the fading Pana'ewa called out asking to be spared. Hi'iaka refused his pleas, stating:

> "If that is it," ... then you shall not be spared, for you have been evil to me in response to the fair request that I made of you. You shall die, though the lehua grove of Pana'ewa shall live on, as a commemorative forest for the people here in Hilo. (Ho'oulumāhiehie 2006a:57)

Pana'ewa was seized by the water and his lifeless body carried out to the depth of the ocean where it was devoured "whole into the belly of a big-mouthed fish" (ibid.). With their path now cleared of the malevolent *mo'o*, Pana'ewa, Hi'iaka and her companion carried on with their journey. As they were exiting the forest, Hi'iaka then turned to Wahine'ōma'o and exclaimed:

> "We have faced the red water and the white waters here in Pana'ewa. We have donned the lei of red lehua and the white lehua of this place, and now we shall leave here and go to the shore of Waiākea. We will encounter many baneful ones in these places prior to reaching Waiākea. There is Pā'ie'ie, a supernatural woman, and Pua'aloa, a supernatural male; Ka'iliahiahi, a woman, and Pu'umoho, a male; Nā'ū is a woman, as is Haili, while Kū'ēho'opiokalā is a male; Ma'ū is the wife of Makali'i; Kapakapakaua is a male, and Honokawailani is also male. However, if I pray diligently and the heed me, then our descent through these places towards the sea should be safe, but if they pay no mind to my plea for compassion, then they shall be made victims of this magical skirt of mine." (Ho'oulumāhiehie 2006a:58–59)

From Ho'oulumāhiehie's narrative, we learn of the *lehua*-filled Pana'ewa forest which was closely guarded by the *mo'o*, Pana'ewa, and his bird guards, Kūkulukukui and Kapuakoai'a, was a forest for those of Hilo. We also learn of two main trails that connected Waiākea to Puna, with the longer route passing along the coast and the shorter but more tretchrous one cutting through the Pana'ewa forest. This narrative also describes the forest being demolished by red and white waters, perhaps a reference to a volcanic eruption, which was later extinguished by a great flood of water. Additionaly, from the preceeding quote, we learn of other *mo'o* that dwelled within Waiākea. Some of these names have been retained today as place names. Additional information for Pana'ewa and the epic battle with Hi'iaka have been compiled and described in the ensuing paragraphs.

In *Hawaiian Legends of Volcanos*, Pana'ewa was a very strong reptile-man who could change forms from animal to man as he desired and would guard the paths through the forest (Westervelt 1916). Pana'ewa allowed some to pass through his forest, but for the others, he brought fog, rain, and wind in attempts to capture travelers, to rob them of their possessions, and in some cases consume those who entered his forest (1916). Westervelt adds that "those who knew about Pana'ewa brought offerings of awa to drink, taro and red fish to eat, tapa for mats, and malos, or girdles" (1916:99). This encounter with Pana'ewa was Hi'iaka's first obstacle in her journey.

While Emerson's (1997) version of the story shares a similar premise, his account provides other details not described in Ho'oulumāhiehie's (2006b, 2006a) version—details that relate the tragic death of the fallen to geological formations found in Pana'ewa. Emerson reports that Pana'ewa did not want Hi'iaka to pass through, so he brought upon thick blinding fog, freezing cold rains, and winds strong enough to bend down the trees and smite Hi'iaka. Emerson continues:

> The warriors of Pana-ewa, who—in imitation of their chief—had for the most part taken the guise of trees and other natural objects, found themselves from the first fettered and embarrassed by a tangle of parasitic vines, so that their thrusts against Hiiaka were of little avail. Now comes the onset of the Pele gods in the tempest-forms of hurricane, lightning, hail, and watery cloud-bursts that opened heaven's flood-gates. Against these elemental forces the dryad-forms of Pana-ewa's host could not stand for a moment. Their tree-shapes were riven and torn limb from limb, engulfed in a swirling tide that swept them down to the ocean and far out to sea.
>
> Two staunch fighters remained, Kiha, who had chosen to retain the honest dragon-form; and Pua'a-loa, a creature, like Kama-pua'a, in the demi-shape of a boar, whom Pana-ewa, at the scent of

> disaster, had thrust into the confinement of a secret cave. This manner of retreat saved the twain from the immediate disaster by flood but not from the vengeance of Pele's army. Detected in their lairs, they were slain and their petrified bodies are pointed out to this day in verification of this story.
>
> The fate of Pana-ewa himself was most tragical. He no sooner had taken the form of a kukui tree than he found himself over laid and entangled with meshes of parasitic growth; he could neither fight nor fly. The spot on which he stood sank and became a swamp, a lake, a sink; the foundations on which its bottom rested were broken up and fell away. Pana-ewa, swallowed up in the gulf, was swept out to sea and perished in the waves- Kane-lu-honua had broken up the underlying strata and made of the place a bottomless sink.
>
> (A reef is pointed out in the ocean opposite Papa'i which is the remains of the body of the mo'o Pana-ewa.) (Emerson 1997:45)
>
> The victory for Hiiaka was complete. Hawaii for once, and for all time, was rid of that pestilential, man-eating, mo'o band headed by Pana-ewa who, from the time of Pele's coming, had remained entrenched in the beautiful forest-land that still bears the name—Pana-ewa. (ibid.:46)

While account described above describes Pana'ewa as a male *mo'o*, the following account relates Pana'ewa to be a female guardian and chiefess of the forest. This account is described in more detail below as related in the account of Ka-Miki.

Pana'ewa Described in the Legend of Halemano

The forested lands of Pana'ewa is further described in Fornander's (1918–1919) *Legend of Halemano* as the place where he and his wife, Kamalālāwalu set up their home before she was taken by Hua'ā, a chief from Puna. Those portions of the story describing their time in Pana'ewa reads thusly:

> They went from Kohala to Waimea where they spend the night; from this place they continued to Hamakua and spent the night at Kaumoali; from this place they proceeded on to Uluomalama in Waiakea, Hilo Hanakahi where they staid [*sic*]. After living in this place for twenty days, Huaa the king of Puna, heard that Kamalalawalu was in Hilo, so he sent a messenger to Kamalalawalu and she was taken to the king of Puna. When she was being taken by the messenger of Huaa, she instructed her brother Kumukahi to take good care of Halemano.

After Kamalālāwalu was enticed away from her husband and taken captive by Hua'ā, Halemano yearns for her. His sorrow and despair consumes his being and he dies, only to be brought back to life again by his supernatural sister, Laenihi. Deparate to bring his wife back, Kamalālāwalu and Halemano find themselves engaged in the game of *kilu*. Halemano in an attempt to woo her by envoking memories of their time together at Uluomalama utters the following chant, which describes their home being in Pana'ewa:

Noho i Hilo i o maua hale—e,	We once lived in Hilo, in our own home,
He hale noho i Panaewa e;	Our home that was in Panaewa.
Maewaewa i ka hale kuleana ole,	For we had suffered in the home that was not ours,
Hookahi no kuleana o kuu kino e.	For I had but one friend, myself.
He kini, he lehu, kahawai o Hilo e,	The streams of Hilo are innumerable,
Pali kui ka hale a ke aloha i alo ai.	The high cliffs was the home where we lived.
Auwe kuu wahine o na lehua o Mokupane!	Alas, my love of the lehua blossoms of Mokupane!
O ia lehua pauku me ka hala e,	The lehua blossoms were braided with the hala blossoms,
Hala ka ukana a ke aloha o ka leo.	For our love for one another was all we had.
Hele kunihi ka ua ma Leleiwi,	The rain only fell at Leleiwi,
Kokolo hele i na hala o Pomaikai,	As it came creeping over the hala trees at Pomaikai,
Akahi la a ke aloha i pepehi ai.	At the place where I was punished through love.
Auwe! Kuu wahine—a!	Alas, O my love!
Kuu wahine mai ke kawa lele o Piikea;	My love from the leaping cliffs of Piikea;
Mai ka wai lumalumai kanaka o Wailuku,	From the waters of Wailuku where the people are carried under,
A kaua i alo aku ai i na pali kinikini o Hilo,	Which we had to go through to get to the many cliffs of Hilo,
O ia mau pali anoano kanaka ole,	Those solemn cliffs that are bare of people,
	Peopled by you and I alone, my love,

Hoolaukanaka i ka wahine—e! You, my own love!
Kuu wahine hoi e!

Ka'ao Ho'oniua Pu'uwai no Ka-Miki (Heart Stirring Story of Ka-Miki)

References to Pana'ewa and other places in Waiākea and Hilo are also mentioned in the legendary account titled "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki*" ("The Heart Stirring Story of Ka-Miki") published in Hilo's Hawaiian language newspaper *Ka Hōkū O Hawai'i* between January 8, 1914 through December 6, 1917 and translated by Maly (1996a). Ka-Miki and his companions, Maka-'iole and Keahialaka, continue their journey circumnavigating Hawai'i Island on foot along the *ala loa* (trails) and relates the gurdian and cheifess of Pana'ewa forest, the competitive nature of the Hilo chiefs, as well as associates legendary characters with specific places. That portion of the story describing their journey through Pana'ewa and into Waiākea area reads:

> ...Ka-Miki, Maka-'iole and their companion Keahialaka departed from the compound of Kapu'euhi (in 'Ōla'a) and descended the *ala loa* towards Hilo to continue their journey. The travelers arrived at a large compound and community, where they saw a man coming towards them with a club. This man was Kūkulu-a-hāne'e-a-hina-pū [Kūkulu]. Kūkulu was a guardian of the chiefess and lands called Pana'ewa-nui-moku-lehua [Great Pana'ewa of the *lehua* forest]. Pana'ewa was a sacred chiefess of Hilo and sister of the chiefs Waiākea-nui-kumu-honua and Pi'ihonua-a-ka-lani.
>
> The chiefess' compound and surrounding community were forbidden to strangers, and Kūkulu regularly killed unaware travelers [thus the name "Unjust place"]. Kūkulu challenged Ka-Miki *mā* but he was quickly defeated, and Ka-Miki left him there as an example to other *'ōlohe* and to receive his due justice. Ka-miki *mā* then continued their journey into Hilo, seeking out 'Ūpēloa, Ku'u-aho-hilo-loa, and Haili-kula-manu.
>
> The lands of Waiākea were named for the high chief Waiākea-nui-kumuhonua, the brother of Pi'ihonua-a-ka-lani [k] and Pana'ewa-nui-moku-lehua [w]. After departing from Pana'ewa, Ka-Miki *mā* met Haili-kula-manu, who was a guardian of Waiākea. Haili led Ka-Miki and his companions to his chief's compound at Kalepolepo. Arrangements were made for Ka-Miki to compete with the *'ōlohe* – experts of Waiākea, with the events to be held at the *kahua* [contest site] at Kalepolepo. 'Ūpēloa the champion, land administrator and war councilor of Waiākea, and an expert fighter with *'ōka'a lā'au* [war clubs] was called to Kalepolepo.
>
> The *kūkini* Ku'u-aho-hilo-loa went throughout the region announcing that contests would be held at Kalepolepo, and in a short time the entire area was filled with people, all wondering who would attempt competing against 'Ūpēloa. Ka-Miki *mā* were then called to the arena, thus Ka-Miki, looking the the very image of the war club of Ka-uluhe-nui-hihi-kolo-i-uka, entered the *kahua* and the contest rules were set. It was agreed that the method of competition would be *'ōka'a lā'au* [war club fighting], and that the loser would be killed and baked in an *imu*.
>
> 'Ūpēloa exited the *hālau mokomoko* [contestants long house] with great agility and speed, and the crowd cried out with excitement at his ability. 'Ūpēloa also held his finely worked club, which was called *'Ohi-ka-lau-o-ke-pāhili*. The club was also called *Ka-piko-o-Wākea*. 'Ūpeloa was so strong, that no competitors had ever stood up to him. As 'Ūpēloa and Ka-Miki stood on the *kahua*, readying to fight, Pi'ikea, the spear fighting expert of the chief Nā-mau'u-a-Pā'ao asked, "O youth, where is your club that you may stand against the spear fighting warrior of the chief Waiākea-nui-kumuhonua?"
>
> Ka-Miki answered, "I have no club. My only weapon is my hands, but I have learned to use the war club from my club fighting teacher. I have used green *hau* spears, stripped like the *maile* [*Alyxia olivaeformis*], I have used clubs made of the *uhiuhi* [*Mezoneuron kauaiensis*] and the *koai'e* [*Acacia koaia*], the resonant clubs made of the resilient *kauila* [*Alphitonia ponderosa*] trees which grow at Pu'ukapele [Kaua'i]; my expertise covers all manner of war club fighting . . . and protecting myself from the top of my head to the bottoms of my feet."
>
> 'Ūpēloa then told Ka-Miki, "If you could truly escape from my club, your knowledge would be great, beyond compare. But coming here with this boasting, you are full of deceit and impertinence like no other, and you will not be spared from my club."

Pi'ikea then went to the edge of the *kahua*, and asked 'Ūpēloa to wait a short time before fighting so that he might go get his club for Ka-Miki to use. 'Ūpēloa responded, "No! You are not his teacher, you are not the alternate for this errant youth, that you should give him your club. He says that his hands and fingers are adequate. Unless you wish to be his *moepu'u* [death companion], you will stop this waste of time. Pi'ikea if you are stubborn about it, you and this youth shall both be the pigs that quench the fires of the *imu* today." Ka-Miki called to Pi'ikea, "I greatly appreciate your consideration, but it has been taken as a waste of time." With that, 'Ūpēloa leapt to attack Ka-Miki in the manner of *Ka-piko-o-Wākea*, thinking that he would strike Ka-Miki with the blow. Ka-Miki leapt over 'Ūpēloa and struck his hand. Because of the force of this blow, 'Ūpēloa lost his club and it flew to Maka-'iole who caught the club and held it.

'Ūpēloa moved to attack Maka-'iole, but Ka-Miki leapt in front of 'Ūpēloa and commanded him to back off and maintain the requirements of the contest. 'Ūpēloa did not heed the command because he was so outraged, and he reached to grab Ka-Miki, thinking to break him into little pieces. Ka-Miki then stepped behind 'Ūpēloa and grabbed him by the thighs. He then picked 'Ūpēloa up and threw him from the arena before Maka-'iole and Keahialaka. Keahialaka then grabbed 'Ūpēloa and bound him. Ka-Miki then called out to 'Ūpēloa with a place-name saying that commemorates his name to this day:

> *Ka manu o Kaupe'a ke 'ope'ope ala i ka uhu hala o 'Ūpēloa e*—The bird of Kaupe'a ['Ūpeloa himself] is all bundled up like the pandanus whichagrows at grows at 'Ūpēloa.

Waiākea heard that 'Ūpēloa had been defeated and was greatly surprised that his war counselor and war club fighting expert had fallen. Waiākea then called to his messenger Kapunakō to go get Kaūmana, the foremost teacher of *lua, ha'iha'i, kākā lā'au* [bone breaking fighting, and spear fighting], and all manner of fighting and bring him to the *kahua*. Upon arriving before his chief, Kaūmana asked Waiākea to send his messenger Kapunakō, to bring Kalanakāma'a, Kaūmana's foremost student, to join him at the *kahua* of Kalepolepo.

[The land of] Kalanakāma'a was named for Kalana-kāma'a-o-uli, the foremost *'ōlohe* student of Kaūmana, and champion of Waiākea. Kalanakāma'a was the ward of Kīpuka 'āhina [k], Hale-aloha [w]aand Hale-loulou [k], who dwelt above Hilo at Kipuka 'āhina.a

When Kapunakō arrived before Kīpuka 'āhina, he spoke about the great rains and rivers of Hilo, a poetic reference to the many skilled *'ōlohe* for which Hilo was famed. It was in this way that Kapunakō described the overwhelming skills of Ka-Miki and his victory over 'Ūpēloa. Kīpukaa 'āhina then asked—*'ōlelo no'eau*:

> *Māmā Hilo i ka wai?*- Is Hilo lightened of [without] its water?

Kapunakō responded—*'Ae māmā Hilo i ka wai 'ole, ua kau i ka lani ka holo [wa'a] ua o Hilo, na ka Mālualua e ki'i ala i pulu ka liko o ka lehua a me ka māmane*!—Indeed one can move swiftly through *Hilo*, for the streams are without water, the water trough [i.e., the clouds] of Hilo are set in the heavens. It is the *Mālualua* which fetches moisture for the budding *lehua* and *māmane*.

Kīpuka 'āhina then asked in amazement—*Nawai e nele o Hilo i ka wai? He lau ka pu'u, mano ka ihona, he kini nā kahawai o Hilo, e 'au i ka wai o Hilo a pau ke aho*!—Who could possibly make Hilo destitute of water? There are *lau* [400, poetically many] hills, *mano* [4,000, many] places to descend, and *kini* [40,000, many] streams to cross, indeed one is worn out swimming through the waters of Hilo!

It was in this way that Kīpuka 'āhina learned that a master *'ōlohe* had come to Hilo challenging its many *'ōlohe*. Using his *ipu hōkiokio* [gourd nose flute], Kīpuka 'āhina awakened Kalanakāma'a, for this was the only way in which Kalanakāma'a could be safely awakened, or he would kill who ever awakened him.

Kalanakāma'a joined his teacher Kaūmana, and met with the assembly at Kalepolepo. Carrying his club *Pūpū-kani-oe-i-ka-ua-o-Hilo* [Land-snail singing in the rain of Hilo], Kalanakāma'a entered the *kahua* with Kaūmana and a great cry arose praising the abilities of these Hilo champions. Ka-Miki and Kalanakāma'a exchanged taunts, Ka-Miki stated that Kalanakāma'a would become the *kāma'a lau-'i i hili kuanaka 'ia* [twined ti leaf sandals] that Ka-Miki wore upon his feet. Outraged, Kalanakāma'a leapt to attack Ka-Miki with his club *Pūpū-kani-oe-i-ka-ua-o-Hilo*, Ka-Miki leapt

out of the way, and took ʻŪpēloaʻs club from Maka-ʻiole. Seeing his student miss, Kaūmana called out to Kalanakāmaʻa telling him how to strike Ka-Miki – *ʻōlelo noʻeau:*

> *Kau i ka lani ka holoua o Hilo, hilo ʻia i ke aho a ka ua he ʻIo ka hauna lāʻau e kiʻi ai, aʻohe wahi pāʻole, pā ma ke poʻo a hōʻea i nā wāwae, pā no pau ka ʻoni, ʻoni no he aīwaiwa ia, he hialōloa no ka naele, alaila hoʻi hou ka hauna lāʻau a ke koa kua makani.* Placed in the heavens is the water trough of Hilo, entwined in the cordage of the rains, *ʻIo* [Hawk] is the war club strike to use, for there is no place that can't be hit. Strike at the head and reach to the feet, for once struck, there will be no movement. If there is any movement, he is indeed a skilled expert of the depths [deepest knowledge], then return and strike again in the manner of the wind swept koa tree.

Ka-Miki then attacked Kalanakāmaʻa and quickly over came him, Kaūmana then leapt to the *kahua* and was beaten as well. After Ka-Miki defeated Kaūmana, word spread throughout the region, and Piʻihonua, Waiākea's brother called his council together, wondering how they might help regain the honor of Hilo from this stranger.

Hanakāhi told Piʻihonua that it would be best not to fight. Piʻihonua then said that perhaps it had been a mistake to honor Hanakāhi with his title as champion, and marriage to ʻOhele. Hanakālhi told Piʻihonua all of the things that Nā-Mauʻu-a-Pāʻao had told Piʻikea about Ka-Miki, and said it would be unwise to compete, and thus leave all of the champions of Hilo in disgrace.

Hanakāhi himself was a master *ʻōlohe* trained by Maulua, of Hilo-Palikū. He was skilled in *kākālāʻau* [spear fencing], *pololū* [long spear fighting], *ihe laumeki* [barbed spear fighting], and all manner of knowledge. Hanakāhi told his chief, "It is my desire to go before them [Ka-Miki *mā*], not in the manner of a competitor, but in the spirit of friendship, and to learn from them the things which they have been taught by their teachers. If I succeed, I will be the foremost *ʻōlohe* of all Hilo, and I will serve as their guide as they journey from one border of Hilo to the next border of Hilo." Hanakāhi then asked his chief, "Do you agree?" Piʻihonua told Hanakāhi to go and compete first, then if he was securely bound, to surrender and ask for friendship.

Hanakāhi approached Kalepolepo, and the contest between Ka-Miki and himself was announced. *ʻŌkaʻa .lāʻau* [club-spear fighting] was selected as the method of fighting, and when Hanakāhi asked Ka-Miki, "How shall the victory be determined?" Ka-Miki said, "By the breaking of one's spear."
Ka-Miki greatly admired the nature of Hilo-Hanakāhi, and as they competed, Ka-Miki dodged each of the thrusts. To those gathered at the *kahua,* it was as if Ka-Miki was the teacher and Hilo-Hanakāhi was the student. Hilo-Hanakāhi tried each technique he had learned from his teacher, but was unable to score against Ka-Miki. Worn out, Hilo-Hanakāhi collapsed and was taken off of the *kahua,* borne in a net. Hilo-Hanakāhi acknowledged the nature and skills of Ka-Miki and surrendered to him, thus *ke ʻahi kananā* [the fierce tuna] of Hilo befriended Ka-Miki *mā* upon the *kahua.* (Maly 1996a:A-6-9)

Hilo-Hanakahi returned to the chief Piʻihonua and they spoke of the events which had taken place at Kalepolepo. Piʻihonua then sent his messenger to invite Ka-Miki *mā* to his compound in the manner of *ʻaikāne* (companions). Ka-Miki *mā* were well hosted by Piʻihonua, and Ka-Miki asked Hilo-Hanakāhi to accompany them to the border of Hilo and Kaʻula in Hāmākua. Thus Hilo-Hanakāhi traveled with Ka-Miki *mā* through out the rest of Hilo. (Maly 1996a)

Waiākea 1820-1848: A Land in Transition and Early Historical Accounts

In October of 1819, seventeen Protestant missionaries set sail from Boston to Hawaiʻi. They arrived in Kailua-Kona on March 30, 1820 to a society whose spiritual system had just been undermined. Many of the *aliʻi*, who were already exposed to western material culture, welcomed the opportunity to become educated in a western style and adopted their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government. During this period, the sandalwood trade wrought havoc on the lives of the commoners, as they weakened from the heavy production, exposure, and famine just to fill the coffers of the *aliʻi*, who were no longer under any traditional constraints (Kuykendall and Day 1976; Oliver 1961). The lack of control of the sandalwood trade was to soon lead to the first Hawaiian national debt as promissory notes and levies were initiated by American traders and enforced by American warships (Oliver 1961) The Hawaiian culture was well on its way towards Western assimilation as industry

in Hawai'i went from the sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar industry.

