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MAR 23 2020

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HAWAII

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: TF

CDUA: HA-3860

MAR 13 2020

TO: Director
Office of Environmental Quality Control

FROM: Suzanne D. Case, Chairperson
Board of Land and Natural Resources

SUBJECT: Publication of the Final Environmental Assessment (EA) for Conservation District Use Application (CDUA) HA-3860 for the Perry Single Family Residence (SFR), Farm, and Related Improvements located at 32-2471 Stone Road, Pīhā, North Hilo, Hawai'i
Tax Map Key (TMK): (3) 3-2-004:040

The applicants Nicolas Perry and Rodrigo Gonzalez are proposing to construct an approximately 4,221 square foot single-family residence, farm, and related improvements on their 3.212-acre property in the State Conservation District, General Subzone. Planned farm, orchard, and other related landscaping are intended for the home's consumption as well as aid in the establishment of sustainable farm. The location of improvements has been drafted to minimize disturbances to local resources (stream, forests, and native vegetation).

The Department of Land and Natural Resources has reviewed the subject Final EA for Conservation District Use Application (CDUA) HA-3860 and has determined a Finding of No Significant Impact (FONSI). However, please be advised that this finding does not constitute approval of the proposal. In accordance with Chapter 11-200.1-13, Hawai'i Administrative Rules (HRS), the reasons supporting the FONSI determination are as follows:

1. The project would not result in substantial adverse impacts to natural, cultural, or historic resources would be lost as the project site is on a periodically mown pasture and none of these resources were found in the area via an archaeological field inspection.

2. The project would not curtail the range of beneficial uses of the environment.

3. The project aims to minimize disturbances to native vegetation while implementing some landscaping improvements that generally supports the broad goals of the State's long-term environmental policies to conserve natural resources and enhance the quality of life.

20-222

4. The project would not result in substantial adverse impacts to the economic welfare, social welfare, or cultural practices of the community and State.

5. The project would not substantially affect public health and safety.

6. The small scale of the proposed project would not produce any major secondary impacts such as population changes or effects on public facilities.

7. The project is small in scale and sensitive to native vegetation and environmental surroundings.

8. There are anticipated small disturbances associated with the construction of a single-family home such as traffic, air quality, noise, and visual quality, but the area is isolated. No special mitigation measures are anticipated.

9. A survey determined that no endangered plant species are present and mitigation measures in the form of timing of vegetation removal have been proposed to reduce impacts to Hawaiian hoary bats and hawks.

10. No substantial effects to air, water, or ambient noises are anticipated and Best Management Practices for erosion and sedimentation will be implemented during grading.

11. The home is located approximately 1,178 feet above sea level and therefore will not be directly impacted by sea level rise or tsunami and is not in a flood zone or other hazardous area.

12. No substantial adverse effects to scenic vistas and view planes are anticipated.

13. Solar through a photovoltaic system will fulfill the home's energy needs and water will be supplied through a rain catchment system. Negligible amounts of greenhouse gases are anticipated during the construction of the project while landscaping improvements through the planting of tree crops and native vegetation will reduce the home's carbon footprint.

The Draft EA was published in the Office of Environmental Quality Control's (OEQC) January 23rd, 2020 edition of *The Environmental Notice*. Comments on the DEA were sought from relevant agencies as well as the public and were included in the FEA. The FEA has been prepared pursuant to Chapter 343, Hawai'i Revised Statutes and Chapter 11-200.1, Hawai'i Administrative Rules. Please publish notice of this FEA-FONSI in the March 23rd, 2020 edition of *The Environmental Notice*.

Please contact Trevor Fitzpatrick of our Office of Conservation and Coastal Lands staff at 587-0373 should you have any questions.

CC: JM Leonard Planning, LLC

From: webmaster@hawaii.gov
To: HI Office of Environmental Quality Control
Subject: New online submission for The Environmental Notice
Date: Friday, March 13, 2020 2:38:27 PM

Action Name

Perry Single-Family Residence in the Conservation District at Pīhā

Type of Document/Determination

Final environmental assessment and finding of no significant impact (FEA-FONSI)

HRS §343-5(a) Trigger(s)

- (2) Propose any use within any land classified as a conservation district

Judicial district

North Hilo, Hawaiʻi

Tax Map Key(s) (TMK(s))

(3) 3-2-004:040

Action type

Applicant

Other required permits and approvals

County of Hawaiʻi: Plan Approval and Grubbing/Grading, and Building Permits State of Hawaiʻi: Conservation District Use Permit Wastewater System Approval

Discretionary consent required

Conservation District Use Permit for Single Family Residence and Agricultural Activities

Approving agency

Department of Land and Natural Resources Office of Conservation and Coastal Lands

Agency contact name

Trevor Fitzpatrick

Agency contact email (for info about the action)

trevor.j.fitzpatrick@hawaii.gov

Email address or URL for receiving comments

trevor.j.fitzpatrick@hawaii.gov

Agency contact phone

(808) 587-0373

Agency address

1151 Punchbowl Street #131
Honolulu, HI 96813
United States
Map It

Applicant

Nicholas Perry (with Rodrigo Gonzalez, landowner)

Applicant contact name

James Leonard

Applicant contact email

jmleonard@mac.com

Applicant contact phone

(808) 896-3459

Applicant address

2185 Pretty Lane Apt #3
West Palm Peach, FL 33415
United States
Map It

Was this submittal prepared by a consultant?

Yes

Consultant

Geometrician Associates

Consultant contact name

Ron Terry

Consultant contact email

rterry@hawaii.rr.com

Consultant contact phone

(808) 969-7090

Consultant address

PO Box 396
Hilo, HI 96721
United States
Map It

Action summary

Applicant proposes a home and farm on 3 acres of former sugar cane land at 1,178 feet in elevation near Ninole. The home is designed to use the minimum of energy and materials. Much of the land will be hand-cleared for fruit orchards and vegetable gardens for home consumption, along with native hapuʻu and neneleau shrubs. A paved driveway, a fence, and an IWS will also be built. Current vegetation is dominated by strawberry guava, melastome and uluhe fern. No archaeological sites are present. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected. Grading will be minimal and mitigated by BMPs. A no-clearing area will buffer a steep slope on the property's eastern edge. Clearing timing restrictions will help prevent impacts to Hawaiian hawks and endangered Hawaiian hoary bats.

Reasons supporting determination

Chapter 11-200.1-13, Hawaiʻi Administrative Rules, outlines those factors agencies must consider when

determining whether an Action has significant effects:

(a) In considering the significance of potential environmental effects, agencies shall consider and evaluate the sum of effects of the proposed action on the quality of the environment.

(b) In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected impacts, and the proposed mitigation measures. In most instances, an action shall be determined to have a significant effect on the environment if it may:

1. Irrevocably commit a natural, cultural, or historic resource. No valuable natural or cultural resource would be committed or lost. A few common native plants are present but native ecosystems would not be adversely affected, particularly given the limited scale of disturbance on the 3-acre property. No adverse impact upon vegetation or endangered species should occur. An archaeological inventory survey has determined that no historic sites are present on the property or would be affected. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way.

2. Curtail the range of beneficial uses of the environment. No restriction of beneficial uses would occur with a home, garden and orchard on this lot.

3. Conflict with the State's environmental policies or long-term environmental goals established by law. The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is environmentally benign and minor, and it is thus consistent with all elements of the State's long-term environmental policies.

4. Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State. The project would not have any substantial effect on the economic or social welfare of the Big Island community or the State of Hawai‘i.

5. Have a substantial adverse effect on public health. The project would not affect public health and safety in any way. Wastewater will be disposed of in conformance with State Department of Health regulations.

6. Involve adverse secondary impacts, such as population changes or effects on public facilities. The small scale of the proposed project would not produce any major secondary impacts, such as population changes or effects on public facilities.

7. Involve a substantial degradation of environmental quality. The project is minor and environmentally benign, and thus it would not contribute to environmental degradation.

8. Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions. The adverse effects of building a single-family residence, garden and orchard are limited very minor and temporary disturbance to traffic, air quality, noise, and visual quality during construction. This area is fairly isolated from sensitive receptors. The County of Hawai‘i occasionally performs road maintenance on Pīhā-Kahuku Road. There are no substantial government or private projects in construction or planning, and no accumulation of adverse construction effects would be expected. Other than the precautions for preventing adverse effects during construction listed above, no special mitigation measures should be required to counteract the small adverse cumulative effect.

9. Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat. Thorough survey has determined that no endangered plant species are present. Other than Hawaiian hoary bats and Hawaiian hawks, island wide-ranging species that will experience no adverse impacts due to mitigation in the form of timing of vegetation removal and/or hawk nest survey, no rare, threatened or endangered species of fauna are known to exist on or near the project site, and none would be affected by any project activities.

10. Have a substantial adverse effect on air or water quality or ambient noise levels. No substantial effects to air, water, or ambient noise would occur. Brief, temporary effects would occur during construction and would be mitigated. The context of the property's location, with no residences, parks, or other sensitive uses nearby, will help avoid noise impacts. Erosion and sedimentation impacts will be avoided by implementation of Best Management Practices during grading, which will occur in a very limited area.

11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. The proposed home site is not located in a flood zone or any other hazardous area, and it would not affect any such area. The home is more than 1,100 feet above sea level and will not be affected directly by sea level rise. The project has adapted to climate change by accounting for the potential for larger storms, through minimizing hard surfaces that generate runoff in heavy rainfall and establishing a buffer on the steep-sloped eastern margin.

12. Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies. No scenic views are located nearby or would be affected in any way. The attractive design of the home, combined with a context in which the home would not be visible from public vantage points, would ensure that the scenery of the project area would not be affected. Only minor exterior lighting is planned, and it will be shielded to protect dark skies and transiting seabirds.

13. Require substantial energy consumption or emit substantial greenhouse gases. Negligible amounts of energy input and greenhouse gas emission would be required for construction and occupation of the residence. Electrical power will be provided via a rooftop solar photovoltaic (PV) system with batteries, with a backup generator used only when absolutely necessary. A solar water heating system will be installed. Awnings, low-emissivity metal panels and greenwall trellises will help cool the house and reduce energy use. The production of a large proportion of the owners' food on the property as well as planting of tree crops and native trees in the buffer area will reduce the carbon footprint.

Attached documents (signed agency letter & EA/EIS)

- FONSI-Ninole-Perry-EA.PDF
- Final-EA-Perry-sfh-in-CD.pdf

Shapefile

- The location map for this Final EA is the same as the location map for the associated Draft EA.

Action location map

- TMK-for-Perry-Property-32004040.zip

Authorized individual

Ron Terry

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Final Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

April 2020

TMK (3rd): 3-2-004:040
Pīhā, North Hilo District, County of Hawai‘i, State of Hawai‘i

APPLICANT:

Nicholas Perry (with Rodrigo Gonzalez)
2185 Pretty Lane Apt #3
West Palm Beach, FL 33415

APPROVING AGENCY:

State of Hawai‘i
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
1151 Punchbowl Street, Room 131
Honolulu, Hawai‘i 96813

CONSULTANT:

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai‘i 96721

Final Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

TMK (3rd): 3-2-004:040
Pīhā, North Hilo District, County of Hawai‘i, State of Hawai‘i

APPLICANT:

Nicholas Perry (with Rodrigo Gonzalez)
2185 Pretty Lane Apt #3
West Palm Beach, FL 33415

APPROVING AGENCY:

State of Hawai‘i
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
1151 Punchbowl Street, Room 131
Honolulu, Hawai‘i 96813

CONSULTANT:

Geometrician Associates LLC
P.O. Box 396
Hilo, Hawai‘i 96721

CLASS OF ACTION:

Use of Land in Conservation District

This document is prepared pursuant to:
The Hawai‘i Environmental Policy Act,
Chapter 343, Hawai‘i Revised Statutes (HRS), and
Title 11, Chapter 200.1, Hawai‘i Department of Health Administrative Rules (HAR)

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TABLE OF CONTENTS

SUMMARY OF PROJECT, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Nicholas Perry (the applicant) and landowner Rodrigo Gonzalez (Mr. Perry's husband) seek a Conservation District Use Permit (CDUP) to build a home and plant a fruit orchard and vegetable garden on his 3.212-acre property in Pīhā Homesteads. The property is located on Stone Road off of Pīhā -Kahuku Road, at 1,178 feet in elevation, in the North Hilo District of the Island of Hawai'i. The vegetation consists of secondary shrubland and forest dominated by strawberry guava, Asian melastome and uluhe fern that grew in after decades of plantation sugarcane.

The 1,500-square foot (sf), 1-story home would connect through a wraparound lanai to a utility storage, agricultural workroom and greenhouse, with a chicken coop, farm shed and catchment water tank on the sides. The roof will include a solar reflective coating to reduce the solar gain to the house and feature rooftop solar photovoltaic panels for electrical generation and a solar water heating collector. Awnings, low-emissivity metal panels and greenwall trellises will help cool the house and reduce energy use. The total developed area as defined under the Conservation District rules including home, lanai, storage/work room, shed, greenhouse, chicken coop and water tank connected by a pipe to the main structure's gutter system, is 4,221 sf. A paved driveway, a perimeter fence with a gate at the driveway entry, and an individual wastewater system meeting or exceeding all regulatory requirements will also be built.

Grading will be minimal, involving the driveway and home/farm structure area only, and will be mitigated by BMPs. With the exception of a steep slope on the east, most of the primarily non-native vegetation on the remainder of the property would be hand-cleared to accommodate a fruit tree orchard and vegetable garden for home consumption. Various parts of the property will also be enhanced with plantings of the natives hapu'u and neneleau.

A botanical survey has determined that no threatened or endangered plant species are present. Clearing timing restrictions will help prevent impacts to endangered Hawaiian hoary bats and Hawaiian hawks, which are widely distributed throughout the island of Hawai'i. An archaeological survey found no archaeological sites, and a cultural impact assessment has determined that no cultural site or practices would be affected. In the unlikely event that additional undocumented archaeological resources, including shell, bones, midden deposits, lava tubes, or similar finds, are encountered during construction within the project site, work in the immediate area of the discovery will be halted and the State Historic Preservation Division will be contacted to determine the appropriate actions. The surroundings are rural and there are only limited views of the building site from other properties. No scenic impacts would occur.

PART 1: PROJECT DESCRIPTION AND E.A. PROCESS

1.1 Project Description and Location

Nicholas Perry (the applicant) and landowner Rodrigo Gonzalez (Mr. Perry's husband) seek a Conservation District Use Permit (CDUP) to build a home and plant a fruit orchard and vegetable garden on his 3.212-acre property in Pīhā Homesteads. The property is old sugarcane land located on Stone Road off of Pīhā-Kahuku Road, at 1,178 feet in elevation, in the North Hilo District of the Island of Hawai'i (Figure 1). The vegetation consists of secondary shrubland and forest dominated by strawberry guava, Asian melastome and uluhe fern that grew in after decades of plantation sugarcane (Figure 2).

The plan for the home consists of a 1,500-square foot (sf), 1-story (maximum height 20'8"), 3-bedroom, 2-bath structure connected by a 1,553-sf wraparound lanai to a 327-sf utility/agricultural work room and 287-sf greenhouse (Figure 3). The roof will include a solar reflective coating to reduce the solar gain to the house and feature solar photovoltaic panels for electrical generation and a solar water heating collector. The walls will be fiber cement painted earth and vegetation tones. A 120-sf chicken coop for about 10 hens and 2 roosters, a 144-sf farm shed, and a 15,000-gallon, 280-sf catchment water tank connected by a pipe to the main structure's gutter system will flank the greenhouse. Galvalume or polycarbonate awnings, low-emissivity metal panels and greenwall trellises in various places will help cool the house and reduce energy use. A greenwall is a vertical trellis affixed to the side of a building and planted with ornamental vines, e.g., *Begonia rex* (not considered invasive in Hawai'i). The plants help protect the wall from the weather and cool the building by reducing the solar radiation reaching a building's surface. They also provide a pleasing appearance. The greenwall is not involved in structural support. The total developed area as defined under the Conservation District rules including home, lanai, storage/work room, shed, greenhouse, chicken coop and water tank is 4,221 sf. A paved driveway, a perimeter fence with a gate at the driveway entry, and an individual wastewater system meeting or exceeding all regulatory requirements will also be built.

Grading will be minimal, involving the driveway with a widened end for parking and turnaround area as well as for the footprint of the residence and farm support structures. Most of the primarily non-native vegetation on the remainder of the property would be hand-cleared to accommodate a fruit tree orchard and vegetable garden for home consumption, as discussed below concerning the Agricultural Management Plan. The exception to this clearing would be a perimeter around the northeast and southeast sides of the property, where the steep edges that slope down to Stone Road and the gulches beyond will be part of a 25-foot wide setback with no disturbance, with clearing only conducted on the flatter areas above. Clearing would produce very minor short-term impacts to noise, air and water quality and scenery, mitigated by Best Management Practices. *Arachis glabrata*, a highly erosion resistant and non-invasive groundcover, would be planted as an ecoturf east of the home instead of a lawn, and also in the orchard. Various parts of the property will also be enhanced with plantings of the natives hapu'u (*Cibotium* spp.) and neneleau (*Rhus sandwicensis*), which are native to this area but were largely extirpated by sugarcane.

Figure 1 Project Location Map

Figure 2 Site Photos

2a, Above: Aerial Image with Property Boundary from Google Earth ©
2b, Below: Proposed house site

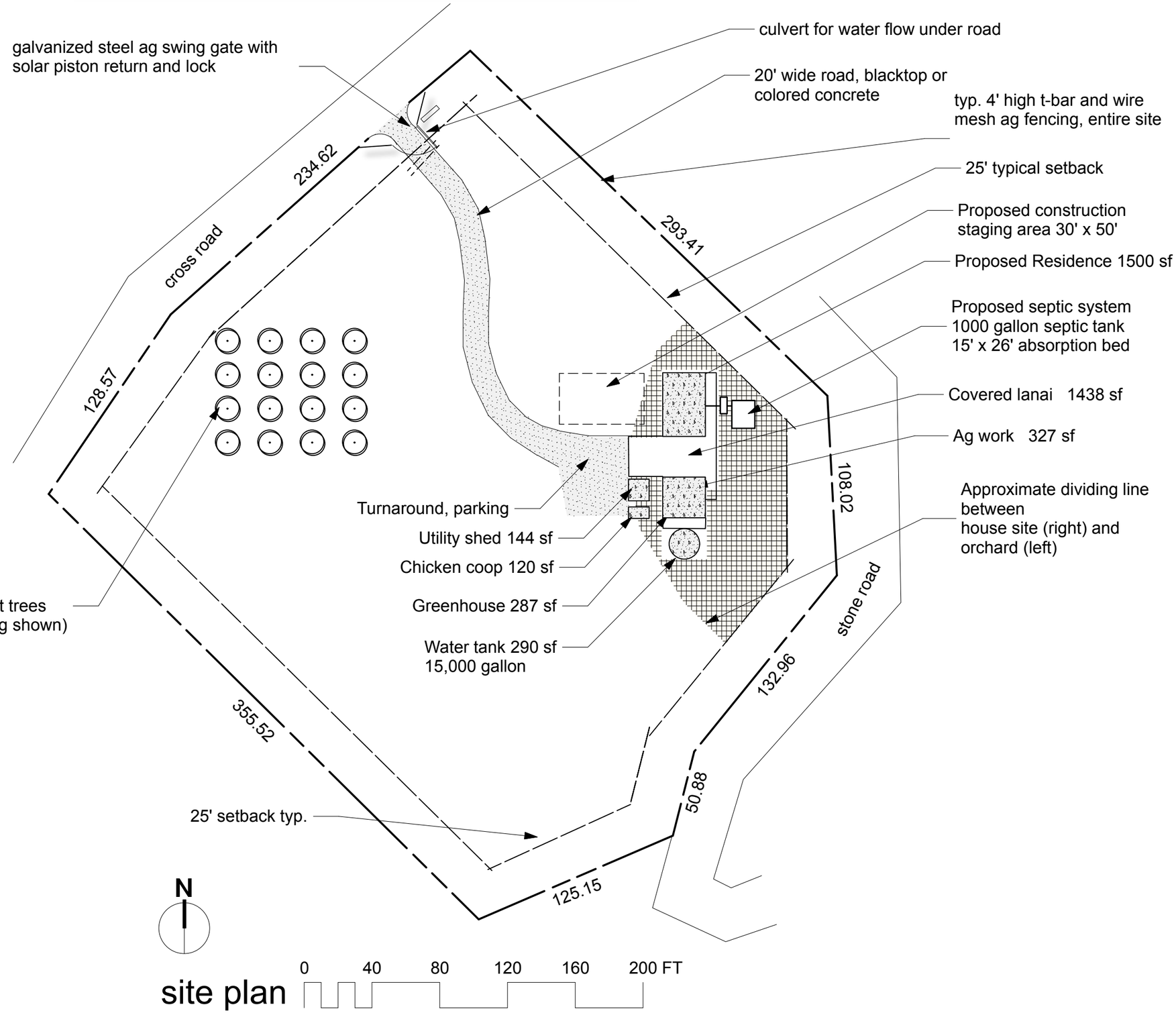
Figure 2. Site Photos

2c, Above: Cross road, with property to left. 2d, Below: Property vegetation

project description

lot area:	
	3.212 ac
	140,204 sf
proposed developed area:	
residence:	
water tank	290 sf
interior space	1500 sf
covered lanai	1553 sf
residence (total)	3343 sf
agricultural areas:	
utility shed	144 sf
ag workshop	327 sf
greenhouse	287 sf
chicken coop	120 sf

total proposed developed area: 4221 sf



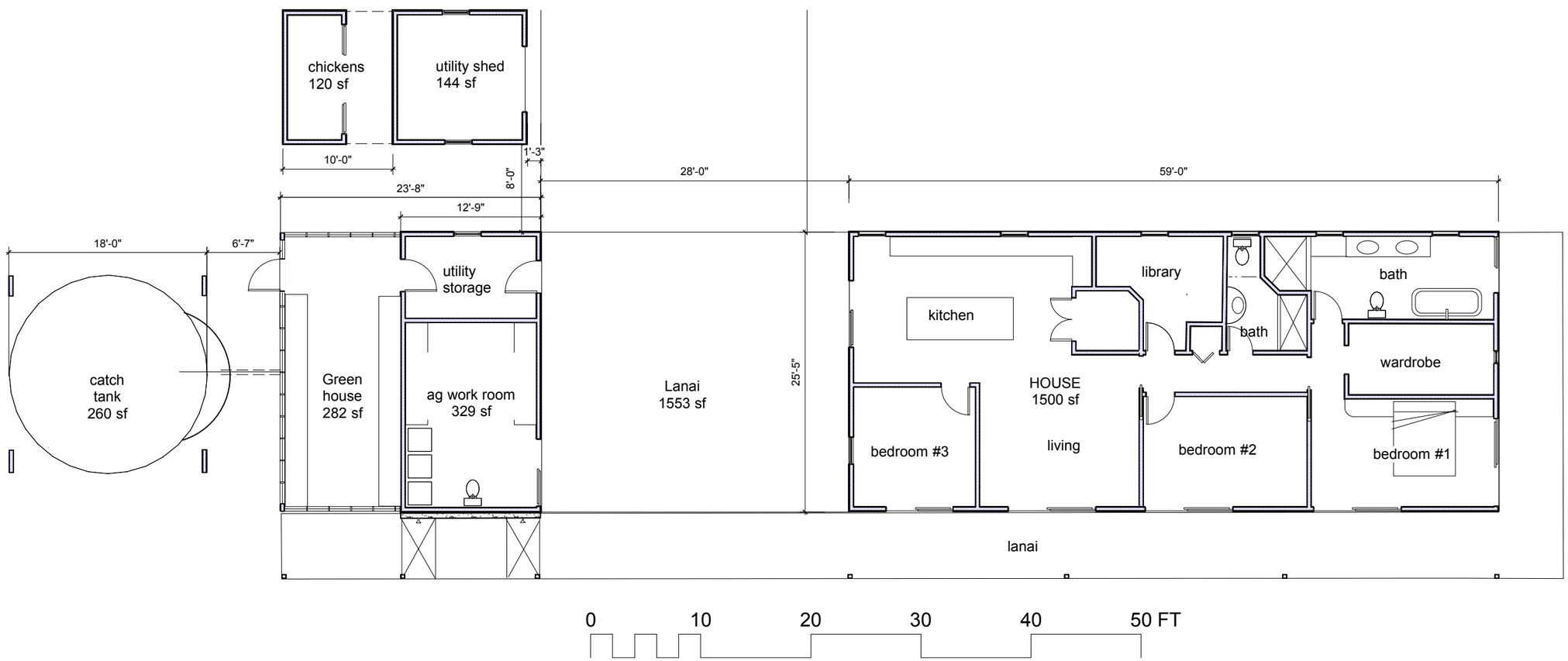
site plan

Perry Residence

TMK 3-3-2-4: 40

Address: Stone Road, Piha, Hawaii

Owner: Email:nicholasperryviolin@gmail.com



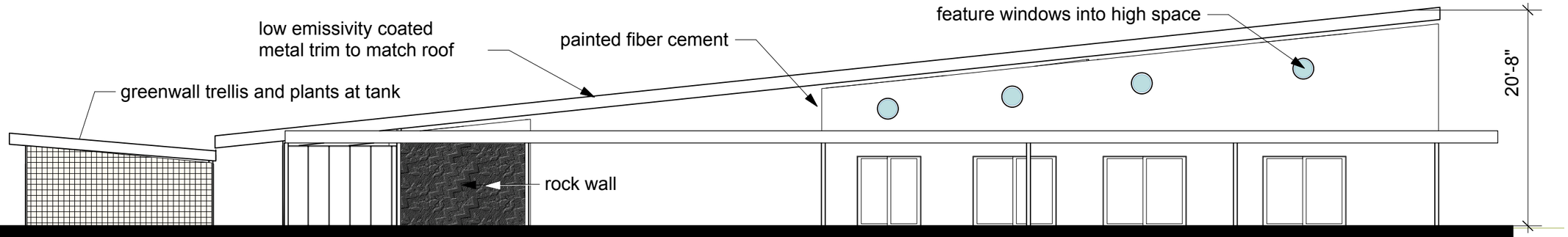
structures floor plan

Perry Residence

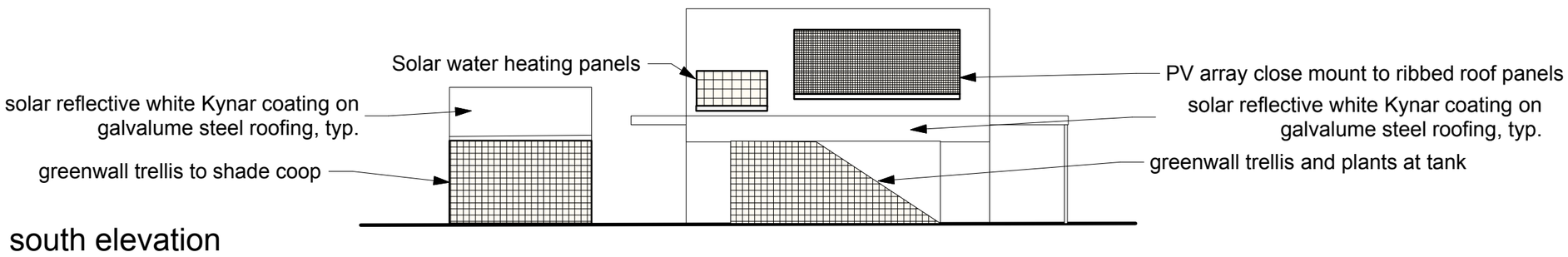
TMK 3-3-2-4: 40

Address: Stone Road, Piha, Hawaii

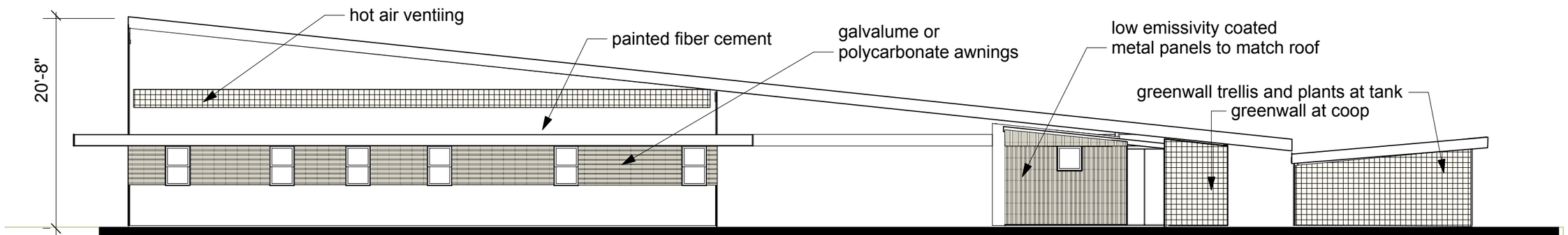
Owner: Email:nicholasperryviolin@gmail.com



makai (east) elevation



south elevation



mauka (west) elevation

Perry Residence

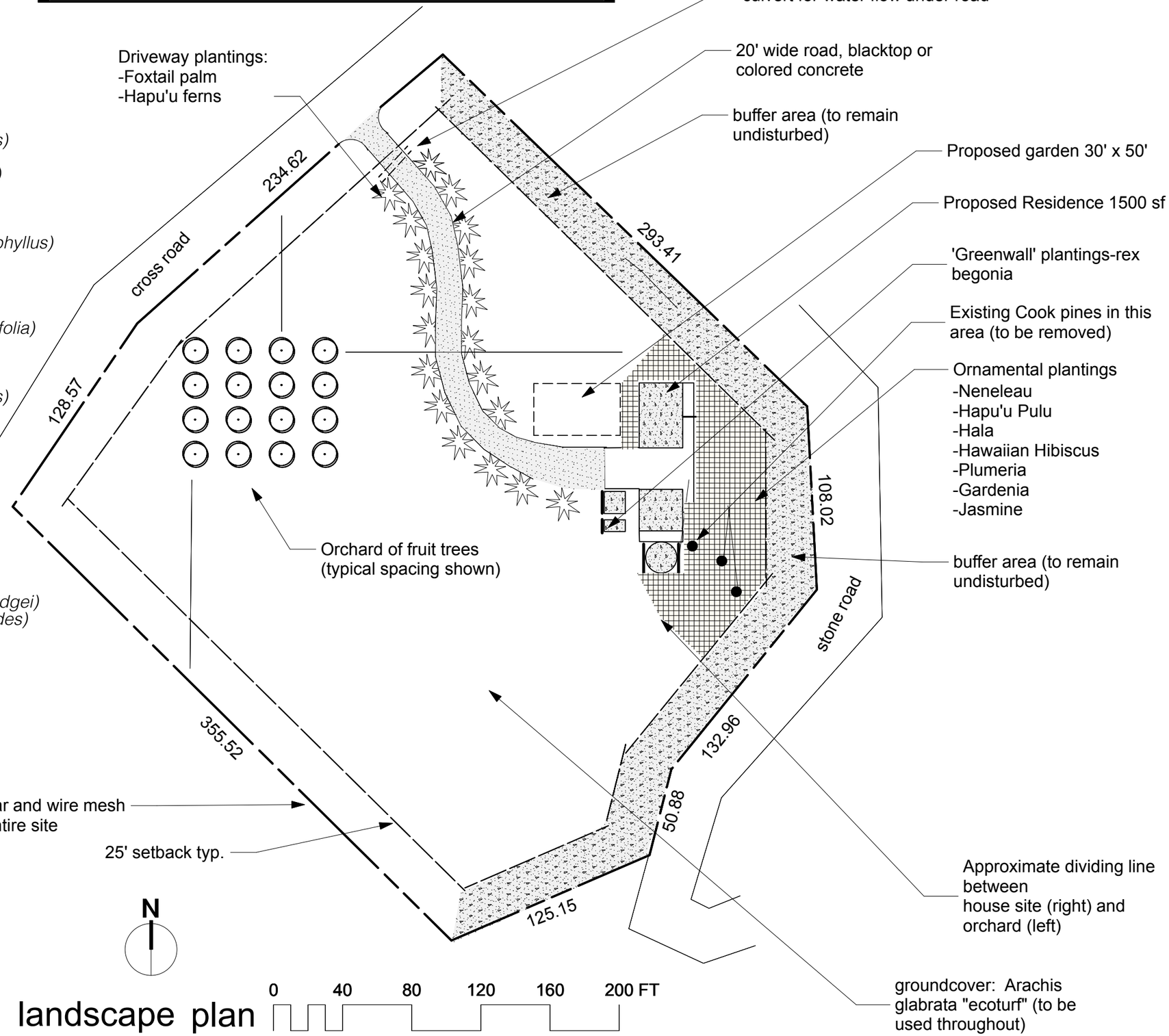
TMK 3-3-2-4: 40

Address: Stone Road, Piha, Hawaii

Owner: Email:nicholasperryviolin@gmail.com

plant list

Common and/or Hawaiian Name	Botanical Name
TREES	
Hawaiian Sumac (Neneleau)	*(Rus sandwichensis)*
Citrus	*(Citrus spp.)*
Avocado	*(Persea Americana)*
Sapotes	*(Sapotaceae spp.)*
Lychee	*(Litchi chinensis)*
Durian	*(Durio zibethinus)*
Jackfruit	*(Artocarpus heterophyllus)*
Soursop	*(Annona muricate)*
Coconut	*(Cocos nucifera)*
Mango	*(Mangifera indica)*
Papaya	*(Carica papaya)*
Macadamia	*(Macadamia integrifolia)*
Jaboticaba	*(Plinia cauliflora)*
Banana	*(Musa acuminata)*
Plumeria	*(Plumeria spp.)*
Hala	*(Pandanus tectorius)*
FERNS	
Hapu'u Pulu	(*Cibotium glaucum)*
SHRUBS	
Hawaiian Hibiscus (Ma'o hau hele)	*(Hibiscus brackenridgei)*
Gardenia	*(Gardenia jasminoides)*
Cape Jasmine (Pikake)	*(Jasmine sambac)*
GROUND COVERS	
Perennial Peanut	*(Archis glabrata)*



landscape plan

Perry Residence

TMK 3-3-2-4: 40

Address: Stone Road, Piha, Hawaii

Owner: Email:nicholasperryviolin@gmail.com

Agricultural Management Plan

As noted above, and shown in the Landscape Plan of Figure 3, most of the primarily non-native vegetation on the portions of the property not utilized for the home or the 25-foot gulch buffers would be hand-cleared to accommodate a fruit tree orchard and vegetable garden for home consumption. This will be supported by a greenhouse, a utility/agricultural work room, a chicken coop for about 10 hens and 2 roosters, a farm shed, and a 15,000-gallon, catchment water tank, as shown in Figure 3's Site Plan.

An agricultural management plan (AMP) was prepared for the CDUP application and is attached as Appendix 4. In summary, the AMP aims to minimize the environmental impacts of farming to the extent feasible, in keeping with the values of the Conservation District. To meet this goal, improvements to the property and farm operation and management will meet the following objectives:

- Siting improvements in areas previously disturbed for sugar cane cultivation, taking advantage of the existing topography so as to minimize the amount of grading required.
- Maintaining a buffer area along the steep slopes on the eastern end of the property that lead to an off-property gulch, to preserve that area in its natural state for water quality protection.
- Implementing a program of Agricultural Best Management Practices aimed at optimizing home consumption crop production while minimizing potential environmental or health impacts from farm activities.
- Removal and ongoing monitoring and control of invasive species that cover most of the property.

BMPs have been formulated through consultation of the University of Hawai'i-Manoa, College of Tropical Agriculture and Human Resource's *Best Management Practices to Manage Non-Point Pollution in Agriculture* (Abbas and Fares 2009). These include short-term practices meant to control erosion and sedimentation related to the relatively small amount of ground disturbing activities.

There will also be long-term practices for soil, nutrient, pest and crop management. Cultivation practices will minimize tillage, add organic material to the soil and establish ground covers. These objectives would be achieved by digging holes for planting trees rather than grading or tilling; maintaining some existing ground cover but mainly replacing with *Arachis glabrata*, a highly erosion resistant, nitrogen-fixing and non-invasive groundcover, and adding mulch from onsite composting and green-waste. Soil removed for holes will be bermed around individual plantings. BMPs for nutrient management will monitor and regulate the application of nutrients to the soil according to the specific crop nutrient requirements. Nutrient management also includes selecting and using the appropriate organic manure amendments, which can help build and stabilize soils while reducing the need for chemical nutrients. Pests will be managed through integrated pest management stressing pest-resistant crops, biocontrol, removal of pests, and, only where necessary, safe and effective storage, handling and application of organic pesticides. Finally, there will be regular and ongoing monitoring of soil, water and plant conditions for early identification of potential environmental or biological threats and for maintenance of optimum crop growing conditions. The applicant and landowner are experienced in growing fruit trees and vegetables and expect to be fully capable of establishing and managing the farm in conformance with the AMP.

1.2 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200.1, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact assessment process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the anticipated finding that no significant impacts are expected to occur, based on the preliminary findings for each criterion made by the consultant in coordination with the Hawai‘i State Department of Land and Natural Resources, the determining agency. If, after considering comments to the Draft EA, DLNR concludes that, as anticipated, no significant impacts would be expected to occur, then the agency will issue a Finding of No Significant Impact (FONSI), and the action will be permitted to proceed to other necessary permits. If the agency concludes that significant impacts are expected to occur as a result of the proposed action, then an Environmental Impact Statement (EIS) will be prepared.

1.3 Public Involvement and Agency Coordination

The following agencies, organizations and individuals have been consulted during the EA Process:

County:

Planning Department	County Council	Civil Defense Agency
Fire Department	Department of Public Works	Police Department

State:

Department of Health, Environmental Planning Office
Department of Land and Natural Resource (DLNR), Land Division, DOFAW and OCCL
Office of Hawaiian Affairs

Private:

Sierra Club Four Nearby Property Owners: NEG Partnership, Singer, Riddle, Sullivan

Copies of communications received during early consultation are contained in Appendix 1a. Notice of the availability of the Draft EA was published in the January 23, 2020 *OEQC Environmental Notice*. Appendix1b contains written comments on the Draft EA and the responses to these comments. Various places in the EA have been modified to reflect input received in the comment letters; additional or modified non-procedural text is denoted by double underlines, as in this paragraph.

PART 2: ALTERNATIVES

2.1 Proposed Project, Alternative House Sites and Alternative Uses

The proposed project and its location are described in Section 1.1 above and illustrated in Figures 1-3. The location of the home site was chosen because it allows a relatively straightforward driveway path and

offers a good view in the *makai* direction. A number of other locations on the property could also theoretically serve as the site for a residence. However, there are no substantial differences in terms of environmental resources or impacts among any potential building site on this property. For this reason, no other home site has been considered. No other alternative uses for the property identified in the Conservation District Rules, such as a commercial farm, a nature park, or other permitted uses, are desired by the applicant, and thus none are addressed in this EA.

2.2 No Action

Under the No Action Alternative, the residence would not be built. The lot would remain unused, except for temporary camping and picnicking by the owner. This EA considers the No Action Alternative as the baseline by which to compare environmental effects from the project.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION

The 3.212-acre property is located in Pīhā Homesteads, on Stone Road, about 1,200 feet north of Pīhā-Kahuku Road, at 1,178 feet in elevation. A number of farms and residences, as well as water supply and communication facilities, are present on Pīhā-Kahuku Road, which is a County-owned and maintained facility for most of its length. The property is bordered by various other properties with homes and small-scale farming on the north, south and *mauka* directions. *Makai* of the property is a vacant property. No streams are within or border the property itself, but Waikaumalo Stream and its tributary Kalaeha Stream are located on adjacent properties. In this EA, the term project site is used to mean the subject property, while the term project area is flexibly used to denote the broader Hāmākua Coast or, in some cases, the Island of Hawai‘i.

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

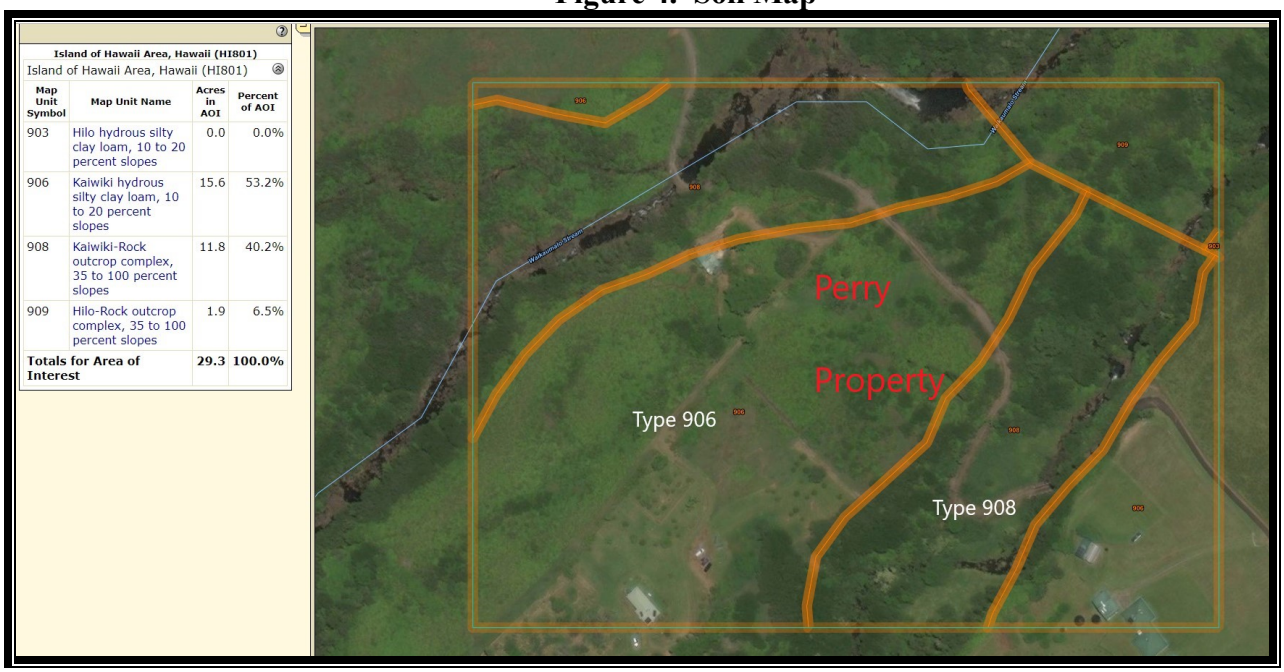
Environmental Setting

The project site has a yearly rainfall average of 187 inches, with a mean annual temperature of about 68 degrees F (Giambelluca et al 2014; UH Hilo-Geography 1998:57). Winds in the area are dominantly northeast trades, replaced periodically by winds with a southerly component. The southerly winds are accompanied by volcanic haze, or vog, during years when Kilauea Volcano is erupting (UH Hilo 1998).

The project site is on the southeastern flank of Mauna Kea. The lava flows that underlie it are dated from prior to 14,000 years before the present (BP), although areas several miles upslope have surface flows dated from as recently as 4,000 to 10,000 years BP (Wolfe and Morris 1996). All lava flows in this area are mantled with a thick layer of volcanic ash derived from Kohala and Mauna Kea volcanoes (USGS-HVO: 2009). Soil in the area is classified as Kaiwiki highly organic hydrous silty clay loam, 6 to 20 percent slopes for most of the property, and Kaiwiki highly organic hydrous silty clay loam, 35 to 100

percent slopes on the eastern fringe, which will be left as an undisturbed buffer (Figure 4). The deep, ash-derived soils that developed in this geology and climate nurtured highly productive farming from early Hawaiian times through the century of sugarcane until today. Kaiwiki hydrous silty clay loams are fairly well drained but have medium to high runoff (U.S. Soil Conservation Service 1973). Locally boggy conditions quickly develop when the soil is compressed by cultivation, vehicles or animals.

Figure 4. Soil Map



Island of Hawaii Area, Hawaii (HI801)

Island of Hawaii Area, Hawaii (HI801)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
903	Hilo hydrous silty clay loam, 10 to 20 percent slopes	0.0	0.0%
906	Kaiwiki hydrous silty clay loam, 10 to 20 percent slopes	15.6	53.2%
908	Kaiwiki-Rock outcrop complex, 35 to 100 percent slopes	11.8	40.2%
909	Hilo-Rock outcrop complex, 35 to 100 percent slopes	1.9	6.5%
Totals for Area of Interest		**29.3**	**100.0%**

The entire Island of Hawai‘i is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard as assessed by the U.S. Geological Survey in this area of the island is Zone 8 on a scale of ascending risk 9 to 1 (Wright et al 1992). The relatively low hazard risk is because Mauna Kea is an inactive volcano. Zone 8 includes areas that have had no lava flows in the last 750 years, and only a few percent covered by lava in the past 10,000 years. Volcanic hazard here is thus very low.

The Island of Hawai‘i experiences high seismic activity and is at risk from earthquake damage (USGS 2000), especially to structures that are poorly designed or built, as the 6.7-magnitude quake of 2006 and the 6.9-magnitude quake of 2018 demonstrated. The portion of the property site proposed for the home, garden and orchard is on a slightly flattened topographic ridge that descends into shallow valleys on either side. There are appropriate setbacks to surrounding steeper slopes, and there does not appear to be a substantial risk at the site from subsidence, landslides or other forms of mass wasting.

Impacts and Mitigation Measures

The very rainy climate of East Hawai‘i poses challenges to homeowners in areas where stream flooding or localized road flooding can occasionally cut off access. Steep driveways in muddy areas can also

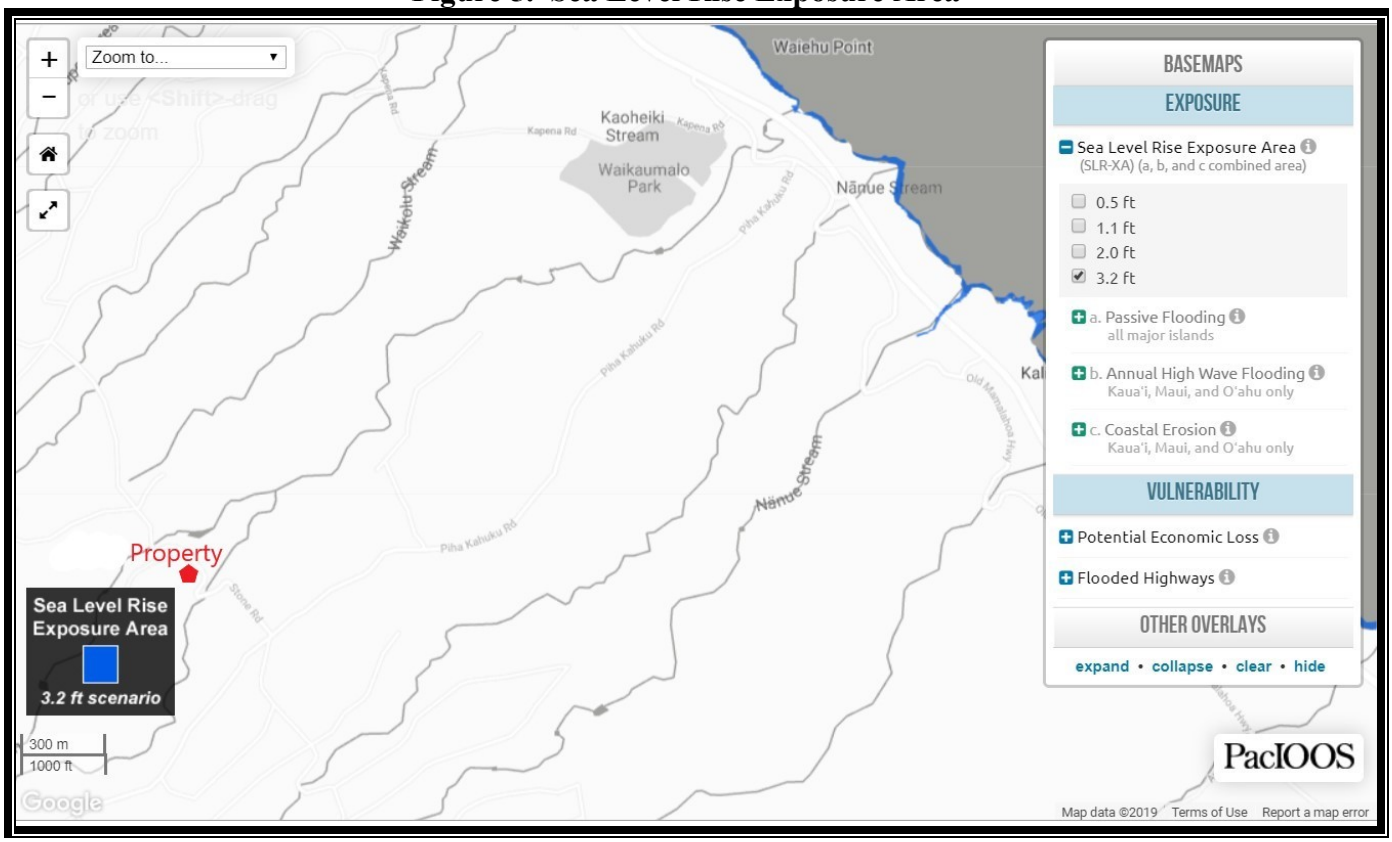
become almost impassable. The road access to the project site over Kalaeha Stream is facilitated by a bridge over Stone Road, a County road. Once on the property, the driveway access can be graded out without crossing streams, although a minor gully with very occasional flow will be outfitted with a 2-foot diameter, 24-foot long culvert. The drainage over which the culvert will be installed is not a stream. Instead, it is a very minor gully of the type that is universal on the rolling topography of former cane land and would not meet any definitions of a stream. Water only flows temporarily after heavy rains through a minor depression covered with California grass and lacking a stream bed or streambanks. The driveway shoulders will need occasional minor maintenance through stabilizing with gravel.

There is a scientific consensus that the earth is warming due to manmade increases in greenhouse gases in the atmosphere, according to the United Nations' Intergovernmental Panel on Climate Change (UH Manoa Sea Grant 2014). Global mean air temperatures are projected to increase by at least 2.7°F by the end of the century. This will be accompanied by the warming of ocean waters, expected to be highest in tropical and subtropical seas of the Northern Hemisphere. Wet and dry season contrasts will increase, and wet tropical areas in particular are likely to experience more frequent and extreme precipitation. For Hawai'i, where warming air temperatures are already quite apparent, accelerating sea level rise is expected. Not only is the equable climate at risk but also agriculture, ecosystems, the visitor industry and public health. It is possible, and even likely, that larger and more frequent tropical storms and hurricanes will affect the Hawaiian Islands in the future. Guidance to federal agencies for addressing climate change issues in environmental reviews was released in August 2016 by the Council on Environmental Quality (US CEQ 2016). The guidance urged that when addressing climate change, agencies should consider: 1) the potential effects of a proposed action on climate change as indicated by assessing greenhouse gas emissions in a qualitative, or if reasonable, quantitative way; and, 2) the effects of climate change on a proposed action and its environmental impacts. It recommends that agencies consider the short- and long-term effects and benefits in the alternatives and mitigation analysis in terms of climate change effects and resiliency to the effects of a changing climate. The State of Hawai'i in Hawai'i Revised Statutes §226-109 encourages a similar analysis, and Title 11-200.1-13 includes significance criteria that consider greenhouse gas emissions and the hazardousness of sea level rise.

As illustrated in Figure 5, the location of the property at 1,178 feet above sea level, 1.5 miles from the shoreline, will ensure that its use is not harmed by the direct effects of sea level rise under any scenario. In order to deal with the potential for larger and more frequent tropical storms that could be part of a changing climate, the home has been designed to withstand hurricane force winds, and several large non-native trees with the potential to fall on the home during heavy storms will be removed. Negligible amounts of energy input and greenhouse gas emissions would be required for construction and occupation of the residence. Electrical power will be provided via a solar photovoltaic (PV) system, and solar water heating panels will also be used. Awnings, low-emissivity metal panels and greenwall trellises will help cool the house and reduce energy use. Growing a large proportion of the owners' food on the property as well as planting of tree crops and native trees in the buffer area will reduce the carbon footprint.

In general, geologic conditions do not impose undue constraints on the proposed action, as the lava flow hazard is very low, the seismic hazard is manageable with proper design that meets the Uniform Building Code, and the site is not otherwise geologically hazardous.

Figure 5. Sea Level Rise Exposure Area



Source: https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/

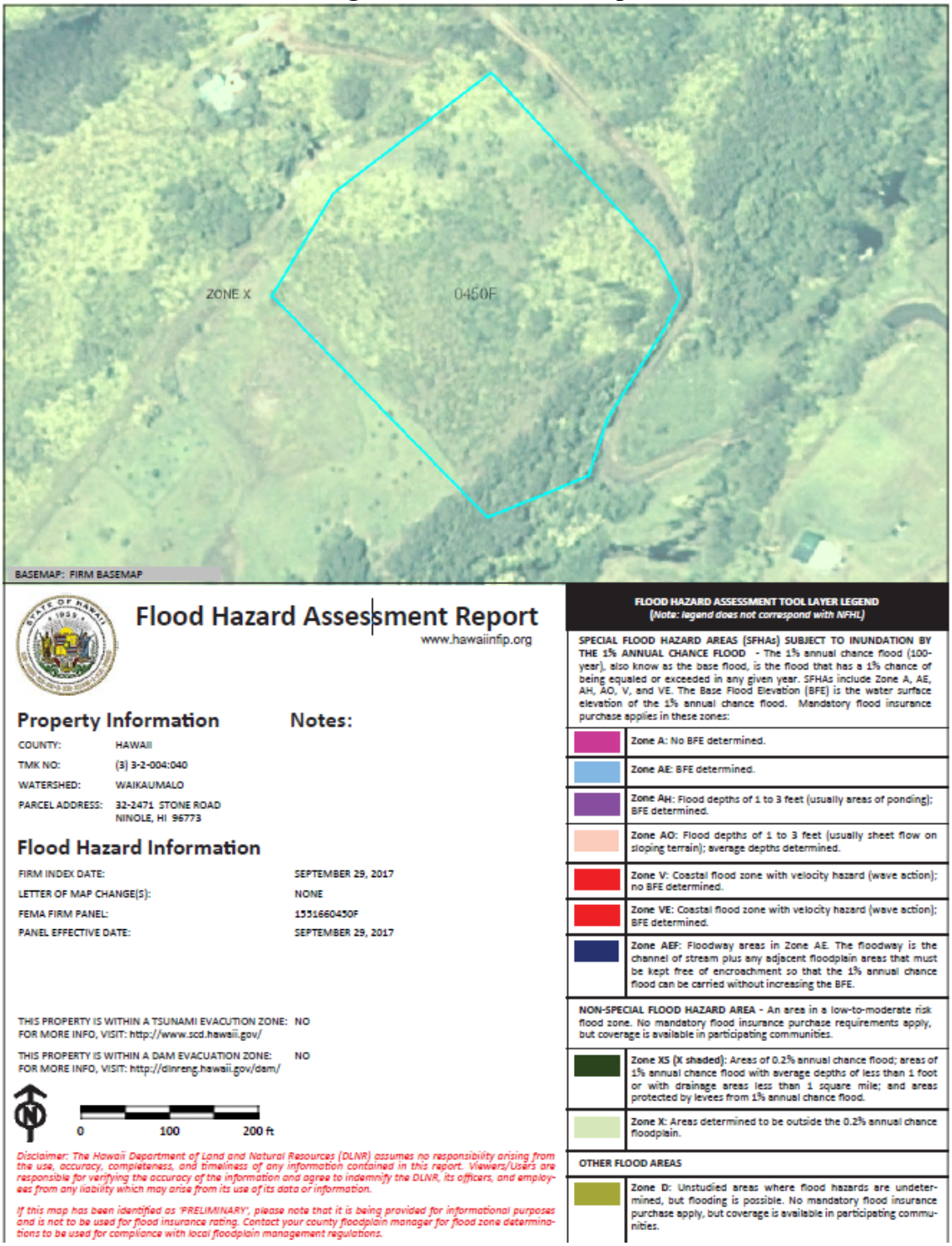
The applicant understands that there are some climatic and geologic hazards associated with homes on the slopes of Mauna Kea and has made the decision that a residence is not imprudent to construct or inhabit.

3.1.2 Flood Zones

Floodplain status for many areas of the island of Hawai‘i has been determined by the Federal Emergency Management Agency (FEMA), which produces the National Flood Insurance Program’s Flood Insurance Rate Maps (FIRM). The flood zones for this region were recently mapped, and digital maps and reports are available from the Department of Land and Natural Resources at http://gis.hawaiinfip.org/fhat/. The property is within Flood Zone X, areas outside the mapped 500-year floodplain (Figure 6). There is no risk of tsunami inundation, and it is outside both the tsunami evacuation and any dam evacuation zone.

The proposed action does not appear to be affected in any way by stream flooding, which is restricted to the steep channels of off-property streams and does not overtop the high banks. The proposed home site and driveway are not near these two streams, and the driveway does not have to cross either.

Figure 6. Flood Zone Map



Source: Hawai‘i DLNR: http://gis.hawaiinfip.org/fhat/

3.1.3 Water Quality

The grading work would be limited to the home site and related areas for driveway/parking, septic system, sheds and coops, water catchment and construction staging area. The total area of grading disturbance would be approximately a quarter-acre and would be set back a minimum of 200 feet from the closest stream channel, which is off-property, across Stone Road. No grading activities would occur in areas with the potential to cause sedimentation in flows that would travel off the property and cross into properties that contain stream banks. Grading will be planned and conducted to balance cut and fill material for the graded area in order to avoid the need to import or export of soils from the site. For trenching required for water pipelines and the septic system, extracted materials (spoils) will be used to refill the trenched areas and to blend the areas with the surrounding topography. As discussed in Section 3.3, a wastewater system fully conformant with State Department of Health Rules will be constructed to serve the home.

A County grading permit will be required. After actual grading plans are developed, the applicant and architect will determine whether the area of disturbance is sufficiently large to require a National Pollutant Discharge Elimination System (NPDES) permit. As stated above, initial estimates indicate that the total grading area will be far less than an acre and that an NPDES permit will not be required. Grading for the driveway and house lot will include practices to minimize the potential for sedimentation, erosion and pollution of coastal waters. The applicant will ensure that their contractor shall perform all earthwork and grading in conformance with:

(a) "Storm Drainage Standards," County of Hawai‘i, October, 1970, and as revised.
(b) Applicable standards of Chapter 27, "Flood Control," of the Hawai‘i County Code.
(c) Applicable standards and regulations of the Federal Emergency Management Agency.
(d) Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawai‘i County Code.
(e) Conditions of an NPDES permit, if required, and any additional best management practices required by the Board of Land and Natural Resources.

Best Management Practices (BMPs) will include, but not be limited, to the following:

- The high-slope buffer area will be marked and fenced in the construction areas to avoid disturbance to the ground or vegetation within the setback area during construction;
- The total amount of land disturbance will be minimized. The construction contractor will be limited to the specific delineated construction work areas within the lot;
- The contractor will take special precautions, including use of a sedimentation control devices such as fiber logs in erosion prone areas, to prevent any sediment leaving the work areas, particularly towards the direction of nearby streams;
- Construction activities with the potential to produce polluted runoff will not be allowed during unusually heavy rains or storm conditions that might generate storm water runoff; and
- Cleared areas will be replanted or otherwise stabilized as soon as possible.

With proper implementation of standard BMPs, the construction and use of the residence and associated facilities would be not expected to contribute to sedimentation, erosion, and pollution of stream waters.

3.1.4 Flora and Fauna

Environmental Setting: Flora

No prior botanical surveys are known to have been conducted on the property, which was cultivated in sugarcane for many decades in the 20th century, but in the *Manual of the Flowering Plants of the Hawaiian Islands,* Gagne and Cuddihy (1990) classified the natural, pre-human vegetation in areas with similar geology, elevation and rainfall as Lowland Wet Forest. Dominant species were likely ʻōhiʻa trees (*Metrosideros polymorpha*), uluhe (*Dicranopteris linearis*) and hapuʻu ferns (*Cibotium* spp.), and a larger variety of trees, shrubs, ferns and herbs[1]. In the steeper, shadier and rockier soils of the gulches, different assemblages of species may have been present. However, this area has a long history of intensive cultivation. Areas *makai* of 2,000 feet in elevation on windward Mauna Kea were cultivated with dryland taro, sweet potatoes, and bananas for centuries after the arrival of Polynesians on the Hawaiian Islands approximately 1,000 years ago (Handy and Handy 1972). After 1850, most of the lowlands in the North Hilo District were cultivated in sugarcane, and sugarcane plantations extended as high as the property's elevation at 1,178 feet, and indeed up to 1,500 feet, based on air photographs dated from 1965 and 1977 in the collection of the University of Hawaiʻi at Manoa (https://guides.library.manoa.hawaii.edu/c.php?g=704385&p=5001010). County Real Property tax records indicate that the property was cultivated in sugarcane at least as late as 1976. Although cane cultivation had ceased by the 1980s, and no grazing is currently occurring, the existing seedbank of non-native plants and the constant activity of feral pigs, cattle and rats promotes a vegetation dominated by invasive plants in which many native plants are suppressed. However, the native fern uluhe can often compete successfully with non-natives in such situations.

At the present time, the vegetation on the project site itself is a mixed native-non-native low-stature forest dominated by the non-natives strawberry guava (*Psidium cattleianum*) and Asian melastome (*Melastoma candidum*), as well as the native fern uluhe. In the understory, non-native grasses, ferns and weeds dominate, including sword fern (*Nephrolepis multiflora*) and the highly invasive Koster's curse (*Clidemia hirta*. A few native species are found sparsely only in scattered locations – e.g. hapuʻu, neneleau (*Rhus sandwicensis*), pakahakaha (*Lepisorus thunbergianus*), and wawaeʻiole (*Lycopodiella cernua*). Several native sedges and the ferns kikawaio (*Christella cyatheoides*) and palaʻa (*Sphenomeris chinensis*) are more widely distributed. All of the native plants found on the property are common in the region, on the island, and for most, throughout the Hawaiian Islands. Importantly, no ʻōhiʻa trees were present, although some were within the gulch on neighboring properties. A list of species detected on the project site is provided in Table 1.

[1] Latin names for species are generally given after the first use of a common name in this report. Refer to Table 1 for a full list of observed plants.

Table 1. Plant Species Observed on Project Site

Scientific Name	**Family**	**Common Name**	**Life Form**	**Status***
Ageratum conyzoides	Asteraceae	Ageratum	Herb	A
Aleurites moluccana	Euphorbiaceae	Kukui	Tree	PI
Andropogon virginicus	Poaceae	Broomsedge	Herb	A
Araucaria columnaris	Araucariaceae	Cook Island Pine	Tree	A
Arundina graminifolia	Orchidaceae	Bamboo Orchid	Herb	A
Blechnum appendiculatum	Blechnaceae	Blechnum	Fern	A
Chamaecrista nictitans	Fabaceae	Partridge Pea	Herb	A
Christella cyatheoides	Thelypteridaceae	Kikawaio	Fern	E
Christella dentata	Thelypteridaceae	Downy Wood Fern	Fern	A
Cibotium glaucum	Dicksoniaceae	Hapu‘u Pulu	Fern	E
Clidemia hirta	Melastomataceae	Koster’s Curse	Herb	A
Commelina diffusa	Commelinaceae	Honohono	Herb	A
Conyza sp.	Asteraceae	Hairy Horseweed	Herb	A
Cordyline fruticosa	Agavaceae	Ti	Shrub	PI
Crocosmia x crocosmiiflora	Iridaceae	Montbretia	Herb	A
Crotalaria pallida	Fabaceae	Smooth Rattlebox	Shrub	A
Cuphea carthagenensis	Lythraceae	Tarweed	Herb	A
Cyperus halpan	Cyperaceae	Cyperus	Herb	A
Cyperus polystachyos	Cyperaceae	Cyperus	Herb	I
Cyrtomium caryotideum	Dryopteridaceae	Cyrtomium	Fern	I
Desmodium incanum	Fabaceae	Desmodium	Herb	A
Dicranopteris linearis	Gleicheniaceae	Uluhe	Fern	I
Eragrostis brownei	Poaceae	Sheepgrass	Herb	A
Erechtites hieracifolia	Asteraceae	Fireweed	Herb	A
Erechtites valerianifolia	Asteraceae	Fireweed	Herb	A
Fimbristylis dichotoma	Cyperaceae	Fimbristylis	Herb	I
Hedychium coronarium	Zingiberaceae	White Ginger	Herb	A
Inga sp.	Fabaceae	Ice Cream Bean Tree	Tree	A
Lepisorus thunbergianus	Polypodiaceae	Pakahakaha	Fern	I
Lycopodiella cernua	Lycopodiaceae	Wawae‘iole	Fern Ally	I
Megathyrsus maximus	Poaceae	Guinea Grass	Herb	A
Melastoma candidum	Melastomataceae	Asian Melastome	Shrub	A
Melinus minutiflora	Poaceae	Molasses Grass	Herb	A
Mimosa pudica	Fabaceae	Sleeping Grass	Herb	A
Musa (Cultivar)	Musaceae	Banana	Shrub	A
Nephrolepis multiflora	Nephrolepidaceae	Sword Fern	Fern	A
Panicum repens	Poaceae	Torpedo Grass	Herb	A
Paspalum conjugatum	Poaceae	Hilo Grass	Herb	A
Paspalum urvillei	Poaceae	Vasey Grass	Herb	A
Pityrogramma calomelanos	Pteridaceae	Silver Fern	Fern	A
Plantago major	Plantaginaceae	Common Plantain	Herb	A

Polygala paniculata	Polygalaceae	Milkwort	Herb	A
Psidium cattleianum	Myrtaceae	Strawberry Guava	Tree	A
Psidium guajava	Myrtaceae	Guava	Tree	A
Psilotum nudum	Psilotaceae	Moa	Fern Ally	I
Rhus sandwicensis	Anacardiaceae	Neneleau	Shrub	E
Rubus rosifolius	Rosaceae	Thimbleberry	Herb	A
Saccharum officinarum	Poaceae	Sugarcane	Herb	A
Sacciolepis indica	Poaceae	Glenwood Grass	Herb	A
Schizachyrium condensatum	Poaceae	Beardgrass	Herb	A
Setaria gracilis	Poaceae	Yellow Foxtail	Herb	A
Sphenomeris chinensis	Lindsaeaceae	Pala‘a	Fern	I
Stachytarpheta jamaicensis	Verbenaceae	Jamaican Vervain	Herb	A
Syzygium jambos	Myrtaceae	Rose Apple	Tree	A
Unknown genus/species	Poaceae	Bamboo	Tree	A
Urochloa mutica	Poaceae	California Grass	Herb	A

A=Alien E=Endemic I=Indigenous END=Federal and State Listed Endangered

Environmental Setting: Fauna

During several visits in 2019, we observed very few individual birds on the property and only four species: Japanese white-eyes (*Zosterops japonicus*), northern cardinals (*Cardinalis cardinalis*), spotted doves (*Streptopelia chinensis*), and striped doves (*Geopilia striata*). Long-term observation would probably reveal a wider bird fauna. The low elevation leads to warm temperatures that promote mosquitos, which are inimical to most native birds. None were identified, but it is highly likely that the property is occasionally utilized by the Hawai’i ‘amakihi (*Hemignathus virens*), as some populations of this native honeycreeper appear to have adapted to the mosquito-borne diseases of the Hawaiian lowlands.

As with all of East Hawai‘i, several endangered native terrestrial vertebrates may be present in the general area and may overfly, roost, nest, or utilize resources of the property. These include the endangered Hawaiian hawk (*Buteo solitarius*), the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the endangered band-rumped storm petrel (*Oceanodroma castro*), and the threatened Newell’s shearwater (*Puffinus auricularis newelli*).

Although there is no habitat for native waterbirds in the property, some may utilize nearby Waikaumalo Stream. In the Hilo-Hāmākua Coast in general, waterbirds are found in streams, estuaries, natural and artificial ponds, and wetlands. The most common native waterbird is the indigenous black-crowned night heron, or ‘auku‘u (*Nycticorax nycticorax hoactli*). This bird is likely present at times in the general area of the property. It is also not unusual to spot the wide-ranging, friendly but endangered Hawaiian goose or nēnē (*Branta sandwicensis*) in various parts of the island. Far less likely to be seen in the property’s streams are two endangered waterbirds that are occasionally present in the Hāmākua coast: the Hawaiian duck or koloa maoli (*Anas wyvilliana*), and the Hawaiian coot or ‘alae ke‘oke‘o (*Fulica alai)*. Of these, only the koloa maoli is noted in streams somewhat similar to Waikaumalo. No waterbirds were observed during any of the field visits to the property.

Aside from the Hawaiian hoary bat, all mammals in the project area are all introduced species, including feral cats (*Felis catus*), feral pigs (*Sus scrofa*), small Indian mongooses (*Herpestes a. auropunctatus*) and various species of rats (*Rattus* spp.). Several species of non-native reptiles and amphibians are also likely present. Coqui frogs (*Eleutherodactylus coqui*) were heard. None of these non-native vertebrates are of conservation concern and all are deleterious to native flora and fauna.

Native fish, crustaceans, molluscs, insects and spiders may be present in the project area's streams. Stream biota will be protected by the long distances between the property and stream channels (200 to 300 feet, on adjacent properties) and the series of measures outlined above to prevent erosion and sedimentation and any other impacts to water quality.

Impacts and Mitigation Measures

The project's small footprint and low degree of physical disturbance combined with its location on a property with few sensitive flora or fauna resources limits the biological impacts to negligible levels.

No rare, threatened or endangered plant species are present. Although a few common natives are present, the property is heavily dominated by non-natives. In the steeply sloped buffer area on the east of the property, the owner wishes to enhance the vegetation through gradual thinning of weedy species and promotion of native species through planting or simple weeding. With minimal care and input, the native component of the vegetation could increase, particularly the ferns uluhe and kupukupu (*Nephrolepis cordifolia*) and the shrubby tree neneleau, a few of which are already present. In addition to these natives, *Arachis glabrata*, a highly erosion resistant and non-invasive groundcover, would be planted as an ecoturf east of the home instead of a lawn and also within the orchards. As noted by the University of Hawaii's College of Tropical Agriculture and Human Resources, "Perennial ground covers [including *Arachis*] can be grown under fruit trees as living mulch, a management strategy that is expected to improve soil quality, reduce the need for chemical inputs" (Radovich et al. 2006.)

An issue for construction projects located in ʻōhiʻa forests has recently surfaced. Two species of fungus called *Ceratocystis lukuohia and C. huliohia* produce a disease that is new to science and new to Hawaiʻi – Rapid ʻŌhiʻa Death or ROD (Hawaiʻi DOFAW 2017). This disease has killed hundreds of thousands of ʻōhiʻa trees across more than 34,000 acres of the Big Island. It was first discovered in Lower Puna. Projects that harm or relocate ʻōhiʻa trees can spread the disease, and mitigation measures are recommended. Accordingly, , the botanical survey carefully searched for ʻōhiʻa trees; none are present on the property or would be affected by the proposed action. Owing to the ongoing ROD issue, no ʻōhiʻa will be utilized in landscaping.

The precautions for preventing effects to water quality during construction listed in Sections 3.1.1 and 3.1.6 will avoid impacts to stream organisms in Waikaumalo and Kalaeha Streams, which are located on adjacent properties

Preventing certain biological impacts will require specific mitigation actions. In order to avoid impacts to the endangered but regionally widespread terrestrial vertebrates listed above, the applicant will commit to certain conditions, which are expected to be proposed for the CDUP. Specifically:

- Construction will refrain from activities that disturb or remove shrubs or trees taller than 15 feet between June 1 and September 15, when Hawaiian hoary bats may be sensitive to disturbance.
- If landclearing occurs between the months of March and September, inclusive, a pre-construction hawk nest search by a qualified ornithologist using standard methods will be conducted. If Hawaiian hawk nests are present, no land clearing will be allowed until October, when hawk nestlings will have fledged.
- Any exterior lighting will be shielded from shining upward, in conformance with Hawaiʻi County Code § 14 – 50 et seq., to minimize the potential for disorientation of seabirds.

3.1.5 Air Quality, Noise, and Scenic Resources

Environmental Setting

Air quality in this part of the North Hilo Coast the area is generally excellent, due to its rural nature and minimal degree of human activity, although when Kilauea Volcano is erupting, volcanic haze (locally called "vog") occasionally blows in. Noise on the site is low, with most noise derived from normal residential and farming activities on adjacent properties and also natural sources, primarily birdsong and wind in trees. The occasional helicopter overflight causes some noise as well.

This medium-statured non-native forest has minor visual quality, but because of the dense vegetation, sloping terrain and distance from public roads and other viewpoints, it offers no public scenic resources. The County of Hawaiʻi General Plan contains Goals, Policies and Standards intended to preserve areas of natural beauty and scenic vistas from encroachment. The General Plan discusses views of the gulches from the Hawaiʻi Belt Road and Old Mamalahoa Highway as noted features of natural beauty in North Hilo. No features or views on or near the isolated project site are noted.

Impacts and Mitigation Measures

The project would not affect air quality, scenery or noise levels in any substantial ways. Brief and minor adverse effects would occur during construction. However, there are no sensitive noise or visual receptors such as nature parks, schools, churches or hospitals in the vicinity. Given the small scale and short duration of construction noise impacts, coupled with the lack of sensitive receptors, noise mitigation during construction would not be necessary. Home-consumption farming activities associated with the fruit trees and vegetable gardens would be visually compatible with the neighborhood and in harmony with the rural landscape of North Hilo.