The early 1800s heralded a new era in the Hilo Bay area that was marked by numerous rapid changes. During the first two decades of the nineteenth century, sandalwood was harvested and shipped from Hilo Bay and whaling ships were a common sight as they stopped at Hilo for supplies. Some of the earliest written descriptions of Hilo come from the accounts of the first Protestant Missionaries to visit the island, and early Historic visitors to Hilo noted the beauty and fertility of the region. In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai'i seeking out communities in which to establish church centers for the growing Calvinist mission. Ellis recorded observations made during this tour in a journal, and described the environs of Waiākea as a well-watered place, with some of the heaviest rains and densest fog he had encountered on the island (Ellis 1963). He considered the inhabitants lucky because of their access to well-stocked fishponds, fertile soil, and to the nearby woods which provided a source of lumber. Ellis (1963) estimated that nearly 400 houses were present near the bay, with a population of not less than 2,000 inhabitants with houses clustered along the beach in the dry lowland areas (Cordy 2000:353–354). During his five-day stay, Ellis characterized Waiākea as:

> ...the most beautiful we have yet seen. . . The whole is covered with luxuriant vegetation, and the greater part of it formed into plantations, where plantains, bananas, sugar-cane, taro, potatoes, and melons, grow to the greatest perfection.
>
> Groves of cocoa-nut and breadfruit trees are seen in every direction loaded with fruit, or clothed with umbrageous foliage. The houses are mostly larger and better built than those of many districts through which we had passed. We thought the people generally industrious; for in several of the less fertile parts of the district we saw small pieces of lava thrown up in heaps, and potato vines growing very well in the midst of them, though we could scarcely perceive a particle of soil.
>
> There are plenty of ducks in the ponds and streams, at a short distance from the sea, and several large ponds or lakes literally swarm with fish, principally of the mullet kind. The fish in these ponds belong to the king and chiefs, and are tabued from the common people.
>
> Along the stone walls which partly encircle these ponds, we saw a number of small huts, where the persons reside who have the care of the fish, and are obliged frequently to feed them with a small kind of mussel, which they procure in the sands round the bay.
>
> ...There are 400 houses in the bay, and probably not less than 2000 inhabitants... (Ellis 1963:337–338)

Ellis eventually set up a mission station in Waiākea that lasted until 1825 before moving to Punahoa 2nd Ahupua'a (Moniz 1994). A large number of churches were commissioned by newly converted *ali'i*, and Missionary journals from this time period describe the growing congregations of people drawn to the Hilo missions. Also in 1825, the H.M.S. *Blonde*, bearing the bodies of Liholiho and his wife Kamāmalu who had both died of measles while in England,t arrived in Hilo Bay. Ka'ahumanu declared Hilo Bay would henceforth by known as Byron's Bay in honor of Lordt Byron, the Commander of the H.M.S. *Blonde*. During shore-leave Lord Byron stayed at Waiākea, at a large houset appropriated by Ka'ahumanu. The officers onboard describe the river of Wailuku and Wailoa as convenient wateringt places for visiting ships (Kelly et al. 1981:33). Upon leaving Hilo Bay the ship logs neatly summarize the potential of t Hilo Bay:t

> Byron Bay will, no doubt, become the site of the capital of Hawaiit The fertility of the district of Hido [sic]...the excellent water and abundant fish-pools which surround it, the easy access it has to the sandal-wood district, and also commerce, and the facility it affords for refitting vessels, render it a place of great importance. (Kelly et al. 1981:35)

In June of 1825, an American Protestant missionary by the name of Charles Samuel Stewart visited Hilo. Stewart depicted Hilo as a well-populated residence for natives and missionaries alike:

> . . .The reef runs in a curved direction from the point at the channel, about half a mile to the east, where it joins a romantic little islet covered with cocoanut trees; from that fact, called "Cocoanut island." A small channel runs between this and the main land, which is low, and sweeps round to the western cliffs in a beautifully curved sandy beach of about two miles, making the form of the bay that of a flattened horseshoe. The beach is covered with varied vegetation, and ornamented by clumps and single trees of lofty cocoanut, among which the habitations of the natives are seen, not in a village, but scattered everywhere among the plantations, like farm houses in a thickly inhabited

> country. The mission houses were pointed out to us, pleasantly situated near the water, about the middle of the curvature forming the head of the bay. At a very short distance from the beach, bread-fruit trees were seen in heavy groves, in every direction, intersected with the pandanus and kukui, or candle-tree, the hibiscus and the acacia, &c. The tops of these rising gradually one above another, as the country gently ascends towards the mountains in the interior, presented for twenty or thirty miles in the southeast a delightful forest scene, totally different in extent from anything I had before witnessed on the islands. (1828:287)

Hilo Bay's protected waters and sandy shores provided a calm and safe alternative for landfall for ocean going vessels involved in whaling and the sandalwood trade. The sandalwood trade was initiated in the 1790s but did not become successful until 1812; Kamehameha held the monopoly on the trade and oversaw its management by his chiefs until his death. Thereafter, King Liholiho's favored chiefs mismanaged the trade, which lead to the depletion of the forests and the end of the sandalwood trade by 1830 (Kelly et al. 1981). According to Kelly et al. (1981), historic accounts about whaling suggest that Hilo Bay was not a preferred port for the whalers due to the missionary influence and the resultant lack of liquor and women; sailors preferred Honolulu and Lahaina as ports-of-call. Whaling declined through the mid to later 1800s and came to a halt in 1892. However, industrial development in Hilo did not cease. Sawmills and early sugar plantations provided milled woods and sugar for export. In an 1840 letter, Reverend Titus Coan, who was stationed in Hilo, remarked on the town's growth:

> Industry is increasing. Our ports and places of trade begin to put on the air of activity and life. Temporal improvements and comforts are fast increasing at Hilo, that is, near the station. Two stores of goods are opened here, and three sugar-mills have recently gone into operation near us. Sugar-cane is being planted to a considerable extent; business assumes more tone and energy, and many of the people are approximating towards industry and competence. Probably the amount of cloth worn by the people has increased ten or twenty fold during four years past. Labor is in better demand and wages are rising continually. (Kelly et al. 1981:49)

In 1840, Lieutenant Charles Wilkes, head of the U.S. Exploring Expedition, traveled to Hilo. His narrative provides a similar account to those written by others in earlier times, painting the Hilo settlement as a lush, verdant, and well-watered locale, and remarked upon the agricultural potential of the district, revealing that "the sugar-cane grows here in abundance, and of a large size; coffee succeeds well, as do indigo and the tacca, from which they make a quantity of arrow-root" (Wilkes 1845:223). In addition to mentioning the early commercial sugarcane enterprises that were just emerging in the district, Wilkes further expands on the environs of Hilo and provided an account of his journey from Hilo to Puna through the Pana'ewa forest:

> The scene which the island presents as viewed from the anchorage in Hilo Bay, is both novel and splendid: the shores are studded with extensive groves of cocoa-nut and bread-fruit trees, interspersed with plantations of sugar-cane; through these, numerous streams are seen hurrying to the ocean; to this succeeds a belt of some miles in width, free from woods, but clothed in verdure; beyond is a wider belt of forest, whose trees, as they rise higher and higher from the sea, change their characters from the vegetation of the tropics to that of polar regions; and above all tower the snow-capped summits of the mountains. . .
>
> Hilo is a straggling village, and is rendered almost invisible by the luxuriant growth of the sugar-cane, which the natives plant around their houses. A good road has been made through it for the extent of a mile, at one end of which the mission establishment is situated. This consists of several houses, most of which are of modern style, covered with zinc and shingles. One of them however, the residence of the Rev. Mr. Coan, was very differently built, and derived importance in our eyes, from its recalling the associations of home. It was an old-fashioned, prim, red Yankee house, with white sills and casements, and double rows of small windows. No one could mistake the birthplace of the architect, and although thirty degrees nearer the equator than the climate whence its model was drawn, I could not but think it as well adapted to its new as to its original station.
>
> The whole settlement forms a pretty cluster; the paths and roadsides are planted with pine-apples; the soil is deep and fertile, and through an excess of moisture, yields a rank vegetation. . .
>
> The church is of mammoth dimensions, and will, it is said, accommodate as many as seven thousand persons. It is now rapidly falling into decay, and another is in progress of erection. Many of the native houses are surrounded with bread-fruit and cocoa-nut trees, and have a fine view of the bay.
>
> Six miles from Hilo we entered the first wood, and at 6 P.M. we passed, at eight miles distance, the chasm that divides the Hilo from the Puna district. As the darkness set in, we began to experience

> the difficulties we had anticipated from our late start: the bustle and noise became every moment more audible along the whole line as the night advanced: what added not a little to our discomfort, was the bad road we now had to encounter, rendered worse as each native passed on in the tracks of those preceding him, until at last it became in places quite miry.
>
> (1845:114–118)

The Māhele ʻĀina of 1848

By the mid-19th century, the ever-growing population of Westerners in the Hawaiian Islands forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership. By 1840 the first Hawaiian constitution had been drafted and the Hawaiian Kingdom shifted from an absolute monarchy into a constitutional monarchy. Convinced that the feudal system of land tenure previously practiced was not compatible with a constitutional government, the *Mōʻī* Kauikeaouli and his high-ranking chiefs decided to separate and define the ownership of all lands in the Kingdom (King n.d.). The change in land tenure was further endorsed by missionaries and Western businessmen in the islands who were generally hesitant to enter business deals on leasehold lands that could be revoked from them at any time. After much consideration, it was decided that three classes of people each had one-third vested rights to the lands of Hawaiʻi: the *Mōʻī* (monarch), the *aliʻi* (chiefs) and *konohiki* (land agents), and the *makaʻāinana* (common people or native tenants).

In 1845 the legislature created the Board of Commissioners to Quiet Land Titles (more commonly known as the Land Commission), first to adopt guiding principles and procedures for dividing the lands and granting land titles, and then to act as a court of record to investigate and ultimately award or reject all claims brought before them. All land claims, whether by chiefs for entire *ahupuaʻa* or by tenants for their house lots and gardens, had to be filed with the Land Commission within two years of the effective date of the Act (February 14, 1848) to be considered. This deadline was extended several times for the *aliʻi* and *konohiki*, but not for commoners (Alexander 1920; Soehren 2005).

The *Mōʻī* and some 245 *aliʻi* (Kuykendall 1938) spent nearly two years trying unsuccessfully to divide all the lands of Hawaiʻi amongst themselves before the whole matter was referred to the Privy Council on December 18,e 1847 (King n.d.). Once the *Mōʻī* and his *aliʻi* accepted the principles of the Privy Council, the *Māhele ʻĀina* (Lande Division) was completed in just forty days (on March 7, 1848), and the names of all of the *ahupuaʻa* and *ʻili kūpono* (nearly independent *ʻili* land division within an *ahupuaʻa*) of the Hawaiian Islands and the chiefs who claimed them,e were recorded in the *Buke Mahele* (also known as the *Māhele* Book) (Buke Mahele 1848; Soehren 2005). As thise process unfolded the *Mōʻī*, who received roughly one-third of the lands of Hawaiʻi, realized the importance of settinge aside public lands that could be sold to raise money for the government and also purchased by his subjects to live on.e Accordingly, the day after the division when the last chief was recorded in the *Buke Māhele* (*Māhele* Book), the *Mōʻī*e commuted about two-thirds of the lands awarded to him to the government (King n.d.). Unlike the *Mōʻī*, the *aliʻi* ande *konohiki* were required to present their claims to the Land Commission to receive their Land Commission Awarde (LCAw.). The chiefs who participated in the *Māhele* were also required to provide commutations ofa portion of theire lands to the government to receive a Royal Patent that gave them title to their remaining lands. The lands surrenderede to the government by the *Mōʻī* and *aliʻi* became known as "Government Land," while the lands that were personallye retained by the *Mōʻī* became known as "Crown Land," and the lands received by the *aliʻi* became known as "*Konohiki* Land" (Chinen 1958:vii, 1961:13). Most importantly, all lands (Crown, Government, and *Konohiki* lands) identifiede and claimed during the *Māhele* were "subject to the rights of the native tenants" therein (Garavoy 2005:524). Finally,e all lands awarded during the *Māhele* were identified by name only, with the understanding that the ancient boundariese would prevail until the land could be formally surveyed as this process expedited the work of the Land Commission.e

Prior to the *Māhele ʻĀina*, the entire *ahupuaʻa* of Waiākea was retained as the personal lands of Kamehameha, which he passed to his son and heir Liholiho. Waiākea was later inherited by chiefess Kaunuohua, a grand-daughter of Keawemauhili and *kahu* of Alexander Liholiho (Kameʻeleihiwa 1992), who later relinquished the *ahupuaʻa* during the *Māhele ʻĀina* to the Crown. As a result of the *Māhele*, Waiākea Ahupuaʻa was retained as Crown Lands for Kamehameha III. Although no *kuleana* awards were claimed or granted within Panaʻewa, twenty-six *kuleana* claims (LCAws.) were granted within Waiākea for houselots and cultivation plots. With the exception of the claim made for Honohononui, all remaining LCAws. were located along major inland roads or centered around the fishponds located inland of Hilo Bay (Devereux et al. 1997; Moniz 1994). The *ʻili kūpono* of Piʻopiʻo and Honohononui were claimed in their entirety by Kekuanāoʻa on behalf of his chiefly daughter, Victoria Kamāmalu. Table 3 below synthesizes all of the land claims that were granted within Waiākea Ahupuaʻa and Figure 27, shows the location of these LCAws. relative to the study area.

Table 1. Land Commission Awards within Waiākea.

LCAw. No	*Awardee*	*Acres*	*Royal Patent No.*
2327	Barenaba	12.25	7601
1279	Halai	0.60	8191
4004	Hale	4.25	2756
2663	Kahue	3.75	8063
2281	Kaiana	10.25	5713
11050-B	Kaihenui	5.19	4365
1333	Kalolo	2.25	5625
8854	Kalua	3.40	1908
1738	Kaluhikaua	2.98	1146
7713	V. Kamāmalu	ʻili kū of Piʻopiʻo and Honohononui	4475
8803	Kamanuhaka	1.02	1927
1-F	Kapu	1.60	2769
11174	Kealiko	1.0	8216
2402	Keaniho	5.0	6790
5018/10505	Keawe	0.24	1913
4344	Kuaio	1.22	6973
9982	Leoi	0.80	1874
4738-B	Lolo	1.27	6632
1-E	Mahoe	4.46	1147
4737	Moealoha	1.03	7616
4785	Nakai	1.05	1121
2603	Napeahi	1.30	1148
4737-B	Wahine	1.01	6984
11173	Wahinealua	2.50	7135
10004	Wahinenohoihilo	1.69	2768

Figure 27. Location of Land Commission Awards within Waiākea with study area outlined in red.

Boundary Commission Testimony

In 1862, the Boundary Commission was established to set the legal boundaries of the *ahupua'a* that were awarded during the *Māhele*. The commissioners were authorized to certify the boundaries in 1874. The primary informants for the boundary descriptions were older native residents of the specific areas in question. Many times the boundaries of particular *ahupua'a* were established through the testimony regarding neighboring *ahupua'a*. Such was the case for Waiākea; informants, many of whom were born in the late 1700s, provided boundary data for Kea'au in Puna, Keauhou in Ka'u, Kukuau in South Hilo, and Humu'ula in North Hilo, all of which border Waiākea. In describing the *ahupua'a* boundaries, references are made to coastal landmarks, then current and former residential areas, planting areas (none extending above about 2000 feet), locations of woods where trees for canoes were acquired (above Hilo at a place called Nehuiki), and areas deep in the forest for bird catching. A point at the summit of Pu'u Kūlani marks the southwestern corner of Waiākea Ahupua'a. Pu'u Kūlani, as a named prominent landscape feature that is referenced in legend and chant (Maly and Maly 2004).

The Transformation of Crown Lands (post-1893)

The late 19th century was a tumultuous time for the Kingdom of Hawai'i as the 8th reigning monarch, Queen Lili'uokalani faced serious pressure from American businessmen to abdicate her throne. On January 17, 1893, a small group of American businessmen and sugar moguls backed by a U.S. consul and marines illegally attacked the Hawaiian Kingdom government and the sovereign, Queen Lili'uokalani (Beamer 2014). This group, consisting of thirteen men referred to themselves as the Committee of Safety and following the overthrow, they proclaimed to be the Provisional Government that would manage the affairs of the Hawaiian Kingdom (Beamer 2014; Van Dyke 2008). The overthrow of the Hawaiian Kingdom government had a rippling effect that cause major instability for the Hawaiian nation and severely impacted the way Crown lands were allocated, such as those in Waiākea Ahupua'a. Van Dyke (2008:153) states that "some also believed that abrogation of the Monarchy would open up the Government and Crown Lands for exploitation." This belief was publicized as early as 1872 by Standford B. Dole, the acting President for the Providional Government. In an article published in the *Pacific Commercial Advertiser* (1872:2) newspaper, Dole asserted that preserving Crown lands as inalienable under an 1865 Statute was a "mistaken policy." Dole believed that maintaining Crown lands as inalienable hampered the economic development of the islands and augued that these

lands should be made available to foreigners for homesteading (Van Dyke 2008). Following the overthrow in 1893, sizable portions of the previously inallenable Crown lands were divided and sold as Government land grants to both foreign and native residents alike. A large number of land grants that were awarded during this time were centered around the more populated coastal section of Waiākea near the Waiākea fishpond and Wailoa river (see Figure 23).

The 1894 *Biennial Report of the Commissioner of Crown Lands* compiled by Curtis P. laukea, described land use across the extent of the entire Waiākea Ahupua'a. From his descriptions we learn that the *mauka* portions of Waiākea were heavily utilized for sugarcane cultivation and that the vast region above the cane fields consisted of excellent coffee lands. Additionally, marine based resources were highly valuable and that the forest extended 2 miles short of the coastline. Iaukea's description is presented below in its entirety:

> Waiakea.—This head embraces all that land lying on the south side of Hilo and extending from the sea to the slop of Mauna Loa, far above the forest belt, a distance of 15 miles. The land on the coast is very rocky excepting about the bay at the mouth of the Waiakea River, a tract of about 100 acres, which is very valuable. The portions along the volcano road and above or mauka of it are somewhat rocky, but the soil is very rich and is mostly under the cultivation of cane by the Waiakea Mill Company. This section contains about 3,000 acres of good cane land. Above this and extending into the forest, which is very dense, is a vast region of excellent coffee land, equally as good as the Olaa lands. A good road connects the plantation with Hilo town. The sugar from the mill is boated down the Waiakea River about half a mile to the landing. A very good fishery belongs to the land, and several excellent fish ponds. There are no running streams on the land, but several fine springs, especially at the seacoast. The ohia forest extends to within a mile of the coast and 2 miles to the Waiakea side of the harbor. Area, about 95,000 acres (laukea 1894:1334)

Commercial Sugar Enterprises in Waiākea, Railroad Development, and Early Historic Accounts

The written history of the late-19th to the early-20th century largely reflects news of new settlers, religious endeavors, and commercial agricultural pursuits in the region. In the decades following the *Māhele 'Āina*, when land became a commodity, Hawaiians were often forced off their house lots (and livelihoods) simply because they lacked the cash with which to make the purchase (of land) or pay the property tax. The creation of private property also resulted in a shift away from the traditional *mauka*-to-*makai* management of whole *ahupua'a* and conventional transportation methods, as certain industries moved into large swaths of land such as livestock ranching and commercial sugar pursuits in the *mauka* lands of Waiākea. As a result, Hawaiian culture was well on its way towards Western assimilation as industry in Hawai'i transitioned from the boom-and-bust sandalwood trade, to a short-lived whaling industry, to the more lucrative, but environmentally destructive sugar and cattle industries.

One of the primary industries that emerged in Waiākea during the mid to late-19th century was commercial sugar cultivation. The Polynesian-introduced *kō* (sugarcane; *Saccharum officinarum*) was grown on all islands, and stands as perhaps the most widely developed and extensively cultivated crop in Precontact Hawai'i. Cultivation of sugar for commerce has had the unfortunate effect of diluting the distinguishing characteristics of Hawaiian cane varieties due to the hybridization of traditional and introduced species. Prior to its exploitation for profit, *kō* served as a fixed element in Hawaiian horticulture that served a variety of important uses. *Kō* was traditionally planted in the lowland plains, and Neal (1965) relates that there were approximately forty named varieties cultivated by the Hawaiians. Included in these is the most common *kō kea* (white cane) which was a typically planted near old homesteads. In general, *kō* is purported to grow well in almost all locales, and was "planted at *kihapai* of sweet potato, dry taro and *wauke*, and on the banks of *lo'i* taro patches; and fields of cultivated plants were beautified by plantings of cane along their banks and borders" (Kamakau 1976:39).

Of great curative value, *kō* was considered especially therapeutic and was included as an essential component of medicinal tonics and compounds (Handy 1940). Aside from its role as an active ingredient in medicines, Abbott (1992) opines that it was sometimes used not as a primary constituent, but rather as a flavoring agent to sweeten distasteful bitter herbs in curative compounds. Alternatively, its sweet juice could also be used in a more insidious manner to conceal and accelerate the effects of various poisons (Lincoln 2017). The juice of the *kō* was considered as a very effective remedy for healing deep cuts and wounds, fractured limbs, and severed body parts, healing the skin leaving no evidence of scar tissue (Kaaiakamanu and Akina 1922; Krauss 1993). It also served chiefly as sustenance, and was eaten as a snack, condiment, and a famine food. The juice of the *kō* could be toasted over the fire and fed to nursing babies, and was used to strengthen children's teeth by chewing (Handy and Handy 1991). From a more utilitarian aspect, *kō* could be used to thatch the interior of houses when *pili* grass or *lauhala* (pandanus) were not abundant (Handy 1940; Malo 1951).

It was not until 1835 that sugar became established commercially in the islands, replacing the waning sandalwood industry, and early sugar enterprises were attempted in South Hilo as early as the 1840s (Kuykendall and Day 1976; Oliver 1961; Wilkes 1845). During the 1860s, Kamehameha IV leased large portions of Waiākea for pastureland and sugarcane cultivation (Moniz 1994). The majority of the eastern portions of Waiākea however, remained outside the region of sugar cultivation, most likely due to the shallow soils therein. Commercial sugarcane cultivation had a profound impact on the *ahupua'a* as a whole, and the declining population of Waiākea began to increase as a result of the industrial and economic growth brought about by the sugar industry (Wolforth 2007). By 1857, there were three sugar mills producing sugar for export in the Hilo area. With the Kingdom-wide economic depression that occurred as a result of the U.S. whaling fleet pulling out of the Hawaiian Islands in 1859, the focus of commercial cultivation shifted from general agriculture to sugarcane (McEldowney 1979). The 1860s not only saw an increase in the appropriation ofland by foreigners for commercial sugar cultivation, but additionally in 1861 S. Kipi leased the Crown Lands of Waiākea at the rate of $600 dollars a year to be used as pasture land for a term of five years (Kelly et al. 1981; Maly 1996). During this time, the study area and lands in the immediate vicinity in Pana'ewa appeared to have been spared by these enterprises, remaining as undeveloped forest lands. One of the earliest maps ofaWaiākea drawn by W.M. Webster in 1851 shows the boundaries of the Pana'ewa forest in addition to two thoroughfares: the "Road from Olaa to Hilo" west of the study area, and the "Road to Puna" directly to the east of the study area, both of which provided access from Puna to Hilo (see Figure 24).

Although the commercial cultivation of sugar had commenced roughly thirty years prior in South Hilo, it hadn't quite begun to dominate the district yet. Isabella Bird visited Hilo in 1873 and published her experiences in *The Hawaiian Archipelago: Six Months Among the Palm Groves, Coral Reefs, & Volcanoes of the Sandwich Islands* (Bird 1882). Her firsthand accounts of Hilo are dreamy and romanticized: perhaps the most vivid of all foreign accounts regarding the environs of Waiākea and Pana'ewa. In the following excerpt, she describes the region as thickly vegetated, but makes no mention of sugarcane or burgeoning industrialization in the vicinity of the study area. She does, however, note that "above Hilo, broad lands sweeping up cloudwards, with their sugar cane, *kalo*, melons, pine-apples, and banana groves suggest the boundless liberality of Nature" (Bird 1882:36). Bird also provide a colorful depiction of her journey from Puna to Hilo through the 4-mile-wide Pana'ewa forest, on either the old Puna Trail or the road to 'Ōla'a (see Figure 24; Figure 28) in the vicinity of the study area:

> . . . We had a delicious gallop over the sands to the Waiakea river, which we crossed, and came upon one of the vast lava-flows of ages since, over which we had to ride carefully, as the *pahoehoe* lies in coils, tortuosities, and holes partially concealed by a luxuriant growth of ferns and convolvuli. The country is thickly sprinkled with cocoanut and breadfruit trees, which merge into the dense, dark, glorious forest, which tenderly hides out of site hideous, broken lava, on which one cannot venture six feet from the track without the risk of breaking one's limbs. All these tropical forests are absolutely impenetrable, except to axe and billhook, and after a trail has been laboriously opened, it needs to be cut once or twice a year, so rapid is the growth of vegetation. This one, through the Puna woods, only admits of one person at a time. It was really rapturously lovely. Through the trees we saw the soft steel-blue of the summer sky: not a leaf stirred, not a bird sang, a hush had fallen on insect life, the quiet was perfect, even the ring of our horses hoofs on the lava was a discord. There was a slight coolness in the air and fresh mossy smell. It only required some suggestion of decay, and the rustle of a fallen leaf now and then, to make it an exact reproduction of a fine day in our English October. The forest was enlivened by many natives bound for Hilo, driving horses loaded with cocoanuts, breadfruit, live fowls, *poi* and *kalo*, while others with difficulty urged garlanded pigs in the same direction, all as presents for the king. (Bird 1882:129–130)

Not long after Bird's visit to Waiākea, and following the signing of the 1875 Treaty of Reciprocity, a free-trade agreement between the United States and the Kingdom of Hawai'i which guaranteed a duty-free market for Hawaiiana sugar in exchange for special economic privileges for the United States, commercial sugarcane cultivation and sugar production became the central economic focus for the Hilo area. By 1874, Hilo already ranked as the second largest population center in the islands and within a few years the fertile uplands, plentiful water supply, and port combined to make Hilo a major center for sugarcane production and export. In that same year, the first lease for sugarcane cultivation in Waiākea was granted to Rufus A. Lyman for a term ofa25 years. The lease granted him all the privileges of the land including the use of the fishponds and the cutting of firewood (Maly 1996). This lease was eventually transferred to the Waiākea Mill Company, founded by Alexander Young and Theo H. Davies, and the Waiākea sugar plantation was established.

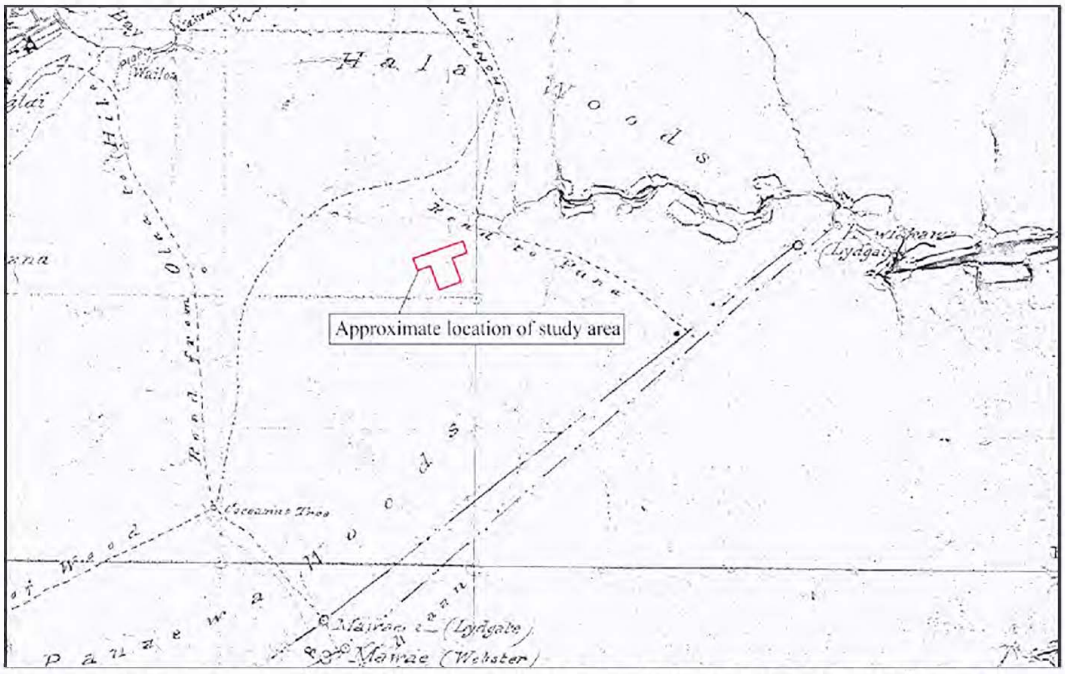

Figure 28. Portion of Hawai'i Registered Map No. 571 by C.J. Lyons (ca. 1870s) of "Central Hawaii Hilo and Hamakua" showing the "Road to Puna" in relation to the current study area within the Pana'ewa forest and the current study area.

In 1879 the Waiākea Mill Company incorporated and began a commercial sugar operation on about 350 acres of land in Waiākea that they acquired from Lyman northeast of the current study area. The Waiākea sugar mill, also built in 1879, was located at the inland end of Waiākea fish pond and by 1931, Hawaiian Cane Products opened a canec plant next to the mill (Rechtman and Lang 2009) (Figures 29 and 30). The company's sugar lands extended south from the mill to the uplands of Waiākea Ahupua'a, but did not include the study area. Rather, the lands in and around the study area remained forested and mostly utilized by individuals traversing between Puna and Hilo on the old Puna Trail. an 1883 account by D.H. Hitchcock paints the route as a "miserable muddy trail to the Panaewa woods, and through these woods on a narrow trail, for most of the time overgrown with ai and guava bushes, until the cocoanut grove was reached" (Hitchcock 1897). The thick density of vegetation in the Pana'ewa forest was also noted in an account from the following year:

> . . . little to be seen along the route [to Hilo from Puna], except the luxury of the tropical forest, the beauty of which increases steadily as we approach the town. It is doubtful if its luxuriance can be surpassed by that of any other country in the world.
>
> . . . The approach from Hilo is the most difficult of all, because it involves the necessity of traversing the belt of forest which lies between the middle slopes of the mountain and the sea. No one can imagine the density and exuberance of tropical vegetation until he has seen it. In truth, the forest can be penetrated only by hewing a way through it or by traversing a route which has already been cut by main force. (Report of the Director of the United States Geological Survey 1883)

Over the course of the next few years, the Pana'ewa forest remained as it was, but the sugar industry continued to progress. By 1887, railroads operating on steam and animal power were built on some plantations, although some utilized flumes or cable railways to transport cane from the fields to the coast mills. One year later in 1888, the Waiākea Mill Company further increased its land holdings by acquiring a 30-year lease for additional lands in Waiākea. These lands were systematically cleared and planted in sugarcane in the years to come. In 1889, J. Cumming Dewar voyaged on the SS *Nyanza* from Kawaihae to Hilo to meet with the manager of the Waiākea Mill, and succinctly described Hilo and its fields of cane:

> After a delightfully fine evening and a smooth passage during the night, we arrived and anchored in Hilo Bay at 10 A.M. on Sunday, January 6. From daybreak till the time of our reaching the port, the scenery as we steamed along the coast was exceedingly attractive. Numerous waterfalls were to be seen precipitating themselves over the cliffs into the sea, whilst ever and anon we passed large plantations of sugar-cane. (Dewar 1892:260–261)

Figure 29. Waiākea Mill and canec plant located near the Waiākea Fishpond in 1932, study area not shown (National Archives and Records Administration).

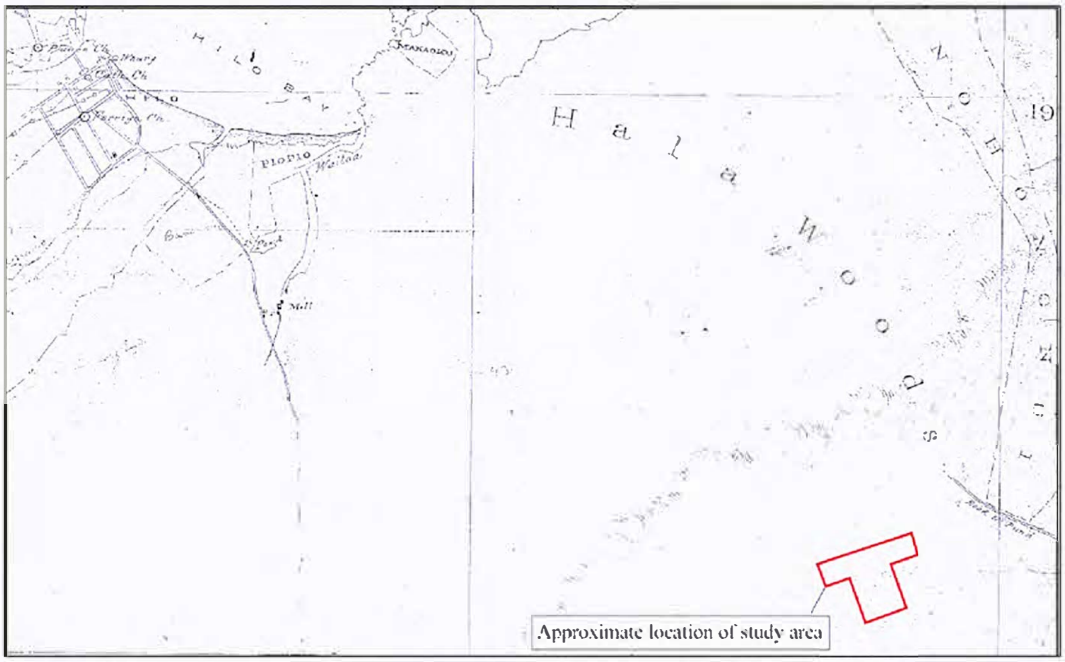

Figure 30. Portion of undated Hawai'i Registered Map No. 842 by Lyons and Covington of showing "Lands of Hilo Hawaii" showing Hilo Bay and Waiākea Mill in relation to study area (outlined in red).

With the annexation of Hawai'i to the United States in 1898 and the granting of Territory status in 1900, Hilo was designated the center of county government in 1905 and remained the second most populated city in the newly formed Territory of Hawai'i. Railroad construction was one of the most important elements of governmental and private sector planning following the Treaty of Reciprocity, as crops and product were still being transported by beast and cart (Dorrance and Morgan 2000). On the Island of Hawai'i, the first major line to be constructed was in North Kohala District, which operated as the Hawaiian Railroad Company. The North Kohala line, however, was envisioned as only the first step toward a much larger system connecting the cane fields of Kohala, Hāmākua, and Hilo with Hilo Harbor, the only protected deep-water port on the island. Beginning in 1899, railroad lines began transporting sugar to the harbor for marine transport, thus Hilo became an important shipping and railroad hub. It was in during this year that the Waiākea Mill Company established a railroad system to carry the cane from the fields to the mill for processing and the Hilo Railroad Company had begun building tracks from Waiākea through the Pana'ewa forest to the 'Ōla'a Sugar Company Mill in the district Puna (Kelly et al. 1981), which would later become part of the Hawai'i Consolidated Railway (HCR). By the early-20th century, the Waiākea Mill Company had increased the area under sugarcane cultivation in Waiākea to nearly 7,000 acres.

The commercial sugar industry provided most of the cargo transported by HRC, but suffered a sharp decline between the years of 1904-1907, which caused a halt of development in Hilo (Thurston 1913). In response, HRC worked with 'Ōla'a Sugar Company to send a representative to Washington D.C. in 1907 to secure funding for the construction of a breakwater that would allow Hilo Bay to accommodate larger ocean-going vessels. Construction on the breakwater began in 1908 and was still ongoing at the time of Thurstons' writing (ca. 1914); the breakwater was finally completed in 1929. In exchange for construction of a breakwater in Hilo Bay, the Hilo Railroad was required to build a new wharf, a one-mile rail extension from Waiākea, and a 50 mile rail extension north to Honoka'a Mill (the Hāmākua Division). The funding of the breakwater by HRC resulted in the extension of the railroad through the populated section north of Hilo all the way to Hakalau and Hāmākua (see Figure 26):

> When the breakwater project was pending before Congress, opposition was made to the appropriation on account of the limited commerce then being transacted through Hilo harbor.
>
> Assurances were thereupon made by the Hilo Railroad Company, that if the breakwater were constructed, a railroad would be built into the country north of Hilo and suitable wharf facilities provided under the lee of the breakwater. Such assurances had a material effect in securing the appropriation. (ibid.:145)

The extension to Honoka'a would finally connect the sugar mills of Hilo, and Hāmākua with Hilo's protected harbor. Between June 1909 and December 1911, HRC built 12.7 miles of rail extending from Hilo to Hakalau Mill, crossing many gulches and valleys along its route. Ultimately, the cost of the Hāmākua section ruined HRC and they were forced to sell out and reorganize under the name Hawaii Consolidated Railway (HCR) in 1916. Two years later in 1918, the Waiākea Mill Company's lease of Waiākea lands expired, and the land fell under new homesteading laws that required the government to lease portions of it to individual homesteaders who would be willing to grow sugarcane. Some of the most fertile lands in Waiākea, to the southwest of the HCR right-of-way (and the study area) were later subdivided by the Territory of Hawai'i into house lots, homesteads, and cane lots of various sizes for lease and purchase. It was during this time that the Puna Trail (Figure 31) fell into deterioration, and by 1919 it was said to be largely unutilized, particularly with the advent of automobiles, the development of more accommodating and direct thoroughfares, and increasing industrialization in surrounding areas. The following account chronicles the decaying condition of the trail during this time, details its construction methods, and significance prior to its abandonment, and reveals that in the face of burgeoning urbanization that traditional lifeways persisted nevertheless:

> There is, for instance, the old Puna trail—or what is left of it. Few have passed that way since automobiles came into general use, yet it leads through charming ways along the coast beyond the Seaside Club. It is no ordinary trail and bears evidence even in the partial decay of being constructed to withstand much traffic. The sides are carefully walled and the footway set with small stones. It is a picturesque relic and with a complementary compilation of the rich legendry which must be identified with it would make an additional showplace for visitors. The trail winds through primitive and riotous jungle, touches secluded bits of shore and discovers here and there tiny huts in which dwell native Hawaiians who appear to be quite happy in knowing little of the world and caring less.
>
> It is not likely that the lands through which this old trail winds will soon be required for commercial use, as most of it is roughly piled aa or pahoehoe full of pukas, but whatever is done with it there should be a strip reserved by the Government to include portions at least of the old Puna trail. It would be a shame to permit its entire obliteration. (Hilo Daily Tribune 1919)

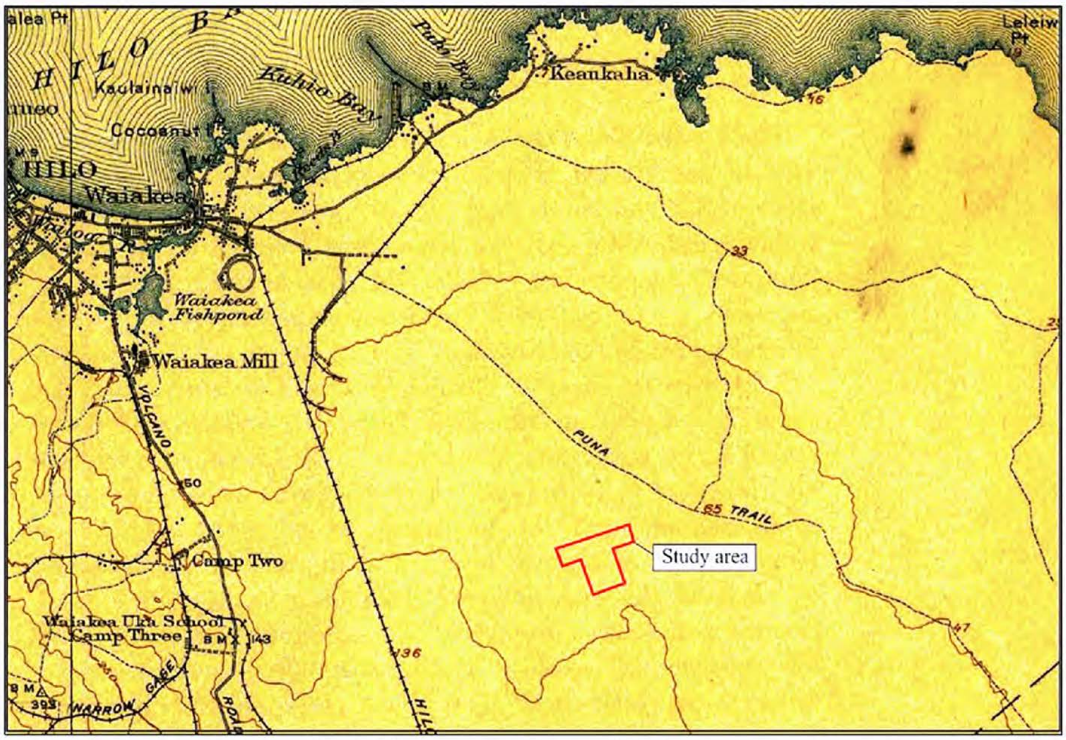

Figure 31. Portion of 1917 USGS Hilo quadrangle map showing current study area (outlined in red) in relation to the "Puna Trail" alignment, Hilo railroad, and Waiākea Mill.