3.1.6 Hazardous Substances, Toxic Waste and Hazardous Conditions

Based on onsite inspection and the lack of any known former and current uses on the property, it appears that the site contains no hazardous or toxic substances and exhibits no other hazardous conditions. State databases did not indicate any Underground Storage Tanks (USTs), Leaking Underground Storage Tanks (LUSTs), or records of incidents or releases on the site or in surrounding properties (https://eha-cloud.doh.hawaii.gov/iheer/#!/viewer). In addition to the water quality mitigation measures detailed in Section 3.1.3, the applicant proposes the following to minimize the possibility for hazardous spills/leaks:

- Unused materials and excess fill will be disposed of at an authorized waste disposal site.
- During both construction and garden/orchard operations, emergency spill treatment, storage, and disposal of all hazardous materials, will be explicitly required to meet all State and County requirements, and the contractor will adhere to "Good Housekeeping" for all appropriate substances, with the following instructions:
    - Onsite storage of the minimum practical quantity of hazardous materials necessary to complete the job;
    - Fuel storage and use will be conducted to prevent leaks, spills or fires;
    - Products will be kept in their original containers unless unresealable, and original labels and safety data will be retained;
    - Manufacturers' instructions for proper use and disposal will be strictly followed;
    - Regular inspection by contractor to ensure proper use and disposal;
    - Onsite vehicles and machinery will be monitored for leaks and receive regular maintenance to minimize leakage;
    - Construction materials, petroleum products, wastes, debris, and landscaping substances (herbicides, pesticides, and fertilizers) will be prevented from blowing, falling, flowing, washing or leaching into the ocean;
    - All spills will be cleaned up immediately after discovery, using proper materials that will be properly disposed of.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics

Existing Environment

The project site is located near the *mauka* end of Pīhā-Kahuku Road, about 1.6 miles from the center of the nearest village, Ninole. This region of traditional Hawaiian settlement was transformed by commercial sugarcane cultivation into a collection of plantation camps and individual homes, some within old government grants and homestead lots. Like many villages along the Hāmākua coast, its former retail, service and government establishments were slowly consolidated and absorbed into a few larger towns. A small and picturesque post office box building still remains. Since the demise of sugarcane, the area at first lost population but then began to gain it, mostly from new residents to Hawai'i, many attracted by

large lots in the uplands that could be farmed or ranched, host a vacation rental, enjoyed as a peaceful hideaway, or serve as a place from which to commute to Hilo. More and more residents tele-commute to jobs around the globe.

Ninole is too small to be measured as a discrete unit by the U.S. Census Bureau, but 2,041 residents were counted in the North Hilo District of which Ninole is a part in the 2010 U.S. Census. This is the smallest of all judicial districts in Hawai‘i, but there has been steady growth since the figure of 1,541 in 1990.

Impacts and Mitigation Measures

No adverse socioeconomic impacts are expected to result from the project. The project will have a very small positive economic impact for the County of Hawai‘i. The residence and associated improvements will not adversely affect population or demand for services.

3.2.2 Cultural and Historic Resources

An archaeological assessment survey of the property and a cultural impact assessment of the project were prepared and are attached as Appendices 2 and 3, respectively. Research for this report included primary fieldwork, consultation of archaeological and ethnographical studies and primary documents including maps and Mahele testimony, and consultation of local informants. In the interest of readability, the summary below does not include all scholarly references; readers interested in extended discussion and sources may consult these appendices. Separately, the Office of Hawaiian Affairs, Councilperson Valerie Poindexter, the Sierra Club, DOFAW officials and four nearby property owners were also consulted by mail, email, in person, and/or telephone as part of the EA to determine whether they had any information on natural or cultural resources that might be present or affected, and additional research on cultural resources and impacts was conducted.

Historical and Cultural Background

The first inhabitants of Hawai‘i were believed to be settlers who had undertaken difficult voyages across the open ocean. For many years, researchers have proposed that early Polynesian settlement voyages between Kahiki (the ancestral homelands of the Hawaiian gods and people) and Hawai‘i were underway by A. D. 300, although recent work suggests that Polynesians may not have arrived in Hawai‘i until at least A. D. 1000 (Kirch 2012).

The initial inhabitants of Hawai‘i are believed to have come from the southern Marquesas Islands and settled initially on the windward side, eventually expanding to leeward areas. Early Hawaiian farmers developed new strategies and tools for their new environment (Kirch 2012; Pogue 1978). Societal order was maintained by their traditional philosophies and by the conical clan principle of genealogical seniority (Kirch 2012). Universal Polynesian customs brought from their homeland included the observance of major gods Kane, Ku, and Lono; the *kapu* system of law and order; cities of refuge, various beliefs, and the concepts of *mana* and the *‘aumakua* (Fornander 1969).

The Development Period, believed under Kirch's new concept to have occurred from A. D. 1100 to 1350, brought an evolution of traditional tools, including a variation of the adze (*ko'i*), and some new Hawaiian inventions such as the two-piece fishhook and the octopus-lure breadloaf sinker. That was followed by the Expansion Period (A. D. 1350 to 1650) which saw greater social stratification, intensive land modification, and population growth. This period was also the setting for the second major migration to Hawai'i, this time from Tahiti. Also established during this period was the *ahupua'a*, a land-use concept that incorporated all of the eco-zones from the mountains to the shore and beyond. The usually wedge-shaped *ahupua'a* provided a diverse subsistence resource base and added another component to what was already becoming a well-stratified society (Kirch 2012).

As population grew during the following centuries so did the reach of inland cultivation in the upland environmental zones and consequent political and social stresses. During the Proto-Historic Period (A. D. 1650-1795), wars reflective of a complex and competitive social environment are evidenced by *heiau* building. During this period, sometime during the reign of Kalaniopu'u (A. D. 1736-1758), Kamehameha I was born in North Kohala.

Ahupua'a were ruled by *ali'i 'ai ahupua'a* or lesser chiefs and managed by a *konohiki*. *Ali'i* and *maka'ainana*, or commoners, were not confined to the boundaries of *ahupua'a* as resources were shared when a need was identified. *Ahupua'a* were further divided into smaller sections such as *'ili, mo'o'aina, pauku'aina, kihapai, koele, hakuone* and *kuakua*. The chiefs of these land units have their allegiance to a territorial chief or *mo'i* (literally translated as king). The project site is located within the *ahupua'a* of Pīhā, which translates literally as "flotsam" (Pūku'i et al. 1974), in the now-judicial district of North Hilo, which was part of the traditional *moku-o-loko* or district of Hilo. Hilo comprises dozens of *ahupua'a* on the eastern/windward shores of Hawai'i Island. As Pīhā encompasses *mauka* agricultural and forest resources and *makai* fisheries, residents were once able to procure nearly all that they needed to sustain their families and contribute to the larger community from within the land division.

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 project site is within Hilo Palikū or "Hilo of the upright cliff" (Pukui et al. 1974:46), which extends north from the Wailuku River to Ka'ula Gulch (Maly and Maly 2006). In *Pele and Hi'iaka*, Emerson recounted the following *mele* that Hi'iaka sang while journeying between Hilo and Puna through the forest territory of the *mo'o* Pana'ewa, which mentions the area (1993:32-33):

Pau ke aho i ke kahawai lau o Hilo	One's strength is exhausted, climbing, climbing
He lau ka pu'u, he mano ka iho'ina	The countless valleys and ridges of Hilo,
He mano na kahawai o Kula'i-po	The streams without number of Ku-la'i-po,
He wai Honoli'i, he pali o Kama-e'e,	The mighty water of Hono-li'i, the precipice walls of Kama-e'e
He pali no Koolau ka Hilo-pali-ku	And the pali of Ko'olau: Such a land is Hilo-pali-ku.
He pali Wailuku, he one ke hele ia;	The banks of Wailuku are walls; the road to its crossing but sand;

He one e keʻehia la i Wai-olama. Sandy the way at Wai-o-lama.

Kepā and Onaona Maly provided additional information pertaining to the ancient land division of Hilo Palikū in the following translation of an excerpt from a legendary account called "*Kaʻao Hoʻoniua Puʻuwai no Ka-Miki"* ("The Heart Stirring Story of Ka-Miki"). This legend was originally published in Hilo's Hawaiian Language newspaper *Ka Hōku o Hawaiʻi*:

> Of Hilo Paliku it is said, one becomes short of breath traveling through Hilo, for there are many (400) hills, many (4,000) areas to descend, and many (40,000) streams, indeed while swimming through the waters of Hilo one becomes out of breath, but one is never out of water at Hilo! (Maly and Maly 2006:13)

Maly and Maly (2006:13) explain that "The Heart Stirring Story of Ka-Miki":

> …is about two supernatural brothers, Ka-Miki (The quick, or adept, one) and Maka-ʻiole (Rat [squinting] eyes), who traveled around the island of Hawaiʻi along the ancient *ala loa* and *ala hele* (trails and paths) that encircled the island. During their journey, the brothers competed in contests alongside the trails they traveled, and in famed *kahua* (contest arenas) and royal courts, against *ʻōlohe* (experts skilled in fighting or in other competitions, such as running, fishing, debating, or solving riddles, that were practiced by the ancient Hawaiians). They also challenged priests whose dishonorable conduct offended the gods of ancient Hawaiʻi. Ka-Miki and Maka-ʻiole were empowered by their ancestress, Ka-uluhe-nui-hihi-kolo-i-uka (The great entangled growth of uluhe fern which spreads across the uplands), a body-form of the goddess Haumea (the creative force of nature—also called Papa and Hina—who was a goddess of priests and competitors).

While no legendary accounts specific to Pīhā Ahupuaʻa have been identified, a few have been recorded for the adjacent lands including Maulua, located to the north of Pīhā Ahupuaʻa. The chief and foremost *ʻōlohe*, Maulua-a-pio (for whom the *ahupuaʻa* of Maulua was named), features in one part of the story. As detailed in Appendix 3, after a long contest of debate and *lua* (the traditional martial art), Ka-Miki proves too much for Maulua. Nevertheless, he shows mercy to his worthy adversary:

> "You have been bound in the net, twined from the hair of Ka-uluhe-nui-hihi-kolo-i-uka." With a smile, Ka-Miki then thanked Maulua for the test, telling him, "You are one of the best competitors I have met, there is but one problem, you are quickly worn out, you have no strength (a play on the name of the land Maulua, where one becomes wearied from traveling the steep valley cliffs). Therefore, let this test between Ka-Miki and Maulua be ended, unless you be killed like one who travels the precipitous cliff trail of Nuʻalolo, falling like the fire brands of Kāmaile, or the flying fire darts, the fluttering tribute of Makua-iki. Because you are a teacher of Hilo Hanakāhi, my traveling companion, I will release you." (Maly and Maly 2006:15)

Another *moʻolelo* describes a grueling battle that took place in the lands of Hilo Palikū between Poliʻahu, the goddess of the snow-covered mountain and her fiery rival, Pele. A tale that began with a sporting

competition in the hills of Hāmākua ended with fire fountains on Mauna Kea, earthquakes, great snowfalls and lava flows, which sculpted the landscape of the region from the ragged mass of Laupāhoehoe to the great ledge of the arch of Onomea.

Pukui (1983:107) provided a further poetic description of Hilo Palikū a part of an *'ōlelo no'eau* or poetical saying:

> *Hilo iki, pali 'ele'el*e.
> Translation: Little Hilo of the dark cliffs.
> Interpretation: Hilo-pali-ku, or Hilo-of-the-standing-cliffs, is always green because of the rain and mists.

King David Kalākaua (1888:284) described the lands of the northern portion of Hilo as he recounted the tale of 'Umi-a-Līloa presented in his book, *Legends and Myths of Hawai'i*. Writing at a time when the region had been transformed by commercial sugarcane cultivation, the King recalls the former landscape:

> The northeastern coast of the island of Hawaii presents an almost continuous succession of valleys, with intervening uplands rising gently for a few miles, and then more abruptly toward the snows of Mauna Kea and the clouds. The rains are abundant on that side of the island, and the fertile plateau, boldly fronting the sea with a line of cliffs from fifty to a hundred feet in height, is scored at intervals of one or two miles with deep almost impassable gulches, whose waters reach the ocean either through rocky channels worn to the level of the waves, or in cascades leaping from the cliffs and streaking the coast from Hilo to Waipio with lines which seem to be molten silver from the great crucible of Kilauea.
>
> In the time of Liloa, and later, this plateau was thickly populated, and requiring no irrigation, was cultivated from the sea upward to the line of frost. A few *kalo* patches are still seen, and bananas grow, as of old, in secluded spots and along the banks of the ravines; but the broad acres are green with cane, and the whistle of the sugar-mill is heard above the roar of the surf that beats against the rock-bound front of Hamakua.

Native Planters in Old Hawaii (Handy et al 1972:538-9) discussed traditional planting areas and methods in the North Hilo area. While Waikaumalo and Kalaeha Streams were not mentioned as significant areas of taro *lo'i*, it was noted that unirrigated taro was planted in the lower forest and along streams.

The specific Pīhā area appears to have been sparsely populated and there is little traditional information in the form of *mele*, *oli* or *'ōlelo* concerning the area's inhabitants or happenings. Nevertheless, it is clear from work in similar areas of Hawai'i that different elevations of Pīhā comprised various social-ecological zones that had profound consequences for not only resources but also the sacredness of the landscape. The inland zones, or *wao*, are stratified by variations in elevation and rainfall, and are considered as a region all their own. As Handy et al. (1991:56) explained:

> *Wao* means the wild—a place distant and not often penetrated by man. The *wao laʻau* is the inland forested region, often a veritable jungle, which surmounts the upland *kula* slopes on every major island of the chain, reaching up to very high elevations especially on Kauai, Maui, and Hawaii. The Hawaiians recognized and named many divisions or aspects of the *wao*: first, the *wao kanaka*, the reaches most accessible, and most valuable, to man (*kanaka*); and above that, denser and at higher elevations, the *wao akua*, forest of the gods, remote, awesome, seldom penetrated, source of supernatural influences, both evil and beneficent. The *wao kele*, or *wao maʻu kele*, was the rain forest. Here grew giant trees and tree ferns (*ʻamaʻu*) under almost perpetual cloud and rain. The *wao kanaka* and the *wao laʻau* provided man with the hard wood of the *koa* for spears, utensils, and logs for boat hulls; pandanus leaves (*lau hala*) for thatch and mats; bark of the *mamaki* tree for making tapa cloth; candlenuts (*kukui*) for oil and lights; wild yams and roots for famine time; sandalwood, prized when shaved or ground as a sweet scent for bedding and stored garments. These and innumerable other materials were sought and found and worked by man in or from the *wao*.

Traditional life in Hawaiʻi' took a sharp turn on January 18, 1778 with the arrival of British Capt. James Cook in the islands. On a return trip to Hawaiʻi ten months later, Kamehameha visited Cook aboard his ship the *Resolution* off the east coast of Maui and helped Cook navigate his way to Hawaiʻi Island. Cook exchanged gifts with Kalaniopuʻu at Kealakekua Bay the following January, and Cook tried to leave Hawaiʻi in February. However, Cook's ship then sustained damage to a mast in a severe storm off Kohala and returned to Kealakekua, setting the stage for his death on the shores of the bay.

During the Proto-Historic Period there was a continuation of the trend toward intensification of agriculture, *aliʻi*-controlled aquaculture, settling of upland areas and development of traditional oral history. The *Ku* cult, *luakini heiau* and the *kapu* system were at their peaks, but the influence of western civilization was being felt in the introduction of trade for profit and a market-system economy. Following the death of Kamehameha I in 1819, the customary relaxing of *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. The family worship of *ʻaumakua* images was allowed to continue.

By 1920, the sandalwood trade established by Europeans and Americans twenty years earlier had greatly expanded. Farmers and fishermen were required to toil at logging, resulting in food shortages, a breakdown of the traditional subsistence system and a decline in population. The rampant sandalwood trade also resulted in the first Hawaiian national debt, as promissory notes and levies granted by American traders were enforced by American warships. The assimilation of western ways continued with the short-lived whaling industry, and later commercial sugarcane, which proved more lucrative but carried a heavy environmental price.

In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawaiʻi scouting communities in which to establish

church centers for the growing Calvinist mission. Ellis recorded observations made during this tour in a journal, including Hilo Palikū:

> The country, by which we sailed, was fertile, beautiful, and apparently populous. The numerous plantations on the eminences and sides of the deep ravines or valleys, by which it was intersected, with the streams meandering through them into the sea, presented altogether a most agreeable prospect. The coast was bold, and the rocks evidently volcanic. We frequently saw water gushing out of hollows in the face of the rocks, or running in cascades from the top to the bottom (Ellis 1826:316).

In 1840, Lieutenant Charles Wilkes, head of the U.S. Exploring Expedition, traveled to North Hilo and described the landscape:

> The coast to the north of Hilo is slightly peculiar: it is a steep bluff, rising about two hundred feet; this is cut into small breaks here called "gulches," within which the villages are generally situated, and the natives grow banana and taro. In some places they cultivate small patches of sugarcane, which succeed well (Wilkes 1845).

The *Mahele ʻAina* took place in 1848, placing all land in Hawaiʻi into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were "subject to the rights of the native tenants," or those individuals who lived on the land and worked it for their subsistence and for their chiefs.

Pīhā Ahupuaʻa is not listed in the Buke Māhele. The lands of Piha 1 & 2 were never assigned or awarded at the time of the Mahele of 1848. Controversy arose over the ownership of this land when the Trustees of the Estate of Bernice Pauahi Bishop claimed this land because it had been continuously held and claimed by her ancestors. In order to settle the controversy, a compromise was proposed whereby the Minister of the Interior conveyed other lands to the Trustees, who in turn conveyed Pīhā (and other lands) to the Kingdom of Hawaiʻi on December 20, 1890.

As part of recording the boundaries of the land in the Māhele, several older residents of the area provided testimony, including Ku, Hemahema, Kalaualoha, Kupahu, and D.H. Hitchcock, the Government Surveyor who surveyed the Pīhā boundaries. D.H. Hitchcock testified that he surveyed the boundaries of Pīhā Ahupuaʻa in October of 1874 with Ku as his *kamaʻāina* (person familiar with the land). Hitchcock also took Kalaualoha with him along a part of the Nanue boundary, and talked with Hemahema prior to the survey. The testimony indicated that the boundary between Kahuku and Pīhā Ahupuaʻa (a part of which is the eastern boundary of the project site) was once marked by an "old trail" used by bird catchers to access the forest, and that the owner of Nanue Ahupuaʻa, Alapai, disputed the *mauka*-eastern boundary of Pīhā Ahupuaʻa as described by Ku and depicted by D.H. Hitchcock in his survey.

Native tenants could claim and acquire title to *kuleana* parcels that they actively lived on or farmed at the time of the Māhele. The Kuleana Act of December 21, 1849 provided the framework by which native

tenants could apply for and receive fee-simple interest in their *kuleana* lands from the Land Commission. The Board of Commissioners oversaw the program and administered the lands as Land Commission Awards (LCAw.). No claims were made for *kuleana* lands within Pīhā Ahupuaʻa during the Māhele ʻĀina of 1848.

By 1870, sugarcane cultivation had begun to dominate the economy and transform the landscape of many districts of the Hawaiian Islands. This included the Hāmākua Coast, where population rapidly dropped in the mid-19th century as a result of both epidemics and migration of rural inhabitants to towns and cities. Following the signing of the 1875 Treaty of Reciprocity, a free-trade agreement between the United States and the Kingdom of Hawaiʻi that guaranteed a duty-free market for Hawaiian sugar in exchange for special economic privileges for the United States, a number of new sugar plantations incorporated in the Islands. In 1878, Claus Spreckels, with W.G. Irwin & Company as his agent, established the Hakalau Plantation Company on 9,000 acres of land located along the North Hilo coast, 16 miles from Hilo (Dorrance and Morgan 2000). The fields of the Hakalau Plantation Company ranged from 250 feet above sea level along the shoreline bluffs to 2,000 feet above sea level at their western (*mauka*) limits. The cane was conveyed by flume from the various fields to its mill site, where it was then processed. The Hakalau Mill, built in 1890 on the shore at the foot of a 200-foot bluff within Hakalau Gulch, produced 5,000 tons of sugar annually during its early years (Ibid). Until 1913, when a railroad connecting the plantation to the port at Hilo was built, the plantation shipped its product from the Hakalau Landing to Honolulu via inter-island vessels that anchored offshore. The 4,250 acres lands of Pīhā Ahupuaʻa were leased to the Hakalau Plantation Co. on February 11, 1892, and the *makai* lands were cleared and used for sugarcane cultivation. Hakalau Plantation Company's fields extended as far *mauka* as what is now the project site and beyond.

The Land Act of 1895 broadened the definition of public land and placed Hawaiʻi's Crown Lands (such as Pīhā) into the public domain. The Land Act, coupled with clarifications to Hawaiʻi's land policies set forth in the 1900 Organic Act, made land available to family farmers through homesteading programs. Many of the Territory lease lands held by the Hakalau Plantation Company were divided into homestead lots (Horowitz et al. 1969). By the early twentieth century, as the plantation's lease on its Pīhā lands was set to expire, the Territorial Government began the process of subdividing the *makai* section of the *ahupuaʻa* below the Hilo Forest Reserve into homesteads. The survey of the Pīhā Homesteads tract began in 1912 and was completed by 1913. "The land of Piha was subdivided into 28 lots, comprising 393.81 acres, 5 miles of roads containing 20.44 acres, and flumes and ditches and remnant covering 5.95 acres" (Department of Interior 1913:65). The Pīhā-Kahuku Homestead Road created as part of the Pīhā homestead subdivision appears to follow the route of the older road described along the boundary between those two *ahupuaʻa* during the Boundary Commission hearings of 1875. Following the subdivision of the Pīhā Homesteads, the Hakalau Plantation, owned at the time by C. Brewer & Co., brought up the question of the boundary between the homesteads and the adjoining lands owned or controlled by the company, which they felt had been encroached upon. Additional surveys of the Pīhā Homesteads tract, involving extensive triangulation work, were then made during the early part of 1914, until the matter was decided to the satisfaction of all parties involved (Department of the Interior 1914:521).

In June of 1914 the newly created Pīhā Homestead lots were sold at public auction to various individuals (Department of the Interior 1916:526). Grant No. 6566 for Lots 13 & 14 of the homesteads, containing a total of 28.63 acres and including the current study area, was assigned to Manuel Ignacio on June 20, 1916. Because Lots 13 & 14 were purchased together, the actual boundaries between the two lots are not shown on any of the maps reviewed for this EA. Based on the layout of the homesteads however, it is likely that the project site was initially a portion of Lot 13. The 1914 survey map prepared for the Pīhā Homesteads shows the boundaries of Lots 13 & 14, the roads accessing the homestead lots between Kalaeha and Waikaumalo Stream gulches (Stone Road and another unnamed road) that are on or near the northeastern and northwestern boundaries of the property, and the small drainages that bound and cross the lots. In 1914, Lots 13 & 14 are listed as containing 0.76 acres of roadways and 0.2 acres of flume. The Hakalau Plantation Company continued to grow sugarcane on lands in the vicinity of the project throughout the first half of the twentieth century, but by the early 1940s, nearly forty percent of the sugarcane on the plantation was being cultivated by independent growers, some of whom had purchased Pīhā Homestead lots, such as Manuel Ignacio.

In 1943, the neighboring Wailea Milling Company merged with the Hakalau Plantation Company, expanding operations, and by 1944 the plantation reached its maximum output, producing 26,000 tons of sugar that year (Dorrance and Morgan 2000). On April 1, 1946, the Hakalau Mill and the railroad connecting the plantation to Hilo were severely damaged by a *tsunami* triggered by an earthquake in the Aleutian Islands. The mill was rebuilt, but the railroad shut down and the product was trucked to the docks at Hilo.

County tax records indicate that Lots 13 & 14 of the Pīhā Homesteads (TMK: (3) 2-004:003) were cultivated in sugarcane throughout the 1950s, with similar acreages of planted, fallow, and waste land as those reported in 1944. A 1954 USGS aerial photograph shows the property and adjacent lots within the Pīhā Homesteads all planted in sugarcane (see Figure 16 of Appendix 2). A map of the Hakalau Sugar Company plantation fields prepared during the mid-20th century indicates that the property was formerly included within Field 135.

In 1962, C. Brewer & Co. merged the Hakalau Plantation Company into the Pepeekeo Sugar Company, its southern neighbor, and the Hakalau Mill was shut down (Dorrance and Morgan 2000). According to County tax records, that same year, Graven Breithaupt, Trustee of the Ella Breithaupt Estate, leased 6.9 acres of land within Lots 13 & 14 of the Pīhā Homesteads to Yoshinobu and Tsutayo Yamada for eighty years at a dollar per acre. A 1965 USGS aerial photograph shows the property and surrounding homestead lots all planted in sugarcane (see Figure 18 of Appendix 2). Subsequently, in 1969, 16 acres of land within the homestead lot were leased to Komatsu Fujimoto for 8 years at a rate of 240 dollars per year (in 1975 this lease was transferred to the K. Fujimoto Estate). By 1970, County records indicate that 10.63 acres within Lots 13 & 14 (including the current property) had been rezoned as conservation land, while the other 18 acres remained agriculturally zoned.

In 1973, C. Brewer & Co. merged the Pepeekeo Sugar Company (including the lands of the former Hakalau Sugar Company, and presumably the cane grown within what is now the project site) into the

Mauna Kea Sugar Company. This combined under one corporate name what had once been five separate sugar plantations strung along the Hilo coast. County tax records indicate that the final lease for the cultivation of sugarcane within Lots 13 & 14 of the Pīhā Homesteads occurred on January 14, 1977. This lease of 16 acres was to Chikako Fujimoto for a time period of "3 crops of sugarcane (6 yrs.)" retroactive to October 23, 1976. A 1977 USGS aerial photograph shows most of the land near the project site still planted in sugarcane (see Figure 19 of Appendix 2), but it is not clear from the photograph if the property was actually still being cultivated. It appears that, following the rezoning of 10.63 acres of land within Lots 13 & 14 to conservation in 1970, the lands to the northwest of Kalaeha Stream gulch (including the property) were left to fallow, while those to the southeast of the Gulch remained in sugarcane cultivation. The Mauna Kea Sugar Company, later named Mauna Kea Agribusiness Company, continued to operate in the vicinity until the 1990s, harvesting its last crop in 1994.

The loss of commercial sugarcane left the region without an economic mainstay. Ranching and farming of diversified crops varying from silage corn to cacao to mushrooms to tea have occupied some of the lands and employ growing numbers of workers. Tourism based on the attractions in and near Honokaʻa and Honomū also provides local jobs. Despite this, it would appear that most residents either commute to Hilo or the west side of the island for jobs, have independent, often web-based businesses, or subsist mostly on retirement or trust income. For long-time residents, a major issue of this transformation has been maintenance of the shoreline and forest access formerly enjoyed as part of the lifestyle of the plantation community. Hunting and fishing remain important subsistence and social activities that are being jeopardized by deteriorating roads, new fences and gates, and no-trespassing signs.

Despite changes, there is a feeling of continuity and heritage in this community. In the words of the Hāmākua Community Development Plan (Hawaiʻi County Planning Department 2018: 20):

> The region referred to as Hamakua stretches along north of Hilo along the upright cliffs (Hilo Paliku) to the majestic, historic valley of Waipiʻo and up the slopes to the sacred summit of Mauna Kea. It is against this sweeping, lush green landscape that the people of the Hamakua region have flourished for generations. The region was historically renowned as a powerful religious, economic, and demographic center of Hawaiʻi Island and from early times, the region was known for its agriculture. One cannot truly understand Hamakua's people without appreciating the legacy that agriculture has stamped on this land and its people.
>
> For some, Hamakua is a place where their ancestors flourished for centuries and for others, agricultural employment drew their ancestors to emigrate from foreign lands. Here they raised their children and learned to love the land and sea as their own. Still others have come in search of a simpler way of life, drawn by the beauty of the land and a host of personal stories that testify to the magical attraction that draws people to places where they feel at home. Together, these groups form the modern communities of Hamakua.
>
> Regardless of their background, the people of Hamakua share a deep appreciation for the historical heritage of their small towns and highly value preserving an ʻohana-centered community that

emphasizes quality of life, neighborhood cooperation, and the aloha spirit. The people of Hamakua recognize that their future is tied to the preservation of their way of life and the natural and cultural resources that have sustained them for generations.

Archaeological Investigations and Resources

Previous archaeological studies conducted in the general project area and reviewed in Appendix 2 provided a working model for the types and density of features that the archaeologists could expect on the project site. The upland forest areas of Hilo were used traditionally for catching birds and gathering forest resources, both of which are transitory activities that are unlikely to have left a substantial, or easily recognizable, archaeological record, particularly when the forests were cut and the land tilled to cultivate sugarcane.

As indicated in the 1875 Boundary Commission testimony for Pīhā Ahupuaʻa, access to the forest lands was facilitated by a bird catcher's trail that followed the boundary between Kahuku and Pīhā Ahupuaʻa, passing about 300 yards to the southeast of project site (approximating the route of the existing Pīhā-Kahuku Homestead Road, which remains a public right-of-way). Little is known of the Pre-Western contact use of the tablelands in this part of the island. These lands may have been opportunistically cultivated and/or accessed for the collection of forest resources prior to the widespread clearing associated with the commercial cultivation of sugarcane during the Historic Period (Cordy 1994). The Hakalau Plantation Company originally planted the lands in the vicinity of the property area in sugarcane during the late nineteenth century. Following the creation of the Pīhā Homesteads in 1914, and the purchase of a larger area including the current project site by Manuel Ignacio as a portion of Grant No. 6566 in 1916, the lands here were leased to independent growers. Sugarcane persisted cultivation until at least the 1970s. Given the land disturbance on the property associated with developing and cultivating the sugarcane fields, it is unlikely that any Pre-Western contact or early Historic Period features would be present. It is possible, although also unlikely given the use of the fields into the Modern Period, that later Historic Period features related to the use of the Pīhā Homesteads or the cultivation of sugarcane (such as survey markers, field infrastructure, or cultural deposits) could be present within the property.

Fieldwork consisted of a pedestrian survey and visual inspection of the surface of the entire 3.212-acre property (TMK: (3) 3-2-004:040). The survey was conducted on June 25, 2019, by ʻIolani K. Kaʻuhane, B.A., and Johnny Dudoit, B.A., under the direction of Principal Investigator Matthew R. Clark, M.A. During the survey, fieldworkers walked northeast/southwest-oriented pedestrian transects spaced at no more than 20-meter intervals across the property. Although the north, west, and south portions of the subject parcel were overgrown with uluhe and tall grass in some areas, ground visibility was generally adequate throughout the property for identifying any historic properties that may have been present. As a result of the pedestrian survey no archaeological resources were identified within the property. Given the negative findings of the pedestrian survey, combined with the review of historical documentary resources, the archaeologists concluded that the proposed construction of a single-family residence, along with associated improvements including a garden and orchard, would not affect any historic properties. The survey was provided to SHPD for their review and comment on July 26, 2019. As of February 28 2020,

no response from SHPD had been received by DLNR or project archaeologists. Although no archaeological sites or other historic properties appear to present, in the unlikely event that any unanticipated archaeological resources are unearthed within the project site during the proposed development activities, work in the immediate vicinity of those resources should be halted and SHPD should be contacted in compliance with Hawai‘i Administrative Rules 13§13-280.

Cultural Resources and Practices

No archaeological features on the project site with potential cultural value are present, and other physical and documentary investigations of the property and its history did not reveal any resources such as springs, streams, famous groves of trees, caves, etc., nor any long-standing cultural practices on the property. No gathering of plant or animal material was historically noted from the property.

Studies from another EA (Geometrician Associates 2019) indicate that historically, the *wao* of Pīhā was used for the procurement of special resources and was specifically utilized for bird-catching and the hewing and carving of *koa* wood for canoes. Although the traditional cultural practices and craft specialization associated with these traditions are no longer actively practiced in Pīhā, the recognition of their practice and importance reinforces the importance of the *mauka* Pīhā lands to the Hawaiian people. Boundary commission testimonies for Pīhā in 1875 revealed that an old trail utilized by bird catchers extended along the boundary of Pīhā and Kahuku Ahupua‘a, which is coterminous with Pīhā Road, which provides access to Stone Road, and, in turn, the project site. The presence of these trails and their association with known traditional customs and practices in the area emphasize Pīhā’s significance as a traditional cultural landscape and its value to the Hawaiian people’s cultural identity.

In order to dig deeper, when assessing potential cultural impacts to resources, practices, and beliefs, input gathered from community members with genealogical ties and/or long-standing residency relationships to the study area is vital. It is precisely these individuals who ascribe meaning and value to traditional resources and practices. Community members may also retain traditional knowledge and beliefs unavailable elsewhere in the historical or cultural record of a place.

To elicit consultation, a notice describing the action and location and inviting consultation was published in the Office of Hawaiian Affairs (OHA) newspaper *Ka Wai Ola* (March 2019). To date, there has been no response to this notice. In addition, consultation letters were mailed on July 24, 2019, to William Ailā, Interim Chair for the Department of Hawaiian Home Lands (DHHL); a representative of KAHEA Environmental Alliance, a nonprofit organization; and a representative of the Office of Hawaiian Affairs (OHA); to date, no responses have been received. Additional consultation efforts were made with individuals of the Honohina and Pīhā communities. Robert Nishimoto was contacted by phone on July 11, 2019. He said that although he grew up in the area, he moved away some time ago and does not know of any traditional cultural uses or practices of the property itself. He recommended that ASM staff contact three other local residents, who did not respond to ASM’s outreach.

Two local residents who had been recommended were able be contacted and agreed to discuss the proposed project in an in-person interview on July 29, 2019. The full results of the consultation are included in Appendix 3 and summarized herein.

Jed Cariaga and his partner Natalie Tavares, a local couple originally from Ka‘ū and Maui, had general concerns about landowners from elsewhere who move to the land and begin to block access or express concern about pig hunting in undeveloped Conservation lands near their properties. Mr. Cariaga and Ms. Tavares hunt via the old trail that extends from the *mauka* end of Pīhā-Kahuku Road and branches off from the old fence line. They reported that there were disputes when access to the forest were blocked by landowners on the Honohina side of Pīhā. Another access road, Stone Road, allowed them to shift their hunting activities to the Waikaumalo side of Pīhā between the Kalaeha and Waikaumalo Stream gulches. Because Stone Road extends *mauka* and provides access to the forest, they use it frequently to access hunting areas. When new landowners bought the parcels surrounding the project site, they invested in developing working relationships with the new residents to allow access for hunting through their properties. There is generally benefit for the owners, as Mr. Cariaga also gets requests for animal control (feral pigs) and is often hired to work on people’s properties in North Hilo to hand clear vegetation.

The issue of pig hunting as a traditional cultural practice is complex. Although recreational hunting of feral pigs and other introduced species has occurred in the islands for over a century, opinions are split among cultural experts concerning whether it is a traditional Hawaiian cultural practice (e.g., see Maly et al. n.d.). The pigs originally introduced by the Polynesians were for the most part domesticated and were an important food product and cultural resource in ancient Hawai‘i, but they were not recreationally hunted (ibid.). The *wao* was considered sacred, particularly the *wao akua*, and great care was taken by the Hawaiians as they passed through. Entry into the depths of the *wao* was conducted with focused intention for the collection of very special natural resources including feathers, wood, foliage, and medicine. In accordance with the custom of exercising profound respect for the spiritual and physical entities that inhabit the *wao akua*, these resources were protected in the ancient days. As noted by Maly et al. (n.d.), “*Pua‘a* were valuable cultural resources, but in ancient times were kept away from the *wao akua*, which held so much more value to Hawaiians than a single species such as a pig.” Following the demise of the Polynesian-introduced pig and the population influx of Western-introduced pig species and the proliferation of hybrids, which thrived on a seemingly endless supply of forest forage, every layer of the *wao* has been infiltrated, and the health of native Hawaiian forests has been in continual decline. Feral pigs wallow in the mud, destroying understory plants, and root up hapu‘u for its starch. These activities create puddles and water basins that serve as breeding grounds for mosquitos that are vectors for deadly diseases for rare native birds. Adding further complexity is the fact that recreational hunting within designated hunting units managed by the State Division of Forestry and Wildlife (DOFAW), which many residents consider a local tradition that both provides natural food and perpetuates family traditions, serves to mitigate degradation to native vegetation caused by feral pigs within the reserve. There is a great diversity of opinion among residents, cultural practitioners, historians and biologists about pig-hunting.

The forested lands at the end of Pīhā-Kahuku Road are a microcosm of this complexity. They have been protected under conservation as the Hilo Forest Reserve since 1905, primarily for their value as

watersheds for the sugarcane industry that dominated the *makai* lands of Pīhā and adjacent areas. Protected deep within these forests are many of the same natural resources of medicinal plants, wood and birds present during Pre-Western contact times. Although no evidence was uncovered as part of the cultural impact assessment, the Hilo Forest Reserve may still be utilized for gathering other forest resources, such as wood or lei materials. One of the primary threats continues to be feral pigs. DOFAW manages various natural area, forest, and game management reserves, wildlife sanctuaries, and public bird/mammal hunting areas throughout the State of Hawai‘i that seek to balance the needs of wildlife, native vegetation, hunters and forest gatherers. In this context, pig hunting within the Pīhā Section of the Hilo Forest Reserve, at least for now, is a management tactic to help maintain the health of the Forest Reserve.