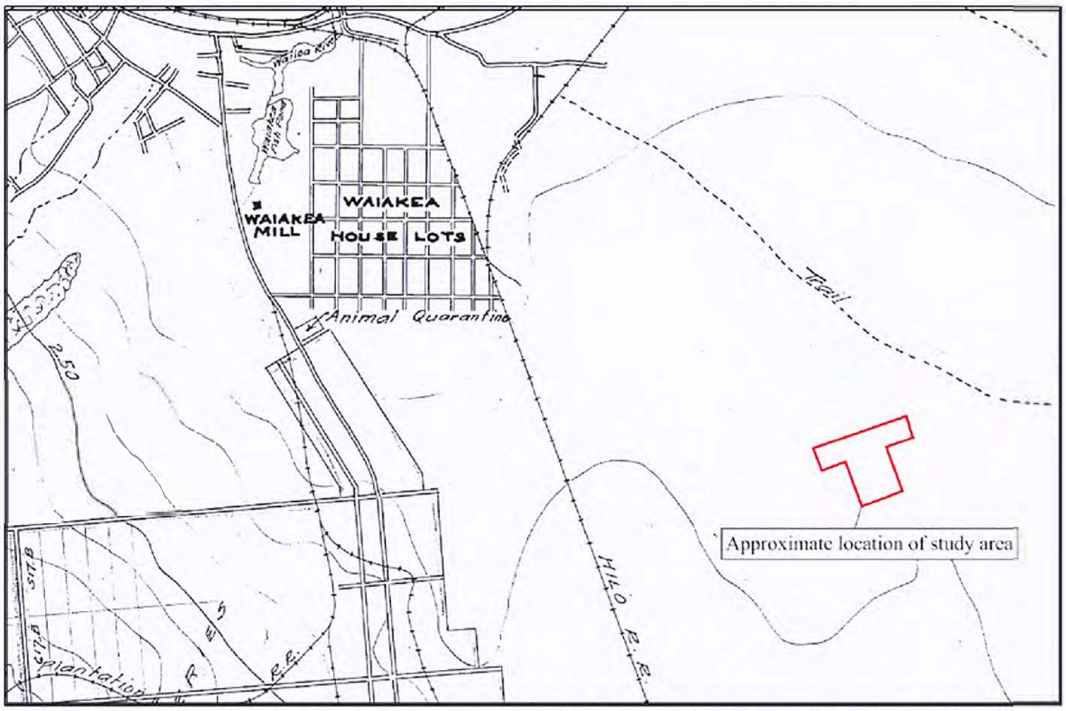

Figure 32. Portion of Hawai'i Territory Survey plat No. 787 by Jos. Iao ca. May 1920 showing study area (outlined in red) in relation to the Hilo Railroad, Puna Trail, Waiākea House Lots, and Waiākea Mill..

By 1921, the large tracts of land within and below the Pana'ewa forest were being recognized for their potential as "an agricultural and pastoral region" and it was opined that "in time to come great enterprise will be built up among the kipukas found all through the Panaewa and Puna sections of this island" (Hilo Daily Tribune 1921). Around this time, the Waiākea Homesteads were established (Figure 32). The sugar industry brought widespread changes to the Hilo area and drastically altered the traditional landscape of the district. As part of the late nineteenth century development of the sugar plantations and related infrastructuree some of Hilo's largest fishponds were filled in, ande many old residences, burial sites, trails, *heiau*, formerly located in the cane fields were destroyed as a result. Throughout the 68 years of its operation, the Waiākea Mill Company was a major force in shaping the economic and social growth of Hilo, and certainly left its mark on both the cultural and physical landscapes of the area. By the mid-1940s, contractual and legal problems combined with a declining sugar market and the devastating *tsunami* of 1946 led the Waiākea Mill Company to cease operation the following year in 1947.

Creation of the Pana'ewa Hawaiian Homesteads and the Hilo Airport

In an effort to help address the indignities faced by Native Hawaiians following the overthrow of the Hawaiian monarchy in 1893, Prince Johah Kūhiō Kalaniana'ole in his capacity as a U.S. Congressman passed legislation for the Hawaiian Homes Commission Act (HHCA) in 1921, which set aside approximately 200,000-acres in the Territory of Hawai'i as a land trust for homesteading by Native Hawaiians with a blood quantum of 50% or more (Hasager and Kelly 2001; Hawaiian Home Lands 2016). These lands were to be administered by the Hawaiian Homes Commission. With regard to the lands chosen to be developed under the HHCA, Hasager and Kelly (2001:8) explain:

> Some of the lands were specifically designated by section 203 of the act, and the rest was to be chosen by the Hawaiian Homes Commission (HHC) from lands designated "available lands." The original selection of "available lands" were by *ahupua'a* or *'ili* (traditional land divisions) name only (according to Kanaka Maoli tradition, in fact), but from each area thus selected were withdrawn lands in sugar cultivation, forest reserves, and under public uses including previous homestead agreements.

According to HHCA of 1920, in the Waiākea portion of the Hilo District, three major tracts of public lands (inclusive of Crown and Government lands) were chosen; a section in Pana'ewa and two other sections in Waiākea-Kai or Keaukaha (labeled as "Tract 1" and Track 2" in Figure 33). In 1924, some 621 acres of nearly barren land wase set aside for the creation of the Kuhio Settlement located along the coastal section of Waiākea (see Figure 33). The Kuhio Settlement, later dubbed the Keaukaha Homestead, was the second homestead community after the Kalama'ula Homestead on Moloka'i to be established following the passage of the 1921 HHCA. These two communities (the Kalama'ula Homestead and Kuhio Settlement) were the first of its kind to pioneer and determine the success of the HHCA. The first fifty-two native Hawaiian residents were granted leases with the Kuhio Settlement and by 1929, roughly 240 lots were distributed to homesteaders (Dayton 2004; Kapuni-Reynolds 2015). These early residents ultimately transformed this once barren land into a highly productive community thereby dispelling the negative criticism about Kūhiō's HHCA.

In April of 1925, via Executive Order 186, some 100 acres of land in Waiākea, south of the Keaukaha Homestead,e was set aside for the creation of the Hilo Airport. (knonw historically as the General Lyman Field and today as the Hilo International Airport). Work for the airport commenced on July 17, 1925, with prisoners using hand tools to clear and level the ground. By 1927, coral dredged material from the Hilo Wharfevas used as the top dressing for the landing strip and used to fill a section of the old Puna Trail, givng both the run way and road a bright white appearance (Figure 41). Although the airport was dedicated in 1928, over the ensuing decades, the airport continued to expand into the Keaukaha Homestead, which wiped out some 300 homestead lots and displaced many homesteaders, some of whom relocated to Pana'ewa (Dayton 2004).

By the 1940s, the first farm lots in Pana'ewa were awarded and some families from Keaukaha held farm lots where they grew various agricultural crops to generate income (Brandt personal communication, 2019). Other families that had been displaced by the airport expansion also relocated to Pana'ewa. It was not until 1976 that the Pana'ewa House and Farm lots were formally mapped (Hawaiian Home Lands 2016). Figure 35 below shows the original extent of the Pana'ewa House and Farm lots, which was divided into two main sections that totaled 1,660 acres. In 1964 the Hawaiian Homestead Commission set aside adjacent lands as industrial/commercial lots to generate revenue (ibid.). Throughout the remainder of the 19th (especially after the devastating 1960 tsunami) and 20th century the Hawaiian Homelands in Pana'ewa continued to expand to include additional residental and commercial/industrial lots. In 2016, the the Hawaiian Home Commission reports that with the Pana'ewa tract, there are some 1,615 acres set aside as Farm Lots; 114 acres used as residential lots; 396 acres zoned for industrial/agriculture; and some 1,027 acres of unencumbered lands (ibid.:23).

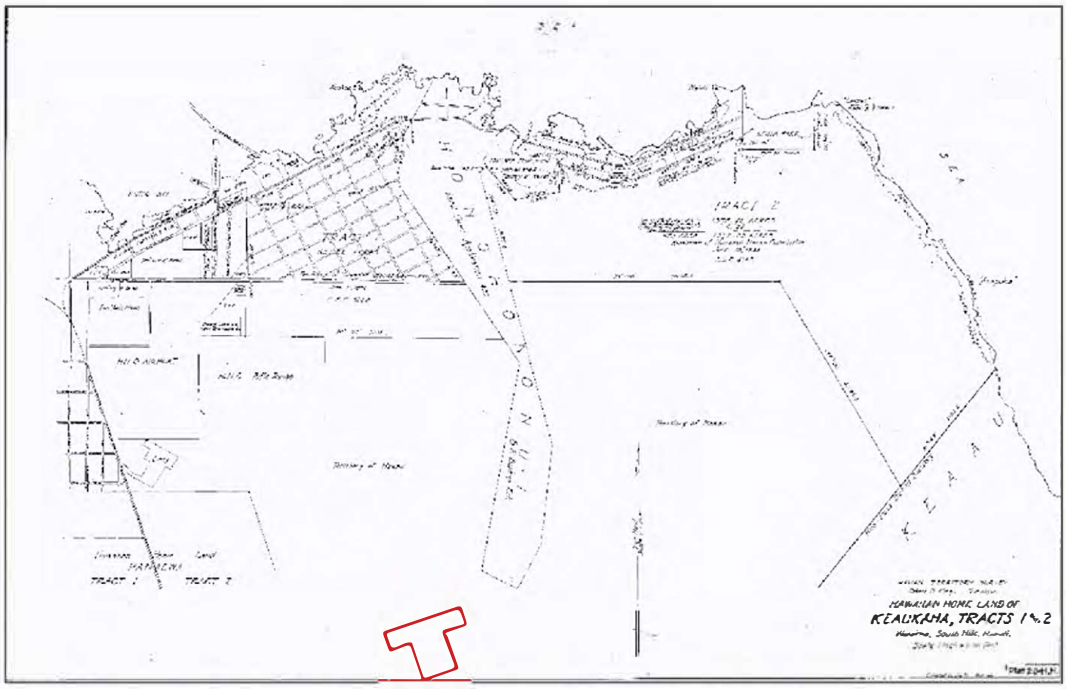

Figure 33. August 1931 map by Jos. Iao showing two tracts of Hawaiian Home Lands in Keaukaha with study area outlined in red.

Figure 34. General Lyman Field and Puna trail decked with white coral dredge material. Note the Kuhio Settlement to the right of General Lyman Field. Study area not shown in photo (Hawaii Aviation 2019)

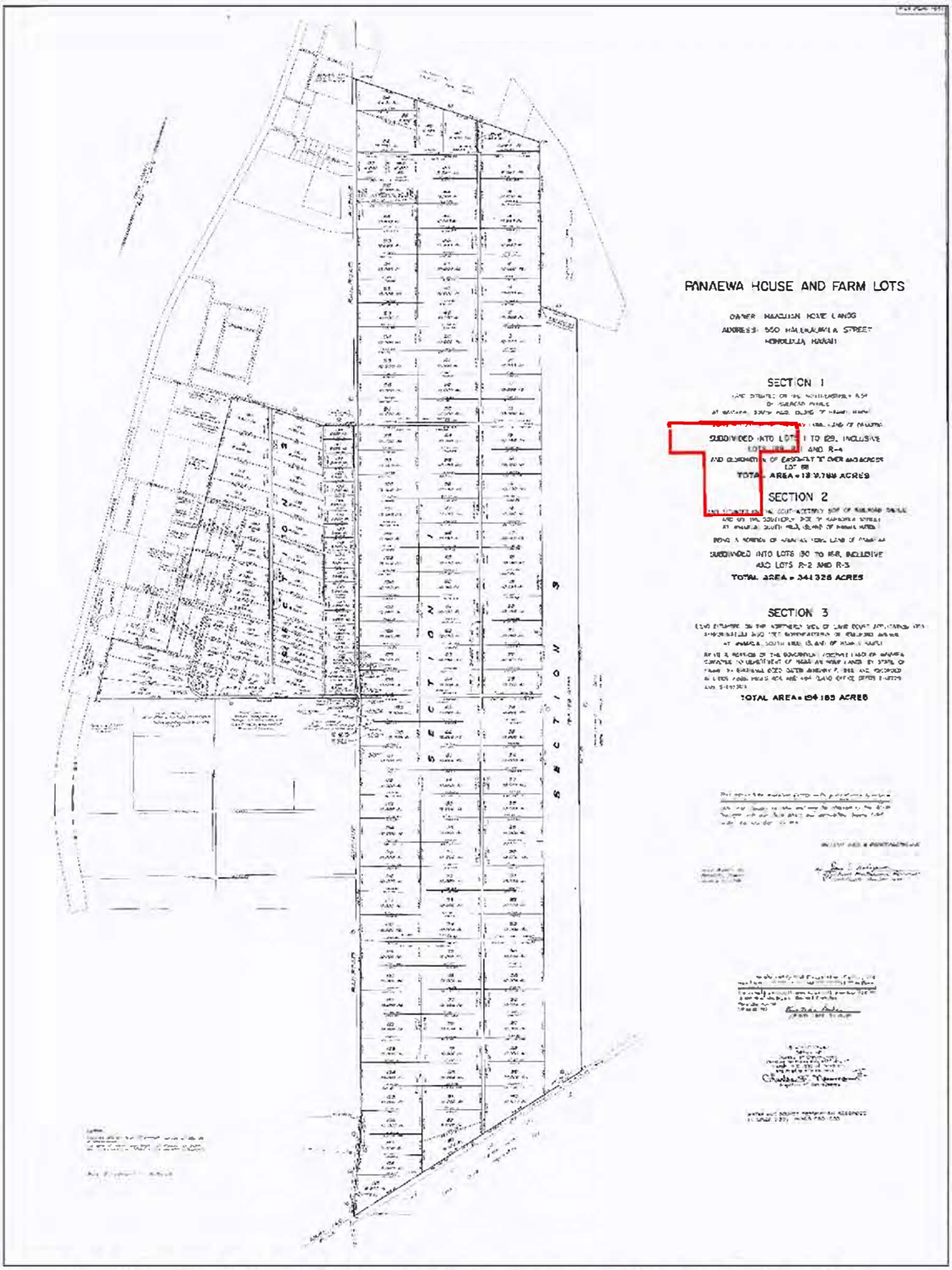

Figure 35. A 1976 map by Nakagawa of the Pana'ewa House and Farm Lots and the location of the study area outlined in red.

The *Tsunami* of 1946 and 1960 and the Lands of the Current Study Area During the 20th Century

On April 1, 1946, a *tsunami* triggered by a 7.1 magnitude earthquake in the Aleutian Islands slammed into the north-facing shores of Hawai'i Island. It claimed the lives of 159 people, destroyed more than 500 buildings, and caused millions of dollars in property damage (Muffler 2015) (Figure 36). The coastal community of Waiākea was decimated by the *tsunami* and associated flooding, which inundated an area spanning from central Hilo eastward to Keaukaha. The waves crushed numerous structures and lifted others off their foundations and swept them inland. The *tsunami* dealt a fatal blow to the already struggling HCR. Tracks around the waterfront were entirely washed out and the Hilo Station was wrecked. An entire span of the Wailuku Bridge was torn out and washed out. Despite the significant damage to Waiākea Town, many residents choose to remain, rebuilding their homes and businesses (ibid.).

Nine years later in 1955, Robert Yamada leased roughly 380 acres of Honohononui, the *'ili kūpono mauka* of Kalaniana'ole Avenue and south of the Hilo Airport, as pasture land. Just five years later, on May 23, 1960, a devastating series of *tsunami* waves triggered by a massive 8.3 earthquake in Chile, South America, swept through Hilo, killing sixty-one people and injuring many others. Hundreds of homes, businesses, and other infrastructure were leveled to the ground causing millions of dollars in damage. The economic loss and high number of casualties resulting from the 1946 and 1960 tsunami prompted Hawai'i County officials to establish the Hawai'i Redevelopment Agency as a means to economic recovery, thereby launching the Project Kaiko'o initiative. In addition to promoting economic recovery, the Hawai'i Redevelopment Agency sought to establish a tsunami buffer zone to prevent future economic and personal loss and between 1962 and 1963 the County of Hawai'i exercised eminent domain to acquire numerous parcels of land in the *tsunami* affected areas of Hilo as part of Project Kaiko'o. The goal of this project was to "designate lands...for such reuse as will minimize the danger of loss of life or damage to property in areas subject to possible inundation and flooding from future seismic waves" (Hawaii Redevelopment Agency 1965:3). Project activities included not only the acquisition of property, but relocation assistance for affected residents and business owners, property management, demolition and building removal, re-zoning of land use and preparation (clearance, grading, and filling) for new development, and disposition of acquired lands by sale or lease at a fair price for new development.

Figure 36. Aftermath from the 1946 tsunami with Waiakea Mill standing near back of Waiākea fishpond, study area vicinity in background. (Hawaii Tribune-Herld 2017)

One year later in 1961, most of Yamada's leased land was chain-dragged and the portion of TMK: (3) 2-1-013:002 that contains the current study area was designated as a 113.382-acre "Borrow Pit Site" as a result of the Hawai'i Redevelopment Agency's Project Kaiko'o. Yamada & Sons, Inc. and the County of Hawai'i also had 40-acre borrow pit sites located to the southwest of the current study area, adjacent to a roughly 192-acre strip of land that was deeded to the Department of Hawaiian Home Lands (DHHL) by the State of Hawai'i on January 8, 1962. Another 40-acre parcel of land adjacent to the northern edge of the borrow pit site eventually became the location of the South Hilo Sanitary Landfill.

By 1965, quarrying activities within the Hawai'i Redevelopment Agency borrow pit had commenced and had intruded slightly into the northern portion of the current study area (Figure 37). Additionally, extensive quarrying activities were being conducted within the original 40-acre Yamada & Sons, Inc. borrow pit site (west of the study area on TMKs: (3) 2-1-013:160, 161, and 163) at this time. Between 1965 and 1970, the leased lands were also used to stockpile sugarcane bagasse. Five years later in 1975, Yamada & Sons, Inc. reduced the number of leasehold lands to encompass only 180 acres, of which 150 acres was used for agricultural purposes with 30 acres being used as a quarry site. During that year, most of the leased lands were mechanically cleared and turned to pastureland. In a seven-year span between 1970 and 1977, much of the study area appears to have been cleared of vegetation, and a 1977 orthographic photo-quadrangle indicates that quarrying activities occurring on the original borrow pit had expanded into the southwestern corner of the study area and also across Parcel D (Figure 38). Additionally, the road that bisects the current study area is evident, as is a connector road that extends northwest to southeast across the northern portion of the area of the proposed quarry site. Although activities associated with quarrying of the current study area appear to have ceased by the early 1990s, as evidenced in a 1992 USGS aerial photograph (Figure 39), quarrying activities at the adjacent borrow pit site to the west have continued to this day. Additionally, that operation expanded its scope in 2007 to include the 14.99-acre "Parcel D" situated directly adjacent to the currently proposed quarry and borrow pit site also to the west.

Figure 37. January 16, 1965 USGS aerial photo showing quarry intruding into northern portion of study area (outlined in red).

Figure 38. Portion of a 1977 orthophotoquad showing quarry expansion and network of quarry roads within study area (outlined in red).

Figure 39. Portion of a September 23, 1992 USGS aerial photo showing active quarry site in relation to current study area (outlined in red).

PRIOR STUDIES

A number of archaeological and several cultural studies have been previously conducted within Waiākea and the general Hilo region over the years, most of which have occurred in areas located to the north and west of the current study area and concentrated primarily on the coastal environs. Collectively, site types previously documented within the coastal section of Waiākea include but are not limited to fishponds, burials, Historic-era military structures, the Puna Trail, temporary and permanent habitation sites, lava tubes, modified sinks, overhang shelters, and Historic sugarcane infrastructure. Within the Pana'ewa section of Waiākea, many more archaeological studies have been conducted, however, these studies have generally reported a lack of findings (Carson 1999; Escott 2013a, 2013b, 2015a; Hammatt and Tulchin 2007; Haun and Henry 2002; Rechtman 2003, 2006, 2009a, 2009b; Rosendahl 1988a, 2002; Wheeler et al. 2014a). There have been no prior archaeological studies conducted that have included the current study area. The most proximate studies conducted within Waiākea either within or in close proximity to Pana'ewa are presented in Table 1 and Figure 40 and those that have identified findings are discussed in detail below.

Table 2. Previous archaeological studies conducted in the vicinity of the current study area.

Year	*Author(s)*	*Type of Study*
1974	Ching and Stauder	Reconnaissance Survey
1979	Bonk	Archaeological Survey
1997	Devereux et al.	Reconnaissance Survey
1999	Carson	Inventory Survey
2000	Hammatt and Bush	Inventory Survey
2001	Godby and Tolleson	Data Recovery
2002	Escott and Tolleson	Inventory Survey
2002	Haun and Henry	Inventory Survey
2002	Rosendahl	Reconnaissance Survey
2003	Rechtman	Archaeological/Limited Cultural Impact Assessment
2006	Rechtman	Archaeological Assessment
2006	Wolforth	Inventory Survey
2007	Tulchin and Hammatt	Archaeological Literature Review and Field Inspection
2009	Mitchell and Hammatt	Cultural Impact Assessment
2009a	Rechtman	Archaeological Survey
2009b	Rechtman	Archaeological Assessment
2013	Escott	Archaeological Assessment
2013a	Escott	Archaeological Assessment
2013b	Escott	Archaeological Assessment
2014	Wheeler et al.	Inventory Survey
2015	Escott	Archaeological Assessment
2015	Escott	Cultural Impact Assessment
2016	Escott	Cultural Impact Assessment

Figure 40. Previous archaeological studies conducted in the vicinity of the current study area..

Early Archaeological Investigations (1900s-1930s)

Thrum and his associates, W.T. Brigham and J.F. Stokes of the Bishop Museum, compiled information on over 130 *heiau* on Hawai'i Island (Thrum 1908a). However, one must take into consideration that Thrum included data on *heiau* that had already been destroyed prior to his data collection efforts in the early 1900s. Regarding the *heiau* of the Hilo district, Thrum stated: "little evidence of their existence now remains, so complete has been their destruction, but though their stones are scattered, much of their history is yet preserved" (1908b:55).