Impacts to and Mitigation for Cultural Resources and Practices

The proposed construction of a single-family residence, orchard and garden on the project site will not harm any cultural resources, nor will it impede access to the forest reserve for pig hunting or cultural utilization of forest resources. The small size of the property, the lack of a true forest, and its location surrounded by roads, driveways and homes, gives it very minimal hunting value. The owner and applicant understand the practices of local hunters and appreciates and welcomes their efforts in reducing the feral pig population in the area, which can wreak havoc with gardens and orchards as well as native plants.

Given the above consultation and assessment, it was the conclusion of the cultural impact assessment that the proposed development of a single-family residence on the project site would not result in impacts to any traditionally valued cultural or historical resources nor will it impact any traditional cultural practices or beliefs. The Draft EA was distributed to agencies and groups who might have knowledge in order to confirm this finding. No party reviewing the Draft EA supplied any cultural information.

3.3 Public Roads, Services and Utilities

3.3.1 Roads and Access

Existing Environment, Impacts and Mitigation Measures

The sole road access to the project site is via Stone Road and a short road that provides access to several lots off Stone Road, visible in the aerial image in Figure 1 and labeled “cross road” on the Site Plan in Figure 3. The owner will construct a driveway from the cross road to the building site. No adverse effects on public or private roads or road access would occur.

3.3.2 Public Utilities and Services

Environmental Setting, Impacts and Mitigation Measures

Rooftop-mounted solar photovoltaic panels together with a backup generator would provide electricity. There would be no extension of electric or other utility lines from Pīhā-Kahuku Road. Domestic water would be supplied via a catchment system directly adjacent to the home (see Figure 3 for location). The proposed 15,000-gallon capacity should be more than adequate to meet the expected demand, based on the owner‘s expected use of less than 200 gallons per day. Wastewater would be treated with a septic system in conformance with State Department of Health regulations (see Figure 3 for location).

No parks, schools or other public facilities are present nearby. Police, fire and emergency medical services are available from stations about eight road miles away in Laupāhoehoe. For onsite fire protection, the applicant proposes use of the water tanks.

There will be no adverse impact to any public or private utilities. The addition of one single-family home will have no measurable adverse impact to or additional demand on public facilities such as schools, police or fire services, or recreational areas. Mr. Perry acknowledges and understands that this lot, along with almost all other residences in the rural areas of the North Hilo District, is not located within a mile of emergency services.

3.4 Secondary and Cumulative Impacts

Due to its small scale, the proposed project would not produce any major secondary impacts, such as population changes or effects on public facilities.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. The County of Hawai‘i occasionally performs road maintenance on Pīhā-Kahuku Road. No substantial government or private projects such as roadways, schools, businesses, or subdivisions are known to be occurring or in planning for this portion of North Hilo. There are several dozen private lots on the two-mile long Pīhā-Kahuku Road. At any given time, a home or agricultural structure or communications facility may be undergoing maintenance or construction, and occasionally there are two or more minor projects occurring simultaneously.

The adverse effects of building a single-family residence in this context are very minor and involve only temporary disturbances to air quality, noise, traffic and visual quality during construction. It should again be noted that the proposed home is in a somewhat isolated, sparsely populated area, and no accumulation of adverse construction effects would be expected. Other than the precautions for preventing adverse impacts during construction listed above in Sections 3.1.3 and 3.1.6, no special mitigation measures should be required to counteract the small adverse cumulative effect.

3.5 Required Permits and Approvals

County of Hawai'i:

Plan Approval and Grubbing/Grading, and Building Permits

State of Hawai'i:

Conservation District Use Permit
Wastewater System Approval

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai'i County General Plan

The *General Plan* for the County of Hawai'i is the document expressing the broad goals and policies for the long-range development of the Island of Hawai'i. The plan was adopted by ordinance in 1989 and revised in 2005. The General Plan's Land Use Allocation Guide Map designates the property as Open. The *General Plan* is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts of the County of Hawai'i. Below are pertinent sections followed by a discussion of conformance.

ECONOMIC GOALS

(a) Provide residents with opportunities to improve their quality of life through economic development that enhances the County's natural and social environments.
(b) Economic development and improvement shall be in balance with the physical, social, and cultural environments of the island of Hawaii.
(d) Provide an economic environment that allows new, expanded, or improved economic opportunities that are compatible with the County's cultural, natural, and social environment.

Discussion: The proposed construction and occupation of a single-family home would be in balance with the natural, cultural and social environment of the County, would create temporary construction jobs for local residents, and would indirectly boost the economy through construction industry purchases from local suppliers. A multiplier effect takes place when these employees spend their income for food, housing, and other living expenses in the retail sector of the economy. Such activities are in keeping with the overall economic development of the island.

ENVIRONMENTAL QUALITY GOALS

(a) Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island

are viable and sustainable.
(b) Maintain and, if feasible, improve the existing environmental quality of the island.
(c) Control pollution.

ENVIRONMENTAL QUALITY POLICIES

(a) Take positive action to further maintain the quality of the environment.

ENVIRONMENTAL QUALITY STANDARDS

(a) Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.
(b) Incorporate environmental quality controls either as standards in appropriate ordinances or as conditions of approval.
(c) Federal and State environmental regulations shall be adhered to.

Discussion: The proposed construction and occupation of a single-family home would not have a substantial adverse effect on the environment and would not diminish the valuable natural resources of the region. The home, garden and orchard would be compatible with the existing rural single-family homes and agricultural uses in the area. Pertinent environmental regulations would be followed, including those for mitigation of water quality impacts.

HISTORIC SITES GOALS

(a) Protect, restore, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.
(b) Appropriate access to significant historic sites, buildings, and objects of public interest should be made available.

HISTORIC SITES POLICIES

(a) Agencies and organizations, either public or private, pursuing knowledge about historic sites should keep the public apprised of projects.
(b) Amend appropriate ordinances to incorporate the stewardship and protection of historic sites, buildings and objects.
(c) Require both public and private developers of land to provide historical and archaeological surveys and cultural assessments, where appropriate, prior to the clearing or development of land when there are indications that the land under consideration has historical significance.
(d) Public access to significant historic sites and objects shall be acquired, where appropriate.

Discussion: An archaeological survey determined that no historic sites are present. No cultural resources or practices are on the property; access to forest resources and hunting areas will not be affected.

FLOOD CONTROL AND DRAINAGE GOALS

(a) Protect human life.
(b) Prevent damage to man-made improvements.
(c) Control pollution.
(d) Prevent damage from inundation.
(e) Reduce surface water and sediment runoff.
(f) Maximize soil and water conservation.

FLOOD CONTROL AND DRAINAGE POLICIES

(a) Enact restrictive land use and building structure regulations in areas vulnerable to severe damage due to the impact of wave action. Only uses that cannot be located elsewhere due to public necessity and character, such as maritime activities and the necessary public facilities and utilities, shall be allowed in these areas.
(g) Development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works and in compliance with all State and Federal laws.

FLOOD CONTROL AND DRAINAGE STANDARDS

(a) "Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.
(b) Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.
(c) Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).
(d) Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.
(e) Applicable standards and regulations of the Natural Resources Conservation Service and the Soil and Water Conservation Districts.

Discussion: The entire property is within Zone X, or areas outside of the 500-year floodplain as determined by detailed methods in the Flood Insurance Rate Maps (FIRM). The project will conform to applicable drainage regulations and policies of the County of Hawai‘i.

NATURAL BEAUTY GOALS

(a) Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.
(b) Protect scenic vistas and view planes from becoming obstructed.
(c) Maximize opportunities for present and future generations to appreciate and enjoy natural and scenic beauty.

NATURAL BEAUTY POLICIES

(a) Increase public pedestrian access opportunities to scenic places and vistas.
(b) Develop and establish view plane regulations to preserve and enhance views of scenic or prominent landscapes from specific locations, and coastal aesthetic values.

Discussion: The improvements are minor and consistent with traditional uses of the land and will not cause scenic impacts or impede access.

NATURAL RESOURCES AND SHORELINES GOALS

(a) Protect and conserve the natural resources from undue exploitation, encroachment and damage.
(b) Provide opportunities for recreational, economic, and educational needs without despoiling or endangering natural resources.
(c) Protect and promote the prudent use of Hawaii's unique, fragile, and significant environmental and natural resources.
(d) Protect rare or endangered species and habitats native to Hawaii.
(e) Protect and effectively manage Hawaii's open space, watersheds, shoreline, and natural areas.
(f) Ensure that alterations to existing land forms, vegetation, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of an earthquake.

NATURAL RESOURCES AND SHORELINES POLICIES

(a) Require users of natural resources to conduct their activities in a manner that avoids or minimizes adverse effects on the environment.
(c) Maintain the shoreline for recreational, cultural, educational, and/or scientific uses in a manner that is protective of resources and is of the maximum benefit to the general public.
(d) Protect the shoreline from the encroachment of man-made improvements and structures.
(h) Encourage public and private agencies to manage the natural resources in a manner that avoids or minimizes adverse effects on the environment and depletion of energy and natural resources to the fullest extent.
(p) Encourage the use of native plants for screening and landscaping.
(r) Ensure public access is provided to the shoreline, public trails and hunting areas, including free public parking where appropriate.
(u) Ensure that activities authorized or funded by the County do not damage important natural resources.

Discussion: Natural resources will not be affected the proposed action, and there would be very minimal alteration of natural landforms. Access to natural resources would not be affected. No unreasonable exposure to natural hazards not shared by every resident of the island would occur.

HĀMĀKUA COMMUNITY DEVELOPMENT PLAN

The Hāmākua Community Development Plan (CDP) planning area encompasses not only the judicial district of Hāmākua, but also that of North Hilo, and a portion of the South Hilo district commonly referred to as Rural South Hilo (Wainaku to Hakalau. It was developed under the framework of the February 2005 County of Hawai‘i General Plan and was adopted in 2018 per Ordinance 2018-078. (http://records.hawaiicounty.gov/weblink/DocView.aspx?dbid=1&id=99067&page=1&cr=1).

Community Development Plans are intended to translate broad General Plan Goals, Policies, and Standards into implementation actions as they apply to specific geographical regions around the County. CDPs are also intended to serve as a forum for community input into land-use, delivery of government services and any other matters relating to the planning area.

The Hāmākua CDP does not specify land use per se on the property, but has policies relevant to construction of a single-family home in certain aspirational priorities for natural and cultural resources and community infrastructure:

- Protects coastal areas, agricultural land, and mauka forests from development
- Protects open space, areas with natural beauty, and scenic view planes
- Guides the development of programs to strengthen protections for coastal and agricultural lands as well as open space and view planes
- Preserves historic resources
- Ensures appropriate public access to the shoreline and mauka forests
- Guides the development of a regional network of trails
- Guides collaborative stewardship and enhancement of coastal and forest ecosystems, cultural resources, agricultural lands, public access, and trails
- Concentrates future development in the existing towns, villages, and subdivisions
- Supports the preservation of village and town character and guides the enhancement of communities’ unique sense of place

Discussion: The proposed single-family home would not represent development of *mauka* forest lands, as the property was subdivided as part of the Pīhā-Kahuku Homesteads in the early part of last century as a site for farming, ranching and residences, the lot supported sugarcane agriculture for many decades, and no native forest land is present. A home, garden and orchard on this lot fulfills the purpose of this rural subdivision. No pristine native vegetation, rare species, forest resources would be affected. A home on this secluded site would have no adverse effect on natural beauty and scenic view planes. No historic properties are affected, and there would be impact to the access to the forest. Occupation of the home would promote additional patronage of local businesses in Laupāhoehoe and Honomū, helping to preserve the quality of life and economy. The construction of a single-family home here would be consistent with the CDP.

3.6.2 Conservation District

The State Land Use District for the project site is Conservation. Its subzone is General, for which, according to Hawai‘i Administrative Rules (HAR) §13-5-15, a single-family residence is an identified use. Any proposed use must undergo an examination for its consistency with the goals and rules of this district and subzone. The applicant has concurrently prepared a Conservation District Use Application (CDUA), to which this EA is an appendix. The CDUA includes a detailed evaluation of the consistency of the project with the criteria of the Conservation District permit process. Briefly, the following individual consistency criteria should be noted:

1. The proposed land use is consistent with the purpose of the Conservation District;

The development of the single-family residence, garden and orchard is in conformance with the purpose of the Conservation District. It is an identified use within the Conservation District, requiring a Board Permit for such use. The owner is committed to conserve, protect and preserve the natural features on the subject property. The proposed use will not impact public forest reserve access or the public’s ability to utilize forest reserve resources present over a mile *mauka* of the property. Additionally, there would be no significant impacts to the natural or cultural resources of the area.

2. The proposed land use is consistent with the objectives of the subzone of the land on which the use will occur;

The objective of the General subzone is to “…designate open space where specific conservation uses may not be defined, but where urban use would be premature.” The General subzone is meant to encompass “…(l)ands with topography, soils, climate, or other related environmental factors that may not be normally adaptable or presently needed for urban, rural, or agricultural use; and (2) Lands suitable for farming, flower gardening, operation of nurseries or orchards, grazing…..” A single-family residence is an identified use in the General subzone under HAR 13-5-24, R-7. The orchard and farm-related structures and uses are identified uses as Agriculture under HAR 13-5-23, L-1. An Agricultural Management Plan is being prepared as part of the Conservation District Use Permit Application (CDUA) for the proposed agricultural use, as required under HAR 13-5-23, L-1. The proposed home conforms to the design standards in 13-5-41 and the home and farming will ensure the sustained use of the natural resources in the project area by mitigating potential impacts, as outlined in this EA.

3. The proposed land use complies with provisions and guidelines contained in Chapter 205A, Hawaii Revised Statutes (HRS), entitled "Coastal Zone Management," where applicable;

The property is outside the Special Management Area (SMA) and is thus not subject to County SMA rules. The use complies with all provisions and guidelines contained in Chapter 205A, Hawai‘i Revised Statutes (HRS), entitled *Coastal Zone Management*. The proposed improvements are located two miles from the coast at 1,178 feet in elevation and are not likely to result in any substantial adverse impact on the coastal environment. No streams are present on the property and with implementation of buffers on

the steep eastern slope and Best Management Practices associated with a grading permit, there should be no impacts on marine resources. The use will not restrict any shoreline uses such as hiking, fishing or water sports. No coastal viewplanes will be affected, and there will be no effects on the biological or economic aspects of the coastal ecosystem. No historic sites or cultural resources/practices are present or will be adversely affected.

4. The proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region;

Because of the relatively minor nature of the project and the lack of threatened or endangered plant species or pristine native ecosystems, the proposed single-family residence, garden and orchard are not likely to cause adverse biological impacts. Impacts to the island wide-ranging endangered Hawaiian hoary bat and Hawaiian hawk will be avoided through timing of vegetation removal and/or hawk nest survey.

5. The proposed land use, including buildings, structures and facilities, shall be compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels;

The proposed use is consistent with single-family residential and family farming use in the area. The proposed home will be single-story, 4,221 square feet in size (including lanai, garden sheds, greenhouse, chicken coops and water tank) and outside the flood zone. It will be in area only minimally visible to the public on any public road or any other public vantage point. This identified use, which conforms to the design standards in HAR 13-5-41, will ensure the sustained use of the natural resources in the project area by mitigating impacts. The home, garden and orchard will not adversely affect the surrounding properties or how these properties are utilized. This land use will be attractive and compatible with the area, as there are scattered single-family residences on other lots on Pīhā-Kahuku Road.

6. The existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon, whichever is applicable;

The proposed use of the subject property for a single-family residence, garden and orchard will help conserve, protect and preserve the natural features of the area.

7. Subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District;

The proposed action does not involve or depend upon subdivision and will not lead to any increase in intensity of use beyond the requested single-family residence, garden and orchard.

8. The proposed land use will not be materially detrimental to the public health, safety and welfare.

The proposed single-family residence, garden and orchard will not be detrimental to the public health, safety, and welfare.

PART 4: DETERMINATION, FINDINGS AND REASONS

4.1 Determination

Based on the findings below, and upon consideration of comments to the Draft EA, the applicant expects that the State of Hawaiʻi, Department of Land and Natural Resources, will determine that the proposed action will not significantly alter the environment, as impacts will be minimal, and that this agency will accordingly issue a Finding of No Significant Impact (FONSI).

4.2 Findings and Supporting Reasons

Chapter 11-200.1-13, Hawaiʻi Administrative Rules, outlines those factors agencies must consider when determining whether an Action has significant effects:

> (a) In considering the significance of potential environmental effects, agencies shall consider and evaluate the sum of effects of the proposed action on the quality of the environment.
>
> (b) In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected impacts, and the proposed mitigation measures. In most instances, an action shall be determined to have a significant effect on the environment if it may:

1. *Irrevocably commit a natural, cultural, or historic resource.* No valuable natural or cultural resource would be committed or lost. A few common native plants are present but native ecosystems would not be adversely affected, particularly given the limited scale of disturbance on the 3-acre property. No adverse impact upon vegetation or endangered species should occur. An archaeological inventory survey has determined that no historic sites are present on the property or would be affected. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way.

2. *Curtail the range of beneficial uses of the environment.* No restriction of beneficial uses would occur with a home, garden and orchard on this lot.

3. *Conflict with the State's environmental policies or long-term environmental goals established by law*. The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is environmentally benign and minor, and it is thus consistent with all elements of the State's long-term

environmental policies.

4. *Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.* The project would not have any substantial effect on the economic or social welfare of the Big Island community or the State of Hawai‘i.

5. *Have a substantial adverse effect on public health.* The project would not affect public health and safety in any way. Wastewater will be disposed of in conformance with State Department of Health regulations.

6. *Involve adverse secondary impacts, such as population changes or effects on public facilities*. The small scale of the proposed project would not produce any major secondary impacts, such as population changes or effects on public facilities.

7. *Involve a substantial degradation of environmental quality*. The project is minor and environmentally benign, and thus it would not contribute to environmental degradation.

8. *Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions.* The adverse effects of building a single-family residence, garden and orchard are limited very minor and temporary disturbance to traffic, air quality, noise, and visual quality during construction. This area is fairly isolated from sensitive receptors. The County of Hawai‘i occasionally performs road maintenance on Pīhā-Kahuku Road. There are no substantial government or private projects in construction or planning, and no accumulation of adverse construction effects would be expected. Other than the precautions for preventing adverse effects during construction listed above, no special mitigation measures should be required to counteract the small adverse cumulative effect.

9. *Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.* Thorough survey has determined that no endangered plant species are present. Other than Hawaiian hoary bats and Hawaiian hawks, island wide-ranging species that will experience no adverse impacts due to mitigation in the form of timing of vegetation removal and/or hawk nest survey, no rare, threatened or endangered species of fauna are known to exist on or near the project site, and none would be affected by any project activities.

10. *Have a substantial adverse effect on air or water quality or ambient noise levels.* No substantial effects to air, water, or ambient noise would occur. Brief, temporary effects would occur during construction and would be mitigated. The context of the property’s location, with no residences, parks, or other sensitive uses nearby, will help avoid noise impacts. Erosion and sedimentation impacts will be avoided by implementation of Best Management Practices during grading, which will occur in a very limited area.

11. *Have a substantial adverse effect on or be likely to suffer damage by being located in an*

environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. The proposed home site is not located in a flood zone or any other hazardous area, and it would not affect any such area. The home is more than 1,100 feet above sea level and will not be affected directly by sea level rise. The project has adapted to climate change by accounting for the potential for larger storms, through minimizing hard surfaces that generate runoff in heavy rainfall and establishing a buffer on the steep-sloped eastern margin.

12. *Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.* No scenic views are located nearby or would be affected in any way. The attractive design of the home, combined with a context in which the home would not be visible from public vantage points, would ensure that the scenery of the project area would not be affected. Only minor exterior lighting is planned, and it will be shielded to protect dark skies and transiting seabirds.

13. *Require substantial energy consumption or emit substantial greenhouse gases*. Negligible amounts of energy input and greenhouse gas emission would be required for construction and occupation of the residence. Electrical power will be provided via a rooftop solar photovoltaic (PV) system with batteries, with a backup generator used only when absolutely necessary. A solar water heating system will be installed. Awnings, low-emissivity metal panels and greenwall trellises will help cool the house and reduce energy use. The production of a large proportion of the owners' food on the property as well as planting of tree crops and native trees in the buffer area will reduce the carbon footprint.

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Draft Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

APPENDIX 1a
Comments in Response to Early Consultation

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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

August 2, 2019

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

via email: rterry@hawaii.rr.com

Dear Mr. Terry:

SUBJECT: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District located at Stone Road, North Hilo, Island of Hawaii; TMK No.: (3) 3-2-004:040 on behalf of Nicholas **Perry**

Thank you for the opportunity to review and comment on the subject matter. The Land Division of the Department of Land and Natural Resources (DLNR) distributed or made available a copy of your request pertaining to the subject matter to DLNR's Divisions for their review and comments.

At this time, enclosed are comments from the (a) Engineering Division, (b) Division of Forestry & Wildlife, and (c) Commission on Water Resource Management on the subject matter. Should you have any questions, please feel free to contact Darlene Nakamura at (808) 587-0417 or email: darlene.k.nakamura@hawaii.gov. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosures
cc: Central Files

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

July 11, 2019

MEMORANDUM

FROM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
__Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District
LOCATION: Stone Road, North Hilo, Island of Hawaii; TMK: (3) 3-2-004:040
APPLICANT: Geometrician Associates, LLC on behalf of Nicholas **Perry**

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by **August 1, 2019.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Darlene Nakamura at 587-0417 or by email at darlene.k.nakamura@hawaii.gov. Thank you.

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

Signed: _____

Print Name: Carty S. Chang, Chief Engineer

Date: 7/22/19

Attachments
cc: Central Files

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD/Russell Y. Tsuji
Ref: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District
TMK(s): (3) 3-2-004:040
Location: Stone Road, North Hilo, Island of Hawaii
Applicant: Geometrician Associates, LLC on behalf of Nicholas Perry

COMMENTS

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated on FEMA's Flood Insurance Rate Maps (FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4846.

Signed: _____
CARTY S. CHANG, CHIEF ENGINEER

Date: 7/22/19

2005

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

July 11, 2019

RECEIVED
LAND DIVISION
2019 JUL 17 AM 10:40
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

MEMORANDUM

TO: FROM:

DLNR Agencies:
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
_X_Engineering Division
_X_Div. of Forestry & Wildlife
___Div. of State Parks
_X_Commission on Water Resource Management
_X_Office of Conservation & Coastal Lands
_X_Land Division – Hawaii District
_X_Historic Preservation

TO: FROM:

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District
LOCATION: Stone Road, North Hilo, Island of Hawaii; TMK: (3) 3-2-004:040
APPLICANT: Geometrician Associates, LLC on behalf of Nicholas **Perry**

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by **August 1, 2019.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Darlene Nakamura at 587-0417 or by email at darlene.k.nakamura@hawaii.gov. Thank you.

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

Signed: _____

Print Name: **DAVID G. SMITH, Administrator**

Date: 7/16/19

Attachments
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII

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

RECEIVED
LAND DIVISION
2019 AUG -1 AM 11:40
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

July 11, 2019

RECEIVED
COMMISSION ON WATER RESOURCE MANAGEMENT
2019 JUL 11 PM 12:03

MEMORANDUM

TO: **DLNR Agencies:**
___Div. of Aquatic Resources
___Div. of Boating & Ocean Recreation
X Engineering Division
X Div. of Forestry & Wildlife
___Div. of State Parks
X Commission on Water Resource Management
X Office of Conservation & Coastal Lands
X Land Division – Hawaii District
X Historic Preservation

FROM: Russell Y. Tsuji, Land Administrator
SUBJECT: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District
LOCATION: Stone Road, North Hilo, Island of Hawaii; TMK: (3) 3-2-004:040
APPLICANT: Geometrician Associates, LLC on behalf of Nicholas **Perry**

Transmitted for your review and comment is information on the above-referenced subject matter. Please submit comments by **August 1, 2019.**

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact Darlene Nakamura at 587-0417 or by email at darlene.k.nakamura@hawaii.gov. Thank you.

( ) We have no objections.
( ) We have no comments.
(x) Comments are attached.

Signed: /s/ M. Kaleo Manuel

Print Name: Deputy Director

Date: July 30, 2019

Attachments
cc: Central Files

FILE ID: RFD.5179 8
DOC ID: 21693

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON

BRUCE S. ANDERSON, PH.D.
KAMANA BEAMER, PH.D.
NEIL J. HANNAHS
WAYNE K. KATAYAMA
PAUL J. MEYER

M. KALEO MANUEL
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

July 30, 2019

REF: RFD.5179.8

TO: Mr. Russell Tsuji, Administrator
Land Division

FROM: M. Kaleo Manuel, Deputy Director
Commission on Water Resource Management

SUBJECT: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District

FILE NO.: RFD.5179.8
TMK NO.: (3) 3-2-004:040

Thank you for the opportunity to review the subject document. The Commission on Water Resource Management (CWRM) is the agency responsible for administering the State Water Code (Code). Under the Code, all waters of the State are held in trust for the benefit of the citizens of the State, therefore all water use is subject to legally protected water rights. CWRM strongly promotes the efficient use of Hawaii's water resources through conservation measures and appropriate resource management. For more information, please refer to the State Water Code, Chapter 174C, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapters 13-167 to 13-171. These documents are available via the Internet at http://dlnr.hawaii.gov/cwrm.

Our comments related to water resources are checked off below.

☐ 1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.

☐ 2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

☐ 3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.

☐ 4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at http://www.usgbc.org/leed. A listing of fixtures certified by the EAP as having high water efficiency can be found at http://www.epa.gov/watersense.

☐ 5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at http://planning.hawaii.gov/czm/initiatives/low-impact-development/

☐ 6. We recommend the use of alternative water sources, wherever practicable.

☐ 7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at http://energy.hawaii.gov/green-business-program.

☐ 8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at

http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

☐ 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

☐ 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.

☐ 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.

☐ 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.

☐ 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.

☐ 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

☒ 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.

☒ 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.

☐ 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.

☒ 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

☐ OTHER:

If you have any questions, please contact Ayron Strauch of the Commission staff at 587-0234.

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
KAHO'OLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAI'I 96809

Ref: OCCL:LY

CORR: HA 20-03

AUG - 6 2019

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

SUBJECT: Pre-Consultation for Environmental Assessment for Proposed Single Family Residence in the Conservation District, North Hilo, Island of Hawaii
Tax Map Key (TMK): (3) 3-2-004:040

Dear Mr. Terry:

The Office of Conservation and Coastal Lands (OCCL) is in receipt of your correspondence regarding the subject project. According to the information provided, Mr. Nicholas Perry, property owner, is proposing to construct a single family residence along with a fruit orchard and vegetable garden on his 3.212-acre property in Piha Homesteads.

The conceptual plan for the home currently consists of an approximately 1,000 square foot, singly story home connected by a lanai to a utility shed and greenhouse. The home will feature solar electricity, a water catchment system, and an individual wastewater system. Grading work will be minimal, involving a driveway, turn around area, and a small pad for the structure. Fruit trees and vegetables will be planted on the rest of the property for personal consumption. A chicken coop and a perimeter fence with a gate for the driveway will also be installed.

The OCCL notes that the project summary does state that the Environmental Assessment (EA) will accompany a Conservation District Use Application (CDUA). We further note that the property is located within the General Subzone of the State Land Use Conservation District. Regarding our comments for the EA, we ask that you provide more detail regarding site preparation and the chicken coop (how many chickens, how they will be managed, etc). We look forward to reviewing the Draft EA along with the CDUA upon submission.

Should you have any questions regarding this correspondence, please contact Ms. Lauren Yasaka of our Office at (808) 587-0386.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

c: HDLO

Harry Kim
Mayor

Paul K. Ferreira
Police Chief

Kenneth Bugado Jr.
Deputy Police Chief

County of Hawai`i

POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawai`i 96720-3998
(808) 935-3311 • Fax (808) 961-8865

August 27, 2019

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

Dear Mr. Terry:

Subject: Early Consultation for Environmental Assessment for Proposed Single-Family Residence in the Conservation District, North Hilo District, Island of Hawai'i, TMK: (3rd)3-2-004:040

Staff, upon reviewing the provided documents, does not anticipate any significant impact to traffic and/or public safety concerns.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Albert Jason Cortez, Hamakua District Commander, at (808) 775-7533.

Sincerely,

JAMES B. O'CONNOR
ASSISTANT POLICE CHIEF
AREA I OPERATIONS

AJC:lli/19HQ0745

From: Roy, Alex <Alex.Roy@hawaiicounty.gov>
Sent: Thursday, July 11, 2019 3:37 PM
To: rterry (rterry@hawaii.rr.com) <rterry@hawaii.rr.com>
Subject: proposed DEA for 332004040 - SFR

Aloha Ron,

This email serves as the Planning Departments notice that we would like to be on the review list for the DEA when it is completed.

Project:
Nicholas Perry SFR
TMK: 332004040
Piha-Kahuku Road, Island of Hawaii

Mahalo!

Alex J. Roy
County of Hawaii Planning Department
101 Pauahi St., Ste. 3
Hilo, HI 96720
(808) 961-8140
alex.roy@hawaiicounty.gov

Planning Division (Planner VI)
CLG Coordinator (Hawaii County)
Cultural Resources Commission (Staff)
Banyan Drive Hawaii Redevelopment Agency (Staff)

Draft Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

APPENDIX 1b
Comments to Draft EA and Responses

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DAVID Y. IGE
GOVERNOR OF
HAWAII

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

ROBERT K. MASUDA
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AQUATIC RESOURCES
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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: TF

CDUA: HA-3860
Acceptance Date: December 27, 2019
180-Day Exp. Date: June 24, 2020

FEB 25 2020

James M. Leonard
JM Leonard Planning, LLC
56 Laukona St.
Hilo, HI 96720

SUBJECT: Conservation District Use Application (CDUA) HA-3860 Single Family Residence; Farm; and Related Improvements Located at 32-2471 Stone Road, Pīhā, North Hilo, Hawai'i, Tax Map Key: (3) 3-2-004:040

Dear Mr. Leonard:

This letter is in regards to the processing of CDUA HA-3860 and the associated Environmental Assessment (EA). The public and agency comment period on the EA has closed as of February 24, 2020. Attached to this letter are copies of the comments received by the Office of Conservation and Coastal Lands (OCCL) regarding your client's CDUA/EA.

Please send copies of your responses to the questions raised in these letters directly to the authoring agency. The final copy of this project's Environmental Assessment (EA) needs to include your responses to the queries raised in these letters pursuant to Hawai'i Administrative Rules (HAR) 11-200.1-20 (c). These responses can be attached to the end of the Final EA document.

Further, the OCCL offers the following comments on the Draft EA and CDUA:

- Please clarify if the SFR will be slab on grade or post and pier;

- Please discuss the dimensions and requirements for outfitting the gully with a culvert for the entrance of the driveway and address the comments offered by the Commission on Water Resources Management (CWRM) during the Early Consultation for Environmental Assessment;

- Please clarify the use of "greenwalls" for the SFR
    - What is a "greenwall"?
    - How does a "greenwall" work?

Please send one (1) hard copy of the Final EA and one (1) CD or flash drive containing the Final EA **in searchable pdf. format** to the OCCL by **March 24, 2020**. The OCCL will send you notice of determination regarding the EA and actions to be taken by you as the applicant or on behalf of your client.

Should you have any questions, please contact Trevor Fitzpatrick of our Office of Conservation and Coastal Lands at (808) 587-0373.

Sincerely,

Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

COPY

State of Hawaii | Department of Land and Natural Resources | Division of Conservation and Resources Enforcement

INVESTIGATION #	District	Lead Investigator	Report Status	Key Report
20-0158-HA	East Hawaii	Branco, Dennis	In Progress	[X] Yes [ ] No
Date/Time Reported	**Location**	**Classification**		**Connecting Reports**
01/28/2020 08:30AM	Hamakua East	OCCL: CDUA		

RECEIVED OFFICE OF CONSERVATION AND COASTAL LANDS

Investigation Report

BASIC

1. CLASSIFICATION: OCCL: CDUA
2. SOURCE: Letter

2020 FEB 11 P 2:03

3. COMPLAINANT'S NAME: Dennis Branco
4. SEX:
5. RACE:
6. AGE:
7. BIRTH DATE:
8. OCCUPATION:
9. ADDRESS:
10. PLACE EMPLOYED/SCHOOL ATTENDING:
11. HOME:
12. WORK:
13. CELL:
14. LOCATION OF INCIDENT/INTERSECTING STREET: 32-2471 Stone Road, North Hilo, Hawaii.
15. DATE/TIME OCCURRED: 01/28/2020 08:30AM
16. DATE/TIME REPORTED: 01/28/2020 08:30AM

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

VEHICLES

17. TYPE:
18. YEAR:
19. MAKE:
20. MODEL:
21. COLOR:
22. LICENSE / HA No.:
23. LENGTH:
24. STOLEN:
25. REGISTERED OWNER:
26. ADDRESS:
27. HOME:
28. WORK:
29.. CELL:
30. NOTES:

31. TYPE:
32. YEAR:
33. MAKE:
34. MODEL:
35. COLOR:
36. LICENSE / HA No.:
37. LENGTH:
38. STOLEN:
39. REGISTERED OWNER:
40. ADDRESS:
41. HOME:
42. WORK:
43.. CELL:
44. NOTES:

PEOPLE

45. NAME: Nicolas PERRY
46. SEX: Male
47. RACE:
48. AGE:
49. BIRTH DATE:
50.. OCCUPATION:
51. CATEGORY: Applicant
52. ADDRESS: 32-2471 Stone Road, Piha, HI, 96773
53. HOME:
54. WORK:
55. CELL:

56. NAME: Rodrigo GONZALEZ
57. SEX: Male
58. RACE:
59. AGE:
60. BIRTH DATE:
61.. OCCUPATION:
62. CATEGORY: Applicant
63. ADDRESS: 32-2471 Stone Road,, Piha, HI, 96773
64. HOME:
65. WORK:
66. CELL:

67. NAME:
68. SEX:
69. RACE:
70. AGE:
71. BIRTH DATE:
72.. OCCUPATION:
73. CATEGORY:
74. ADDRESS:
75. HOME:
76. WORK:
77. CELL:

SYNOPSIS

78. SYNOPSIS

On 01-28-2020 at about 0830. I was assigned by Lt. Lawrence TERLEP to complete a request for comments on a Conservation Use Application.

SCENE: 32-2471 Stone Road, Piha, Hawaii. Tax Map Key: (3) 3-2-004:040. Which is located in North Hilo, Hawaii 96773.

OFFICERS OBSERVATIONS: On 01-31-2020 at about 1230 hrs. I conducted a site assessment of the said property above and have no comments to add.

DISPOSITION: Based upon my review and assessment of the property, I will be forwarding this report to the Office Of Conservation And Coastal Lands for their final review and disposition.

CLOSED: REFER TO THE OFFICE OF CONSERVATION AND COASTAL LANDS FOR FINAL REVIEW. ATTN: TREVOR FITZPATRICK.

WRITER

79. REPORT WRITTEN BY	80. BADGE No.	81. DATE/TIME WRITTEN	82. SUPERVISOR APPROVING	83. DATE/TIME APPROVED	84. BADGE No.
Branco, Dennis	244	02/02/2020 10:23AM	Terlep, Jr., Lawrence	02-03-20/1100	3

#240

85. DISPOSITION:

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
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: TF

CDUA: HA-3860
Acceptance Date: December 27, 2019
180-Day Exp. Date: June 24, 2020
SUSPENSE DATE: 21 Days from stamped date

JAN 13 2020

MEMORANDUM

TO:

State Agencies

✓ DLNR-Resource Enforcement
____ DLNR-Aquatic Resources
____ DLNR-Hawaii District Land Office
____ DLNR-Forestry and Wildlife
____ DLNR-Na Ala Hele
** DLNR-Historic Preservation
-via e-mail w/6E Form

____ Office of Hawaiian Affairs

County Agencies:

____ Planning Department
____ Fire Department

FROM: for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA) HA-3860
Single Family Residence; Farm; and Related Improvements

APPLICANT: Nicolas Perry and Rodrigo Gonzalez

LOCATION: Pīhā, North Hilo, County of Hawai'i
TMK: (3) 3-2-004:040

Attached please find a CD of CDUA HA-3860 and the draft Environmental Assessment along with our Department's notice to the applicant. These documents may also be found on our website at dlnr.hawaii.gov/occl under current applications. We would appreciate your agency's review and comment on this application. If no response is received by the suspense date, we will assume there are no comments. The suspense date starts from the date stamp.

Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached

(✓) No Comments

DENNIS A BRANLO CREOIII

Signature/ Print your Name and Title

Attachment
Enclosure

2454

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

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MEMORANDUM

~~TO:~~ From:

State Agencies

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✓ DLNR-Forestry and Wildlife
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____ Office of Hawaiian Affairs

County Agencies:

____ Planning Department
____ Fire Department

~~FROM:~~ To ✓ for Samuel J. Lemmo, Administrator
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Single Family Residence; Farm; and Related Improvements

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Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached

(✓) No Comments

DAVID G. SMITH, Administrator
Signature/ Print your Name and Title

Attachment
Enclosure

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
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JAN 13 2020

MEMORANDUM

TO:

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_____ DLNR-Na Ala Hele
** DLNR-Historic Preservation
-via e-mail w/6E Form

_____ Office of Hawaiian Affairs
_____ CWRM

County Agencies:

_____ Planning Department
_____ Fire Department
✓ Engineering Div

FROM

FROM: TO for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

RECEIVED
LAND DIVISION
2020 JAN 22 PM 4:49
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA) HA-3860
Single Family Residence; Farm; and Related Improvements

APPLICANT: Nicolas Perry and Rodrigo Gonzalez

LOCATION: Pīhā, North Hilo, County of Hawai'i
TMK: (3) 3-2-004:040

2020 JAN 15 PM 1:40 ENGINEERING

Attached please find a CD of CDUA HA-3860 and the draft Environmental Assessment along with our Department's notice to the applicant. These documents may also be found on our website at dlnr.hawaii.gov/occl under current applications. We would appreciate your agency's review and comment on this application. If no response is received by the suspense date, we will assume there are no comments. The suspense date starts from the date stamp.

Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached
(✓) No additional Comments

Carty S. Chang, Chief Engineer
Signature/ Print your Name and Title

Attachment
Enclosure

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
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2020 JAN 21 P 1:
DEPT. OF LAND &
NATURAL RESOURCES
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

REF: OCCL: TF

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Acceptance Date: December 27, 2019
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JAN 13 2020

MEMORANDUM

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_____ DLNR-Na Ala Hele
** DLNR-Historic Preservation
-via e-mail w/6E Form

_____ Office of Hawaiian Affairs

County Agencies:

_____ Planning Department
_____ Fire Department

FROM: for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA) HA-3860
Single Family Residence; Farm; and Related Improvements

APPLICANT: Nicolas Perry and Rodrigo Gonzalez

LOCATION: Pīhā, North Hilo, County of Hawai'i
TMK: (3) 3-2-004:040

RECEIVED
LAND DIVISION
HILO, HAWAII
2020 JAN 15 A 10:

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Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached

(✓) No Comments

The DLNR Land Division (HI District Branch)
has no comments regarding this request.

GORDON C. HEIT
Signature/ Print your Name and Title District Land Agent

Attachment
Enclosure

DAVID Y. IGE
GOVERNOR OF
HAWAII

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

ROBERT K. MASUDA
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JAN 13 2020

MEMORANDUM

TO:

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_____ DLNR-Na Ala Hele
** DLNR-Historic Preservation
-via e-mail w/6E Form

_____ Office of Hawaiian Affairs

County Agencies:
✓ Planning Department
_____ Fire Department

2020 JAN 15 PM 2 09
PLANNING DEPARTMENT
COUNTY OF HAWAII

FROM: for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA) HA-3860
Single Family Residence; Farm; and Related Improvements

APPLICANT: Nicolas Perry and Rodrigo Gonzalez

LOCATION: Pīhā, North Hilo, County of Hawai'i
TMK: (3) 3-2-004:040

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Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached
(✓) No Comments

Attachment
Enclosure

Signature/ Print your Name and Title
ALEX ROY
SR. PLANNER

SCANNED
JAN 15 2020
By 130543

2497

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
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MEMORANDUM

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-via e-mail w/6E Form

_____ Office of Hawaiian Affairs

County Agencies:

_____ Planning Department
_____ Fire Department

RECEIVED
OFFICE OF CONSERVATION
AND COASTAL LANDS
2020 JAN 14 P 12:06
DEPT OF LAND & NATURAL RESOURCES
STATE OF HAWAII

FROM: for Samuel J. Lemmo, Administrator
Office of Conservation and Coastal Lands

SUBJECT: REQUEST FOR COMMENTS
Conservation District Use Application (CDUA) HA-3860
Single Family Residence; Farm; and Related Improvements

APPLICANT: Nicolas Perry and Rodrigo Gonzalez

LOCATION: Pīhā, North Hilo, County of Hawai'i
TMK: (3) 3-2-004:040

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Contact Trevor Fitzpatrick at (808) 587-0373 should you have any questions on this matter.

( ) Comments Attached

(X) No Comments

Doris Moana Rowland
Doris Moana Rowland
Abstractor for DOFAW
Signature/ Print your Name and Title

Attachment
Enclosure

H 20:01 Piha

Rcvd 1-14-2020

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

March 6, 2020

Sam Lemmo, Administrator
Office of Conservation and Coastal Lands
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Lemmo:

Subject: Comments on Draft Environmental Assessment (DEA)/Conservation District Use Application (CDUA) for Perry Single-Family Residence in the Conservation District at Pīhā, Island of Hawai'i, TMK 3-3-2-004:040

I am in receipt of your letter that summarizes OCCL's comments and also attaches all other comment letters on the Draft EA for the subject project, which was provided by Trevor Fitzpatrick to project planner James Leonard.

In the interest of a complete record on comments to the EA/CDUA, I would first like to acknowledge receipt of comment letters from various DLNR divisions and programs as well as other agencies contained within form memos circulated by your office. We acknowledge here the *no-comment* or *no-additional comments* remarks of the Division of Conservation and Resources Enforcement, the Division of Forestry and Wildlife, Hawai'i Island Land Division, the Engineering Division, the Na Ala Hele Program and the Planning Department.

The comments from your office are summarized below, along with our responses to each:

1. *Construction method.*

The house will be slab on grade.

2. *Culvert in gully.*

Concerning the comments made during early consultation by the Commission on Water Resources Management, the water source for drinking water will be catchment, as stated in the Draft EA. To elaborate on the description provided in Section 3.1.1 of the Draft EA, the drainage over which the expected 2-foot diameter, 24-foot long culvert will be installed is not a stream. Instead, it is a very minor gully of the type that is universal on the rolling topography of former cane land and would not meet any definitions of a stream. Water only flows temporarily after heavy rains through a

minor depression covered with California grass that lacks a stream bed or streambanks. This information has been added to the Final EA. Therefore a SCAP would not appear to be required. No stream diversion works are planned.

3. *Greenwall description*.

A greenwall is a vertical trellis affixed to the side of a building and planted with ornamental vines, e.g., *Begonia rex* (not considered invasive in Hawai‘i). The plants help protect the wall from the weather and cool the building by reducing the solar radiation reaching a building’s surface. They also provide a pleasing appearance. The greenwall is not involved in structural support. This information has been added to the Final EA.

Thank you for circulating the EA and CDUA for review by DLNR agencies. If you have any questions about the EA, please contact me at (808) 969-7090; for questions about the project or CDUA, please contact James Leonard, Project Planner, at (808) 896-3459.

Sincerely,

Ron Terry, Principal
Geometrician Associates

Cc: James Leonard, Nick Perry, Rodrigo Gonzalez

January 24, 2020

Re: Perry Single-Family Residence and farm, TMK(s)(3) 3-2-004: 040

Dear Sirs,

Article XI, Section 1, Constitution of the State of Hawaii states.....

For the benefit of present and future generations, ***the State and its political subdivisions*** *shall conserve and protect Hawaii's natural beauty and all natural resources,* ***including*** *land, water, air, minerals, and energy sources,* ***and shall promote the development and utilization of these resources*** ***in a manner consistent with their conservation*** ***and in furtherance of the self-sufficiency of the State"***

The most outstanding ***natural resource*** likely found on the former field area of the 3 acres of former sugar cane field is its ***"Prime Agricultural Soils"***, Class C. The **ag. use** of South and North Hilo quadrangle lands is described often as ***"Scenic"***. I also own land in the South Hilo district. It has been my experience that the DLNR/OCCL has a highly limiting interpretation of what ***"Scenic"*** means in its interpretation of its Rules.

The ALISH classification for the soil on the Perry property is ***Prime type C.***.....

> *"PRIME AGRICULTURAL LAND* ***is land best suited*** *for the production of food, feed, forage and fiber crops.* ***The land has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, including water management, according to modern farming methods."***

The ALISH classification system does not differentiate between **existing use vs. capacity to produce agricultural crops** whether or not such use may be determined to have been interrupted for a period of time exceeding one (1) year and subsequently resumed.

The EA and CDUA describe that the historical use of the property was for ***'cane production'*** dating to a period before the Conservation District was overlaid on the privately owned property.

The property already qualifies for ***"Allowed"*** rather than ***"Allowable"*** agricultural production., *ref., HAR 13-5-2* ***Definition****'s Rule*.....

> ***"Nonconforming use"*** *means the lawful use of any building, premises, or land for any* ***trade, industry****, residence, or other purposes which is the same as and no greater than that established prior to October 1, 1964, or prior to the inclusion of the building, premises, or land within the conservation district."*

and *HAR 13-5-7's* ***Nonconforming Use Rule***.....

"§13-5-7 Nonconforming uses and structures. (a) This chapter shall not prohibit the continuance, or repair and maintenance, of nonconforming ***land uses*** *and structures as* ***defined*** *in this chapter."*

Neither the Definitions Rule nor the Nonconforming Use Rule require 'continuous use', without interruption, in order that land qualify for resumed nonconforming use in the State's Conservation District. This is different than other SLU districts which do.

Agriculture is an ***industry*** and ***trade*** in ag. products results in a commercial use of a property. It is sometimes argued that the Rules provide that 'the nonconforming use has to be the same as, *ie sugar cane cropping*, and not greater than the use at the time the Conservation District was overlaid'. Agriculture is a land use and sugar cane cropping is a type of agricultural use. Sugar cane, pineapple, raising of livestock, agro- forestry and the like are types of agriculture and not specific land uses.

The OCCL repeatedly requires that applicants apply for a ***"Conditional Permit"*** for ag. use supported by a ***"management plan"*** to be first reviewd for acceptance for processing and subsequently ***"Approved"*** by the BLNR rather than advising applicants that former sugar cane properties already qualify for ag. use without any permitting requirements. This is a waste of scarce government resources. The OCCL frequently has raised concerns to the BLNR that it suffers a heavy workload. In my opinion some of the work load is 'self imposed' and discretionary by the OCCLwhich is not always required by the Rules and particularly is against the State's Constitution in regards to ***promoting the development and utilization of these resources in a manner consistent with their conservation and in furtherance of the self-sufficiency of the State***.

Particularly management plans are something that the BLNR reviews and approves. Prior approval by the OCCL is not provided for in the Rules in order that an application be accepted for processing yet this is what is often required. The OCCL's implementation of the Rules in this regard is an unnecessary waste of scarce Government resources, adds considerable cost to applicants and delays land use, restricts land use, requires huge volumes of supporting studies, endless negotiations with OCCL staff etc. This was never intended by the law-makers when the State overlaid the conservation district on lands that were in intense ag. use.

HAR 13-5 Rules do not particularly differentiate between personal ag. use and commercial ag. use in its definition of Agricultural use except that commercial use of conservation districted property **generally** is discouraged and suffers a much higher level of submission of documents, review, ongoing review, and permitting, expense **and registration of title restrictions**. Furthermore the OCCL generally presses applicants to use their Prime ag. land only for "personal" ag. use and in a very limited and highly specified way when their property already qualify for more libberally/generally ***"Allowed"*** nonconforming agricultural use according to HAR 13-5-7's Nonconforming Use Rule.

When one of the most outstanding quality of a property is its Prime ag. soils that is a resource that needs ***protection and promotion*** by the OCCL as required by the State's Constitution.

The CDUApplication process for ***"Allowable"*** vs. ***"Allowed"*** ag. is expensive to draft and submit, results in delayed ag. land use etc. Resulting CDUPermits restrict the ag. use of properties in various ways and often require that the terms of the permit be registered against the title of the property which forever limit and restrict ag. use.

This goes against the State's Constitution, quoted above.....
'State and its political subdivisions shall <u>promote</u> the development and utilization of these resources in a manner consistent with their conservation <u>and in furtherance of the self-sufficiency of the State</u>'

Clearly the DLNR/OCCL is not in compliance with the State's Constitution because it is not ***promoting the development and utilization*** of the Perry property's Prime ag. soils ***'in furtherance of the self-sufficiency of the State'***. The tedium of application effectively discourages and does not promote ag. use.

Particularly the historical field area of the property cannot be described to have any significant resource ***greater*** than its **Prime ag. soils** with a ***high capacity for*** their ag. use.

The State Land Use Law, *HRS 205-2,* states that in establishing district boundaries the *'**<u>greatest</u> possible protection** be given to lands with a high capacity for intensive cultivation',* The word ***"greatest"*** does not need definition. The Statute is succinct in requiring that *'in establishing district boundaries'* **no other** land zoning priority be given to land if it has a *'high **capacity** for intensive cultivation.*

The Perry Property has a *'high capacity for intensive cultivation'*. The State intended that while zoning ***prime ag. land*** into the Conservation District that the DLNR would not effectively burden land owners and would rather allow continued, unrestricted, ag. use of such land in perpetuity and in-as-much the conservation zoning would still be in compliance with the described State Constitutional requirement. It was intended that the DLNR would simply apply its higher level of discretionary review and permitting for further development of new uses for such properties *ie., dwellings etc.*

<u>"Greatest"</u> is a succinct word. The Perry property has a *'high **capacity** for intensive cultivation'* and a long history of intense agricultural use including uses accessory and incidental to agriculture.

By submitting the Perry application through the highly restrictive, highly conditioned, CDUPermitting process the Perry (or by direction of the OCCL their land use professional consultant/s**??**) are reducing the agricultural capacity of the State by restricting the Perry property contractually to only be used for highly described, conditional and limited **and** personal ag. use and requiring the conditional permit to be registered against the title of the property.

The OCCL repeatedly effectively forces applicants through a very expensive, time consuming, tedious and limiting Conditional (contractual) form of application by

refusing to accept applications for processing until they conform to the much more restrictive process of applying for a CDUA for ag. use when a property already qualifies for same. While consideration of acceptance of an application by the OCCL for processing is provided for in the Rules as **"complete"**, the administrative office of the OCCL is not given the ***discretionary*** authority to deny acceptance for processing simply because the OCCL believes that the application conforms to its highly ***discretionary interpretation*** of the Rules. **In this regard *discretion* is a BLNR authority according to the Rules!**

Please describe.....

- What attempts did the applicant make to secure the unrestricted use of the property for agriculture through the Nonconforming use Rule rather than the highly restrictive conditional permitted CDUA?

- Did the applicant or its representative visit the Sugar Cane Museum, which I believe is located in Papaikau, in order to research and establish ***"proof"*** *ref., HAR 13-5-7 (f)* that the historical use of the property was for ag.? The museum has considerable field crop production records, maps and aerial pictures of cane fields including the Perry property.

- Did the OCCL direct the applicant to apply for a permit for ag. use rather than apply for nonconforming ag. use as is provided for in HAR 13-5-7(f)? .....

  *"The burden of proof to establish that the land use or structure is legally nonconforming shall be on the **applicant**. Proof may include historic photos or records showing that the specific area in question was used for agriculture."*

- Did the OCCL require the submission of an ag. use management plan which is not required for the property as it qualifies for nonconforming ag. use already?

- Did the OCCL ***promote the development and utilization*** of the Perry property's Prime ag. soils as is required by the State's Constitution? Utilization for ag. ought to include substantial utilization in furtherance of the State's desire to be agriculturally self sufficient. Deed restrictions limiting ag. use goes against the State's Constitution.

- Did the OCCL describe to the applicant that the property does not qualify for nonconforming ag. use as such use was interrupted for a period of years? I am aware that this has happened, improperly, in at least one other case.

- Was the Perry application denied being ***'accepted for processing'*** by the OCCL until the application conformed to their highly ***'discretionary'*** process of application review for ***'completeness'*** before accepting it for consideration by the BLNR? It is noteworthy that such ***'discretion'*** is a BLNR authority and not an authority provided to the OCCL in HAR 13-5 regarding ag. use.

- Did the OCCL describe that only the ***'raising of sugar cane'*** would be allowed as a nonconforming use? I am aware that this happened in another case.

Please provide a detailed and comprehensive response to these questions.

It is my opinion and direct experience that the OCCL and by extension the DLNR and the BLNR does not have a consistent, evenly applied policy that is in conformance with HRS 183C, HAR 13-5 nor the State's Constitution regarding the processing and approval of applications for ***"allowable"*** ag. use and/or ***"allowed"*** nonconforming ag. use on former sugar cane properties. Formal permit applications for Ag. use of such land is effectively **restricted and limited** rather than being ***promoted*** as is required in the State's Constitution.

It is often argued by the OCCL that the DLNR must preserve and protect various characteristics of land. On-the-other-hand if ag. use is already an ***"Allowed"*** use then use through the highly regulated CDUPermitting of ag. use should not be restricted through the CDUPermitting processes. Clearly the historical use of the land before the Conservation District was overlaid on it required its clearing, grubbing, cultivation of soils, removal of volunary weedy plant growth, planting of ag. use plants, raising crops etc. It can hardly be argued that regulations be applied now that are preemptive of ***"Allowed"*** ag. use in order to preserve and protect other conservation qualities of the property.

Again..... the State never intended to interfere with existing uses of land when it overlaid the conservation district onto privately owned properties. Particularly the land use law required/iers that the ***'greatest protection be given to land with a high capacity for ag. production'***. ***Greatest*** is a succinct word. It means that no other consideration be given a higher priority by administrative officials than ag. use of land ***with a high capacity for intense ag. us***e.

"Hawaii, Legislative Reference Bureau, Public Land Policy in Hawaii: The Multiple-Use Approach, Report No. 1, 1965 (Rev. 1969), Honolulu, p.17.) states.....

> *The dual public purposes of preservation and conservation are apparent in the land use law and the forest and water reserve zones law. The land use law speaks of "protecting," "preserving," and "conserving"; it also speaks of uses "not detrimental to a multiple use conservation concept." In multiple use, land is used for two or more purposes (for example, water conservation, timber production, and foraging)* ***in order to increase the benefits derived from*** *an area.".....*

I fully support that the Perry property be recognized to qualify for "Allowed" ag. use and that its ag. use not be restricted through the DLNR's CDUPermitting process.

Sincerely,
Ken Church, Hakalau

geometrician
ASSOCIATES, LLC
integrating geographic science and planning

phone: (808) 969-7090 PO Box 396 Hilo Hawaii 96721 rterry@hawaii.rr.com

March 6, 2020

Ken Church
Dockline3@yahoo.ca

Dear Mr. Church:

Subject: Comments on Draft Environmental Assessment (DEA)/Conservation District Use Application (CDUA) for Perry Single-Family Residence in the Conservation District at Pīhā, Island of Hawai‘i, TMK 3-3-2-004:040

Thank you for the comment letter dated January 24, 2020. We appreciate your support for granting of the CDUP. After consulting with Mr. Perry, I would like to answer to your specific comments:

1. *Agriculture as a non-conforming use on the property*. Although a case can be made that the proposed agricultural activities is simply a continuation of a non-conforming use that ended in the 1970s, the sugar cane plantings long ago reverted to partially native forest/ shrubland. As such, the applicants believed that a CDUA was the most appropriate mechanism for achieving their plans.
2. *The application reduces the agricultural capacity of the State of Hawaii by restricting operations*. Although it does not seem credible that decisions made on this small property could affect the agricultural production of the State of Hawai‘i, Mr. Perry’s goals are to conduct the type of agricultural operations he and his partner desire to have for their own sustenance, not to advance agricultural policy or production in the State. As such, the application is appropriate.

If you have any questions about the EA, please contact me at (808) 969-7090; for questions about the project, please contact James Leonard, Project Planner, at (808) 896-3459.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

Cc: OCCL; James Leonard, Nick Perry, Rodrigo Gonzalez

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Draft Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

APPENDIX 2
Archaeological Assessment Survey

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An Archaeological Assessment of a 3.2-Acre Parcel within the Pīhā Homesteads

TMK: (3) 3-2-004:040

Pīhā Ahupuaʻa
North Hilo District
Island of Hawaiʻi

DRAFT VERSION

Prepared By:

ʻIolani K. Kaʻuhane, B.A.,
and
Matthew R. Clark, M.A.

Prepared For:

Mr. Nicholas Perry
2185 Pretty Lane Apt #3
West Palm Beach, FL 33415

July 2019

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ASM Project Number 32680.00

An Archaeological Assessment of a 3.2-Acre Parcel within the Pīhā Homesteads

TMK: (3) 3-2-004:040

Pīhā Ahupuaʻa
North Hilo District
Island of Hawaiʻi

ASM affiliates

EXECUTIVE SUMMARY

At the request of Mr. Nicholas Perry (landowner), ASM Affiliates conducted an archaeological survey of a roughly 3.2-acre parcel (TMK: (3) 3-2-004:040) located within the Pīhā Homesteads, Pīhā Ahupuaʻa, North Hilo District, Island of Hawaiʻi. The current study, which was conducted in support of an Environmental Assessment (EA) and Conservation District Use Permit (CDUP) Application being prepared for the development of a single-family residence on the property, was undertaken in accordance with Hawaiʻi 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 Hawaiʻi Administrative Rules 13§13–276. According to 13§13-284-5(b)(5)(A) when no archaeological resources are discovered during an Archaeological Inventory Survey the production of an Archaeological Assessment report is appropriate. Compliance with the above standards is sufficient for meeting the historic preservation review process requirements of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawaiʻi Planning Department. This report provides a study area description, a detailed culture-historical background, a discussion of prior archaeological studies conducted in the vicinity of the current study area, and the results of the current field investigation.

The archaeological survey was conducted on June 25, 2019, by ʻIolani K. Kaʻuhane, B.A., and Johnny Dudoit, B.A., under the direction of Matthew R. Clark, M.A. (Principle Investigator). During the survey, fieldworkers walked northeast/southwest oriented pedestrian transects spaced at 20-meter intervals across the entire study area. As a result of the investigation, no archaeological resources were identified. Given these findings, we conclude that the proposed construction of a single-dwelling on TMK: (3) 3-2-004:040 will not affect any historic properties. With respect to the historic preservation review process of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawaiʻi Planning Department, our recommendation is that no further work needs to be conducted. In the unlikely event that significant archaeological resources are discovered during the construction of the proposed dwelling, work shall cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

CHAPTERS

FIGURES

1. INTRODUCTION

At the request of Mr. Nicholas Perry (landowner), ASM Affiliates conducted an archaeological survey of a roughly 3.2-acre parcel (TMK: (3) 3-2-004:040) located within the Pīhā Homesteads, Pīhā Ahupuaʻa, North Hilo District, Island of Hawaiʻi (Figures 1 and 2). The current study, which was conducted in support of an Environmental Assessment (EA) and Conservation District Use Permit (CDUP) Application being prepared for the development of a single-family residence on the property, was undertaken in accordance with Hawaiʻi 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 Hawaiʻi Administrative Rules 13§13–276. According to 13§13-284-5(b)(5)(A) when no archaeological resources are discovered during an Archaeological Inventory Survey the production of an Archaeological Assessment report is appropriate. Compliance with the above standards is sufficient for meeting the historic preservation review process requirements of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawaiʻi Planning Department. This report provides a study area description, a detailed culture-historical background, a discussion of prior archaeological studies conducted in the vicinity of the current study area, and the results of the current field investigation.

STUDY AREA DESCRIPTION

The current study area, a portion of the former Lot 13/14 of the Pīhā Homesteads, consists of a 3.212-acre parcel (TMK: (3) 3-2-004:040) located in Pīhā Ahupuaʻa, North Hilo District, Island of Hawaiʻi (see Figures 1 and 2). Located at an elevation of roughly 1,178 feet (359 meters) above sea level, roughly 2.7 kilometers inland of the coast, the subject parcel is situated within the Lower Windward Slopes Sub-region of North Hilo (Cordy 1994), which extends from sea level to about 5,000–6,000 feet in elevation and is characterized by rolling tablelands alternating with narrow, deeply dissected stream gulches. The current study area is located on a narrow finger of tablelands between the Kalaeha and Waikaumalo stream gulches. Soils within this area (Figure 3) are classified primarily as Kaiwiki highly organic hydrous silty clay loam on 10 to 20 percent slopes, but an area near the southeastern boundary along the upper edge of Kalaeha Stream gulch is classified as Kaiwiki rocky outcrops on 35 to 100 percent slopes (Soil Survey Staff 2018). These soils have formed from Pleistocene lava flows of the Hāmākua Volcanic Series (Qhm in Figure 4) that originated from Mauna Kea Volcano 64,000 to 300,000 years ago (Sherrod et al. 2007). Rainfall in the vicinity of the study area averages 4,684 millimeters (184 inches) per year, and the mean annual air temperature is 68.4°F (20 °C) (Giambelluca et al. 2013, 2014).

The study area is accessed from Stone Road, which extends northwest from Pīhā-kahuku Homestead Road (along the Pīhā-Kahuku *ahupuaʻa* boundary), across the Kalaeha Stream gulch to the Waikaumalo Stream gulch and beyond (Figure 5). The subject parcel is bounded to the northeast by Stone Road (Figure 6), to the northwest and southwest by developed residential parcels, and to the southeast by Kalaeha Stream gulch (Figure 7). The southwestern boundary of the parcel, separating it from Parcel 44, is marked by a fence line (Figure 8). The study area, which was formerly used (for more than a century) for the cultivation of sugarcane, is currently undeveloped and covered in thick vegetation consisting primarily of strawberry guava (*Psidium cattleianum*), *uluhe* (*Dicranopteris linearis*), Asian melastome (*Melestoma candidum*), with numerous other grasses, vines, ferns, shrubs, and weeds also present (Figure 9). The western corner of the study area contained the most restrictive vegetation cover, consisting of thick patches of *uluhe* (Figure 10), while the eastern corner, where some hand clearing of brush has occurred, contained the least restrictive vegetation (Figure 11). Several mature Cook Island pines (*Araucaria columnaris*) are growing in a line near the eastern corner of the parcel adjacent to Kalaeha Stream gulch and Stone Road.

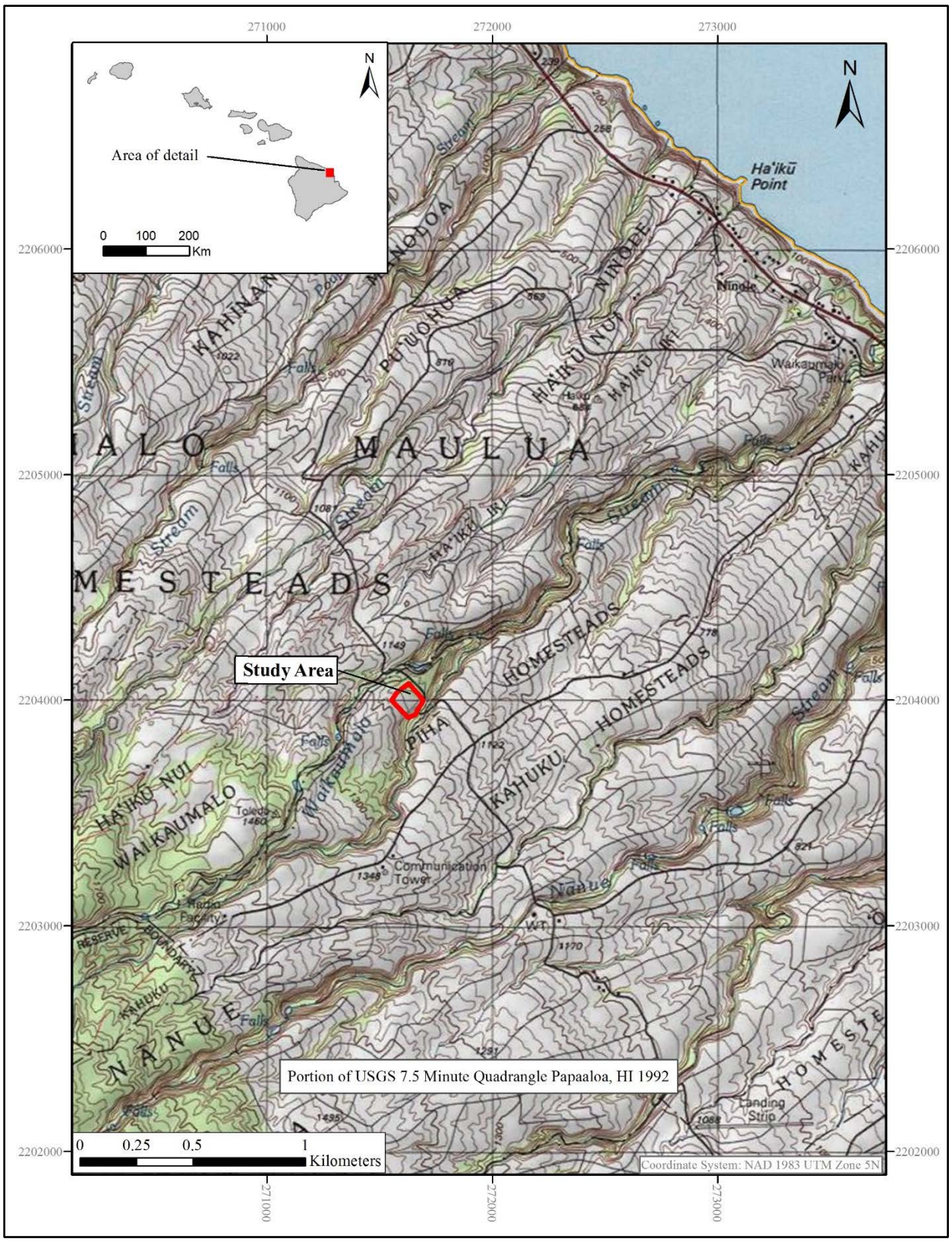

Figure 1. Study area location.

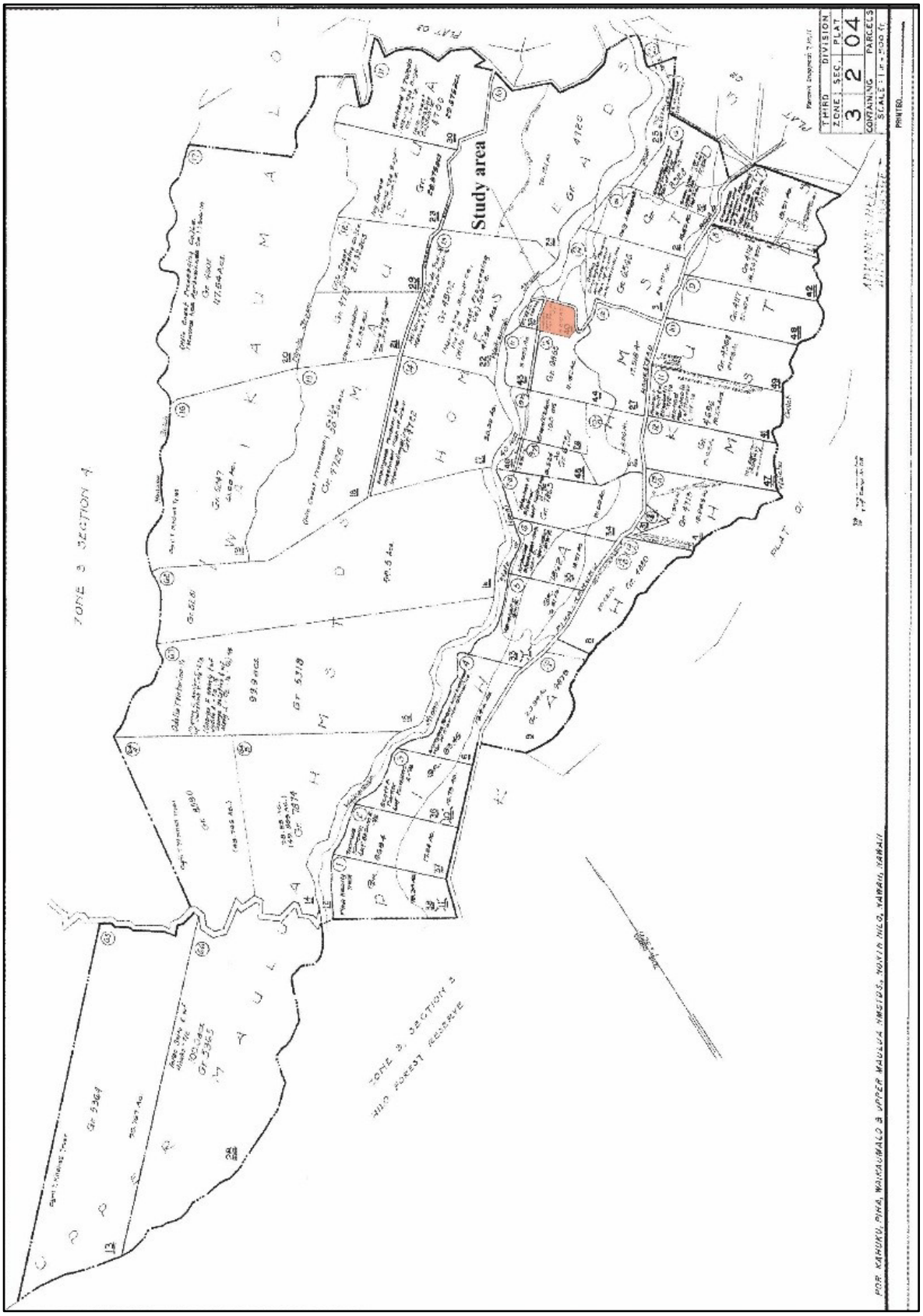

Figure 2. Tax Map Key (3) 3-2-004 showing location of current study parcel (040).

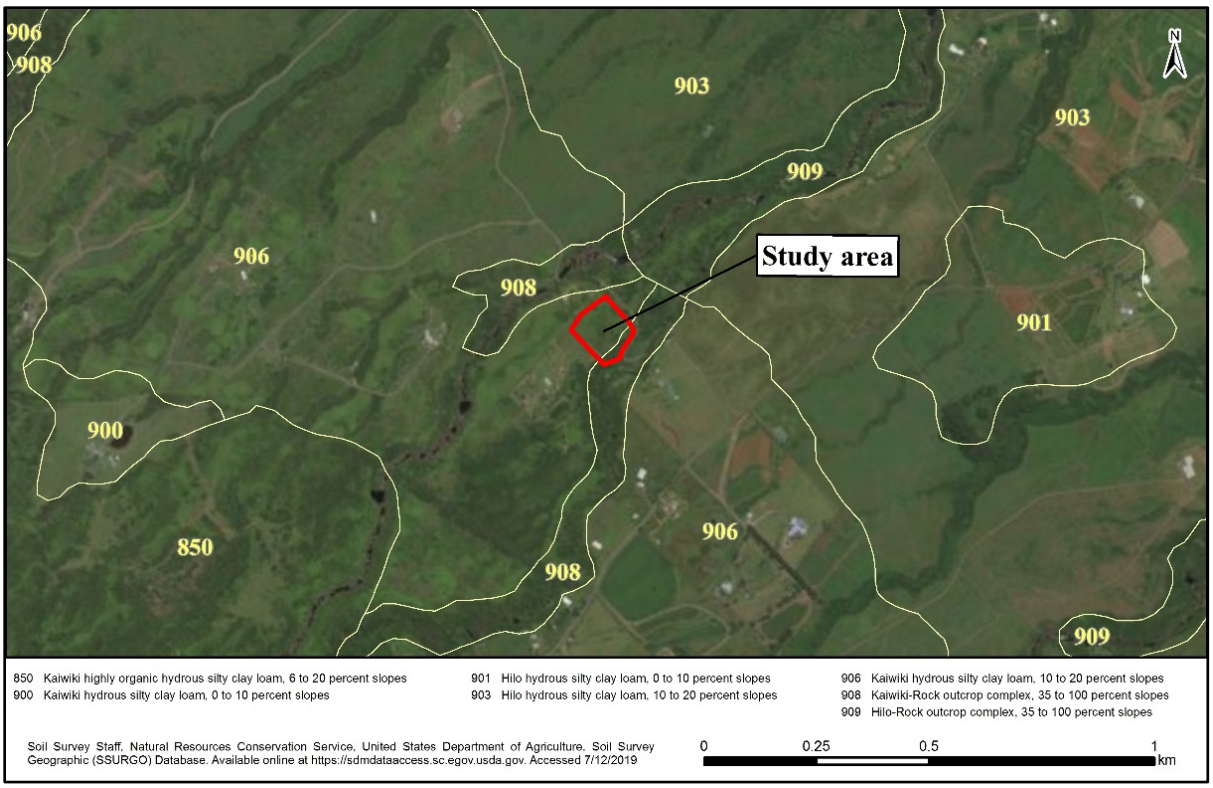

Figure 3. Soils in the current study area.

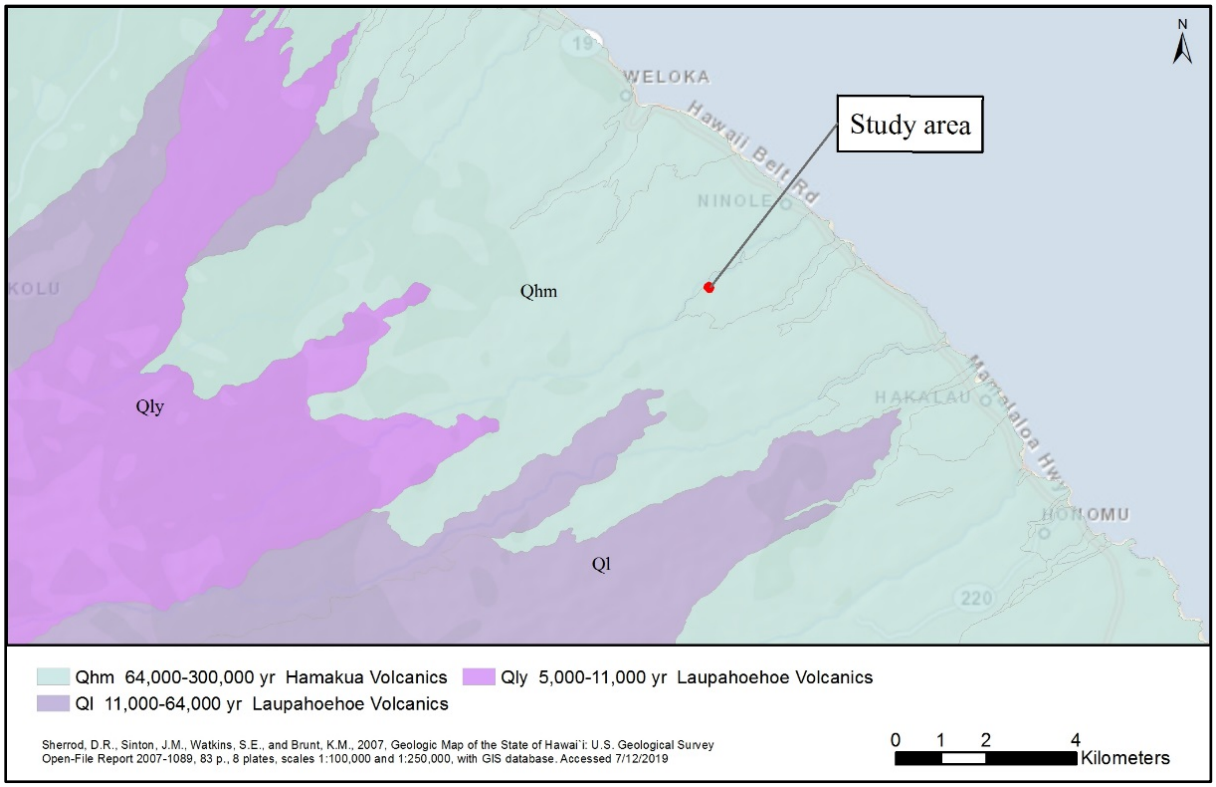

Figure 4. Geology in the current study area.

Figure 5. Google Earth (2017) aerial image showing the current study area.

Figure 6. Stone Road along the northeastern boundary of the study area, view to the south.

Figure 7. Kalaeha Stream Gulch along the southeastern edge of the study area, view to the east.

Figure 8. Fence line along the southwestern boundary of the study area, view to the southwest.

Figure 9. Typical vegetation cover within the study area, view to the northwest.

Figure 10. Thick *uluhe* growing within the western corner of the study area, view to the east.

Figure 11. Hand cleared vegetation and Cook Island pines in the eastern corner of study area, view to the northwest.

2. BACKGROUND

To generate a set of expectations regarding the nature of cultural resources that might be encountered within the study area, and to establish an environment within which to assess the significance of any such resources, a brief culture-historical background for the North Hilo District and Pīhā Ahupuaʻa is presented, followed by a summary of prior archaeological research conducted in the vicinity of the study area.

CULTURE-HISTORICAL CONTEXT

The current study area is located within the *ahupuaʻa* of Pīhā, in the District of North Hilo, on the windward coast of Hawaiʻi Island (Figure 12). This portion of the district was traditionally referred to as *Hilo-pali-Kū* or "Hilo of the upright cliffs" (Maly and Maly 2006). The name describes the region's treacherous coastline, with its sheer cliffs broken only by a string of narrow gulches containing streams that pour down from the slopes of Mauna Kea. Pīhā, which literally translates as "flotsam" (Pukui et al. 1974:184), meaning any floating material carried by flood waters or the sea, is one of many land divisions (*ahupuaʻa*) extending inland from the coast of North Hilo with boundaries that generally follow the meanderings of the gulches, and encompass the tablelands in between. It was along these gulches, and on the tablelands near the ocean's edge, that the first Polynesian settlers of this part of Hilo lived. 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 that environment. The brief generalized cultural sequence that follows below provides a time frame for the peopling of Hawaiʻi, the development of Hawaiian culture, the expansion and intensification of the Hawaiian population, and the resulting stresses on it from the earliest Polynesian settlers to the time of European Contact.

A Generalized Model of Hawaiian Prehistory

This generalized cultural sequence is based on Kirch's (1985) model but is amended to include more 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; Kirch 1985; Hommon 1986). However, there is no archaeological evidence for occupation of Hawai‘i Island (or perhaps anywhere in Hawai‘i) during this initial settlement, or colonization stage of island occupation (A.D. 300 to 600). More recently, Kirch (2011) and Athens et al. (2014) have convincingly argued that Polynesians may not have arrived at the Hawaiian Islands until at least A.D. 1000, but expanded rapidly after that. 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, and the Expansion Period to A.D. 1350 to 1650.

The initial settlement in Hawai‘i is believed to have occurred from the southern Marquesas Islands. 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. Order was further assured by the conical clan principle of genealogical seniority (Kirch 1984). According to Fornander (1969), the 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*. Initial permanent settlements in the islands were established at sheltered bays with access to freshwater and marine resources. Communities shared extended familial relations, and there was an occupational focus on the collection of marine resources.

For several centuries, the areas with the most abundant 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 Hawai‘i were controlled by a few powerful chiefs.

The Development Period brought about uniquely Hawaiian culture. The portable artifacts found in archaeological sites of this period reflect not only an evolution of the traditional tools but some 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. A few areas in Hawai‘i, such as the summit region of Mauna Kea, produced quality basalt for adze production. The two-piece fishhook and the octopus-lure bread loaf sinker were also Hawaiian inventions of this period, as are *‘ulu maika* stones and *lei niho palaoa*. The later was a status item worn by those of high rank, indicating a trend toward greater status differentiation (Kirch 1985).

The Expansion Period was characterized by the greatest social stratification, significant socioeconomic changes, and intensive land modification. Most of the ecologically favorable zones of the windward and coastal regions of all major islands had been settled, and the more marginal leeward areas were being developed. The greatest population growth occurred during the Expansion Period. Subsistence patterns intensified as crop farming evolved into large irrigated field systems and expanded into the marginal dryland areas. The *loko* or fishpond aquaculture flourished during this period (Bellwood 1978; Kirch 1985).

The concept of the *ahupua‘a* was likely established during the Expansion Period (Kirch 1985), adding another component to a then 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* were usually wedge or pie-shaped, incorporating 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).

The *ali‘i* and the *maka‘āinana* (commoners) were not confined to the boundaries of the *ahupua‘a*; when there was a perceived need, they also shared with their neighbor *ahupua‘a ohana* (Hono-ko-hau 1974). The *ahupua‘a* were further divided into smaller sections such as the *‘ili, mo‘o‘aina, pauku‘aina, kihapai, koele, hakuone,* and *kuakua* (Hommon 1986, Pogue 1978). The chiefs of these land units gave their allegiance to a territorial chief or *mō‘ī* (king). *Heiau* building 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).

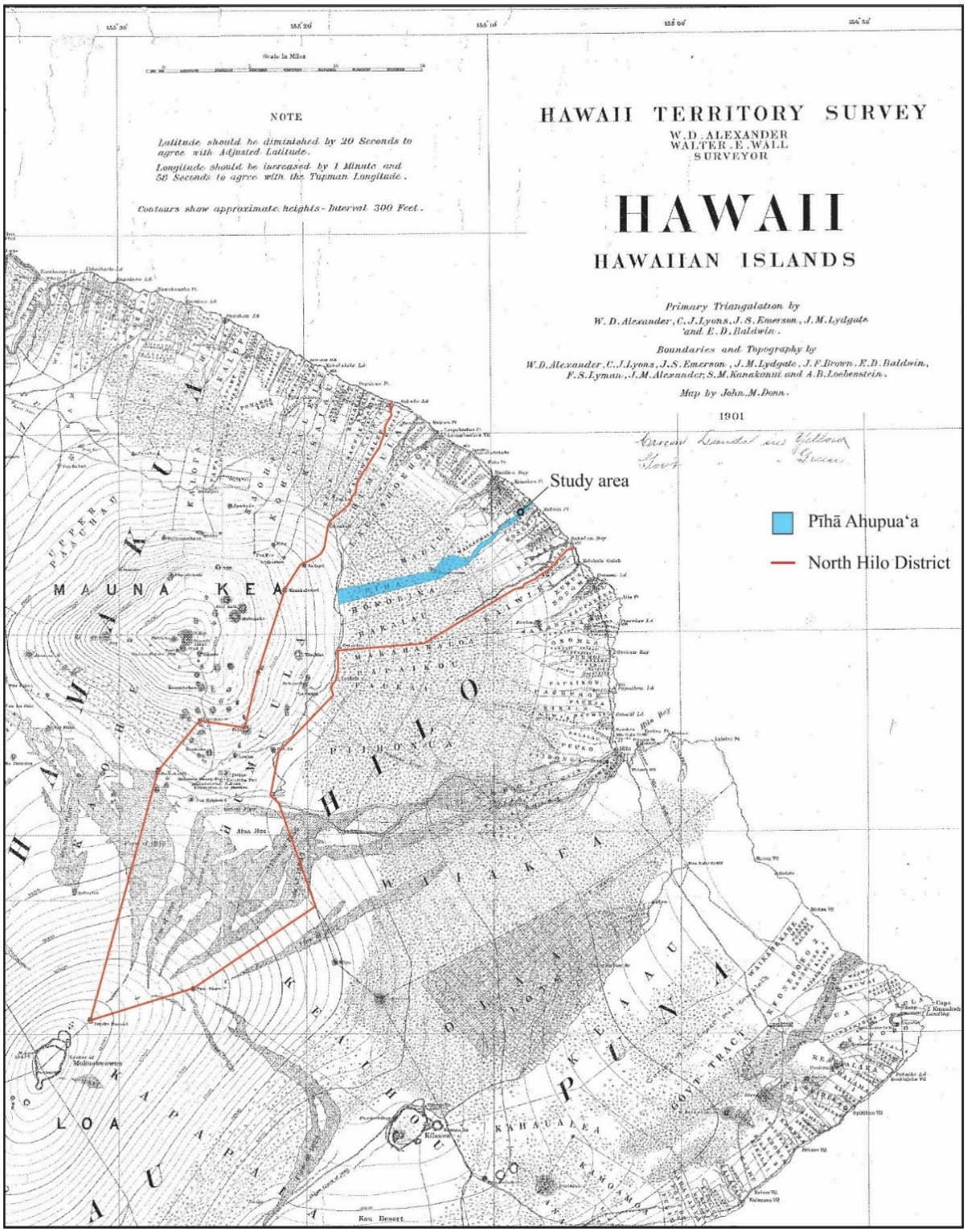

Figure 12. 1901 map of Hawai'i Island (prepared by John M. Donn 1901), showing the North Hilo District, Pīhā Ahupua'a, and the approximate location of the current study area.

It was during the Expansion Period 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, Kuʻkaʻilimoku, and had fought bitterly with his older brother, the high priest Lonopele. After much tragedy on both sides, Pāʻao was expelled from his homeland by Lonopele. He prepared for a long voyage and set out across the ocean in search of new land. Onboard Pāʻao's 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). In 1866 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 of a high chief was 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 Umi (from roughly A.D. 1460 to 1620). Before 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).

Līloa and his son ʻUmi were two of the most renowned rulers of the Pili line. Both were from Hāmākua and had their ruling centers in Waipiʻo (Cordy 1994). ʻUmi, who is often credited with uniting the island of Hawaiʻi under one rule, had a chiefly father (Līloa) and a mother (Akahi) who was a commoner (Kamakau 1992). Līloa met Akahi when he secretly left the valley to visit his other Hāmākua lands. As a young boy, ʻUmi was raised in the Hāmākua countryside by his mother, but he soon moved to Waipiʻo to reside with his father and learn the chiefly ways (Kamakau 1992). Waipiʻo remained a leading chiefly center until the end of ʻUmi's reign around ca. 1620 (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 *aliʻi*. 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, was born in the District of North Kohala on the Island of Hawaiʻi (Kamakau 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 *aliʻi*. In A.D. 1775 Kalaniʻōpuʻu and his forces, who had already conquered Hana in eastern Maui, raided and destroyed the neighboring Kaupō District, then launched several more raids on Molokaʻi, Lānaʻi, Kahoʻolawe, and parts of West Maui. It was at the battle of Kalaeokaʻilio that Kamehameha, a favorite of Kalaniʻōpuʻu, was first recognized as a great warrior and given the name of Paiʻea (hard-shelled crab) by the Maui chiefs and warriors (Kamakau 1992).

History After Contact

Captain James Cook landed in the Hawaiian Islands on January 18, 1778. Ten months later, on a return trip to Hawaiian waters, Kalaniʻōpuʻu, who was at war with Kahekili, visited Cook on board the *Resolution* off the East coast of Maui. The following January [1779], Cook and Kalaniʻōpuʻu met again in Kealakekua Bay and exchanged gifts. In February, Cook set sail intending to leave the Hawaiian Islands, but a severe storm off the Kohala coast damaged a mast and he was forced to return to Kealakekua Bay. Cook's return occurred at an inopportune time, and this misfortune cost him his life (Kuykendall and Day 1976).

Around A.D. 1780 Kalaniʻōpuʻu proclaimed that his son Kiwalao would be his successor, and he gave the guardianship of the war god Kūʻkāʻilimoku to Kamehameha. Many chiefs, concerned about their land claims, which Kiwalao did not seem to honor, preferred Kamehameha as the next ruler. Encouraged by these chiefs Kamehameha usurped Kiwalao's authority during a sacrificial ritual in Kaʻū. He then withdrew to his home district of Kohala where

he farmed the land, growing taro and sweet potatoes (Handy and Handy 1972). After Kalani‘ōpu‘u died in A.D. 1782 civil war broke out, Kiwalao was killed, and Kamehameha became the ruler of Hawai‘i Island. The wars between Maui and Hawai‘i continued until A.D. 1795 (Kuykendall and Day 1976; Handy and Handy 1972).

In 1793-1794 Captain George Vancouver, who had previously visited Hawai‘i with Cook in 1778-1779, returned leading his own expedition. It was on this voyage that Vancouver first introduced cattle to the Island of Hawai‘i, giving 17 head to King Kamehameha as a gift (Barrére 1983). Kamehameha placed a *kapu* on the cattle, and they were driven to the upland plain of Waimea to increase and multiply (Vancouver in Kuykendall 1938). Inevitably, some escaped and made their way to the mountain lands, where they would later play an important role in land use for much of the nineteenth and early twentieth centuries.

Demographic trends during the early Contact Period indicate population reduction in some areas, due to war and disease, yet increase 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, upland residential sites, and the enhancement of traditional oral history. The Kū cult, *luakini heiau*, and the *kapu* system were at their peaks, although the Western influence was already altering the cultural fabric of the Islands (Kirch 1985; Kent 1983). Foreigners had introduced the concept of trade for profit, and by the end of the 1700s, 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.

By 1796 Kamehameha, with the aid of foreign weapons and advisors, had conquered all of the island kingdoms except Kaua‘i. In 1810, when Kaumuali‘i of Kaua‘i gave his allegiance to Kamehameha, the Hawaiian Islands were united under a single rule (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.

Kamehameha I died in 1819 at Kamakahonu in Kailua-Kona. With the passing of Kamehameha, his heir Liholiho was given the name of Kamehameha II. Ka‘ahumanu, the favorite wife of Kamehameha, announced the last commands of Kamehameha I:

> O heavenly one! I speak to you the commands of your grandfather. Here are the chiefs; here are the people of your ancestors; here are your guns; here are your lands. But we two shall share the rule over the land. Liholiho consented and became ruling chief over the government. (Kamakau 1992:220)

Following the death of an *Ali‘i Nui*, it was customary to remove all of the regular *kapu* that maintained social order and the separation of men and women and 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 for the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history traditional customs changed:

> 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 was sent away to Kawaihae to keep him safe from the impurities of Kamakahonu brought about by the death of Kamehameha. After purification ceremonies Liholiho returned to Kamakahonu:

> Then Liholiho on this first night of his arrival ate some of the tabu dog meat free only to the chiefesses; he entered the *lauhala* house free only to them; whatever he desired he reached out for; everything was supplied, even those things generally to be found only in a tabu house. The people saw the men drinking rum with the women *kahu* and smoking tobacco, and thought it was to mark the ending of the tabu of a chief. The chiefs saw with satisfaction the ending of the chief’s tabu and the freeing of the eating tabu. The *kahu* said to the chief, “Make eating free over the whole kingdom

> from Hawaii to Oahu and let it be extended to Kauai!" and Liholiho consented. Then pork to be eaten free was taken to the country districts and given to commoners, both men and women, and free eating was introduced all over the group. Messengers were sent to Maui, Molokai, Oahu and all the way to Kauai, Ka-umu-ali‘i consented to the free eating and it was accepted on Kauai. (Kamakau 1992:225)

When Liholiho, Kamehameha II, ate the *kapu* dog meat, entered the *lauhala* house and did whatever he desired it was still during a time when he had not reinstituted the eating *kapu* but others appear to have thought otherwise. Kekuaokalani, caretaker of the war god Kū‘kā‘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 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 (Oliver 1961; Kamakau 1992). 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).

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 adopt their dress and religion. Soon they were rewarding their teachers with land and positions in the Hawaiian government. In 1823, the Reverend William Ellis, one of the early Protestant missionaries to arrive in Hawai‘i, passed along the South Hilo coast during his tour of Hawai‘i Island. Having been warned against walking due to the ruggedness of the terrain, he sailed from Hilo to Laupāhoehoe in a canoe, and described the Hilo coastline he saw from the canoe as follows:

> The country, by which we sailed, was fertile, beautiful, and apparently populous. The numerous plantations on the eminences and sides of the deep ravines or valleys, by which it was intersected, by streams meandering through them into the sea, presented altogether a most agreeable prospect. (Ellis 2004:344)

Overland travel across the central and northern Hilo District remained difficult throughout the first part of the nineteenth century due to its rugged coastline and many deep gulches. Transportation difficulties may have even temporarily delayed large-scale commercial exploitation of the *kula* lands in the vicinity of the project area (Desilets et al. 2004). Initial commercial exploitation of these lands was limited to small scale agriculture in areas with coastal access for shipping and receiving goods. The Reverend Titus Coan, who settled at the Hilo Mission Station in 1835, wrote that:

> For many years after our arrival there were no roads, no bridges, and no horses in Hilo, and all my tours were made on foot. . . The path was a simple trail, winding in a serpentine line, going down and up precipices, some of which could only be descended by grasping the shrubs and grasses, and with no little weariness and difficulty and some danger. (Coan 1882:31-32)

Pīhā Ahupua‘a During the Māhele ‘Āina of 1848

By the mid-nineteenth century, the ever-growing population of Westerners in Hawai‘i forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership, and in 1848 the *Māhele ‘Āina* became the vehicle for determining ownership of native lands. This change in land tenure was promoted primarily by the missionaries and Western businessmen in the island kingdom. Generally these individuals were hesitant to enter business deals on leasehold land. The *Māhele* (division) defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the *konohiki*. During the *Māhele*, all lands in the Kingdom of Hawai‘i were placed in one of three categories: (1) Crown Lands (for the occupant of the throne); (2) Government Lands; and (3) *Konohiki* Lands (Chinen 1958:vii, 1961:13). The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name

only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission.

The *ahupuaʻa* of Pīhā (1 & 2) does not appear in the *Buke Māhele*, and was apparently never assigned or awarded during the 1848 division of lands. Subsequent to the *Māhele*, however, the ownership of Pīhā caused some controversy when the Trustees of Bernice Pauahi Bishop Estate claimed that *ahupuaʻa* (along with other lands) had been continuously held and claimed by Bernice Pauahi Bishop's ancestors (Rowland 2018). In order to settle this dispute a compromise was reached by which the Minister of the Interior conveyed certain other lands to the Trustees, and they in turn conveyed the land of Pīhā (besides other lands) to the Kingdom of Hawaiʻi. Thus it was not until December 20, 1890 that Pīhā became part of the Government Lands of the Kingdom of Hawaiʻi.

All lands awarded during the *Māhele* were subject to the rights of the native tenants therein; those individuals who lived on the land and worked it for their subsistence and the welfare of the chiefs (Sinoto and Kelly 1970). Native tenants could claim, and acquire title to, *kuleana* parcels that they actively lived on or farmed at the time of the *Māhele*. The Kuleana Act of December 21, 1849 provided the framework by which native tenants could apply for and receive fee-simple interest in their *kuleana* lands from the Land Commission. The Board of Commissioners over saw the program and administered the lands as Land Commission Awards (LCAw.). No claims were made for *kuleana* lands within Pīhā Ahupuaʻa during the *Māhele ʻĀina* of 1848.

The 1875 Boundary Commission Hearings for Pīhā Ahupuaʻa

In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawaiʻi to legally set the boundaries of the lands that were awarded during the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the *ahupuaʻa*, many of whom had also been claimants for *kuleana* during the *Māhele*. The boundary testimonies were collected primarily between 1873 and 1885 and were usually given in Hawaiian, but transcribed in English as they occurred.

On February 8, 1875, on the application of J. Dominis, the agent of the Crown Lands and administrator for the estate of M. Kekuanaoa, the Boundary Commission met at the courthouse in Hilo to settle the boundaries of Pīhā Ahupuaʻa (Boundary Commission Vol. B pgs. 325-330). Several older residents of the area provided testimony at the hearing, including Ku, Hemahema, Kalaualoha, Kupahu, and D.H. Hitchcock (the Government Surveyor who surveyed the Pīhā boundaries). D.H. Hitchcock testified that he surveyed the boundaries of Pīhā Ahupuaʻa in October of 1874 with Ku as his *kamaʻāina* (person familiar with the land). From the testimony we learn that boundary between of Pīhā and the neighboring *ahupuaʻa* of Waikaumalo, to the north of the current study area, was marked by Waikaumalo Stream from the sea to where Waikaumalo is cut off by Puuohua Ahupuaʻa. One named point along the stream, Paina Falls, is mentioned in the boundary description for Pīhā Ahupuaʻa in the vicinity of the current study area (Figure 13).

We also learn from the testimony that the boundary between Kahuku and Pīhā *ahupuaʻa* (to the south of the current study area) was once marked by an "old trail" used by bird catchers to access the forest. The old trail, which roughly follows the alignment of the current Pīhā-Kahuku Road (a public right-of-way), is located approximately 275 meters southeast of the current study parcel. Much of the 1875 boundary commission testimony for Pīhā is spent discussing the *mauka*-southern boundary of the *ahupuaʻa* that it shares with Nanue Ahupuaʻa, as Alapai, the owner of that *ahupuaʻa*, disputed the boundaries between these two lands (as depicted by D.H. Hitchcock in Figure 13). The testimonies regarding this southern boundary of Pīhā describe the old trail systems that once extended from the coastline to the *mauka* regions of the *ahupuaʻ*a that bird catchers and canoe cravers would utilize to access the forests. Ku, described in the boundary commission records as "an old man" born during the time of Kamehameha I, stated that he had learned the boundaries of Pīhā from his grandfather, Hue, and his father, Mahiai, both of whom were bird catchers, and that his older brother, Koia, was once *konohiki* of the *ahupuaʻa*. Ku accompanied Hitchcock during the boundary survey and pointed out the boundaries to him, showing him a stone *ahu* at the *mauka* corner of Pīhā (where the *ahupuaʻa* is cut off by Humuʻula) that his brother had built during the reign of Kamehameha II. With regards to the trail along the Pīhā/Kahuku boundary, Ku testified that:

> …My grandfather made the road on Honohina to Moohalohalo, and I made the road to Hopuwai, Kahuku bounds Piha on Hilo side at shore, there is a small gulch there called Alanaio on boundary, thence runs up gulch a short distance above road to head of it, thence up old trail to Kaawau, thence bounded by Nanue up old trail to Nenelu old kauhale [group of houses], thence up trail to Waipahehoe a kahawai [stream/gulch] and kauhale, the old trail does not reach to the gulch, but turns to the left…(page 325)

When cross-examined Ku clarified that:

> …Piha and Nanue join at Kawau cutting off Kahuku. I have stated that the mauka boundary of Nanue is at Kaahina not at Nahuina of Waipahoehoe. There is an old kauhale kalaiwaa [group of canoe carvers' houses] at this place, this is the boundary I have always known. Nanue had no old road. The birds in olden times belonged to Piha and not to Nanue. (page 326)

At the conclusion of the testimony it was decided by R. A. Lyman, the Commissioner of Boundaries, that the boundaries of Pīhā as given by Ku be accepted, that the notes of the survey be filed (see Figure 13), and Certificate of Boundaries be issued accordingly.

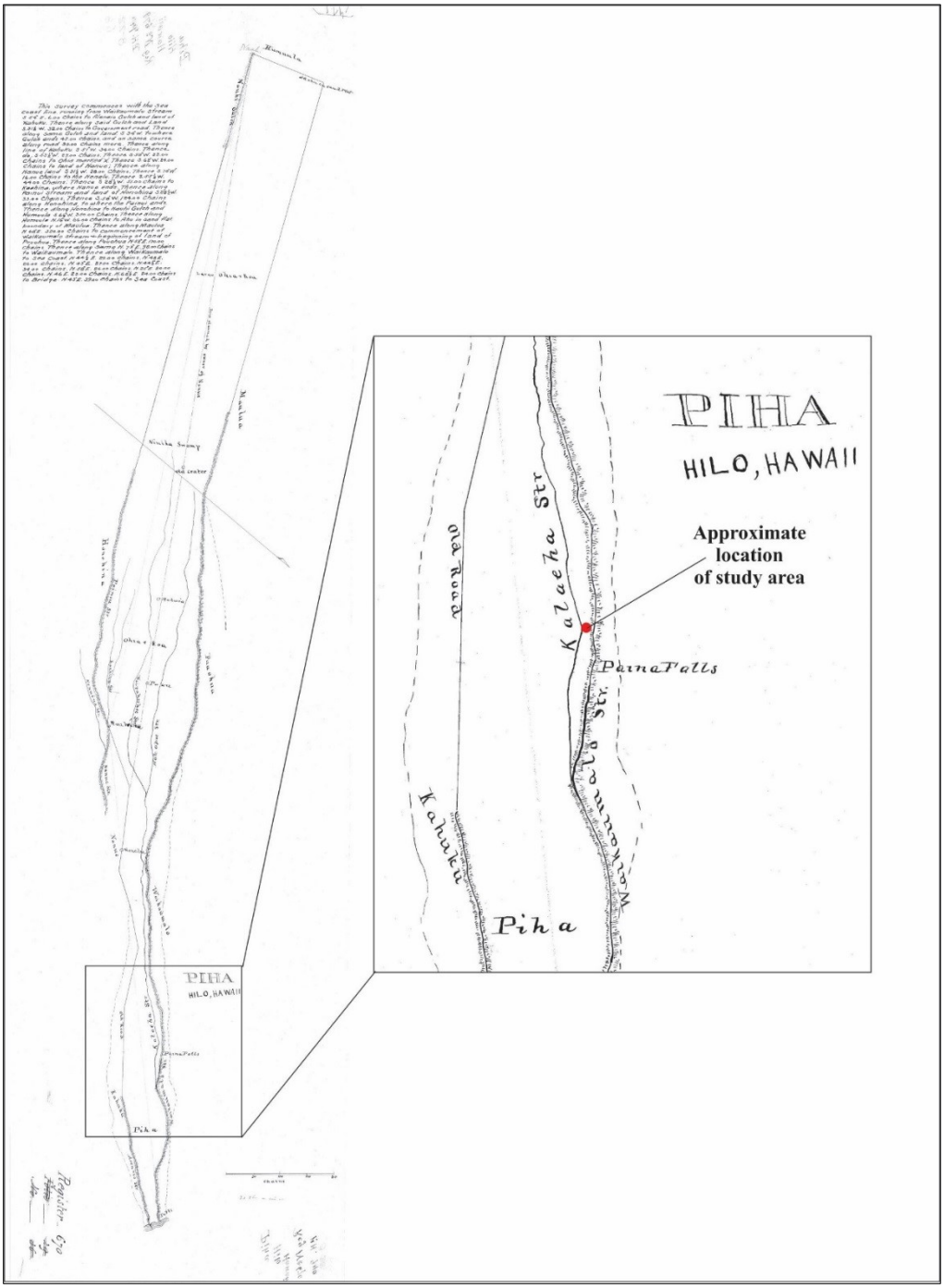

Figure 13. Hawai'i Registered Map No. 670 (Hitchcock n.d.) showing Pīhā Ahupua'a in ca. 1874, with the approximate location of the current study area indicated.

Pīhā Ahupuaʻa During the Late Nineteenth and Twentieth Centuries

Following the signing of the 1875 Treaty of Reciprocity, a free-trade agreement between the United States and the Kingdom of Hawaiʻi, which guaranteed a duty-free market for Hawaiian sugar in exchange for special economic privileges for the United States, a number of new sugar plantations incorporated in the Islands. In 1878, Claus Spreckels, with W.G. Irwin & Company as its agent, established the Hakalau Plantation Company on 9,000 acres of land located along the North Hilo coast, 16 miles from Hilo (Dorrance and Morgan 2000). The fields of the Hakalau Plantation Company ranged from 250 feet above sea level along the shoreline bluffs to 2,000 feet above sea level at their western (*mauka*) limits. The Hakalau Mill, built in 1890 on the shore at the foot of a 200-foot bluff within Hakalau Gulch, produced 5,000 tons of sugar annually during its early years (Dorrance and Morgan 2000). The cane was flumed from the various fields to the mill site, where it was then processed. Initially, until 1913 when a railroad connecting the plantation to the port at Hilo was built, the plantation shipped its product from the Hakalau Landing to Honolulu via inter-island vessels that anchored offshore. Laborer camps were established at various locations throughout the plantation's fields, and were generally segregated by ethnicity. By the late nineteenth century, the company employed approximately 2,000 people for the harvesting and cultivation of sugarcane, and this labor force was compromised of a majority of Portuguese and Japanese immigrants (Forbes 2019; Kurisu 1995).

The Government Land of Pīhā Ahupuaʻa (containing 4,250 acres) was leased to the Hakalau Plantation Company by the Kingdom of Hawaiʻi on February 11, 1892 for a term of twenty years (see C.S.F. 449). The *makai* lands of the *ahupuaʻa* (up to the roughly 2,000 foot elevation contour), including the current study area, were subsequently cleared by the plantation and used for the cultivation of sugarcane, while the upper lands were kept in forest and used for pasture. As the plantation's lease on its Pīhā lands was set to expire, the Territorial Government began the process of subdividing the *makai* section of the *ahupuaʻa* into homesteads. Government Lands such as Pīhā were made available to family farmers for homesteading purposes following the passage Land Act of 1895. The process for obtaining homestead lots was then clarified by the Organic Act of 1900, a law enacted at a time in the islands (and in the United States Congress) when there was growing concern regarding the consolidation of land ownership within the plantation system, and its reliance on foreign labor (Horowitz et al. 1969). Survey of the Pīhā homestead tract began in 1912 and was completed by 1913 (Figure 14), when the Survey Department of the Territory of Hawaiʻi reported that "the land of Piha was subdivided into 28 lots, comprising 393.81 acres, 5 miles of roads containing 20.44 acres, and flumes and ditches and remnant covering 5.95 acres" (Department of Interior 1913:65). The Pīhā-Kahuku Homestead Road, located roughly 275 meters southeast of the study parcel, was created as part of the Pīhā homestead subdivision, appears to follow the route of the older road described along the boundary between those two *ahupuaʻa* during the Boundary Commission hearings of 1875. The roads that bound the current study area to the northeast and northwest (Stone Road and another unnamed road), while they may have been originally created by the plantation to access their fields between the Kalaeha and Waikaumalo stream gulches, were formalized as part of the creation of the homestead lots.

Following the subdivision of the Pīhā homesteads, the Hakalau Plantation, now owned by C. Brewer & Co., brought up the question of the boundary between the homesteads and the adjoining lands owned or controlled by the plantation, which they felt had been encroached upon. Additional surveys of the Pīhā homestead tract, involving extensive triangulation work, were then made during the early part of 1914 until the matter was decided to the satisfaction of all parties involved (Department of the Interior 1914:521).

In June of 1914 the newly created Pīhā Homestead lots (see Figure 14) were sold at public auction to various individuals (Department of the Interior 1916:526). Grant No. 6566 for Lots 13 & 14 of the homesteads, containing a total of 28.63 acres and including the current study area, was assigned to Manuel Ignacio on June 20, 1916. Because Lots 13 & 14 were purchased together, the actual boundaries between the two lots are not shown on any of the maps reviewed for this study. Based on the layout of the homesteads however, it is likely that the current study area was initially a portion of Lot 13. The 1914 survey map prepared for the Pīhā Homesteads shows the boundaries of Lots 13 & 14, the roads accessing the homestead lots between Kalaeha and Waikaumalo stream gulches (Stone Road and another unnamed road) that form the northeastern and northwestern boundaries of the study area, and the drainages that bound and cross the lots (Figure 15). In 1914, Lots 13 & 14 are listed as containing 0.76 acres of roadways and 0.2 acres of flume. The Hakalau Plantation Company continued to grow sugarcane on lands in the vicinity of the current study area throughout the first half of the twentieth century, but by the early 1940s, nearly forty percent of the sugarcane on the plantation was being cultivated by independent growers, some of whom had purchased Pīhā Homestead lots, Such as Manuel Ignacio.

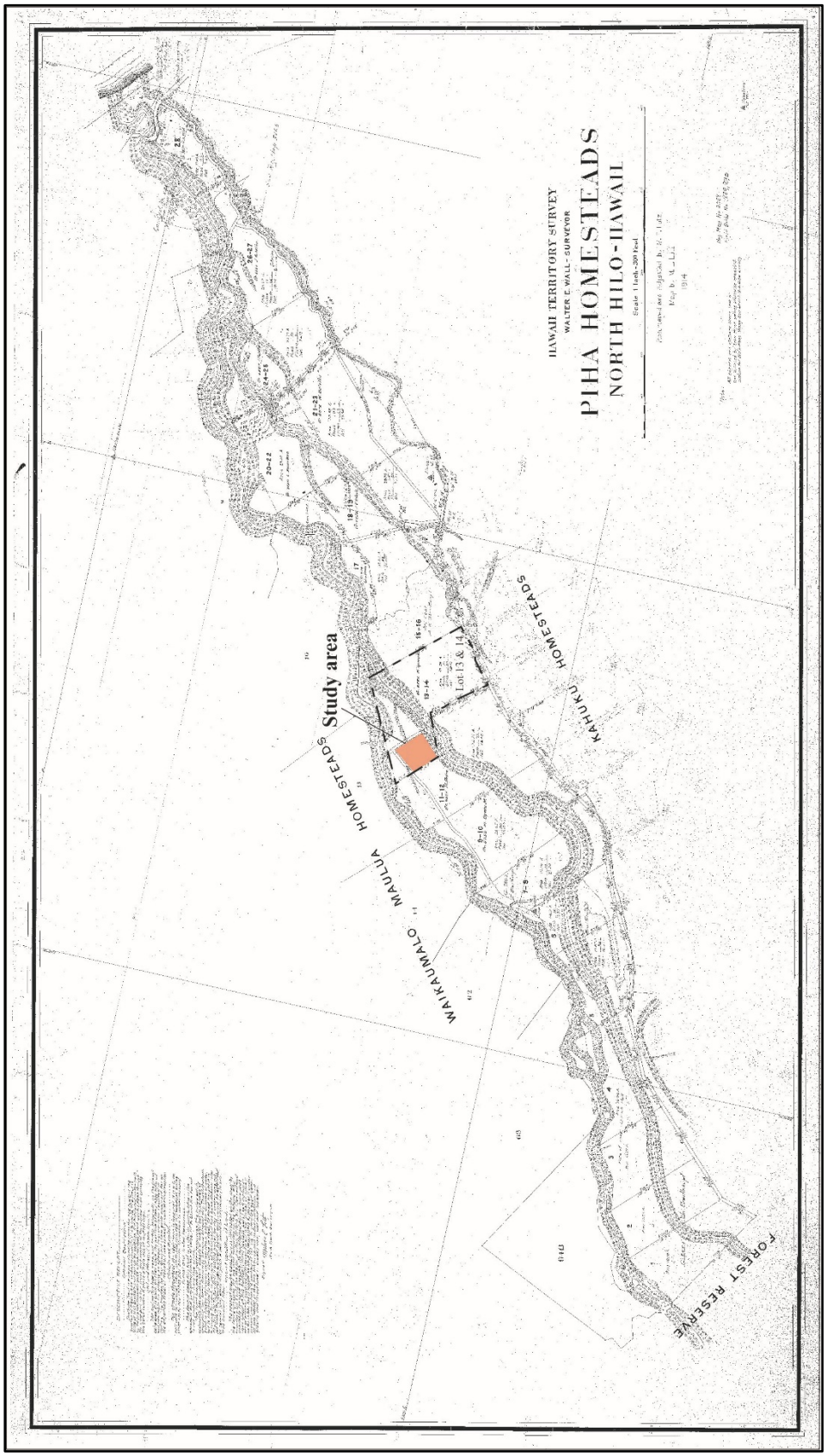

Figure 14. Map of the Pīhā Homesteads (Hawaii Registered Map No. 2568; Lutz 1914) showing the location of the current study area (shaded red with Lots 13 & 14 indicated by a dashed black line).