During the early 1930s, A.E. Hudson (Hudson 1932), working under the aegis of the Bernice Pauahi Bishop Museum, also conducted archaeological investigations in East Hawai'i. He found little in the region surrounding the current area of study, although he noted that "there was an important village and trading center around Hilo Bay" (1932:20), but stated that, "no archaeological remains are to be found within the town of Hilo itself except a few stones which are said to have been taken from heiaus..." (1932:226). Hudson also relates the following account of a previously existing *heiau* in Waiākea near Coconut Island (Mokuola) and another one near the route of the present Kīlauea Avenue:

> Of the several heiaus known to have existed in and around Hilo, that at Cocoanut Island was also a puuhonua.
>
> There is some reason to think that the island itself was the place of refuge and that the heiau was situated on the mainland opposite. Thrum (65-c, p. 40) locates it on the shore opposite the island. Elsewhere (65-d, p. 56) he says:
>
> > "Occasional reference is made to Cocoanut Island (Mokuola) as the place of refuge of thea Hilo district, hence its name, Life Island." Careful inquiry shows that the area of thisa puuhonua included also a portion of the mainland adjoining. The heiau connected with it,a named Makaoku, was of the Luakini class. Its dimensions are unknown though it is said toa have had a pyramid of stone 30 feet high as if for a place of observation. The remaininga stones were taken by Captain Thos. Spencer for a boat landing about 1860. The northerna part ofaMokuola is known as Kaulaineiwi, being the place where the bones were placed toa dry or for airing".
>
> The present archaeological remains consist of a few single stones in the park opposite the island. Mr. Levi Lyman tells me that although they were found on the mainland they have all been moved in making the park. Quite probably they had also been moved several times previously so they are ofano use in reconstructing the outlines of the site. Their only significance is in indicating that the structure was built, at least in part, of large lava blocks, rather than beach boulders. (Hudson 1932:256–257)

Hudson also identified one of the inland *heiau* as being in Waiākea, along the old Hilo/'Ōla'a trail (not far from the route of modern-day Kīlauea Avenue):

> There was a heiau named Kapaieie near Honokawailani in Waiakea. Bloxam who passed the site on his way from Hilo to the volcano say that its center was marked by a single coconut tree. At the time of his visit nothing remained but ruined walls choked with weeds. He was told that the priests would lie in wait for passersby and dispatch them with clubs. Thrum [1908:40] states that the site was famed in the Hilo-Puna wars but its size and class are unknown. No remains of any kind could be found and no Hawaiians with whom I talked had ever heard of it. (1932:240)

Subsequent Archaeological and Cultural Studies (1970-present)

It wasn't until the Hawai'i Island portion of the Statewide Inventory of Historic Places (SIHP) conducted during the early 1970s that detailed recording of archaeological sites in the general vicinity of the current study area began. Records on file at the State Historic Preservation Division reveal that as a part of that study, three sites, all dating to the Historic Period, were recorded to the west/northwest of the study area These sites included the Hawai'i Consolidated Railway's eight-stall roundhouse, or locomotive garage (Site 7432); the "*Tsunami* Clock" (Site 7452) located along Kamehameha Avenue, and the Wailoa River Bridge (Site 7484).

In 1974, the Archaeological Research Center Hawai'i (Ching and Stauder 1974) conducted a reconnaissance survey for a proposed 2.5 mile alignment of a road located to the southeast of the current study area (Figure 40). As a result of the study, Ching and Stauder (ibid) recorded four archaeological sites in the south portion of their study area including a "stacked *pāhoehoe* wall. . . platform/monument burial, animal enclosure and habitation site" (in Wheeler

et al. 2014a). It was recommended that an archaeological inventory survey (AIS) be undertaken for the proposed development area and that the projected alignment be shifted in an effort to protect archaeological resources.

Five years later in 1979, William Bonk (1979) of the University of Hawai'i at Hilo conducted an archaeological survey of a 39-acre portion of Tract 1 of the Pana'ewa Hawaiian Home Lands located to the northwest of the current study area (Figure 40). As a result of the survey, two modern features were documented: a segment of a stone wall and a fragment of a wire fence. Additionally, a 15 to a 20-foot-wide section of a roadway was identified, which was intermittently marked by short stone alignments. It was concluded by Bonk (1979) that no further work was the recommended treatment.

By the 1980s, stricter environmental regulations in the United States led to an increased number of archaeological and cultural studies. In 1981, at the request of the U. S. Army Corps of Engineers, the B. P. Bishop Museum Department of Anthropology prepared a chronological history of the Hilo Bay area in an effort to assist in future environmental planning (Kelly et al. 1981). Aside from a limited amount of survey work (Clark and Rechtman 2016; McEldowney 1979; Rechtman 2001) previously conducted in the upper forest area of Waiākea, most of the major previous (and more recent) archaeological studies in the *ahupua'a* were conducted within the vicinity of Hilo town (Carson 1999; Hammatt et al. 1993; Hunt et al. 1993; Jennings 1991; Maly 1994; Maly et al. 1994; Rechtman and Henry 1998; Walker 1994). Collectively, these studies document the ravages that Historic Period land use associated with ranching and sugarcane cultivation (taking place between the 1860s-1940s) and increasing housing development associated with a growing population (from the 1950s through the present) had on the Precontact archaeological record. The acquisition of local building materials (rock and fill) and solid waste disposal are paramount among the infrastructural needs and by 1950, the vicinity of the current study area became the focal point for both of these activities.

Since the late 1980s, archaeological studies conducted near the current study area have concentrated largely on the development and continued expansion of the Hilo Industrial area, situated north and northeast of the study area. These studies focused primarily on the proposed implementation and development of rock quarrying and stockpiling sites, waste sorting locales, industrial plants, and the expansion of the Keaukaha Military Reserve (KMR), (Bush et al. 2000; Devereux et al. 1997; Escott 2013b, 2013a; Escott and Tolleson 2002; Rechtman 2006; Rosendahl 1988a, 1988b, 2002; Tolleson and Godby 2001; Wheeler et al. 2014a)

There have been several archaeological studies conducted within the Keaukaha Military Reserve (KMR), situated north of the current study area beginning in 1996 when Cultural Surveys Hawai'i (CSH) (Devereux et al. 1997) conducted a selective archaeological reconnaissance survey of a 500-acre parcel within KMR. Portions of their survey area bordered the current study area to the west, south, and east (Figure 40). As a result of their study, two archaeological sites were identified; however, one of these was subsequently reinterpreted to be a modern bulldozer push pile. The other, temporary site CSH-1, is a C-shaped enclosure located near a Jeep road that was interpreted to have served as a temporary habitation shelter. Devereux et al. (ibid.) suggested that the Jeep road may have been a remnant of the old Puna Trail (Site 18869) and that the C-shaped shelter may have been an ancillary feature of the trail. In addition to the C-shape, Devereux et al. (ibid.) also recorded ten historic buildings associated with KMR. No further work was the recommended treatment for the historic buildings. However, it was recommended that a more intensive AIS be conducted within the undisturbed forested areas along what they believed to be the old Puna Trail alignment, located to the northeast of the current study area.

Three years later in 2000, CSH (Bush et al. 2000) returned to the KMR and conducted a Phase II inventory survey in the forested areas and other sections that were determined during Phase I fieldwork to have been only minimally impacted by previous disturbance. As a result of their revisit, they documented the previously identified C-shape as Site 21657 and interpreted it as being military in origin. Additionally, they identified two new sites: Site 21658, a complex comprised of five *ahu* (rock mounds) interpreted as a location marker for a water source or temporary shelter; and Site 21659, a modified lava blister interpreted as a traditional Hawaiian agricultural feature. Bush and Hammatt (ibid.) also documented a section of the previously recorded Puna Trail (Site 18869).

A year later, Scientific Consultant Services (SCS) (Tolleson and Godby 2001) conducted a survey of a 100 square meter portion of the KMR, situated to the north of the current study area (Figure 40), which resulted in the identification of a newly identified site complex (Site 21771) consisting of four features (a platform, an enclosure, a possible *imu*, and a meadow) dating to the late 1800s. It was determined that Site 21771 was associated with the construction and maintenance of the Puna Trail, which Tolleson and Godby (ibid.) opined was widened from a foot

trail to a Government Road during the late 1800s to accommodate horses and wagons. Limited data recovery (excavation of two test units) was undertaken at Site 21771.

In 2002, SCS conducted an additional archaeological inventory survey (Escott and Tolleson 2002) of the KMR (Figure 40). As a result of that study, four sites previously identified by Bush and Hammatt (2000) were re-recorded (Sites 18869 and 21657, 21658, and 21659). Also in 2002, Paul H. Rosendahl Inc. (PHRI) conducted a 14.99-acre archaeological reconnaissance survey (Rosendahl 2002) located to the southeast of General Lyman Field (Hilo Airport). No historic properties or cultural resources were encountered as a result of that study.

In 2006, SCS conducted an archaeological inventory survey (Wolforth 2006) of a 147-acre industrial subdivision for the proposed development of the Mana Industrial Park project situated immediately west of the KMR and to the northwest of the current study area (Figure 40). Four WWII-era sites were identified within the study area including Site 25538, a Historic breakwater quarry and railroad line and Naval Air Station fuel station; Site 25539, a fuel station road; Site 25540, the southern end of the airport parking area; and Site 25541, a warehouse area. All of the identified sites were found to be characteristic with the known U.S. Navy and Army occupation of the area. No further work was the recommended treatment for all of the sites.

In 2009, CSH prepared a cultural impact assessment study (Mitchell and Hammatt 2009) for the Kamoleao Laulima Community Resource Center situated northwest of the current study area. Their study included a traditional and historical background of Waiākea Ahupua'a, as well as the history of land use. Four Native Hawaiian organizations were contacted, and two groups responded with brief comments. As a result of the study, Mitchell and Hammatt (ibid.) concluded that the proposed project will have little impact on Hawaiian traditional cultural practices within the project area, and that they recommended that the proposed project "incorporate the planting of native Hawaiian plant resources to serve future members of the Panaewa Community and its youth" (ibid.: 34).

In June of 2012, SCS conducted archaeological fieldwork (Escott 2013a) for a proposed 10.05-acre expansion of the quarry. As a result of the pedestrian survey, no archaeological sites or features were observed within their study area. In addition, very little natural landscape was present in the project area as a result of past and ongoing quarrying activity. Escott summarized his field observations thusly,

> Three quarters of the 50-acre parcel has been quarried in the past. Only the northeast corner of the project area is unaltered forest. The entire 50.0 acres were surveyed during the current study. At present, there are no cultural resources or modern structures on the study parcel. (ibid.:ii)

In July of 2013, SCS conducted archaeological fieldwork for the proposed expansion of the existing quarry (Escott 2013b). As a result of the roughly ninety-acre pedestrian survey, no archaeological sites or features were identified within the current project area. Escott summarized the terrain of the project area thusly:

> Roughly one quarter of the project area is previously quarried ground surface. The remainder of the project area has north-south bulldozer cuts through it, or has been completely bulldozed in the past. (ibid.:6)

Escott (2013b) also included the following conclusion based on his review of previous archaeological studies within the vicinity of the current project area, all of which report a low site density:

> The studies suggest that the lack of sites in this region is the result of the rugged and inhospitable landscape, having little fertile soil or arable land, being thickly forested, and subject to high rates of rainfall. (ibid.:21)

Escott (2013b) goes on to suggest that although no cultural resources were identified within the project area, undiscovered archaeological features may exist within the limited previously undisturbed areas of thick vegetation. As a result he recommended that a qualified archaeological monitor be present during initial ground clearing and grubbing operations for the proposed expansion.

In 2014, CSH conducted an AIS (Wheeler et al. 2014a) of a 405.3-acre portion of the KMR situated to the north of the current study area, roughly 600 meters north of the study area's northeastern boundary (Figure 40). While it was determined that the majority of KMR had been subject to intensive previous disturbance, the survey fieldwork primarily focused on areas which had been subject to minimal disturbance. As a result of the survey, a total of eleven archaeological sites (Sites 18869, 21657, 21658, 21771, 23273, 30008-30012, and 30038) were documented: four of which were previously identified during the inventory survey conducted by Bush and Hammatt (2000) and one (Site 21771) that was previously identified by Godby and Tolleson (2001). Specific site types identified during the Wheeler et al. (2014a) study included two segments of the Puna Trail (Site 18869 and Site 30038); a C-shaped enclosure (Site 21657); a complex comprised of five *ahu* (Site 21658); a complex of twelve features associated with potential

temporary habitation or agriculture (Site 21771); a remnant segment of a secondary Precontact/early Historic trail (Site 23273); a modified lava tube (Site 30008); a complex comprised of three temporary habitation features associated with a modified outcrop (Site 30009); a complex comprised of five features associated with temporary habitation or agriculture (Site 30010); a two-feature complex of indeterminate function (Site 30011); and a 15-meter-long segment of another secondary curbed trail (Site 30012). The trail segment designated Site 30038 was interpreted as an intact remnant ofathe Puna Trail alignment and was assigned a separate site number because it diverts from the modern Jeep road alignment that had been assigned the earlier Puna Trail designation (Site 18869). Collectively, all of the sites identified during the Wheeler et al. (2014a) study were interpreted either as ancillary features of the Puna Trail or associated with possible intermittent agricultural activities. It was concluded that the section of Waiākea in which KMR is situate was only marginally inhabited during the Precontact and Historic periods, with traditional settlements being concentrated mostly along the coast. As a result of extensive military-associated modification throughout the 20th century within KMR, many of the previously extant archaeological sites had been obliterated. While no further work was the recommended treatment for seven of the identified sites, including the segment of the Puna Trail, Wheeler et al. (2014a) did recommend preservation through avoidance (conservation) as the proposed treatment for three sites (Sites 21658, 21771, and 30038) and proposed future subsurface testing for Sites 21771 and 30010. Archaeological monitoring was recommended as a mitigation measure for all ground-disturbing activities, and a subsequent archaeological monitoring plan was prepared by CSH (Wheeler et al. 2014b).

In August of 2015, SCS prepared an archaeological monitoring report that consisted of descriptions of four of the aforementioned previously recorded sites (SIHP Sites 21658, 30008, 30009, and 30038) located in closest proximity to the current study area, within the adjacent KMR property. According to Escott (2015b:1), "The sites are located between 100 and 300 meters southeast of the existing Glover quarry boundary and between 300 and 600 meters southeast of the proposed quarry expansion project area boundary."

In October of 2015, SCS prepared a cultural impact assessment (Escott 2015c) for five ten-acre parcels of Department of Hawaiian Home Lands (DHHL) property located in the Pana'ewa region (TMK: (3) 2-1-025: 006, 007, 047, 048; and (3) 2-1-061: 002). Their study included a historical and cultural context of the project area as well as the history of land use from the Precontact period to modern times. A group interview was conducted with Native Hawaiian organizations including members of the Keaukaha-Pana'ewa Farmers Association, the Pana'ewa Community Association, DHHL, and state representatives. Escott states that although some interviewees knew of the history of the project area, no cultural practices were mentioned or identified during the consultation process. The study concluded that "no past or ongoing cultural practices associated with the project area lands were identified" (ibid.: 28).

In 2016, SCS conducted an archaeological assessment (Escott 2016a) and a CIA (Escott 2016b) for eighty-acres of modern quarry land (TMK: (3) 2-1-013: 142, 160, 161, and 163) located in the Pana'ewa region. As a result of the fieldwork survey no archaeological sites or historic resources were identified. Consultation was conducted as part of the archaeological assessment and three individuals responded to the public notices request for information. These individuals included Lei Leihua Kane, Carmen Maluanao, and Aunty Carmelita Dutchie Safferey. Two individuals, Carmen Maluanao and Aunty Dutchie Safferey, stated they were not aware of any historic properties or cultural practices associated with the project area. However, Lei Lehua Kane shared "that her family used to travel along the coastal trail east of the Pana'ewa forest and chant on their way to make offerings to Pele" but indicated that was "not aware of any historic properties or past/ongoing cultural practices associated with the project lands" (ibid.:6). Escott concluded that no historic properties will be affected by the proposed undertaking.

3. CONSULTATION

Gathering input from community members with genealogical ties and long-standing residency or relationships to the study area is vital to the process of assessing potential cultural impacts to resources, practices, and beliefs. It is precisely these individuals that ascribe meaning and value to traditional resources and practices. Community members often possess traditional knowledge and in-depth understanding that are unavailable elsewhere in the historical or cultural record of a place. As stated in the OEQC Guidelines for Assessing Cultural Impacts, the goal of the oral interview process is to identify potential cultural resources, practices, and beliefs associated with the affected project area. It is the present authors' further contention that the oral interviews should also be used to augment the process of assessing the significance of any identified traditional cultural properties. Thus, it is the researcher's responsibility to use the gathered information to identify and describe potential cultural impacts and propose appropriate mitigation as necessary.

INTERVIEW METHODOLOGY

In an effort to identify individuals knowledgeable about traditional cultural practices and/or uses associated with the current study area, a public notice was submitted to the Office of Hawaiian Affairs (OHA) for publication in their monthly newspaper, *Ka Wai Ola*. The notice was submitted via email on April 19th and was subsequently published in the May 2019 issue (Ka Wai Ola 2019:21)(Appendix A). As of the date of the current report, no responses have been received from the public notice.

Although no responses were received as a result of the *Ka Wai Ola* publication, nine individuals and three organization were contacted via email, mail, and/or phone regarding the preparation of the current CIA. Table 3 below is a listing of all individuals contacted. Of the nine individuals contacted, three individuals responded to our request with either brief comments, referrals, or accepted the interview request (see Table 3). Of the three individuals that responded to our interview request, Nākoʻolani Warrington provided written comments via email stating that she has lived on Auwae Road since 1983 and has heard of folks who would gather *maile lau liʻi* from the Panaʻewa forest, but with the expansion of houses and stores, this practice has ceased. With respect on ongoing cultural practices, Nākoʻolani stated that "taking care of our ʻāina and our people/family (neighbors taking care of neighbors) since we are indeed family here in Panaʻewa, just like those practices of old. Here also, we are constantly thinking and working towards making Railroad Avenue safe because the practice of being responsible for safety belongs to us." Nākoʻolani also recommended that ASM staff reach out to Maile Luʻukia, the President of the Keaukaha-Panaʻewa Farmers Association. Summaries of the two additional interviews are provided below.

Additionally, consultation letters were mailed to William Ailā from the Department of Hawaiian Home Lands; Maile Luʻuwai, President of Keaukaha-Panaʻewa Farmers Association; Patrick Kahawaiolaʻa, President of the Keaukaha Community Association; William Brown, President of the Panaʻewa Hawaiian Home Land Community Association; and a representative of the Office of Hawaiian Affairs (OHA), and to date, no response has been received.

The interviewees were asked a series of questions regarding their background, and their experience and knowledge of the proposed quarry site. Additional questions focused on any known cultural uses, traditions, or beliefs associated with the general Panaʻewa area. The interviewees were then asked about their general thoughts about the proposed quarry project and whether they were aware of any potential cultural impacts that could result from the development of the quarry site. The interviewees were then asked whether they had any recommendations to mitigate any identified cultural impacts as well as share any additional thoughts about the proposed action.

As part of the interview process and with the consent of the interviewees, some of the interviews were audio-recorded for note-taking purposes only (audio files not available). Where audio recordings were not permitted, ASM staff recorded notes throughout the interview process. Upon completion of the interview, ASM staff prepared an interview summary, which was emailed to the interviewees for review. The interviewees were given the opportunity to review the summary for accuracy and allowed to make any necessary edits. With the approval of the interviewees, the finalized version of the summaries are been presented below.

Table 3. Persons contacted for consultation.

Name	*Initial Contact Date*	*Response*	*Comments*
Kala Mossman	5/8/2019; 7/23/2019	Yes	Unable to secure interview
William Brown	5/8/2019	No	No response
Nakoʻolani Warrington	5/8/2019	Yes	Written comments. Referred ASM staff to Maile Luʻuwai.
Maile Luʻuwai	5/9/2019	No	No response
Gail Makuakane Lundin	5/9/2019	Yes	Unable to secure interview
Grant Kainalu Borges	5/10/2019	Yes	See summary below
Ray Bumatai	5/14/2019	Yes	Declined interview
Makaʻala Joshua Rawlins	7/12/2019	Yes	See summary below
Patrick Kahawaiolaʻa	7/12/2019	No	No response
Office of Hawaiian Affairs	7/12/2019	No	No response
Department of Hawaiian Home Lands	7/12/2019	No	No response
Keaukaha-Panaʻewa Farmers Association	7/24/2019	No	No response

GRANT KAINALU BORGES

On April 23rd and July 12th, 2019, ASM staff, ʻIolani Kaʻuhane conducted an interview with Grant Kainalu "Nalu" Borges, a Panaʻewa resident and a current board member of the Keaukaha-Panaʻewa Farmers Association. Nalu's family is recognized in the community as being one of the first families to move into the Panaʻewa Hawaiian Homestead community. Their home is situated along the *mauka* side of Railroad Avenue between Manuia Road and Mahiʻai Street. Nalu spent the majority of his life living in Panaʻewa where he learned to gather the natural resources from the area for subsistence and other traditional cultural practices, which are further described below.