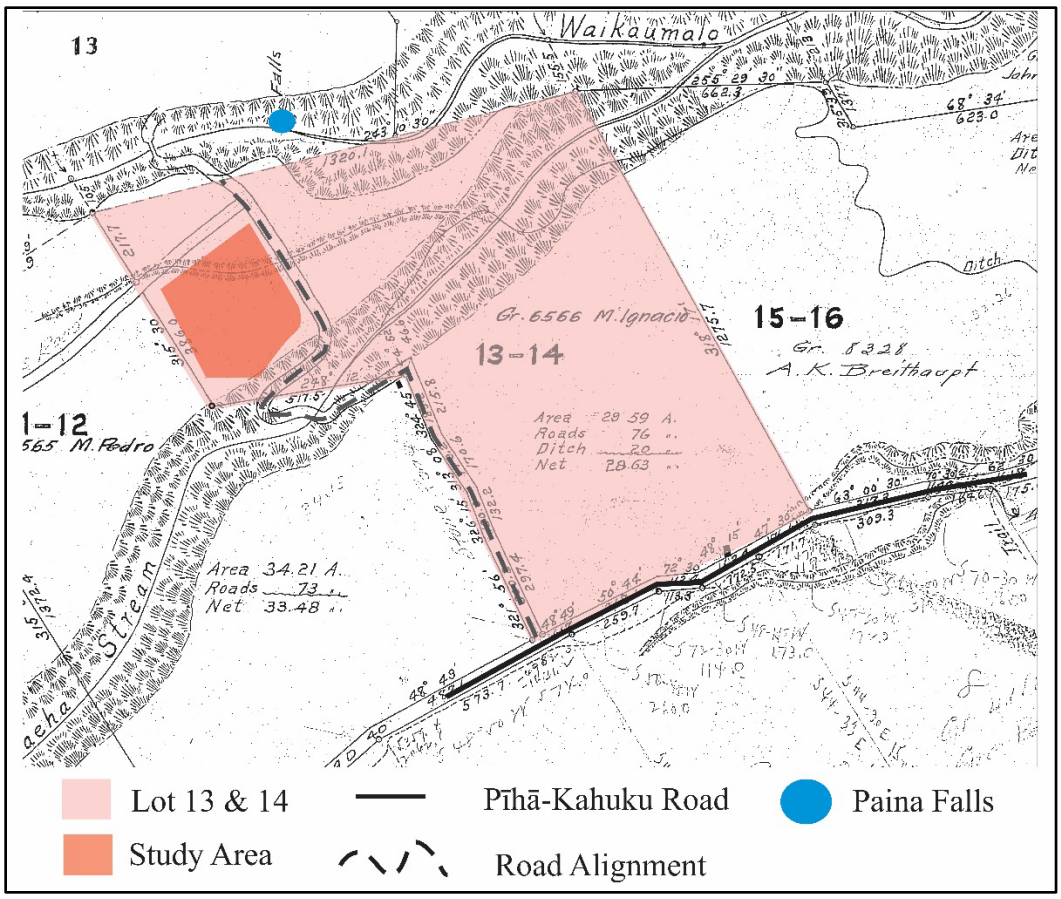

Figure 15. Portion of Hawai‘i Registered Map No. 2568 (Lutz 1914) showing a detail of the lands in the vicinity of the current study area.

The Hakalau Plantation Company was a model for other sugar plantations and had a reputation for high production levels and providing quality work amenities (Kurisu 1995). For over hundred years in operation, the company only employed a half dozen managers, bringing stability to the plantation. One of these managers in particular, John Ross (1903-1942), is remembered for modernizing the plantation through construction and establishment of facilities including a school at Honohina, and also known for preserving ancient Hawaiian burial grounds (Kurisu 1995). During Ross' tenure as manager several plantation camps were established in the vicinity of the Pīhā Ahupua‘a, including Kahuku Camp (Camp 17), located *makai* of the study area near the intersection of the Pīhā-Kahuku Homestead Road and the Old Māmalahoa Highway, and the Honohina and Nanue Camps (Camps 13 and 14), located *mauka* and south of the study area adjacent to the Nanue and Waiehu stream gulches.

In 1943, the neighboring Wailea Milling Company (also started by Claus Spreckels) merged with the Hakalau Plantation Company, making it the third largest sugar producer in the islands, and by 1944, the plantation had reached its maximum yields, producing 26,000 tons of sugar that year (Dorrance and Morgan 2000). County Tax records for Lots 13 & 14 (TMK: (3) 2-004:003), which go back to 1944, indicate that the current study area was likely cultivated in sugarcane (leased to the Hakalau Plantation Company with a cane contract to the Wailea Milling Company) throughout the first half of the twentieth century. In 1944, Lots 13 & 14 are listed as being owned by Ella K. Breithaupt, and containing 15 acres of sugarcane with 5 acres fallow, and 8.65 acres of waste land. On April 1, 1946, the Hakalau Mill, and the railroad connecting the plantation to Hilo, were severely damaged by a *tsunami* triggered by an earthquake in the Aleutian Islands. The mill was rebuilt, but the railroad shut down permanently, and following the *tsunami* the products of the plantation were trucked to the docks at Hilo for transport.

County tax records indicate that Lots 13 & 14 of the Pīhā homesteads (TMK: (3) 2-004:003) were cultivated in sugarcane throughout the 1950s with similar acreages of planted, fallow, and waste land as were reported in 1944. A 1954 USGS aerial photograph shows the study area, and the adjacent lots within the Pīhā homesteads, all planted in sugarcane (Figure 16). A map of the Hakalau Sugar Company plantation fields prepared during the mid-twentieth

century indicates that the current study area was formerly included within Field 135 (Figure **Error! Reference source not found.**).

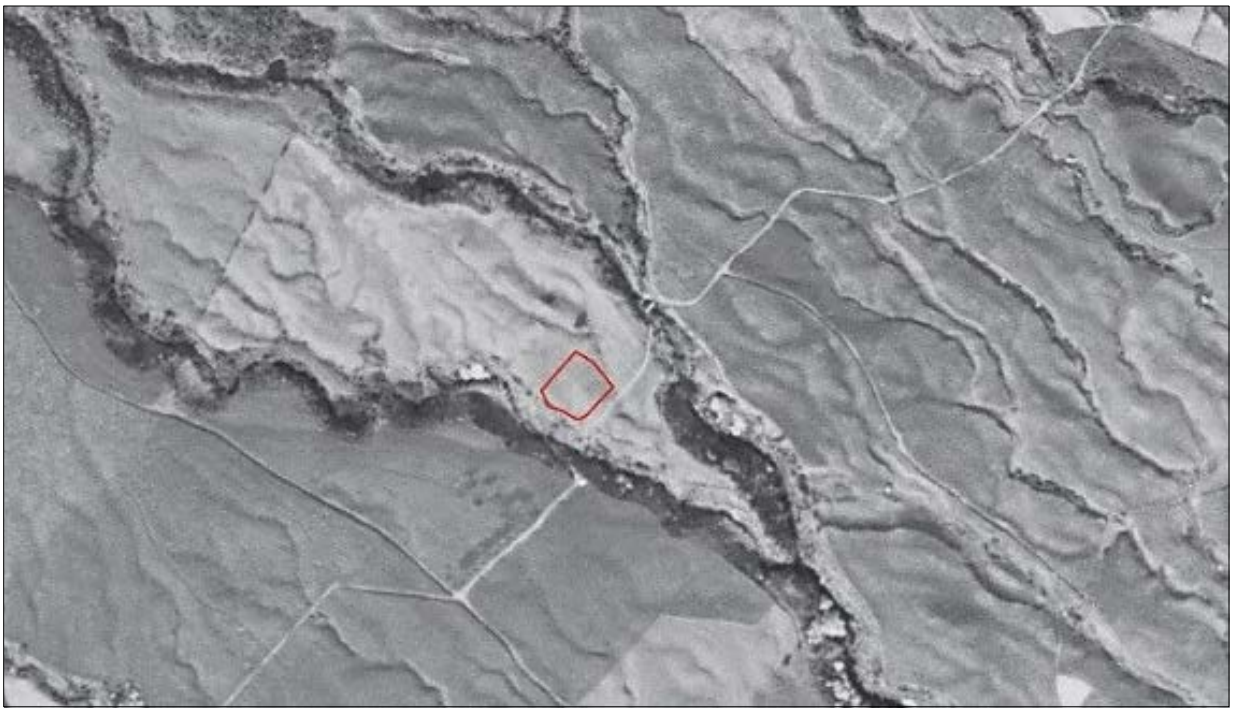

Figure 16. 1954 USGS aerial photograph, study area indicated in red.

In 1962, C. Brewer & Co. merged the Hakalau Plantation Company into the Pepeʻekeʻō Sugar Company, its southern neighbor, and the Hakalau Mill was shut down (Dorrance and Morgan 2000). According to County tax records, that same year, Graven Breithaupt Trustee of the Ella Breithaupt Estate, leased 6.9 acres of land within Lots 13 & 14 of the Pīhā Homesteads to Yoshinobu and Tsutayo Yamada for eighty years at a dollar per acre. A 1965 USGS aerial photograph shows the study area and the surrounding homestead lots all planted in sugarcane (Figure 18). Subsequently, in 1969, 16 acres of land within the homestead lot were leased to Komatsu Fujimoto for 8 years at a rate of 240 dollars per year (in 1975 this lease was transferred to the K. Fujimoto Estate). By 1970, County records indicate that 10.63 acres within Lots 13 & 14 (including the current study area) had been rezoned as conservation land, while the other 18 acres remained agriculturally zoned.

In 1973, C. Brewer & Co. merged the Pepeʻekeʻō Sugar Company (including the lands of the former Hakalau Sugar Company, and presumably the cane grown within the subject parcel) into the Mauna Kea Sugar Company, combining under one corporate name what had once been five separate sugar plantations situated along the Hilo coast. County tax records indicate that the final lease for the cultivation of sugarcane within Lots 13 & 14 of the Pīhā Homesteads occurred on January 14, 1977. This lease of 16 acres, was to Chikako Fujimoto for a time period of "3 crops of sugar cane (6 yrs)" retroactive to October 23, 1976. A 1977 USGS aerial photograph shows most of the lands in the vicinity of the current study area still planted in sugarcane (Figure 19), but it is not clear from the photograph if the current study area was still being cultivated. It appears that, following the rezoning of 10.63 acres of land within Lots 13 & 14 to conservation in 1970, the lands to the northwest of Kalaeha Stream gulch (including the current study area) were left to fallow, while those to the southeast of the Gulch remained in sugarcane cultivation. The Mauna Kea Sugar Company, later named Mauna Kea Agribusiness Company, continued to operate in the vicinity of the study are until the 1990s, harvesting its last crop in 1994.

In 1998, following the closure of the plantation, it was determined by the County Planning Director (at the request of the landowner), that Lots 13 & 14 of the Pīhā Homesteads (TMK: (3) 2-004:003) originally consisted of two separate legal lots of record, and that based on the information contained in Land Patent (Grant) No. 6566 and Hawaiʻi Registered Map No. 2568 (see Figures 14 and 15), the reservation of the two 30-foot road public rights-of-way (Stone Road and the unnamed road) across those lots in 1914, divided one of those lots into two additional legal lots of record. Based upon this determination, Parcel 003 (Lots 13 & 14) was subdivided into its current configuration of TMK parcels (TMKs: (3) 2-004:003, 039, and 040; see Figure 2), with the current study area (Parcel 040) consisting of a

3.212-acre portion of the larger lot (situated in its western corner) bounded by the aforementioned Stone Road and unnamed road.

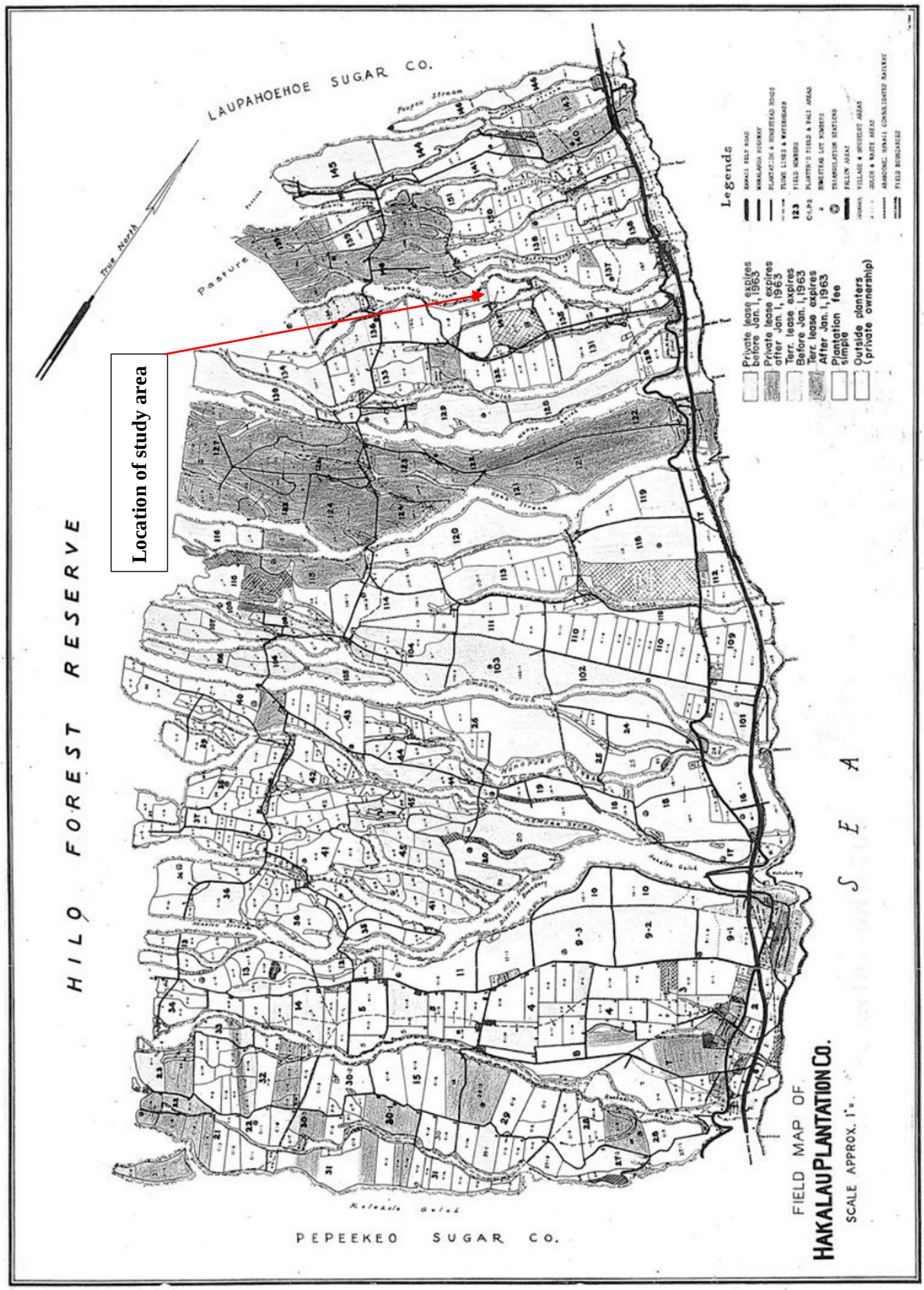

Figure 17. Undated (mid-twentieth century) Field Map of the Hakalau Plantation with the location of the current study area indicated (from https://www.hakalauhome.com/field-map.html).

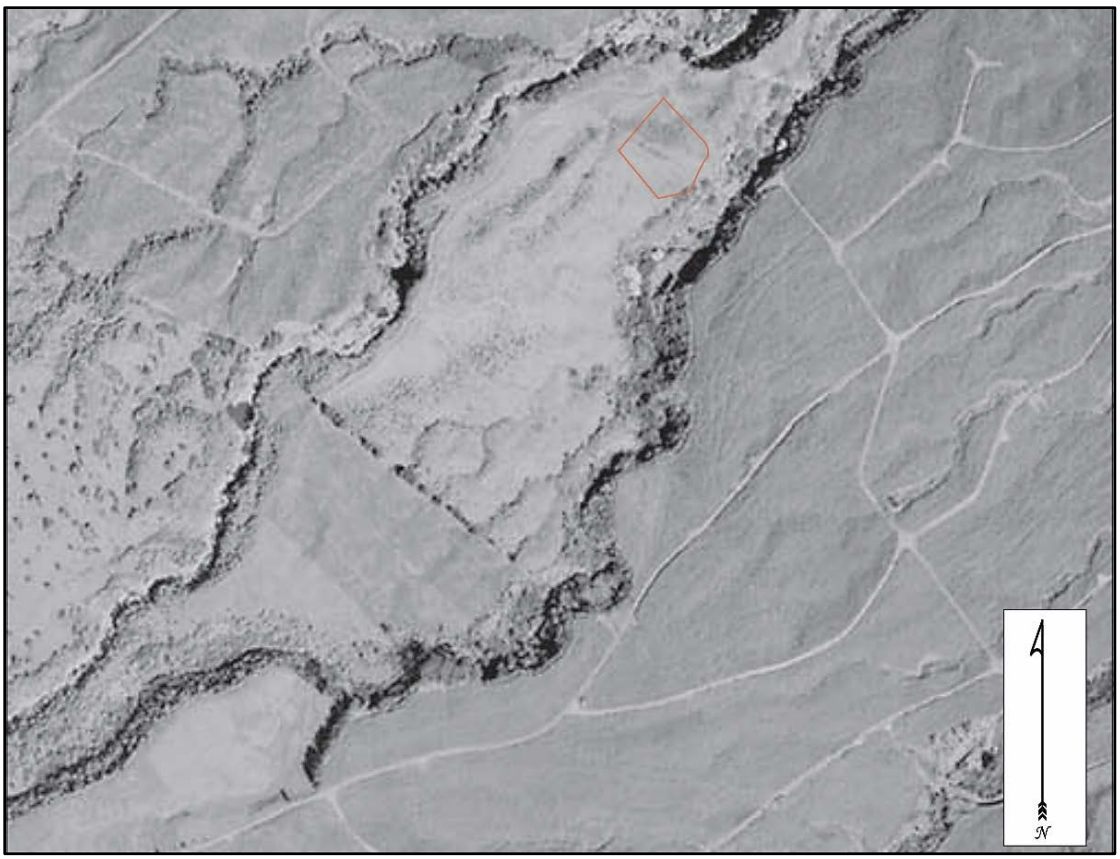

Figure 18. 1964 USGS aerial photograph with the study area outlined in red.

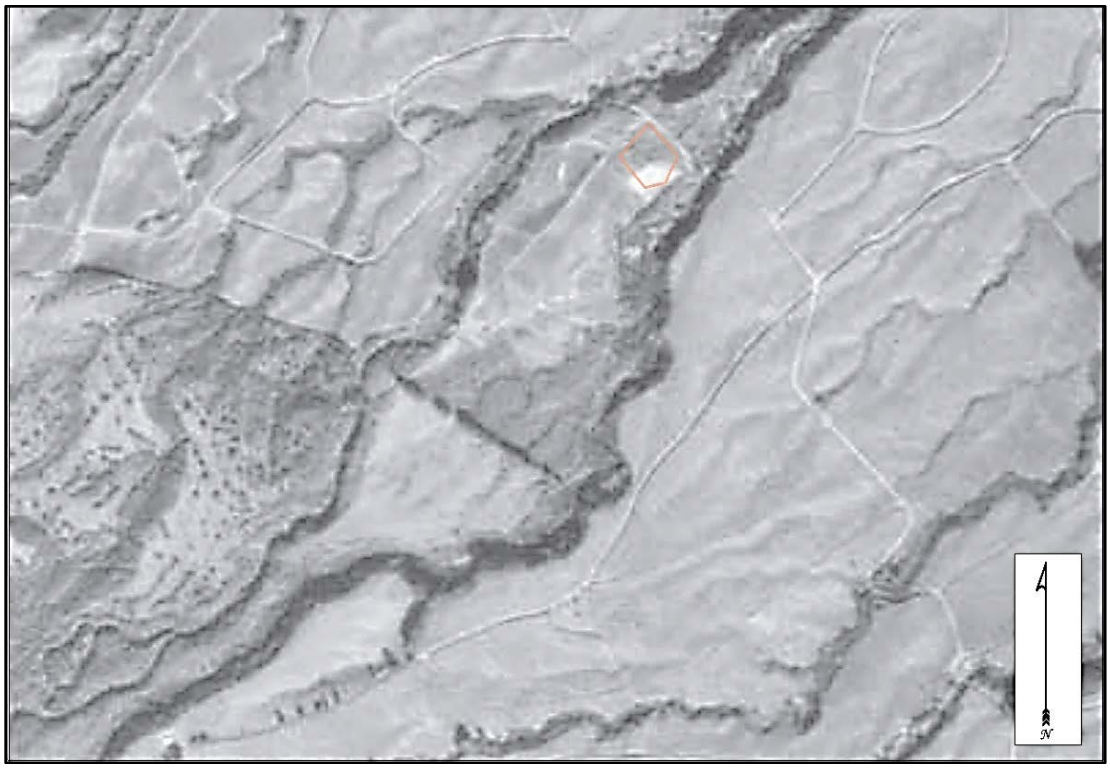

Figure 19. 1977 USGS aerial photograph with the study area outlined in red.

PREVIOUS ARCHAEOLOGICAL STUDIES

Very few archaeological studies have been conducted anywhere within the district of the North Hilo at elevations similar to the current study area. The first archaeological work conducted in East Hawai‘i was that of the early twentieth-century *heiau* researchers Thrum and Stokes (Thrum 1908, Stokes and Dye 1991). Neither investigator was able to identify *heiau* within Pīhā Ahupua‘a or, for that matter, within the broader region between the town of Hilo and Laupāhoehoe Ahupua‘a. In the early 1930s, A.E. Hudson, working under the aegis of the Bishop Museum, also conducted archaeological investigations in East Hawai‘i, surveying primarily along the coast of the district (Hudson 1932). He found little in the region *makai* of the study area, although he did note the presence of a .25 mile square area of taro terraces in the upper part of Hakalau Gulch to the east of the study area. According to Hudson (1932:218), there was formerly a *kōnane* board in the bottom of Hakalau Gulch, and the gulch was at one time a robber's stronghold.

More recently, Walker and Rosendahl (1994a, 1994b) conducted an archaeological study of some 595 acres of Hakalau Nui Ahupua‘a, South Hilo District, situated between Hawai‘i Belt Road and the 1,500-foot elevation contour. Low-level aerial (helicopter) survey was conducted over some of the uncultivated, forested portions of that study area, and other uncultivated areas were inspected using "variable-coverage (partial to 100%) variable-intensity ground survey" (Walker and Rosendahl 1994b:2). Walker and Rosendahl reported that the study area had been extensively modified during the Historic Period for sugarcane cultivation, and that no archaeological sites or "significant cultural materials of any kind" were found (Walker and Rosendahl 1994b:2).

Tomonari-Tuggle (1996) prepared a cultural resource overview for the Hakalau National Wildlife Refuge that included lands *mauka* of the current study area (but not Pīhā Ahupua‘a). Very little archaeological survey was undertaken as part of the study, but Tomonari-Tuggle (1996:67-72) does provide a predictive model for site distribution within the upland forests of Hilo. She notes that the forest areas were used primarily for the collection of special resources, and that:

> …Traditionally these resources would have been birds (for featherwork) and hardwoods (for tools and canoes). In historical times, birds and hardwoods would have continued as resources, with the addition of cattle for meat and hides. The upland forests may also have been transited by individuals going from the coast to the upper slopes or summit of Mauna Kea...
>
> These transitory activities would likely have left neither a substantial nor easily recognized archaeological record. Further, the density and rapid regrowth of vegetation in the rainforest would also make any remains virtually impossible to identify once abandoned. (Tomonari-Tuggle 1996:67)

Specific site types discussed by Tomonari-Tuggle (1996) that might be encountered within the upland forests of the Hilo District include temporary shelters used by bird catchers, canoe builders, bullock hunters, scientists, travelers, surveyors, shrines or other religious structures, ponds and waterholes, roads and trails, bullock pits, surveyor's marks and ranch structures. She describes the lowest forest zone, above the current study area as the "Wet *‘Ōhi‘a* Zone," an area that was largely used as a source of specialized forest resources such as hardwoods for crafts or construction, and forest birds for feathers.

A review of reports and correspondence on file at the SHPD office in Hilo indicates that only one archaeological study has been conducted in the vicinity of the current study area, but that SHPD has previously written "no effect" letters for at least seven parcels within the Pīhā and Kahuku Homesteads. These "no effect" letters include a November 1, 1996 letter for TMK: (3) 3-2-004:025 (*Log No. 18344 Doc No. 9610ms04*), an April 24, 1998 letter for TMK: (3) 3-2-004:027 (*Log No. 21307 Doc No. 9804PM15*), a June 1, 1998 letter for TMK: (3) 3-2-004:039 (*Log No. 21050 Doc No. 9802PM03*), an August 18, 1998 letter for TMK: (3) 3-2-004:041 (*Log No. 22025 Doc No. 9807ms17*), a June 19, 2001 letter for TMK: (3) 3-2-004:043 and 044 (*Log No. 27706 Doc No. 0105ms08*), a December 31, 2010 letter for TMK: (3) 3-2-004:045 (*Log No. 28884 Doc No. 0112PM10*), and an April 17, 2013 letter for TMK: (3) 3-2-004:046 (*Log No. 2013.2304 Doc No. 1304SN05*) (see Figure 20). The reason generally given for SHPD's belief that the proposed development of these parcels would have "no effect" on significant historic sites, was that a review of aerial photographs revealed that intensive cultivation of sugarcane had already altered the land. SHPD undertook no archaeological survey of the parcels listed above.

The only archaeological survey undertaken within the Pīhā homesteads was an archaeological assessment of a portion of Lot 1 (TMK: (3) 3-2-004:038 por.) conducted by ASM Affiliates (Clark 2018). This study of a five-acre area located *mauka* of the current study (see Figure 20) did not identify any archaeological sites, although Clark (2018) did note that the Pīhā-Kahuku Road passed near (but outside of) the eastern boundary of the study area.

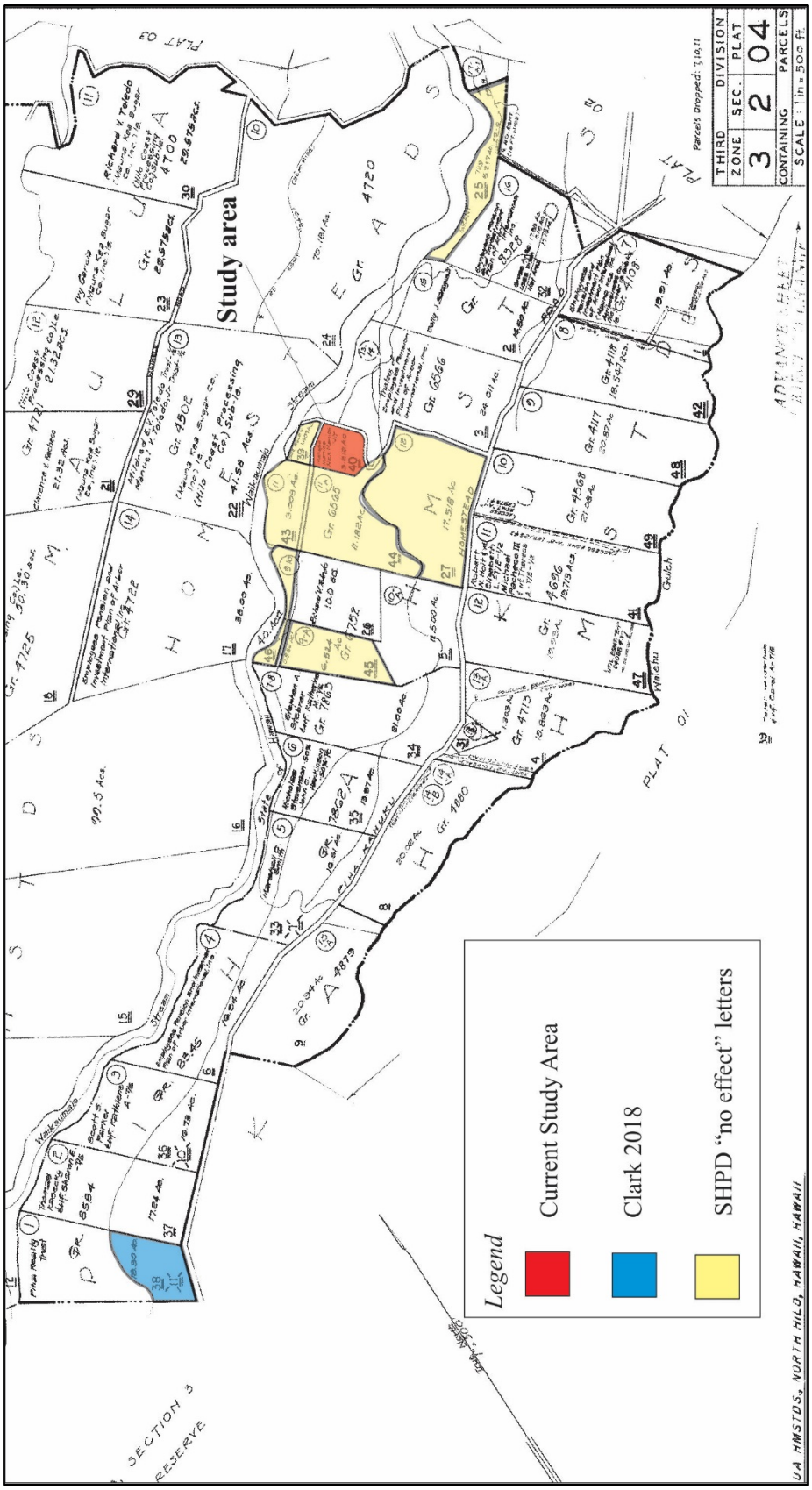

Figure 20. Locations of previous State Historic Preservation Division (SHPD) determinations of "no effect" and archaeological studies conducted in the vicinity of the current study area.

3. STUDY AREA EXPECTATIONS

Based on the culture-historical context and the findings of previous archaeological studies presented above a set of archaeological expectations for the current study area is now presented. As discussed by Tomonari-Tuggle (1996) the upland forest areas of Hilo were used traditionally for catching birds and gathering forest resources, both of which are transitory activities that are unlikely to have left a substantial, or easily recognizable, archaeological record. As indicated in the 1875 Boundary Commission testimony for Pīhā Ahupuaʻa, access to the forest lands was facilitated by a bird catcher's trail that followed the boundary between Kahuku and Pīhā *ahupuaʻa* (see Figure 13), passing 275 meters to the southeast the current study parcel (approximating the route of the existing Pīhā-Kahuku Homestead Road, which remains a public right-of-way). Little is known of the Precontact use of the tablelands in the vicinity of the current study area. These lands may have been opportunistically cultivated and/or accessed for the collection of forest resources prior to the widespread clearing associated with the commercial cultivation of sugarcane during the Historic Period (Cordy 1994). The Hakalau Plantation Company originally planted the lands in the vicinity of the current study area in sugarcane during the late nineteenth century. Following the creation of the Pīhā Homesteads in 1914, and the purchase of the subject parcel by Manuel Ignacio as a portion of Grant No. 6566 in 1916, however, the study area lands were leased to independent growers. Sugarcane cultivation continued within the study area, once a portion of the Hakalau Plantation Company's Field 135, until at least the 1970s, and perhaps into the 1990s. Historic aerial photographs from 1954, 1965, and 1977 show the extent of the sugarcane cultivation within the study area during those years. Given the land disturbance associated with the creation of the sugarcane fields, and the extent of the former cultivation within the subject parcel itself, it is unlikely that any Precontact Period or early Historic features will be present within the study area. It is possible, although also unlikely given the use of the fields into the Modern Period, that later Historic Period features related to the use of the Pīhā Homesteads or the cultivation of sugarcane (such as survey markers, field infrastructure, or cultural deposits) could be present within the study area.

4. FIELDWORK

Fieldwork consisted of a pedestrian survey and visual inspection of the surface of the of the entire 3.212-acre study area (TMK: (3) 3-2-004:040). The survey was conducted on June 25, 2019, by ʻIolani K. Kaʻuhane, B.A., and Johnny Dudoit, B.A., under the direction of Matthew R. Clark, M.A. (Principle Investigator). During the survey, fieldworkers walked northeast/southwest oriented pedestrian transects spaced at no more than 20-meter intervals across the study area. Although the north, west, and south portions of the subject parcel were overgrown with *uluhe* and tall grass in some areas, ground visibility was generally adequate throughout the study area for identifying any historic properties that may have been present. As a result of the pedestrian survey no archaeological resources were identified within the current study area.

5. DETERMINATION OF EFFECT AND RECOMMENDATIONS

Given the negative findings of the pedestrian survey, combined with the review of historical documentary resources presented above, it is our conclusion that the proposed construction of a single-dwelling on TMK: (3) 3-2-004:040 will not affect any historic properties. With respect to the historic preservation review process of both the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD) and the County of Hawaiʻi Planning Department, our recommendation is that no further work needs to be conducted. In the unlikely event that significant archaeological resources are discovered during the construction of the proposed dwelling, work shall cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

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Draft Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

APPENDIX 3
Cultural Impact Assessment

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A Cultural Impact Assessment of a 3.2-Acre Parcel within the Pīhā Homesteads

TMK: (3) 3-2-004:040

Pīhā Ahupuaʻa
North Hilo District
Island of Hawaiʻi

DRAFT VERSION

Prepared By:

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ASM Project Number 32680.00

A Cultural Impact Assessment of a 3.2-Acre Parcel within the Pīhā Homesteads

TMK: (3) 3-2-004:040

Pīhā Ahupuaʻa
North Hilo District
Island of Hawaiʻi

CHAPTERS

FIGURES

APPENDIX

Page

1. INTRODUCTION

At the request of Mr. Nicholas Perry (landowner), ASM Affiliates has prepared this Cultural Impact Assessment (CIA) for the development of a single-family residence on a roughly 3.2-acre parcel (TMK: (3) 3-2-004:040) located within the Pīhā Homesteads, Pīhā Ahupuaʻa, North Hilo District, Island of Hawaiʻi (Figures 1 and 2). The current CIA report is intended to inform an Environmental Assessment (EA) conducted in compliance with Hawaiʻi Revised Statutes (HRS) Chapter 343. This CIA was prepared in adherence with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawaiʻi, on November 19, 1997. As stated in Act 50, which was proposed and passed as Hawaiʻi State House of Representatives Bill No. 2895 and signed into law by the Governor on April 26, 2000, "environmental assessments . . . should identify and address effects on Hawaii's culture, and traditional and customary rights . . . Native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the 'aloha spirit' in Hawaiʻi. Articles IX and XII of the Hawaiʻi 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."

As specified in the OEQC *Guidelines for Assessing Cultural Impacts*, "to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment" the geographical extent covered by this CIA utilizes, at minimum, an *ahupuaʻa* level analysis. This CIA report begins with a description of the proposed development activity and the general study area and followed by a detailed culture-historical background and a presentation of prior studies; all of which combine to provide a physical and cultural context for the current study area. The results of the consultation process are then presented, along with a discussion of potential impacts that may result from the proposed development activity as well as appropriate actions and strategies to mitigate any such impacts.