When asked about his knowledge of the proposed study area, Mr. Borges reflected on his childhood when his family began homesteading on the plot of land that they currently reside in. He shared that when his family moved to their homestead lot in 1979, they started by clearing small sections of land where they slept in a tent and planted guava to help generate income. Nalu's memories of the area are strongly connected to when he was about seven or eight years old and recounted how he and his father, Ammon Nalei Borges, would explore the forest lands located east of their homestead lot, which during that time was undeveloped. Nalu shared that because they were homesteading and building their house, his family was highly dependent on the forest. They would catch wild boars and have "plenty of food" which they used to feed their family. Nalu also described gathering *maile (Alyxia olivaeformis)* which they sold to supplement the family income. Nalu emphasized that gathering *maile* and hunting wild pigs were their primary activities conducted by his family near the study area vicinity. When asked about specific practices associated with the gathering of *maile,* Nalu described that when his family or when other families in the community needed *maile* they would walk to the forest from their house lot and handpick the *maile.* Nalu explained that his family no longer gathers resources from the study area vicinity because of the increased development of residential lots and the expansion of the industrial area.

While the Panaʻewa forest provided the means for Nalu's family to survive, he also described how these resources (wild boars and *maile*) were used in *lūʻau* (traditional feast), which were organized for important milestone celebrations such as graduations, birthdays parties as well as church events. Nalu's father was an active member of the Mormon Church and would access the forest to hunt wild boars that were used to supply food for large church gatherings and mission-related feasts. *Maile* was also collected from the forest and were given as gifts during *lūʻau.*

Nalu also expressed that it is very important for Hawaiians living today to protect what Panaʻewa was traditionally known for, which is the massive *ʻōhiʻa* (*Metrosideros polymorpha*) trees. He described the Panaʻewa forest as having ancient *ʻōhiʻa* trees, and during the bulldozing of their homestead lot, they encountered giant trees but given the circumstances of that time, they were more focused on surviving and planting guava to generate income. With the threat of Rapid ʻŌhia Death (ROD), Nalu is very concerned for the loss of the Panaʻewa *ʻōhiʻa* and that current bulldozing practices in Panaʻewa maybe spreading ROD. Nalu comments that the *ʻōhiʻa* is a vital cultural resource to the Hawaiian people and is utilized in many ways from cooking to craft making. Nalu advocated for the protection of this resource and stated that we all utilized the tree in some form.

When asked about recommendations for the proposed quarry site, Nalu would like to see all large *ʻōhiʻa* trees, especially those that do not show signs of ROD preserved in place. Nalu stated that if the trees cannot be preserved in

place then the project managers should contact the Pana'ewa community so that the trees can be collected and repurposed.

MAKA'ALA JOSHUA RAWLINS

An in-person interview was conducted by 'Iolani Ka'uhane on July 13, 2019, with Maka'ala Rawlins, a Pana'ewa resident and current board member of the Keaukaha-Pana'ewa Farmers Association (KPFA). Maka'ala is the grandson of Genesis Namakaokalani Lee Loy and Elizabeth Genevieve Luahiwa Ho'opi'i and currently lives on the Hawaiian Homestead lot that was granted to his grandparents in the early 1970s. This lot is situated west of the current study area along Auwae Road. Maka'ala explained that before Pana'ewa Homesteads was opened up for residential lots, his grandparents and family lived in Keaukaha. When the State of Hawaii was dividing up the lands for the Hilo International Airport between 1960 and 1967, Maka'ala's grandfather and his uncles as well as other people like Uncle Randy Ahuna and his wife Aunty Maka, sued the Department of Hawaiian Home Lands (Ahuna vs State) to open up lands in Pana'ewa for agricultural and homestead purposes. In 1972-73, Maka'ala's grandparents were awarded their homestead lot and began growing *Beaumont* guavas, through a partnership with the University of Hawai'i Hilo. Ten years later in 1983, Maka'ala and his family moved to the Pana'ewa homestead lot, when Railroad Avenue was a dirt road and the surrounding area was predominately forest and tall cane grass.

When asked about his knowledge of the proposed study area, Maka'ala responded that the Pana'ewa forest was famous for its natural resources such as *'ōhi'a, maile, lama* (*Diospyros sandwicensis*), and *'ie'ie* (*Freycinetia arborea*). He expressed that the Pana'ewa forest was known for its large *'ōhi'a* and *maile lau loa*—a variety of *maile* known for its long and broader leaves which differs from the more commonly known, *maile lau li'i* (small-leaved *maile*), which is common to the islands of O'ahu and Kaua'i. Maka'ala recounts seeing an old newspaper article referring to *kahuna*, or priest, who sought out the Pana'ewa *maile* for its *mana*, or spiritual strength, and that the forest was named after the *mo'o* deity, Pana'ewa. He remembers as a kid seeing an abundance of *'ōhi'a, maile,* and *lama* growing in the general vicinity of the study area and shared that his grandfather kept some of the large *'ōhi'a* and *lama* trees on their property. He also described an instance when his uncle was awarded a homestead lot located near his grandfather's place, in which they kept the majority of the native trees intact during the initial development of his uncle's lot. They discovered an abundance of *'ōhi'a, maile, and lama* and also a wild variety of *'awa* (*Piper methsticum*) growing which they still have on their farms today.

In the late 1980s to the early 1990s, his grandfather found a variety of *'awa*, called Pana'ewa *'awa*, near the study area by the Hilo Transfer Station, that initiated a Hawaiian association of *'awa* growers, which included the late Jerry Konanui, Ed Johnson, and his grandfather. The association was created to increase *'awa* growing and to promote its cultural uses in the early 1990s. Maka'ala explained that the presence of *'awa* in the forest indicated that Pana'ewa used to have *'awa* and that this variety has adapted to Pana'ewa's weather and climate, resulting in a new strain. When asked how his grandfather discovered the Pana'ewa *'awa*, Maka'ala responded that his grandfather's and uncle's house lots (Maka'ala's current residence) are situated on the northeast back portion of the Pana'ewa Hawaiian Homesteads located near an abandoned auxiliary road that extended from the Hilo Transfer Station area to their lots. His family would utilize the auxiliary road and look for native plants in the vicinity of the current study area.

Maka'ala expressed that the area of the current study area where his grandfather discovered the *'awa* is still an essential region of the Pana'ewa forest that he utilizes for collecting native plants and seeds. He mentioned that there are many native plants in the vicinity of the current study area including *'ōhi'a, maile,* and *lama*, and notes that *lama*, once common but now rare, can be found in high numbers. Maka'ala is concerned with the growing development that is occurring in the vicinity of the current study area and stated that these undisturbed areas of forest serve as seed banks for the Pana'ewa community. Instead of planting and growing native species from other districts of Hawai'i Island, we should be taking care of our forest areas in our communities and utilize those seeds and native plants to be incorporated back into the Pana'ewa communities.

4. IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are natural features of the landscape and historic sites, including traditional cultural properties. In the Hawai'i Revised Statutes–Chapter 6E a definition of traditional cultural property is provided.

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

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

It is however with the definition of "Property" wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. However offensive the concept of boundaries may be, it is nonetheless the regulatory benchmark for defining and assessing traditional cultural properties. As the OEQC guidelines do not contain criteria for assessing the significance for traditional cultural properties, this study will adopt the state criteria for evaluating the significance of historic properties, of which traditional cultural properties are a subset. To be significant the potential historic property or traditional cultural property must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

a Be associated with events that have made an important contribution to the broad patterns of our history;

b Be associated with the lives of persons important in our past;

c Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

d Have yielded, or is likely to yield, information important for research on prehistory or history;

e Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.

While it is the practice of the DLNR-SHPD to consider most historic properties significant under Criterion d at a minimum, it is clear that traditional cultural properties by definition would also be significant under Criterion e. A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa'akai O Ka 'Āina* vs Land Use Commission court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigative actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

A review of the culture-historical background material, and as expressed by the consulted parties, the Pana'ewa forest is associated with multiple traditional *mo'olelo* that associate the creation of this forest to several Hawaiian *akua* (deities), *kupua* (culture heroes), and *mo'o* (guardians of fresh water sources). The Pana'ewa forest is arguably one of the most storied forests in east Hawai'i celebrated in traditional lore and chants for its grand stands of *'ōhi'a*, its *hala* forest, its unique variety of *maile*, and its *'awa* that were transported by birds and grew in the trees. All of the consulted parties described the traditional practice of gathering *maile* while some also spoke about the gathering of *'ōhi'a*. Collectively, these *mo'olelo* and the natural resources found therein are the major contributing elements that make the Pana'ewa region a culturally significant place. These *mo'olelo* enhance our understanding of traditional

perspectives and values associated with the Pana'ewa forest, which include the dangers of traversing the forest, the creation of forests by divine forces, and its role in storing the life giving element, *wai* (water).

Some of these *mo'olelo*, especially those associated with *mo'o* (i.e. the *Epic Tale of Hi'iakaikapoliopele*) are foundational cultural beliefs associated with water resources as well as the unpredictable and unforgiving landscape of Pana'ewa. According to Maka'ala Rawlins, *mo'o* deities served as cultural indicators for freshwater and he made reference to the coastal region of the Pana'ewa forest where he has seen many surface water features. Many of the *mo'olelo* associated with the Pana'ewa forest also describe two main trail routes, one that passed through the forest while the other along the coast (old Puna Trail), whichaconnected Waiākea to Kea'au in the Puna District. As evidenced in the ancient accounts, caution was taken when traversing through this area. As learned from the story of Hi'iakaikapoliopele, Hi'iaka calls forth the fires of her siblings to slay Pana'ewa, thereby providing a safe passage for travelers. Although these fires ultimately destroy the forest, through her supernatural powers, she restores the growth. The message of ridding the forest of its dangers is also echoed in the *mo'olelo* of "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki*" ("The Heart Stirring Story of Ka-Miki"), when Ka-Miki and his companions encountered and defeated Kūkulu, guardian of the chiefess Pana'ewa-nui-moku-lehua. In all of the traditional *mo'olelo*, the name Pana'ewa is said in referenced to a high ranking *ali'i* or *mo'o* that inhabited and guarded the forest.

While the gathering of natural resources from the Pana'ewa forest remains an important part of the cultural practices of this community, no explicit reference was made to such practices occurring in the study area. While it is not anticipated that the proposed quarry project will impact these cultural practices, based on the information obtained through the consultation efforts, continued development into the undeveloped forest, has impacted the area's natural resources by hindering access to or eliminating them completely from the landscape. As expressed by Nāko'olani Warrington, continued development, has for many years impeded upon the traditional practices associated with the Pana'ewa forest natural resources. As shared by Nalu Borges, Pana'ewa was known for its forest with large *'ōhi'a* trees and *maile,* and that to maintain the natural character of the forest is integral to maintaining the cultural essence and beauty of the area. Nalu also added that Rapid 'Ōhi'a Death has also resulted in the loss of important forest resources. While the consulted parties described the presence of *lama*, *'ōhi'a*, *maile*, and *'awa* within this general area of the Pana'ewa forest, none of these species, with the exception of *'ōhi'a,* was observed within the proposed quarry site.

It is the findings of the current study that the proposed development of the quarry will have no direct impact on any historic properties or traditional and customary native Hawaiian practices. While we recognize that intact sections of the Pana'ewa forest are valued cultural and natural resources, there is only one small section of such forest within the proposed quarry site. Based on our findings, it is recommended that Yamada and Sons Inc. make efforts to preserve or avoid disturbing the small and seemingly healthy portion of intact native *'ōhi'a* forest that is present within the southeast section of the proposed quarry site. This effort would serve to mitigate any potential impacts to the valued cultural and natural resources that may result from the development of the proposed Yamada and Sons' quarry site.

5. POST-STUDY UPDATE

Following the submission of the draft CIA, Ron Terry of Geometrician Associates, LLC shared the above described potential cultural impacts and recommendations with the staff and planners for the proposed Yamada quarry site project. Based on the recommendations in the draft CIA, Yamada & Sons Inc. (the applicant) agreed to reduce the size of the proposed quarry site to exclude a seemingly healthy section of *'ōhi'a* forest that is located in the southeast section of the original 51.192 acre proposed quarry site. The proposed project area in the revised Yamada quarry site plan has been reduced from 51.192 acres to 37.882 acres and now excludes the section of *'ōhi'a* forest as well as the Drag Strip road (Figure 41). The elimination of 13.31 acres from the original quarry site project area thereby mitigates the above described potential cultural impacts. Under the revised quarry site plan (see Figure 41), it is the findings of the current study that the revised quarry site project area will not directly impact any historic properties, traditional and customary native Hawaiian practices or any culturally valued forest resources.

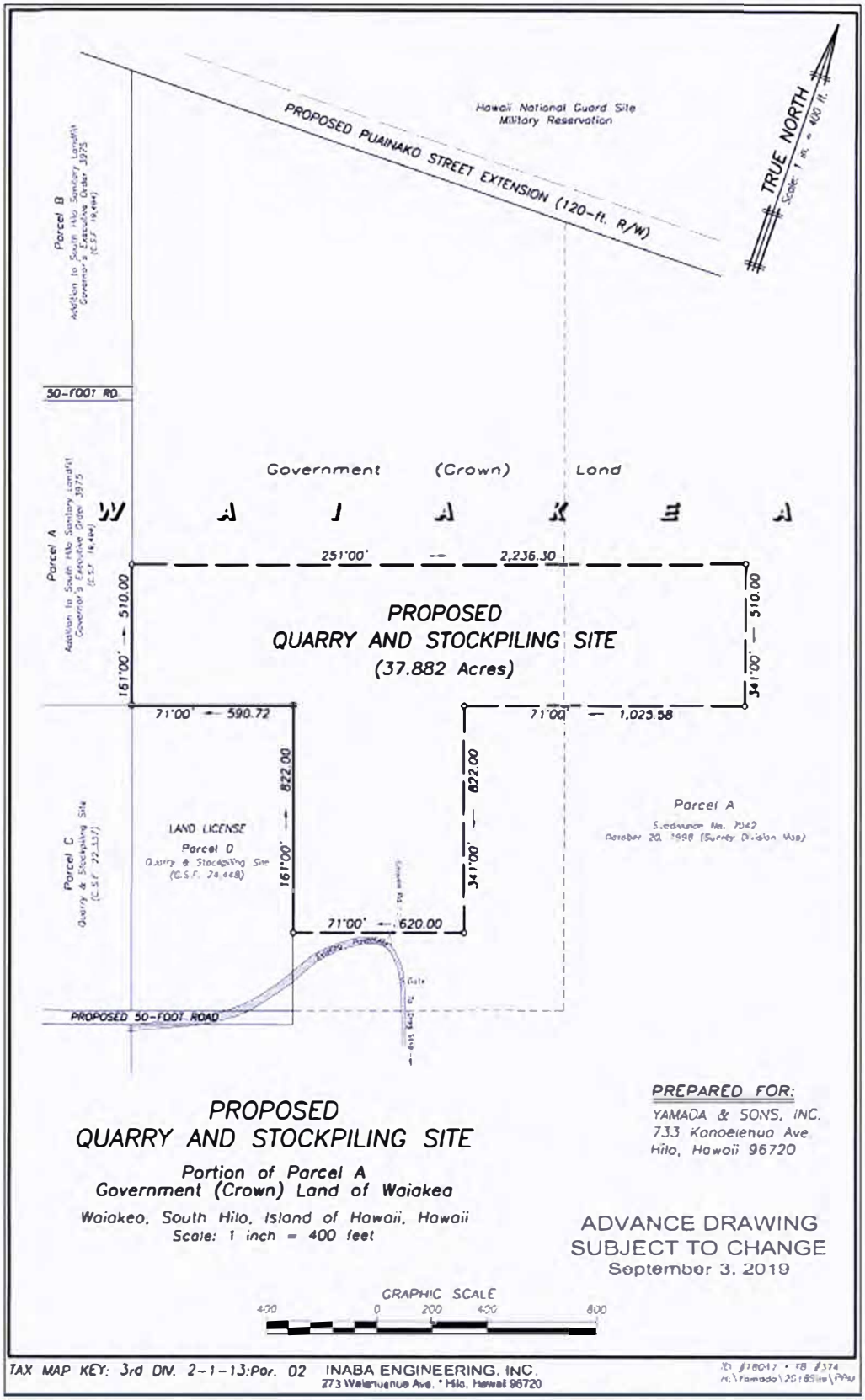

Figure 41. Revised Yamada & Son's Inc. quarry site plan which excludes *'ōhi'a* forest located in the southwest section of the study area.

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APPENDIX A.

KA WAI OLA, PUBLIC NOTICE

ASM Affiliates is preparing a Cultural Impact Assessment (CIA) in advance of a proposed 14.99-acre new quarry license adjacent to an existing quarry located on a portion of TMK (3) 2-1-3:002, situated in Waiākea Ahupua'a, South Hilo District, Island of Hawai'i. We are seeking consultation with any community members that might have knowledge of traditional cultural uses of the proposed project area; or who are involved in any ongoing cultural practices that may be occurring on or in the general vicinity of the subject property, that may be impacted by the proposed project. If you have and can share any such information please contact Lokelani Brandt lbrandt@asmaffiliates.com, or Aoloa Santos asantos@asmaffiliates.com, phone (808) 969-6066, mailing address ASM Affiliates 507A E. Lanikaula Street, Hilo, HI 96720.

Ka Wai Ola, Mei (May) 2019, Vol. 36, No. 5.

County of Hawai'i

WINDWARD PLANNING COMMISSION

Aupuni Center • 101 Pauahi Street, Suite 3 • Hilo, Hawai'i 96720
Phone (808) 961-8288 • Fax (808) 961-8742

January 31, 2011

Yamada & Sons, Inc.
733 Kanoelehua Avenue
Hilo, HI 96720

Gentlemen:

Special Permit Application (SPP 10-000110)
Applicant: Yamada & Sons, Inc.
Request: To Establish Quarry and Related Uses on 14.99 Acres in State Land Use Agricultural District
Tax Map Key: 2-1-13:portion 2

The Windward Planning Commission at its duly held public hearing on January 6, 2011, voted to approve the above-referenced special permit to allow for the establishment of a quarry and related uses on a 14.99-acre portion of a larger 2,500±-acre parcel situated within the State Land Use Agricultural District. The project site is located to the south of the Hilo Sanitary Landfill and adjacent to the east of existing quarries within the district of Waiākea, South Hilo, Hawai'i.

Approval of the request is based on the following:

The applicant, Yamada & Sons, Inc., is requesting a Special Permit in order to establish and operate a quarry and related uses on a 14.99-acre portion of a 2,407-acre parcel. The applicant has quarried three other properties nearby in the past but these sites are now inactive because either the supply of material has been exhausted or the license to quarry materials at these sites has expired. Quarrying of the new site would allow the applicant to supply aggregate materials, concrete, and hot-mix asphalt for its general contracting business and for sale to the general public. Quarried material would be transported to the applicant's crusher site which is located off Railroad Avenue, within the industrial area. All material would be hauled by the applicant's trucks. Quarry operations would be from 6:00 a.m. to 6:00 p.m., daily. During peak operation periods, there will be a maximum of ten (10) employees on-site. There will be no retail sales on-site.

Planning Dept.
Exhibit 1

The criteria for approving a Special Permit are based on Rule 6-6 in the Planning Commission Rules. Rule 6-6 states that the Planning Commission shall not approve a Special Permit unless it is found that the proposed use (a) is an unusual and reasonable use of land situated within the Agricultural or Rural District, whichever the case may be; and (b) the proposed use would promote the effectiveness and objectives of Chapter 205, Hawai'i Revised Statutes, as amended.

The proposed use is an unusual and reasonable use of land situated within the Agricultural District. In recognizing that lands within the Agricultural district might not be best suited for agricultural activities and yet classified as such, and in recognition that certain types of uses might not be strictly agricultural in nature, yet reasonable in such districts, the legislature has provided for the Special Permit process to allow certain unusual and reasonable uses within the Agricultural district. Based on the poor soil conditions of the project site for agricultural activities, the proposed request is considered an unusual and reasonable use of agricultural land in this location within the State Land Use Agricultural District.

The granting of this request would promote the effectiveness and objectives of Chapter 205, Hawai'i Revised Statutes, as amended. The State Land Use Law and Regulations are intended to preserve, protect and encourage the development of lands for those uses to which they are best suited in the interest of the public welfare of the people of the State of Hawai'i. In the case of the Agricultural District, the intent is to preserve or keep lands of high agricultural potential in agricultural use. Soils on the project site are identified by the USDA Soil Survey Report as Paipai series (rPae), which consist of well-drained, thin, extremely stony organic soils over fragmented a'a lava. The Land Study Bureau's Overall Master Productivity Rating for the site is "E" or "Very Poor" for agricultural production. Additionally, the property is classified as Other Important Agricultural Land by the Department of Agriculture's ALISH system. As the site is currently vacant and is not in active agricultural use, the use will not displace any existing agricultural activity or diminish the agricultural potential of the site. Therefore, the proposed use will not adversely affect the preservation and agricultural use of the County's prime agricultural lands, and is not contrary to the objectives sought to be accomplished by the State Land Use Law and Regulations.

In addition to the above listed criteria, the Planning Commission shall also consider the criteria listed under Section 6-3(b)(5) (A) through (G). In considering the criteria, the Planning Director recommends the following:

(A) Such use shall not be contrary to the objectives sought to be accomplished by the Land Use Law and Regulations. The request is considered an unusual and reasonable use of agricultural lands. The requested use will not adversely affect the preservation and agricultural use of the County's prime agricultural land; thus, the request is not contrary to the objectives sought to be accomplished by the State Land Use Law and Regulations.

(B) The desired use would not adversely affect surrounding properties. The project site is a 14.99-acre portion of an approximately 2,407-acre State-owned parcel. Lands to the north, east and south are vacant and heavily vegetated. Immediately west of the site is a quarry operated by Jas W. Glover. Additional quarries are located further west and the County's transfer station and landfill site are located northwest of the site. The County's *Integrated Resources and Solid Waste Management Plan* identifies these quarry sites as a potential location for future expansion of the South Hilo landfill. The plan does not identify any conflict with the proposed quarry, and in fact Exhibit 9-1 of the plan already identifies the subject site as a "future quarry." The closest dwellings are located about half a mile from the proposed quarry site. Potential impacts typically associated with quarry operations include dust and noise. However, these impacts can be mitigated by the applicant complying with Department of Health rules and regulations related to air quality and noise. A condition of approval will also limit hours of operation to between 6:00 a.m. to 6:00 p.m., daily.

(C) Such use shall not unreasonably burden public agencies to provide roads and streets, sewers, water, drainage, school improvements, and police and fire protection. Access to and from the site is via Ammunition Dump Road, which is a two-lane road that meanders over County, State and Department of Hawaiian Home Lands property. The paved portion of the road varies in width but is mostly 30 feet wide and ranges in condition from excellent to poor. The applicant estimates that the quarry operation will require use of 4 to 5 rock-hauling trucks making about three trips per hour between the quarry and the applicant's crusher site at its base yard which is located between Railroad Avenue and Ammunition Dump Road on TMK's 2-1-025:001, 041, and 042. Traffic will not increase on the Ammunition Dump Road since the new quarry site is replacing other sites presently used by the applicant that are also accessed via the same road using the same trucks and frequency of travel. Electrical and telephone are not required for the quarry operation. Water for dust suppression will either be trucked to the site or provided by catchment tank. Portable toilets will be provided and maintained for employees to use at the site. Medical, police and fire services are all available nearby in Hilo.

(D) Unusual conditions, trends, and needs have arisen since district boundaries and regulations were established. Since the district boundaries and regulations were established in the 1960's and 1970's, the State DLNR has issued several

land licenses in the area for quarry operations because this area has proven to be a valuable source of raw material used in the construction industry. Through the issuance of a Special Permit, a community may establish various "non-agricultural" services that are reasonable but unusual in nature such as quarries.

(E) The land upon which the proposed use is sought is unsuited for the uses permitted within the district. The proposed quarry site is currentlyanot used for agricultural purposes. As previously mentioned the lands are rated "E" or "Very Poor" for agricultural productivity and classified as Other Important Agricultural Land by the ALISH Map. Other Important Agricultural Land is land other than Prime or Unique Agricultural Land that is of statewide or local importance for the production of food, feed, fiber and forage crops. The lands in this classification are important to agriculture in Hawai'i yet they exhibit properties, such as seasonal wetness, erodibility, limited rooting zone, slope, flooding, or droughtiness, that exclude them from the Prime or Unique Agricultural Land classifications. The soils in this area are not suitable for many types of agricultural uses, which may explain why the site has not historically been used for agricultural purposes although it is classified for such use.

(F) The use will substantially alter or change the essential character of the land and the present use. The character of the property is vacant land that has been recently grubbed of vegetation. Thus, removal of raw materials from the site will substantially alter the essential character of the land. However, there are several quarries located to the west and other industrial-type land uses to the northwest in close proximity to the project site. Therefore, although the character of the 14.99-acre site will be substantially altered, the proposed use is consistent with other land uses in the nearby area. Additionally, the DLNR land license for the site requires that upon closure or abandonment of the quarry, the applicant leave the site in a non-hazardous condition.

(G) The request will not be contrary to the General Plan. Although thea request is not consistent with the General Plan LUPAG Map "Important Agricultural Land" designation, it does meet several of the goals and policies of the General Plan, including the following:

Land Use:

- a Industrial activities may be located close to raw material or key resources. Thea ability of the subject property to provide the needed raw material vital to thea construction industry while able to absorb the noxious nature of quarries speaks toa the appropriateness of the area for such uses.a

Economic:

- a The County shall strive for diversification of its economy by strengtheninga industries and attracting new endeavors.a
- a Economic development and improvements shall be in balance with the physicala and social environments of the island of Hawaii.a

Natural Resources and Shoreline Elements:

- a Ensure that alteration to existing land forms and vegetation, except crops, anda construction of structures cause minimum adverse effect to water resources, anda scenic and recreational amenities and minimum danger of floods, landslides,a erosion, siltation, or failure in the event of earthquake.a
- a The County of Hawaii should require users of natural resources to conduct theira activities in a manner that avoids or minimizes adverse impacts on the environment.a

In order to provide for raw construction materials that are vital to the constructiona industry, quarries must be established in locations where there is an abundance of these raw materials. For this reason, quarries, while industrial in character, cannot be confined to Industrial-designated areas. As evidenced by the issuance of Special Permits for other quarries within the affected area, this particular area contains the raw materials essential to the construction industry. The establishment of the proposed quarry in this particular location will not adversely impact agricultural resources, as many of the uses are industrial in nature. There are many areas in the County where lands within the Agricultural District are not in active agricultural productivity. Because quarrying operations are resource-based, sites are restricted in location by the availability of raw materials. Other previous and ongoing quarry activities in the vicinity of the project site have shown that the materials are available in this area, which makes this an appropriate site to establish a quarry.

The request is consistent with the objectives and policies as provided by Chapter 205A, HRS, and Special Management Area guidelines contained in Rule No. 9 of the Planning Commission Rules of Practice and Procedure. The project site is not proximate to the shoreline and will not be impacted by coastal hazard and beach erosion. There are no identified recreational resources, historic resources, public access to the shoreline or mountain areas, scenic and open space preserves, coastal ecosystems, marine resources or other natural and environmental resources in the area. Thus, the request is consistent with the objectives and policies of HRS, Chapter 205A.

The request will not have a significant adverse impact to traditional and customary Hawaiian Rights. In view of the Hawai'i State Supreme Court's "PASH" and "*Ka Pa'akai O Ka'Aina*" decisions, the issue relative to native Hawaiian gathering and fishing rights must be addressed in terms of the cultural, historical, and natural resources and the associated traditional and customary practices of the site:

Investigation of valued resources: An intensive on-foot archaeological survey of the property was conducted by Rechtman Consulting in May 2006. Also in 2006, Dr. Ron Terry of Geometrician Associates made an effort to obtain information about any potential cultural properties and associated practices occurring on the site. A walk-through botanical survey of the site was conducted in April 2006 by botanist Layne Yoshida.

The valuable cultural, historical, and natural resources found in the permit area: No valuable cultural, historic, or natural resources related to traditional and customary practices were identified on the site. In a letter dated November 20, 2006, the State Historic Preservation Division determined that no historic properties will be affected by the proposed quarry.

Possible adverse effect or impairment of valued resources: Native plants may be destroyed by quarry operations. There is no evidence that the flora in the area are particularly desired or used for cultural practices. The site is not adjacent and/or proximate to the shoreline. As such, gathering of marine life, fishing and coastal access is not an issue.

Feasible actions to protect native Hawaiian rights: To the extent to which traditional and customary native Hawaiian rights are exercised, the proposed action will not affect traditional Hawaiian rights and no action is necessary to protect these rights. A condition of approval will be included to require the applicant to notify the DLNR-SHPD should any unidentified sites or remains be encountered, and proceed only upon an archaeological clearance from the DLNR-SHPD.

Based on the above considerations, the approval of the request would support the objectives sought to be accomplished by the Land Use Laws and Regulations. Approval of this request is subject to the following conditions:

1.a The applicant, its successor or assigns shall be responsible for complying with alla stated conditions of approval.a

2.a The life of this permit shall be co-terminus with the Department of Land anda Natural Resources land license issued to Yamada & Sons, Inc. for quarryinga activities on the subject property.a

3.e Quarrying activities shall be limited to the hours of 6:00 a.m. and 6:00 p.m., daily.e

4.e Adequate dust control and noise mitigation shall be implemented for the duratione of the operation in accordance with Department of Health requirements. Thee applicant shall provide an on-site water storage tank or truck water to the site toe be used for dust control.e

5.e Should any remains of historic sites, such as rock walls, terraces, platforms,e marine shell concentrations or human burials be encountered, work in thee immediate area shall cease and the Department of Land and Natural Resources - State Historic Preservation Division (DLNR-HPD) shall be immediately notified.e Subsequent work shall proceed upon an archaeological clearance from DLNR-HPD when it finds that sufficient mitigation measures have been taken.e

6.e Within ninety (90) days after termination of the quarry operation or abandonmente of the project site, the applicant shall submit to the Planning Departmente appropriate documentation which demonstrates compliance with the DLNRe approved closure/site reclamation plan.e

7. The applicant shall comply with all applicable County, State, and Federal laws,e rules, regulations and requirements, including the United States Department ofe Labor's Mine Safety and Health Administration (MSHA) and Occupational Safetye and Health Administration (OSHA).e

Should any of the conditions not be met or substantially complied with in a timely fashion, the Planning Director may initiate procedure to revoke the permit.

This approval does not, however, sanction the specific plans submitted with the application as they may be subject to change given specific code and regulatory requirements of the affected agencies.

Should you have any questions, please contact Daryn Arai of the Planning Department at 961-8288.

Sincerely,

Zendo Kern, Chairman
Windward Planning Commission

Lyamada&sonsspp10-110

cc: Department of Public Works
Department of Water Supply
County Real Property Tax Division
State Land Use Commission
Department of Land & Natural Resources-Honolulu
Department of Land & Natural Resources-HPD
✓Mr. Gilbert Bailado

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII
HILO, HAWAII

DATE: April 22, 2022

Memorandum

TO: Zendo Kern, Planning Director

FROM: FOR: Department of Public Works, Engineering Division BH.

SUBJECT: SPECIAL PERMIT APPLICATION (PL-SPP 2022-000012)
Applicant: Yamada and Sons, Inc.
Request: To Establish a Quarry and Related Activities
TMK: 2- 1- 013: 002 (Por.)

We have reviewed the subject application forwarded by your memo dated March 31, 2022, and provide the following comments:

1. All earthwork activity, including grading, grubbing, and stockpiling, shall conform to Chapter 10, Erosion and Sedimentary Control, of the Hawaii County Code.

2. All driveway connections and construction within the Hoolaulima Road Right-of-Way shall conform to Chapter 22, County Streets, of the Hawaii County Code. Access to Hoolaulima Road, including the provision of adequate sight distances, shall meet with the approval of the Department of Public Works.

3. All development-generated runoff shall be disposed of on site and not directed toward any adjacent properties. A drainage plan may be required by the Plan Approval process in accordance with Section 25-2-72(3) of the Hawaii County Code.

4. The subject parcel is in an area designated as Flood Zone X on the Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA). Zone X is an area determined to be outside the 500-year floodplain.

Questions may be referred to Bryce Harada at 961-8042.

Planning Dept.
Exhibit 2

Mitchell D. Roth
Mayor

Lee E. Lord
Managing Director

Ramzi I. Mansour
Director

Brenda D. Iokepa-Moses
Deputy Director

County of Hawai'i

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

345 Kekūanāo'a Street, Suite 41 · Hilo, Hawai'i 96720
Ph: (808) 961-8083 • Fax: (808) 961-8086
Email: cohdem@hawaiicounty.gov

MEMORANDUM

TO: Zendo Kern, Director
Planning Department

FROM: Ramzi I. Mansour, Director
Department of Environmental Management

DATE: April 13, 2022

SUBJECT: Special Permit Application (PL-SPP-2022-000012)
Applicant: Yamada and Sons, Inc.
Request: To Establish a Quarry and Related Activities
Tax May Key: (3) 2-1-013:002 (Por.), South Hilo, Hawai'i

The Solid Waste Division has reviewed the subject application and offers the following comments and/or recommendations (contact the Solid Waste Division for details):

( ) No comments.
( ) Commercial operations, State and Federal agencies, religious entities and non-profit organization may not use transfer stations for disposal.
( ) Aggregates and any other construction/demolition waste should be responsibly reused to its fullest extent.
( ) Ample and equal room should be provided for rubbish and recycling.
( ) Green waste may be transported to the green waste sites located at the West Hawai'i Organics Facility and East Hawai'i Organics Facility, or other suitable diversion programs.
( ) Construction and demolition waste is prohibited at all County Transfer Stations.
( ) Submit Solid Waste Management Plan in accordance with attached guidelines.
( ) Existing Solid Waste Management Plan is to be followed. Provide update to the department on current status.
(X) Other: Applicant is reminded that: 1) Current use of rock hauler shall end once quarrying operations of the parcel has started and Applicant must use highway legal vehicles to haul quarried material from the quarry site to the Applicant's processing plant. 2) Further, it is Applicant's responsibility to inform DEM of the starting date of the quarrying operations.

Planning Dept.
Exhibit 3

The Wastewater Division has reviewed the subject application and offers the following comments and/or recommendations (contact the Wastewater Division for details):

( ) No comments.
( ) Require connection of existing and/or proposed structures to the public sewer in accordance with Section 21-5 of the Hawai'i County Code.
( ) Require Council Resolution to approve sewer extension in accordance with Section 21-26.1 of the Hawai'i County Code. Complete Sewer Extension Application.
( ) Require extension of the sewer system to service the proposed subdivision in accordance with Section 23-85 of the Hawai'i County Code.
( ) *Check or line out as applicable*: [ ] If required by the Director of the Department of Environmental Management ("Director of DEM"), [ ] applicant shall conduct a sewer study in accordance with the applicable wastewater system design standards prior to approval to connect to the County sewer system. Applicant shall provide such sewer line or other facility improvements as the Director of DEM may reasonably require, which the sewer study may indicate are advisable for mitigation of impacts of the proposed project. Contact Wastewater Division Chief for details.
( ) Proposed activity may be subject to existing or future federal, state, or county regulation under Title 40 CFR 403.5, prohibiting discharge of certain pollutants into publicly owned treatment works. Contact the Hawai'i Department of Health for information regarding pretreatment standards.
(X) Applicant shall follow Department of Health regulations.
( ) Other:

RM:pls

Mori, Ashley

From: Cab General <Cab.General@doh.hawaii.gov>
Sent: Friday, April 1, 2022 2:56 PM
To: Planning Internet Mail
Subject: Special Permit Application (PL-SSP-2022-000012)

Aloha

Thank you for the opportunity to provide comments on the subject project. Original comment sent November 8, 2017, in response to a Draft EA for Yamada & Sons Rock Quarry, Waiakea.
Please see our standard comments at:

https://health.hawaii.gov/cab/files/2019/08/Standard-Comments-Clean-Air-Branch-2019.pdf

Please let me know if you have any Questions

Lisa M.M. Wallace
EHS QA Officer
Clean Air Branch
Environmental Health Office
Hilo, Hawaii 96720

Planning Dept.
Exhibit 4

Standard Comments for Land Use Reviews
Clean Air Branch
Hawaii State Department of Health

If your proposed project:

Requires an Air Pollution Control Permit

You must obtain an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements. If you do not know if you need an air pollution control permit, please contact the Permitting Section of the Clean Air Branch.

Includes construction or demolition activities that involve asbestos

You must contact the Asbestos Abatement Office in the Indoor and Radiological Health Branch.

Has the potential to generate fugitive dust

You must control the generation of all airborne, visible fugitive dust. Note that construction activities that occur near to existing residences, business, public areas and major thoroughfares exacerbate potential dust concerns. It is recommended that a dust control management plan be developed which identifies and mitigates all activities that may generate airborne, visible fugitive dust. The plan, which does *not* require Department of Health approval, should help you recognize and minimize potential airborne, visible fugitive dust problems.

Construction activities must comply with the provisions of Hawaii Administrative Rules, §11-60.1-33 on Fugitive Dust. In addition, for cases involving mixed land use, we strongly recommend that buffer zones be established, wherever possible, in order to alleviate potential nuisance complaints.

You should provide reasonable measures to control airborne, visible fugitive dust from the road areas and during the various phases of construction. These measures include, but are not limited to, the following:

a) Planning the different phases of construction, focusing on minimizing the amount of airborne, visible fugitive dust-generating materials and activities, centralizing on-site vehicular traffic routes, and locating potential dust-generating equipment in areas of the least impact;
b) Providing an adequate water source at the site prior to start-up of construction activities;
c) Landscaping and providing rapid covering of bare areas, including slopes, starting from the initial grading phase;
d) Minimizing airborne, visible fugitive dust from shoulders and access roads;
e) Providing reasonable dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and
f) Controlling airborne, visible fugitive dust from debris being hauled away from the project site.

If you have questions about fugitive dust, please contact the Enforcement Section of the Clean Air Branch

Clean Air Branch (808) 586-4200 cab@doh.hawaii.gov	Indoor Radiological Health Branch (808) 586-4700

Mori, Ashley

From: Chen, Edward <edward.chen@doh.hawaii.gov>
Sent: Friday, April 1, 2022 7:18 AM
To: Planning Internet Mail
Cc: Wong, Alec Y; Lum, Darryl C; Chen, Edward; Honda, Eric; Rossio, Marianne Fuji
Subject: FW: Request for Comments on App. No. PL-SPP-2022-000012 for Yamada & Sons, Inc. on TMK: (3) 2-1-013:002 (por.)
Attachments: 03_31_2022 MEMO TO AGENCIES (PL-SPP-2022-012).pdf

Good Morning, Jaclyn:

Based on the information submitted in the email and attachment, below, NPDES permits are required from the CWB if point source discharge into State waters is anticipated from the following activities:

1. Stormwater discharges associated with the proposed rock quarry facility construction activities; or
2. Effluent discharges (industrial storm water, process wastewater, etc.) from the operation of the proposed rock quarry facility.

If you have any questions, please call me, at (808) 586-4309.

Best Regards,

Edward Chen
Environmental Engineer
Clean Water Branch
State of Hawaii Department of Health
Phone: (808) 586-4309

From: Araujo, Jaclyn <Jaclyn.Araujo@hawaiicounty.gov>
Sent: Thursday, March 31, 2022 10:57 AM
To: DPW Eng <dpweng@hawaiicounty.gov>; dwsengineeringreview@hawaiidws.org; cohdem <cohdem@hawaiicounty.gov>; HCPDONE <HCPDONE@hawaiicounty.gov>; Fire Admin <fire@hawaiicounty.gov>; Henderson, Royd <Royd.Henderson@hawaiicounty.gov>; Vares, Kyle <Kyle.Vares@hawaiicounty.gov>; Kawasaki, Edward <Edward.Kawasaki@hawaiicounty.gov>; Kurashige, Palani <Palani.Kurashige@hawaiicounty.gov>; Baybayan, Clinton <Clinton.Baybayan@hawaiicounty.gov>; Surprenant, April <April.Surprenant@hawaiicounty.gov>; Morrison, Bethany <bethany.morrison@hawaiicounty.gov>; Honda, Eric T. <Eric.Honda@doh.hawaii.gov>; Une, Michael Y. <michael.une@doh.hawaii.gov>; DOT HWY-H_esign <DOT.HWY-H_esign@hawaii.gov>; DOT AIR Visitor Information Program Office <dot.air.vip@hawaii.gov>; DBEDT State Planning <dbedt.stateplanning@hawaii.gov>; HDOA.PLANNING <hdoa.planning@hawaii.gov>; DLNR.LD.Land <dlnr.land@hawaii.gov>; DLNR.CO.PublicDLNR <dlnr@hawaii.gov>; PIFWO_Admin, FW1 <pifwo_admin@fws.gov>; maile@luuwailaw.com; kumukauilani@gmail.com; kcaiprez@gmail.com
Cc: Kay, Christian <Christian.Kay@hawaiicounty.gov>; Dacayanan, Melissa <Melissa.Dacayanan@hawa...ov>

Planning Dept.
Exhibit 5

Subject: [EXTERNAL] Request for Comments on App. No. PL-SPP-2022-000012 for Yamada & Sons, Inc. on TMK: (3) 2-1-013:002 (por.)
Importance: High

Aloha Kākou,

Please see attached Memo requesting your review & comments on the subject application.
Link to review the application & related documents in the County's web-based EPIC system can be found below:

- Yamada and Sons, Inc. Special Permit Application
- Exhibit A - Land License No. S-359
- Exhibit B - Final Environmental Assessment
- Exhibit C - Special Permit No. SPP-10-000110

We kindly ask that you submit your comments to planning@hawaiicounty.gov no later than April 22, 2022.

Should you have any questions, please feel free to reach out to Christian Kay (cc'd herein) at (808) 961-8136.

Have a great day & take care! 😊

Mahalo nui loa,

Jaclyn Araujo
Planning Commission Support Technician
County of Hawai'i - Planning Department
101 Pauahi Street, Suite 3
Hilo, HI 96720
Phone: (808) 961-8288

COUNTY OF HAWAI'I
Electronic Processing and Information Center (EPIC)

The County of Hawai'i officially launched its new **Electronic Processing & Information Center (EPIC)** permit system on July 26, 2021. We are now only accepting electronic applications. For more information, go to **https://hawaiicountyhi-energovpub.tylerhost.net/Apps/SelfService#/home.**

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
ROSS M. HIGASHI
EDUARDO P. MANGLALLAN
PATRICK H. MCCAIN
EDWIN H. SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
DIR 0368
STP 8.3379

April 20, 2022

VIA EMAIL: planning@hawaiicounty.gov

Mr. Zendo Kern
Planning Director
Planning Department
County of Hawaii
101 Pauahi Street, Suite 3
Hilo, Hawaii 96720

Dear Mr. Kern:

Subject: Special Permit (SP) Application (PL-SPP-2022-000012)
Yamada and Sons, Inc. – To Establish a Quarry and Related Activities
South Hilo, Hawaii
Tax Map Key: (3) 2-1-013: 002 (Por.)

Thank you for your letter dated March 31, 2022, requesting the Hawaii Department of Transportation's (HDOT) review and comments on the subject SP Application. HDOT understands that Yamada and Sons, Inc. is proposing to establish a 37.882-acre quarry for the continued support of its existing construction material supply and general contracting operations.

HDOT previously commented on the subject project during the review of the Draft Environmental Assessment in letter STP 8.2790 dated November 22, 2019 (attached).

HDOT has the following comments for the subject SP Application:

Airports Division (HDOT-A)

1. The proposed quarry site is approximately 1.75 miles from the Runway 8/26 centerline at Hilo International Airport (ITO). The site is next to an existing quarry operation and does not underlie any approach or departure flight tracks. All projects within 5 miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf

2. The HDOT-A requires that the developer incorporates measures to minimize hazardous wildlife attractants in compliance with the Federal Aviation Administration (FA

Planning Dept.
Exhibit 6

Advisory Circular 150/5200-33C, Hazardous Wildlife Attractants On Or Near Airports. If the project results in a wildlife attractant, these effects shall be immediately mitigated by the developer upon notification by the HDOT-A and/or FAA.

3. The HDOT-A recommends that the project be coordinated with Hawaii Airports District Manager, Mr. Steven Santiago, at (808) 961-9302, to ensure compliance with existing regulations.

Highways Division (HDOT-HWY)

HDOT-HWY previously commented in the STP 8.2790 letter and would like to reiterate that the proposed project will have no anticipated impact to State highways.

If there are any questions, please contact Mr. Blayne Nikaido of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

Attachment

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A.S. ARAKI-REGAN
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
STP 19-115
STP 8.2790

November 22, 2019

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

Dear Mr. Terry:

Subject: Yamada and Sons, Inc Quarry
Draft Environmental Assessment
Hilo, Hawaii
TMK: (3) 2-1-013:002 (por.)

The State of Hawaii, Department of Transportation (DOT) understands that Yamada and Sons, Inc. proposes to lease land from the Department of Land and Natural Resources that is adjacent to their existing quarry operation for the purpose of continuing their quarry operation. DOT's comments on the subject project are as follows:

Airports Division

1. Page 37 (PDF Reader, p. 48) states that "the proposed project does not appear to require such a notice (of Proposed Construction or Alteration with the Federal Aviation Administration), and it involves no hazardous wildlife attractants, glint or glare hazards or aerial obstructions. No effect to the facilities or operation of Hilo International Airport (ITO) is anticipated."

   Although the project involves no hazardous wildlife attractants, if conditions such as standing water attracts wildlife, Yamada and Sons shall mitigate the wildlife attractant to ensure flight safety to ITO.

2. Please coordinate project development activities with Mr. Steven Santiago, ITO Airport District Manager, to ensure compliance with existing regulations.

Highways Division

Since the proposal is to continue an existing operation from roughly the same vicinity and make use of County roads for quarry operations between the applicant's quarry and their quarry base yard on Railroad A venue, this activity will not impact our State highway facilities.

If there are any questions, please contact Mr. Blayne Nikaido of the Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

4/13/22

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

Mar 31, 2022

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division (DLNR.ENGR@hawaii.gov)
_X_Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
___Div. of State Parks
_X_Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
___Office of Conservation & Coastal Lands
_X_Land Division – Hawaii District (gordon.c.heit@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator *Russell Tsuji*
SUBJECT: Special Permit Application (PL-SPP-2022-000012) – Request to Establish a Quarry and Related Activities
LOCATION: Waiakea, South Hilo, Island of Hawaii; TMK: (3) 2-1-013: 002 (por.)
APPLICANT: County of Hawaii on behalf of **Yamada and Sons, Inc.**

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by **April 20, 2022.**

If no response is received by the above date, we will assume your agency has no comments. Should you have any questions about this request, please contact Darlene Nakamura at darlene.k.nakamura@hawaii.gov. Thank you.

BRIEF COMMENTS:

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are included/attached.

Signed: _____
Print Name: GORDON C. HEIT
Division: Land Division
Date: 4/13/22

Attachments
cc: Central Files

Planning Dept.
Exhibit 7

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE
MANAGEMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

75 Aupuni Street, Room 204
Hilo, Hawaii 96720
PHONE: (808) 961-9590
FAX: (808) 961-9599

April 21, 2022

MEMORANDUM

TO: Russell Y. Tsuji, Administrator

FROM: Gordon C. Heit, Hawaii District Land Agent

SUBJECT: Special Permit Application – Request to Establish a Rock Quarry and Related Activities

LOCATION: Waiakea, South Hilo, Island of Hawaii, TMK: (3) 2-1-013:portion of 002

APPLICANT: County of Hawaii on behalf of Yamada and Sons, Inc.

With regards to your request for comments on the above matter, we offer the following:

By letter dated January 21, 2020, the State Department of Land and Natural Resources approved a Final Environmental Assessment (FEA) and issued a Finding of No Significant Impact (FONSI) related to the sale of a license at public auction affecting the Project Site that will allow for quarrying and stockpiling activities within the Project Site.

A lease for the subject property was sold at public auction on 9/30/2021 pursuant to the Hawaii Revised Statutes §171-54. Land License No. S-359 was issued for a twenty-year term effective 10/01/2021.

Please contact me should you have any questions.

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813

April 22, 2022

MEMORANDUM *Log no. 3612*

TO: RUSSELL Y. TSUJI, Land Administrator
Land Division

FROM: DAVID G. SMITH, Administrator
Division of Forestry and Wildlife

SUBJECT: Division of Forestry and Wildlife Comments for the Special Permit Application to Establish a Quarry and Related Activities on Hawai'i Island

The Department of Land and Natural Resources, Division of Forestry and Wildlife (DOFAW) has received your request for comments regarding the Special Permit Application (PL-SPP-2022-000012) for a state property located at Waiākea, South Hilo, on the island of Hawai'i; TMK: (3) 2-1-013: 002 (por.). The proposed project consists of developing a 37.882-acre portion of a parcel for use as a rock quarry, that is adjacent to existing quarries, to allow for the manufacture of engineered products, including base course, and components of hot mix asphalt and concrete. The proposed quarrying activities would be identical in nature to the ongoing quarrying activities located on adjacent parcels that involve rock excavation with heavy equipment when possible, and when impenetrable rock is encountered, drilling and blasting would be performed.

We appreciate and concur with mitigation measures included in the Final Environmental Assessment intended to avoid construction and operational impacts to State-listed species including the Hawaiian Hoary bat or 'Ōpe'ape'a (*Lasiurus cinereus semotus*), Hawaiian Hawk or 'Io (*Buteo solitarius*), and seabirds. For illustrations and further guidance related to seabird-friendly light styles that also protect the dark, starry skies of Hawai'i please visit https://dlnr.hawaii.gov/wildlife/files/2016/03/DOC439.pdf. We also appreciate the measures outlined to minimize the movement of plant and soil material to prevent the spread of invasive species including mitigation protocols targeting Rapid 'Ōhi'a Death. DOFAW provides the following additional comments regarding the potential for the proposed work to affect listed species in the vicinity of the project area.

The State listed Hawaiian Goose or Nēnē (*Branta sandvicensis*) has the potential to occur in the vicinity of the proposed project site. It is against State law to harm or harass this species. If any are present during construction activities, then all activities within 100 feet (30 meters) should cease, and the bird should not be approached. Work may continue after the bird leaves the area of

its own accord. If a nest is discovered at any point, please contact the Hawai'i Island Branch DOFAW Office at (808) 974-4221.

We appreciate your efforts to work with our office for the conservation of our native species. Should the scope of the project change significantly, or should it become apparent that threatened or endangered species may be impacted, please contact our staff as soon as possible. If you have any questions, please contact Paul Radley, Protected Species Habitat Conservation Planning Coordinator at (808) 295-1123 or paul.m.radley@hawaii.gov.

Sincerely,

DAVID G. SMITH
Administrator

Mori, Ashley

From: Kay, Christian
Sent: Tuesday, April 12, 2022 11:22 AM
To: Mori, Ashley
Subject: FW: Panaewa Hawaiian Home Lands Community Association (PHHLCA)

Aloha Ash,

Will you please intake the testimony below from Ms. Almeida for PL-SPP-2022-000012?

Please let me know if you have any questions.

Mahalo,

Christian

Christian Kay, Planner
County of Hawai'i Planning Department
Aupuni Center, 101 Pauahi Street, Suite No. 3 Hilo, Hawaii 96720
Phone: (808) 961-8136
Fax: (808) 961-8742
Email: christian.kay@hawaiicounty.gov

-----Original Message-----
From: Antoinette Almeida <kumukauilani@gmail.com>
Sent: Tuesday, April 12, 2022 7:57 AM
To: Kay, Christian <Christian.Kay@hawaiicounty.gov>
Subject: Panaewa Hawaiian Home Lands Community Association (PHHLCA)

Aloha. My grandmother Mabel Godoy lived on Krauss avenue in Keaukaha and when the air field extension happened she moved her family to Panaewa. I moved my family to Panaewa Residential Homestead in 1985 and continue with my daughter and her family. Looking at the " special permit" land use of 14.99-acres location of the Yamada extension, there are two concerns we have 1) Noise abatement and dust abatement. The Panaewa homestead have suffered many years with the County Hilo Landfill especially when it was breezy, gusty and/or windy. The wind blows directly towards our homestead ag and residential bringing all the toxic smells, flies, rodents, cockroaches of the Dump. The current location of the Yamada quarry's noise level is tolerable on windy days during nap time of the kupuna and babies.

On page 7 #4 Adequate dust and noise mitigation shall be implemented for the duration of the operation accordance to Department of Health requirements. The applicant shall provide an on-site water storage tank and truck water to the site to be used for dust control. Adequate means sufficient. We are stating our concerns.We have a Panaewa residential

homestead meeting tomorrow night this will be part of the agenda. The homesteaders will decide to support or not. Mahalo.

750

Mori, Ashley

From: Daryn Arai <Daryn.Arai@outlook.com>
Sent: Friday, April 29, 2022 2:29 PM
To: Heit, Gordon C
Cc: Shellby Yamada; Planning Internet Mail
Subject: Regarding Land License No. S-359 and Special Permit Application PL-2022-000012 (Yamada and Sons, Inc.) affecting TMK: (3) 2-1-013: 002 (por), Waiākea, South Hilo, Hawai'i
Attachments: Request for DLNR Acknowledgement per Sec 15-15-95 HAR (Yamada and Sons, Inc.).pdf

Aloha Mr. Heit,

As a follow-up to our recent discussion regarding the above-described matter, please find attached a request for the State of Hawaii, or its designee if appropriate, as it pertains to the Licensee's current effort to secure a Special Permit from the State Land Use Commission in accordance with its rules and procedures.

Appreciate your efforts to assist the licensee, Yamada and Sons, Inc. Please let me know if additional information is necessary.

Daryn

Daryn Arai
Land Use Planning Consultant
PO Box 4501
Hilo, HI 96720
Mobile: (808) 895-3218

Planning Dept.
Exhibit 10

Daryn Arai
Land Use Planning Consultant

April 29, 2022

Mr. Gordon Heit, District Land Agent
State Department of Land and Natural Resources
75 Aupuni Street, Suite 214
Hilo, HI 96720

Dear Mr. Heit:

Subject: Request for Written Acknowledgement from DLNR acknowledging itself to be bound by Special Permit Application PL-SPP-2022-000012
Applicant: Yamada and Sons, Inc.
TMK: (3) 2-1-013: 002 (por), Waiākea, South Hilo, Hawai'i

I am a land use planning consultant assisting Yamada and Sons, Inc. with the preparation and processing of a Special Permit application affecting the above-described project site before both the Windward Planning Commission and the State Land Use Commission.

As you are aware, the State Board of Land and Natural Resources (BLNR) executed a 20-year license (Land License No. S-359) to Yamada and Sons, Inc. on October 28, 2021 to enter and quarry, stockpile, and remove rock and waste deposits for commercial use from 37.882-acres of land (licensed area) situated within a larger 2,407.72-acre property identified above.

As required by Condition 6 of Land License No. S-359, Yamada and Sons, Inc. subsequently filed with the County of Hawai'i Planning Department an application for a Special Permit to allow for the licensed activities to be conducted on the 37.882-acre licensed area that is situated within the State Land Use Agricultural District, for which a tentative hearing date before the Windward Planning Commission has been scheduled for Thursday, June 2, 2022.

Yamada and Sons, Inc., as licensee, is respectfully requesting that the State of Hawai'i, or its designee as appropriate, issue a written statement that the State of Hawai'i, as owner of the licensed area, acknowledges that it will be bound by the subject Special Permit and its conditions of approval should it be approved by the State Land Use Commission pursuant to Title 15, Chapter 15 of the Hawai'i Administrative Rules as recited, in part, below:

§15-15-95 Petition before county planning commission.
(a) Any person who desires to use land within an agricultural or rural district for other than a permissible agricultural or rural use may petition the county planning commission of the county within which the land is located for a special permit to use the land in the manner desired; provided that if the person is not the owner or sole owner in fee simple of the land, the record shall include evidence that the

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PHONE: (808) 895-3218 EMAIL: DARYN.ARAI@OUTLOOK.COM

> person requesting the special permit has written authorization of all fee simple owners to file the petition, which authorization shall also include an acknowledgement that the owners and their successors shall be bound by the special permit and its conditions. (emphasis added)

The Applicant's receipt of this written acknowledgement from the State of Hawai'i is essential to the proper processing of the Special Permit application as required by the Administrative Rules of the State Land Use Commission. As I interpret these rules, there is no exception to this requirement. I was not able to identify any specific language within Land License No. S-359 that would appear to satisfy this particular requirement of the Land Use Commission, although I would hope to be corrected.

Due to the upcoming Windward Planning Commission meeting on the application tentatively scheduled for June 2, 2022, we look forward to receiving prompt written acknowledgement from the State of Hawai'i, or its appropriate designee, that it will be bound by the requested Special Permit and its conditions, should it be approved by the State Land Use Commission.

Should you have any questions regarding this matter or require additional information, please do not hesitate to contact me.

Sincerely,

Daryn Arai

copy via email: County of Hawai'i Planning Department, attn: Planning Division
Yamada and Sons, Inc.

Daryn Arai
Land Use Planning Consultant

May 17, 2022

Mr. Zendo Kern, Planning Director
County of Hawai'i Planning Department
101 Pauahi Street, Suite 3
Hilo, HI 96720

Dear Director Kern:

Subject:	Applicant's Response to Agencies' and Public Comments regarding Special Permit Application PL-SPP-2022-000012
Applicant:	Yamada and Sons, Inc.
Request	Proposed quarry and related activities on 37.882 acres
TMK:	2-1-013: 002 (portion); Waiākea, South Hilo

This letter will respond to comments received from consulting agencies that have reviewed the above-described amendment request. We appreciate these agencies' and public comments being provided to the Applicant.

Department of Health – Clean Air Branch (via email dated April 1, 2022)

If required, the Applicant will secure an air pollution control permit from the Clean Air Branch and comply with all applicable conditions and requirements.

No demolition of existing structures or activities involving asbestos are proposed.

Quarrying activities have the potential to produce fugitive dust emissions. The topography and nature of quarrying on this landscape, which occurs in a pit that deepens over time as materials are excavated, helps further reduce air quality impact and even noise. Mitigation for dust generated during initial clearing operations would be part of the dust control management measures described below. Water trucks for spraying are available during unusually dry periods, during which operations may generate dust.

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PHONE: (808) 895-3218 EMAIL: DARYN.ARAI@OUTLOOK.COM

Dust control management measures to be applied include:

- Maintain a buffer of existing vegetation around the perimeter of the quarry site that will help to mitigate both noise and fugitive dust;
- Phasing of the project to disturb the minimum area of soil at a particular time;
- Establish slope protection as soon as possible to promote natural vegetation growth and increase perimeter vegetation buffer;
- Maintain on-site travel routes to minimize dust and runoff;
- On-site dust will be monitored by Yamada and Sons, Inc. supervisory personnel and dust suppression measures will be implemented as needed;
- A stabilized construction entrance/exit will be installed and maintained to help eliminate vehicle tracking from the license area onto Hoolaulima Road;
- All quarry-related traffic between the license area and our baseyard facility will be limited to one haul route via Hoolaulima Road; and
- The haul route will also be monitored by Yamada and Sons, Inc. supervisory personnel. If our haul vehicles track shoulder material onto Hoolaulima Road we can deploy our water truck(s) and/or pavement sweeper(s) equipped with dust suppression systems to clean off the haul route as needed.

Department of Health – Clean Water Branch (via email dated April 1, 2022)

The Applicant will apply for and secure an NPDES permit if deemed necessary. The Applicant will coordinate with the Clean Water Branch to secure necessary approvals and permitting.

State Department of Transportation (memo dated April 20, 2022)

While the proposed quarry site is located within 1.75 mile from the Hilo International Airport, the quarry operations itself will not involve standing water that will create a wildlife attractant or other hazards. If required, the Applicant will coordinate proposed quarry-related activities with Mr. Steven Santiago, ITO Airport District Manager, to ensure compliance with existing regulations.

It is noted that the Highways Division found that the proposed quarry activities will have no anticipated impact to State highways.

State DLNR – Division of Forestry and Wildlife (memo dated April 22, 2022)

The Forestry and Wildlife Division concurred with the Applicant's mitigation measures included within the Final Environmental Assessment to avoid construction and operational impacts to State-listed species, as well as measures to prevent the spread of Rapid 'Ōhi'a Death.

The Applicant acknowledges that the listed Hawaiian Goose (Nene) has the potential to occur in the vicinity of the proposed quarry site and that any harassment or harm is against State law. The Applicant will manage its operations to ensure that quarrying activities within 100 feet (30 meters) of any Nene present within the quarry site or its immediate vicinity will immediately cease, and the bird not be approached. Work will continue only after the bird leaves the area of its own accord. If a nest is discovered at any point, the Applicant will contact the Hawaii Island Branch DOFAW Office.

State DLNR – Land and Engineering Divisions (memos dated March 31, 2022)

Both the Land and Engineering Divisions within the State Department of Land and Natural Resources has no comments specific to the operational aspects of the proposed quarry.

Department of Environmental Management (memo dated April 13, 2022)

The Solid Waste Division noted that the current use of rock haulers between the proposed quarry site and the Applicant's processing facilities along Hoolaulima Road shall end upon the commencement of quarrying operations within the project site. The Applicant will notify DEM on anticipated start-date for quarry operations and will abide with the requirements of DEM regarding the use of rock haulers on Hoolaulima Road.

The Applicant does request, however, that a specific condition prohibiting the use of rock haulers and requiring the use of highway-legal vehicles to haul quarried material along Hoolaulima Road not be included as a condition of the Special Permit, should it be approved, as conditions or situations may change given that the use of rock haulers have been ongoing for more than 30 years with no incident or conflict with users of this road. Furthermore, the County of Hawai'i has full authority to control traffic along Hoolaulima Road without having to place restrictive conditions within the Special Permit that would then necessitate an amendment by the State Land Use Commission should conditions regarding the permitted types of quarry-related vehicles change, as it did in this case.

As required by the Wastewater Division, the quarry operations will comply with State Department of Health regulations.

Department of Water Supply (letter dated April 7, 2022)

The Department of Water Supply (DWS) had no objections to the proposed quarry operations as County water is not necessary to support quarry operations.

Department of Public Works (memo dated April 22, 2022)

The Applicant will comply with the requirements of Chapter 10, Hawaii County Code regarding Erosion and Sedimentation Control.

Any new driveway connections and construction within the Hoolaulima Road right-of-way will comply with Chapter 22, Hawaii County Code regarding Streets, including the provision of adequate sight distances.

The Applicant understands that a drainage plan may be required by the Planning Department. Regardless of whether a drainage plan is required or not, quarry operations will ensure that any activity-related runoff will be disposed of on-site and not directed towards any adjacent properties.

Police Department (memo dated April 5, 2022)

The Police Department does not anticipate any impact to traffic and/or public safety concerns and has no objection to the proposed quarry project.

Ms. Antoinette Almeida
Resident of Panaewa Hawaiian Home Lands Community Assoc. (email dated April 12, 2022)

Potential noise and dust concerns from the existing and proposed quarry operations, as well as odor and vermin from the dump, is a concern, especially on windy days.

The Applicant can only manage activities occurring on lands that it has a license from the State to operate upon. For the potential noise and dust generated by quarry-related operations, beyond complying with State clean air and clean water regulations, the Applicant will maintain a buffer of existing vegetation around the proposed quarry site, as it does for its existing quarry site located immediately adjacent to the west.

As previously mentioned, the topography and nature of quarrying on this landscape, which occurs in a pit that deepens over time as materials are excavated, helps further reduce air quality impact and even noise. Locationally, this proposed quarry site is not appreciably closer to the existing communities of Panaewa Homesteads and Keaukaha.

Keaukaha-Panaewa Farmers Association

The Applicant wishes to inform the Planning Department that it continues to communicate with the Keaukaha-Pana'ewa Farmers Association (KFPA) regarding the proposed quarry site and its related activities and operations. A Zoom meeting was held with KFPA members and the Department of Hawaiian Home Lands on April 12, 2022 and two (2) site inspections by KFPA members were conducted. A copy of the Notice of Hearing before the Windward Planning Commission regarding this Special Permit application was emailed to KFPA President, Maile Lu'uwai.

The Applicant looks forward to receiving any formal comments from the KFPA as a result of its meeting and site inspections and will do its best to address any concerns.

We hope that we have adequately responded to comments offered by the respective agencies and area resident. Please feel free to contact me should there be any questions or need for additional information.

Sincerely,

DARYN ARAI
Land Use Planning Consultant

copy via email: Shellbylynn Yamada, President, Yamada and Sons, Inc.