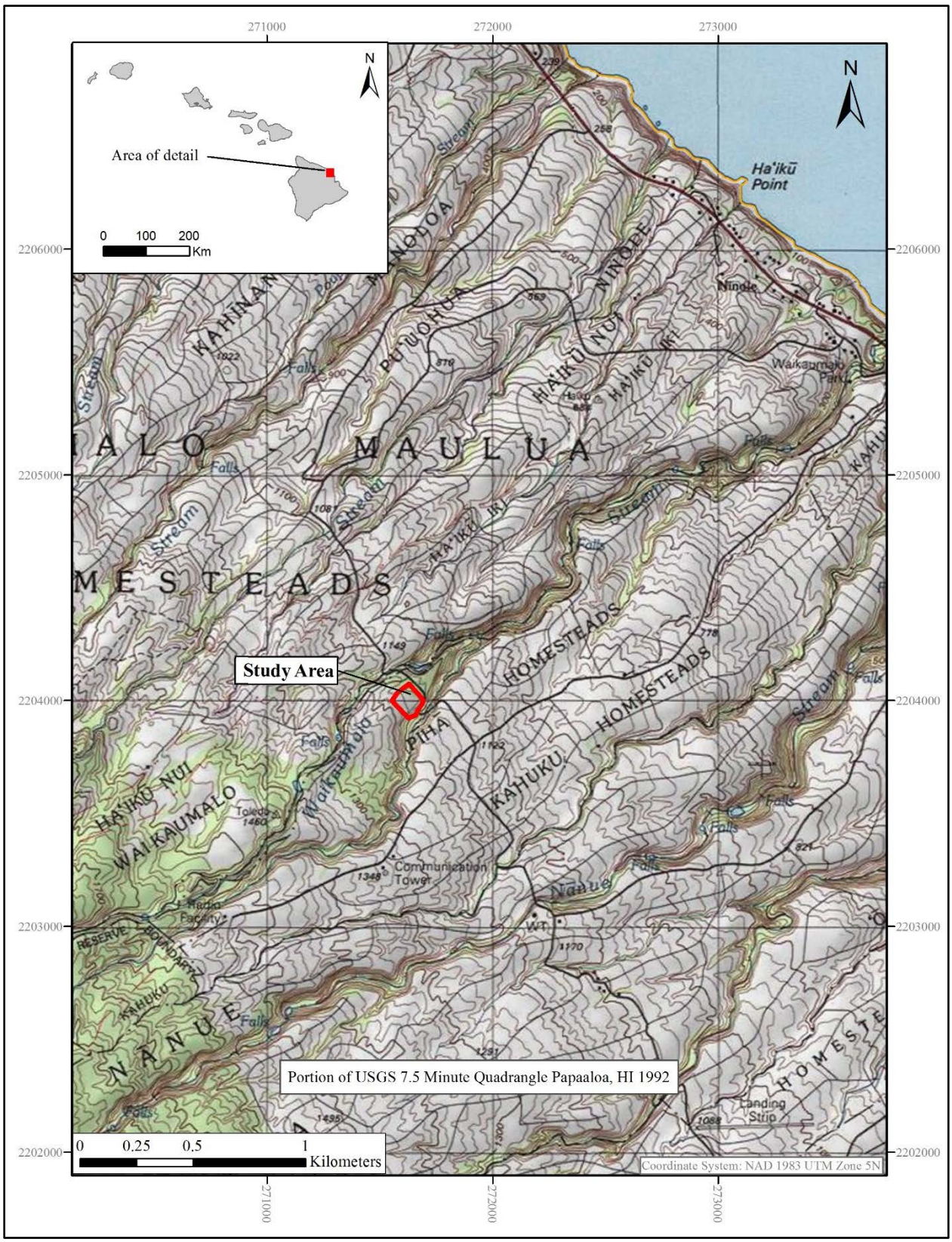

Figure 1. Study area location plotted on a portion of the U.S.G.S 7.5-minute series, Papa‘aloa, HI quadrangle, 1992 (shaded in red).

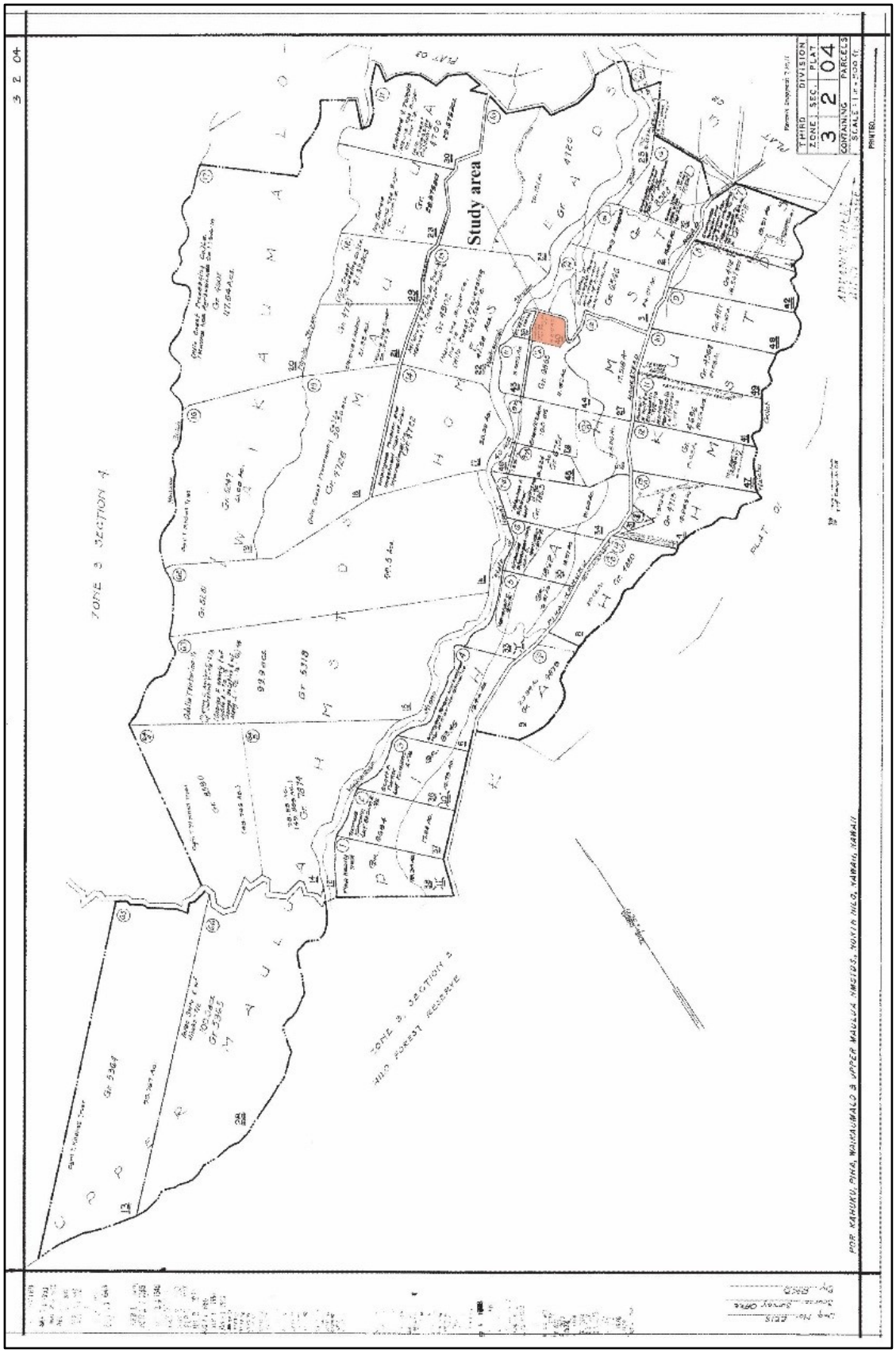

Figure 2. Tax Map Key (3) 3-2-004 showing the current study parcel (040).

STUDY AREA DESCRIPTION

The current study area, a portion of the former Lot 13/14 of the Pīhā Homesteads, consists of a 3.212-acre parcel (TMK: (3) 3-2-004:040) located in Pīhā Ahupuaʻa, North Hilo District, Island of Hawaiʻi (see Figures **Error! Reference source not found.** and **Error! Reference source not found.**). Located at an elevation of roughly 1,178 feet (359 meters) above sea level, roughly 2.7 kilometers inland of the coast, the subject parcel is situated within the Lower Windward Slopes Sub-region of North Hilo (Cordy 1994), which extends from sea level to about 5,000–6,000 feet in elevation and is characterized by rolling tablelands alternating with narrow, deeply dissected stream gulches (Figure 3). The current study area is located on a narrow finger of tablelands between the Kalaeha and Waikaumalo stream gulches. Soils within this area (Figure 4) are classified primarily as Kaiwiki highly organic hydrous silty clay loam on 10 to 20 percent slopes, but an area near the southeastern boundary along the upper edge of Kalaeha Stream gulch is classified as Kaiwiki rocky outcrops on 35 to 100 percent slopes (Soil Survey Staff 2018). These soils have formed from Pleistocene lava flows of the Hāmākua Volcanic Series (labeled as Qhm in Figure 5) that originated from Mauna Kea Volcano 64,000 to 300,000 years ago (Sherrod et al. 2007). Rainfall in the vicinity of the study area averages 4,684 millimeters (184 inches) per year, and the mean annual air temperature is 68.4°F (20 °C) (Giambelluca et al. 2013, 2014).

The subject parcel is accessed from Stone Road (Figure 6), which extends northwest from Pīhā-Kahuku Homestead Road (along the Pīhā-Kahuku *ahupuaʻa* boundary), across the Kalaeha Stream gulch (Figure 7) to the Waikaumalo Stream gulch and beyond (see Figure 3). The subject parcel is bounded to the northeast by Stone Road, to the northwest and southwest by developed residential plots, and the southeast by Kalaeha Stream gulch. The southwestern boundary of the subject parcel, separating it from Parcel 44, is marked by a fence line. The subject parcel, which was formerly used (for more than a century) for the cultivation of sugarcane, is currently undeveloped and covered in thick vegetation consisting primarily of strawberry guava (*Psidium cattleianum*), *uluhe* (*Dicranopteris linearis*), Asian melastome (*Melestoma candidum*), with numerous other grasses, vines, ferns, shrubs, and weeds (Figure 8). The western corner of the study area contained the most restrictive vegetation cover, consisting of thick patches of *uluhe* (Figure 18), while the eastern edge, where some hand clearing of brush has occurred, provided the least restrictive vegetation. Several mature Cook Island pines (*Araucaria columnaris*) are growing in a line near the eastern corner of the parcel adjacent to Kalaeha Stream gulch and Stone Road.

Figure 3. Google Earth (2017) aerial image showing the current study area.

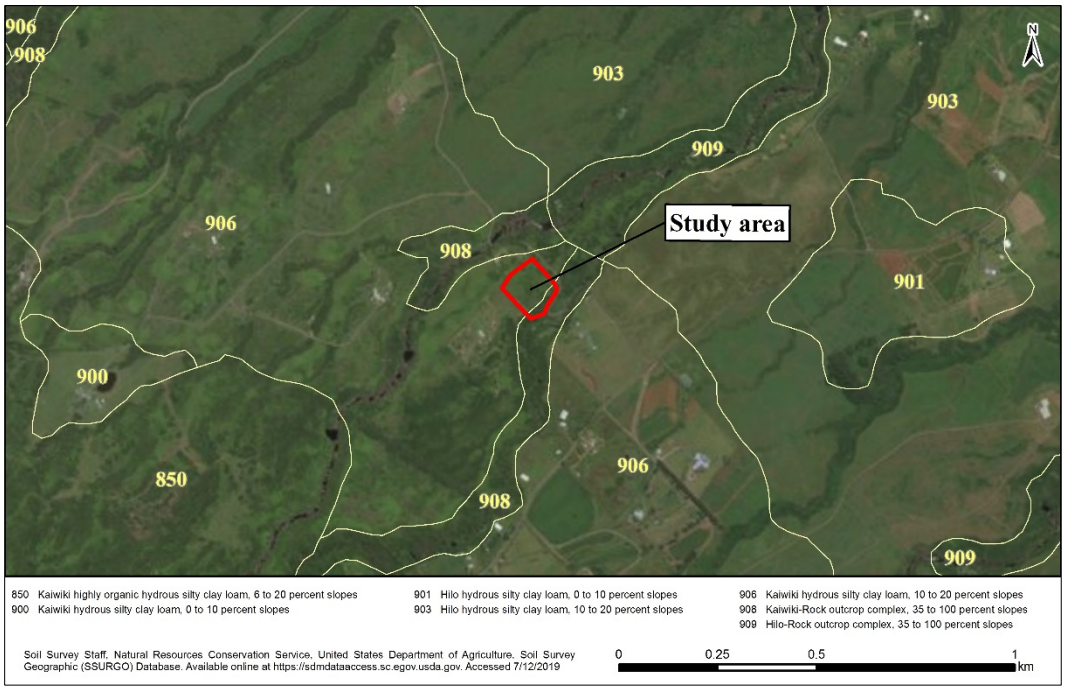

Figure 4. Soils in the current study area.

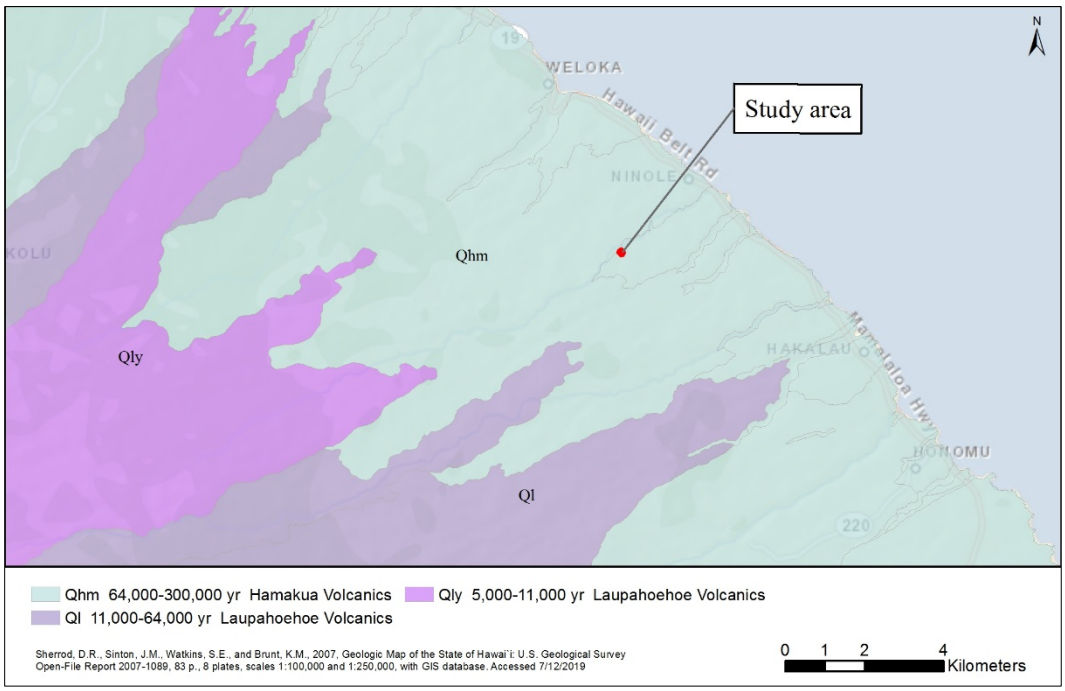

Figure 5. Geology in the current study area.

Figure 6. Stone Road along the northeastern boundary of the study area, view to the south.

Figure 7. Kalaeha Stream Gulch along the southeastern edge of the study area, view to the east..

Figure 8. Typical vegetation cover within the study area, view to the northwest.

Figure 9. Thick *uluhe* growing within the western corner of the study area, view to the east.

2. BACKGROUND

This section of the report includes a discussion of the cultural-historical background for the study 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 *ahupuaʻa* in which the study area is located. As will be demonstrated in the ensuing section, a consideration of the broader region and island landscape is also required.

CULTURE-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 historical references to Pīhā Ahupuaʻa and the general North Hilo area including the effects of the 1848 Māhele ʻĀina. This summary includes oral traditions and first-hand Historic accounts recorded by visitors and missionaries. Land use practices in the study area vicinity are also presented, including commercial sugar cultivation.

A Generalized Model of Hawaiian Prehistory

While the question of the timing of the first settlement of Hawaiʻi 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 Hawaiʻi is believed to have originated from the southern Marquesas Islands (Emory in Tatar 1982). During these early times, Hawaiʻi'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 *ʻaumakua* 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 Hawaiʻi 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 (*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* (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 Hawaiʻi 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 *ahupuaʻa* 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 *ahupuaʻa*—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 *ahupuaʻa* became the equivalent of a 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 chief of the land sent select members of his retinue to collect tribute in the form of goods from each *ahupuaʻa*. The *makaʻāinana* (commoners) who resided in the *ahupuaʻa* brought their share of tribute and offerings to an *ahu* (altar) that was symbolically marked with the image of a *puaʻa* (pig). *Ahupuaʻa* were ruled by *aliʻi ʻai ahupuaʻa* or chiefs who controlled the *ahupuaʻa* resources; who, for the most part, had complete autonomy over this generally economically self-supporting piece of land (Malo 1951). *Ahupuaʻa* lands were in turn, managed by an appointed *konohiki* or lesser chief-landlord (ibid.). The *aliʻi-ʻai-ahupuaʻa*, in turn, answered to an *aliʻi ʻai moku* (chief who claimed the abundance of the entire district) (ibid.). Thus, *ahupuaʻa* resources supported not only the *makaʻāinana* and *ʻohana* (families) who lived on the land but also contributed to the support of the royal community of regional and/or island kingdoms. *Ahupuaʻa* 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 *ahupuaʻa* 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 seventeenth century, large areas of Hawaiʻi Island were controlled by a few powerful *aliʻi ʻai 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 Hawaiʻi, with people moving to more favorable agricultural areas (Barrera 1971; Schilt and Sinoto 1980). ʻUmi a Līloa, a renowned *aliʻi* of the Pili line, is often credited with uniting the Island of Hawaiʻi under one rule during the Precontact Period (Cordy 1994). ʻUmi-a-Līloa is also credited with formalizing the land division system on Hawaiʻi Island and separating the various classes of chiefs, priests, and laborers (Beamer 2014; Cordy 2000; Kamakau 1992). Upon the death of ʻUmi-a-Līloa, Hawaiʻi Island came under the control of his eldest son Keliʻiokāloa-A-ʻUmi (Cordy 2000), whose reign is marked by his mistreatment of the lesser chiefs and commoners. His reign was short-lived and by the early eighteenth century, Hawaiʻi Island fell under the control of Alapaʻinui, who assembled a robust army and assigned his closest potential usurpers (his nephews Keawemaʻuhili, Kalaniʻōpuʻu, and Keōua) as generals in his militia. The prodigious ʻĪ clan, spread across the districts of Kaʻū, Puna, Hilo, and portion of Hāmākua was also a powerful force and threat to Alapaʻi campaign (Cordy 2000). As Alapaʻi gathered his forces to strike back at Kekaulike, the *aliʻi nui* of Maui, the high ranking *aliʻi wahine* (chiefess) Kekuʻiapoiwa made her way to Kokoiki, Kohala and give birth to Paiʻea, 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 Kekūhaupiʻo. Upon Alapaʻi's death, his eldest son Keaweʻōpala was named heir to his father's kingdom.

By the mid-eighteenth century, the young and determined Kamehameha directed his efforts toward consolidating Hawaiʻi Island under his rule. To accomplish this monumental task, Kamehameha continued his training under his more experienced kin namely Kalaniʻōpuʻu, who was the *aliʻi nui* of Hawaiʻi Island (ʻĪʻī 1959). During Kalaniʻōpuʻū's reign, the first foreign vessels arrived in Hawaiian waters captained by the British explorer, James Cook. Cook first landed at Waimea, Kauaʻi in 1778 and in 1779, he anchored just off the shore of Kealakekua Bay, Kona. 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 *aliʻi* and *makaʻāinana* alike. Acquisition of these technological advancements came through barter. This resulted in the *aliʻi* 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).

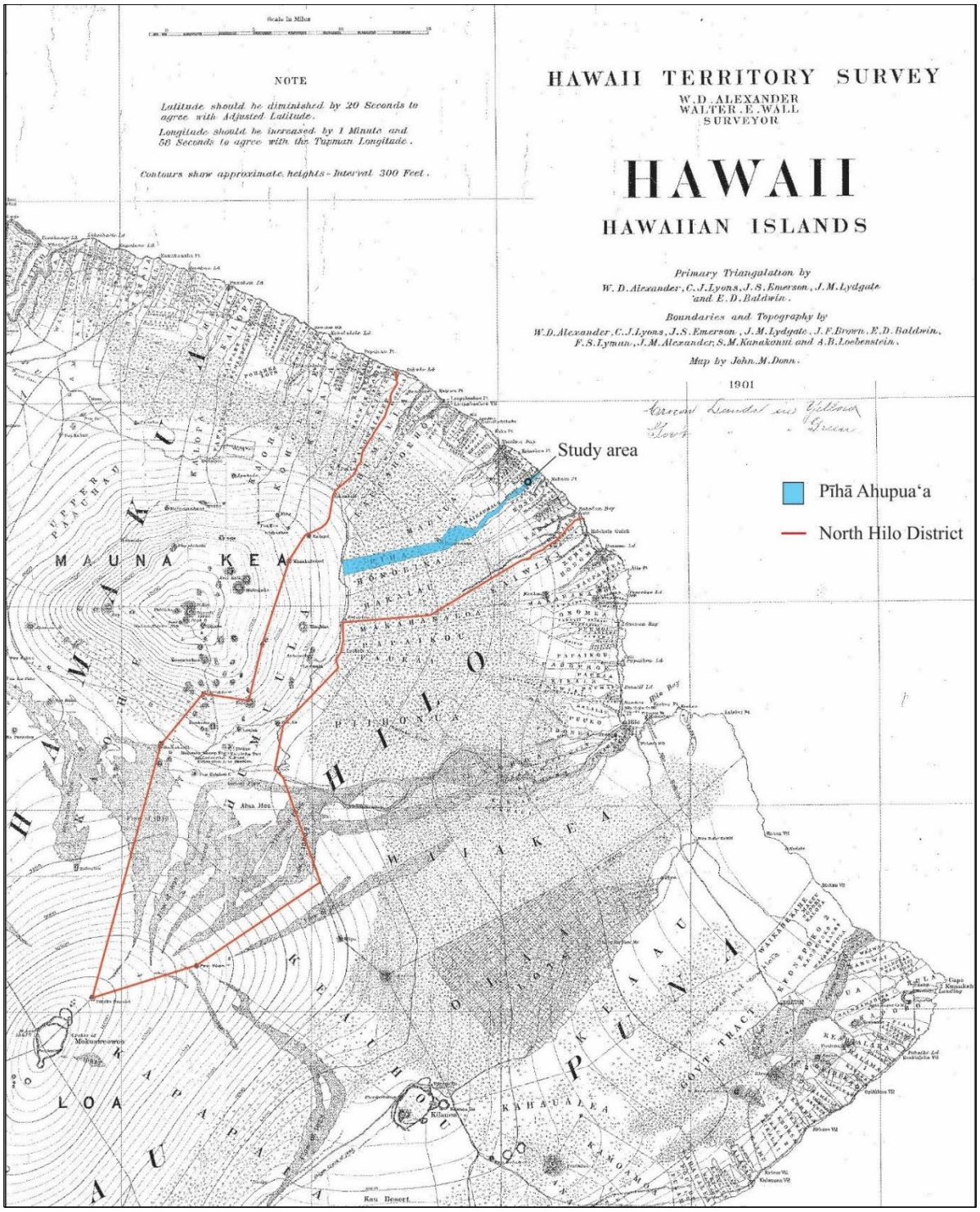

Figure 10. Portion of Hawaiʻi Registered Map 2060 by John M. Donn from 1901, showing the North Hilo District (outlined in red), Pīhā Ahupuaʻa (shaded blue), and the approximate location of the current study area.

A Brief History of Hawai‘i After Western Contact

The arrival of Western explorers in Hawai‘i signified the end of the Precontact Period and the beginning of the Historic Period. With the influx of foreigners, Hawai‘i’s culture and economy underwent drastic changes. Demographic trends during the early Historic Period indicate population reduction in some areas, due to war and disease, yet increase in others, with relatively little change in material culture. At first, there was a continued trend toward craft and status specialization, intensification of agriculture, *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, 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 had conquered O‘ahu, Maui, and Moloka‘i, in 1795, Hawai‘i saw the beginnings of a market system economy (Kent 1983). Some of the work of the *maka‘āinana* 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, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845). In 1819, Kamehameha died and the *kapu* system that governed all aspects of traditional Hawaiian society was symbolically abolished when Liholiho (son of Kamehameha) ate in the presence of his mothers, Keōpūolani and Ka‘ahumanu. Shortly after 1820, Christianity established a firm foothold in the islands, and introduced diseases and global economic forces began to have a devastating impact on traditional life-ways.

PĪHĀ AHUPUA‘A AND GREATER ‘OKANA OF HILO PALIKŪ

The current study area is located within the *ahupua‘a* of Pīhā, in the District of North Hilo (see Figure 18), on the windward coast of Hawai‘i Island in a region traditionally known as Hilo Palikū (Hilo of the upright cliffs), which is defined by the area extending north from the Wailuku River (Edith Kanaka‘ole Foundation 2012). The traditional regional name, Hilo Palikū describes the rugged and steep coastline, with its sheer cliffs broken only by a string of narrow steam-cut gulches that pour down from the slopes of Mauna Kea. Pīhā, which literally translates as “flotsam” (Pukui et al. 1974:184), meaning any floating material carried by floodwaters or the sea, is one of many land divisions (*ahupua‘a*) extending inland from the coast of North Hilo with boundaries that generally follow the meanderings of the gulches, and encompass the tablelands in between. Pīhā Ahupua‘a is bounded on the southeast end by Nanue Ahupua‘a and at its southwest end by Honohina Ahupua‘a. Pīhā is cut off at its *mauka* (west) end by the massive Humu‘ula Ahupua‘a. Along its northern boundary, Pīhā is bounded by three *ahupua‘a*. They are, from east to west, Pua‘akuloa Ahupua‘a, Waikaumalo Ahupua‘a and Mauluanui (see Figure 18).

Pīhā Ahupua‘a is situated within the traditional *moku* (district) of Hilo, which is one of six *moku* of Hawai‘i Island. The Hawaiian proverb, “*Hilo, mai Mawae a ka pali o Maulua*” details the extent of the district spanning from Mawae, the southernmost boundary, and Maulua its northernmost boundary (Pukui 1983:108). Handy and Handy (1991:538) provides a general description of the Hilo 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.

As noted above, the *moku* of Hilo was traditionally 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—characterized by its upright cliffs, this area of Hilo extends north of the Wailuku River to Ka‘ula Gulch (Maly and Maly 2006; Pukui et al. 1974). 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 location of the current study area coincides with the Hilo Palikū region which is celebrated in traditional lore for its numerous streams and valleys that made for a difficult journey for early travelers. The source of these *‘okana* are found 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 8th, 1914, through December 6th, 1917. Maly, who compiled and translated this lengthy account explains that:

> 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 Fornander's 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, the personification of individuals and their associated place names may not be "ancient," the site documentation within the story is of great value. (Maly 1996:A-4)

Kepā and Onaona Maly provide additional information pertaining to the ancient land division of Hilo Palikū in the following translation of an excerpt from the account "*Ka'ao Ho'oniua Pu'uwai no Ka-Miki"* ("The Heart Stirring Story of Ka-Miki").

> *O Hilo Palikū kāhi i 'ōlelo 'ia ai; Pau ke aho i ka hele o Hilo, he lau ka pu'u, he mano ka ihona, he kini nā kahawai, a e 'au no ho'i i ka wai o Hilo a pau ke aho, a'ohe e pau ka wai!*
> Of Hilo Paliku it is said, one becomes short of breath traveling through Hilo, for there are many (400) hills, many (4,000) areas to descend, and many (40,000) streams, indeed while swimming through the waters of Hilo one becomes out of breath, but one is never out of water at Hilo! (Maly and Maly 2006:13)

The following account also describes the tough and rugged terrain in this region. As recorded in the epic sage of *Pele and Hi'iaka*, Emerson recounts the following *mele* (song/chant) that Hi'iakaikapoliopele (the younger sister of Pele), sang while journeying through this region:

Pau ke aho i ke kahawai lau o Hilo:	One's strength is exhausted, climbing, climbing
He lau ka pu'u, he mano ka iho'na;	The countless valleys and ridges of Hilo,—
He mano na kahawai o Kula'i-po;	The streams without number of Ku-la'i-po,
He wai Honoli'i, he pali o Kama-e'e,	The mighty water of Hono-li'i, the precipice walls of Kama-e'e
He pali no Koolau ka Hilo-pali-ku;	And the pali of Ko'olau: Such a land is Hilo-pali-ku.
He pali Wailuku, he one ke hele ia;	The banks of Wailuku are walls;
	The road to its crossing but sand;
He one e ke'ehia la i Wai-olama.	Sandy the way at Wai-o-lama. (1993:32-33)

A unique aspect of the Hilo Palikū region, which mirrors that of the adjacent district of East Hāmākua, is its numerous narrow *ahupua'a* that extend from the coast to about the 3,000-foot elevation. These *ahupua'a* are characterized by their sloping *kula* lands with their boundaries following the natural contours or ridgelines of the gulches (Cordy 1994). A few *ahupua'a* extended further inland, essentially cutting off the lower *ahupua'a* at their *mauka* most end. There are three very large *ahupua'a* in the Hilo District, namely Humu'ula, Pi'ihonua, and Waiākea that comprises the interior portion of the district (see Figure 18) extending along the slopes of both Mauna Kea and Mauna Loa (Lyons 1875). The practice of subdividing the land into carefully managed sections provided its inhabitants with a wealth of nearshore marine and upland forest resources. As Maly and Maly (2006:9) note, "in this system, the people learned to live within the wealth and limitations of their natural environment, and were able to sustain themselves on the land and ocean.

Rains and Waterways

The district of Hilo is renowned for its abundance of rain and freshwater, which has been recorded in countless oral traditions including *mele* (songs), *oli* (chants), and *'ōlelo no'eau* (proverbs and poetical expressions). In their most recent publication *Hānau Ka Ua*, Collette Akana and Kiele Gonzalez (2015:xv) describes the Hawaiian cultural significance of rain:

> Our kūpuna [ancestors] had an intimate relationship with the elements. They were keen observers of their environment, with all of its life-giving and life-taking forces. They had a nuanced understanding of the rains of their home. They knew that one place could have several different rains, and that each rain was distinguishable from another. They knew when a particular rain would fall, its color, duration, intensity, the path it would take, the sound it made on the trees, the scent it carried, and the effect it had on people.

While the various waterways furnished the area residents with one of life's fundamental necessities, *wai* (freshwater) also carries spiritual and purification properties and is considered a *kinolau* (physical manifestation) of

the god Kāne. The origin of Hawai‘i’s freshwater sources is often attributed to Kāne, who along with his companion Kanaloa (whose dominion was over the ocean), came to Hawai‘i from Kahiki (land outside of Hawai‘i). Legend has it that Kāne and Kanaloa both enjoyed consuming *‘awa*, a drink prepared by mixing the root of the *‘awa* plant (*Piper methysticum*) with fresh water. In their travels, they stopped at various places around the Hawaiian Islands, including Hilo and opened new fresh water springs from which they prepared their favorite drink (Handy and Handy 1991). The *‘ōlelo no‘eau* (Hawaiian proverb) “*He huewai ola ke kanaka na Kāne*” literally translates as [m]an is Kāne’s living water gourd,” and emphasizes the relationship that Hawaiians have to fresh water, and thereby to the deity Kāne (Pukui 1983:68). Handy and Handy (1991:64) emphasize the spiritual relationship that Native Hawaiians have to water:

> Fresh water as a life-giver was not to the Hawaiians merely a physical element; it had a spiritual connotation. In prayers of thanks and invocations used in offering fruits of the land, and in prayers chanted when planting, and in prayers for rain, the “Water of Life of Kane” is referred to over and over again. Kane—the word means “male” and “husband”—was the embodiment of male procreative energy in fresh water, flowing on or under the earth in springs, in streams and rivers, and falling as rain (and also as sunshine), which gives life to plants.

Wai was not only valued for its life-giving properties, but also its purifying properties. The continuous *mauka* to *makai* flow of *wai* provided fresh drinking water, supplied water to irrigated fields, and fishponds, recharged ground water supplies, and sustained productive estuaries and fisheries by transporting nutrients from the uplands to the sea (Sproat 2009). Because flowing water was considered a vital artery for both the land and man, great care was paid to maintaining clean waterways. Traditionally, domestic duties involving the use of water were dispersed along the length of the river. For instance, “there was a place for bathing (*‘au‘au*) low down in the stream; a place up farther along the stream for washing utensils or soaking calabashes; still farther up were dams for *‘auwai*; and above the dams was the place where drinking water was taken” (Handy and Handy 1991:61). Because of the high degree of dependency on *wai* to furnish and satisfy life’s needs, *wai* was a public trust resource that was considered inalienable. Handy and Handy continue thusly,

> Inalienable title to water rights in relation to land use is a conception that has no place in old Hawaiian thinking… [w]ater, whether for irrigation, for drinking, or other domestic purposes, was something that “belonged” to Kane-i-ka-wai-ola (Procreator-in-the-water-of-life)… The *ali‘i nui*, in old Hawaiian thinking and practice, did not exercise personal dominion, but channeled dominion. In other words, he was a trustee. (ibid.:63)

The nuanced understanding of the various rains of Hilo has been captured in the following *‘ōlelo no‘eau* published by Mary Kawena Pukui (1983). These *‘ōlelo no‘eau* offers a more detailed understanding of the characteristics of the many rains of Hilo:

> *Halulu me he kapua‘i kanaka la ka ua o Hilo*.
> The rain of Hilo makes a rumbling sound like the treading of feet. (ibid.:53)
>
> *Hilo ‘āina ua lokuloku.*
> Hilo of the pouring rain. (ibid.:107)
>
> *Hilo i ka ua Kani-Lehua*.
> Hilo of the Kanilehua rain.
> The Kanilehua rain, or the rain that patters in the lehua forest, is frequently referred to in the chants and songs of Hilo. (ibid.:168)
>
> *Ka ua he‘e nehu o Hilo.*
> The nehu-producing rain of Hilo.
> The people knew the season when the schools of nehu fish followed the rain. (ibid.:167)
>
> *Kau i ka lani ka holowa‘a ua o Hilo.*
> Placed high in heaven is the rain trough of Hilo.
> An expression of admiration for a person of regal bearing. (ibid.:173)
>
> *Ku pāpū Hilo i ka ua.*
> Hilo stands directly in the path of the rain. (ibid.:207)

> *Luʻuluʻu Hanakahi i ka ua nui.*
> Weighted down is Hanakahi by the heavy rain.
> Hanakahi, Hilo, was named for a chief of ancient times. This expression was much used in dirges to express heaviness of the heart, as tears pour like rain. (ibid.:219)

> *Pāuli hiwa ka lani o Hilo.*
> Black with rainclouds is the sky of Hilo.
> Sometimes said in humor when a dark-skinned person is seen. (ibid.:287)

> *Pō Hilo i ka ua Kanilehua.*
> Hilo is darkened by the Kanilehua rain.
> Said of one who is weighted by sorrow and grief. (ibid.:293)

The abundance of rain that falls in the district of Hilo supplies all of its *ahupuaʻa*, including the subject *ahupuaʻa* of Pīhā. Rain has played its role in shaping both the physical landscape and ultimately influenced the area's cultural-history. Pukui (1983) published several *ʻōlelo noʻeau* that speaks specifically to the districts many gulches, rivers, and streams.

> *ʻAu umauma o Hilo i ka wai.*
> Hilo has breasted the water.
> To weather the storm. The district of Hilo had many gulches and streams and was difficult to cross. (1983:28)

> *"Māmā Hilo?" "ʻAe, māmā Hilo i ka wai ʻole."*
> "Is Hilo light?" "Yes, Hilo is light for lack of water."
> A question asked of a runner, and his reply. It means that the way is clear, with no robbers or unpleasant experiences, and no rains to swell the streams and make traveling difficult. (ibid.:232)

> *Pau ke aho i ke kahawai lau o Hilo.*
> One's strength is exhausted in crossing the many streams of Hilo.
> Said of or by one who is weary with effort. First uttered by Hiʻiaka in a chant when she found herself weary after a battle with the lizard god Panaʻewa. (ibid.:287)

This windward district provided an abundance of the most basic life-giving element *wai* from which life could be sustained. Maly and Maly (2006:7) note that during the Precontact and even into the early Historic periods, the area from the shoreline to about the 3,000-foot elevation "supported residential and agricultural activities"…while the "upper forest regions…were frequented by travelers, collectors of natural resources, and for a wide range of cultural practices…" Maly and Maly (ibid.) goes on to add that:

> A system of trails, running *mauka-makai* (between mountains and shore), a near-shore trail (the ala loa), and trails skirting the upper forest region were established as well. All of the large *ahupuaʻa* supported *mauka-makai* trails, while smaller *ahupuaʻa*, shared trails, and access to the larger upland regions.

While the windward regions of Hawaiʻi Island are known for its lush greenery and well-watered lands, traditional accounts relate that the lands extending from Hilo to Kohala became the domain of the pig-god, Kamapuaʻa, after his fiery relationship with Pele. 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.).

Wao: Environmental Zones

While *ahupuaʻa* served as a politically controlled taxable land unit, the Kānaka Maoli (lit. true people of the land) also divided the land along its horizontal axis to distinguish *wao* or ecological zones where particular types of flora were found growing along the mountain slopes. While the substantially larger *ahupuaʻa* of Humuʻula, Piʻihonua, and Waiākea would have given its residents access to the full spectrum of available natural resources, smaller *ahupuaʻa* such as Pīhā, whose boundaries were along the lower elevations, were given access to the resources found in the area extending from the *wao nāhele* (forested areas) down to the *ʻaekai* (shoreline). In summarizing the types of ecological zones that could be found in any given *ahupuaʻa*, Hawaiian scholar and historian, Samuel Kamakau writes:

> Here are some names for [the zones of] the mountains—the *mauna* or *kuahiwi*. A mountain is called a *kuahiwi*, but *mauna* is the overall term for the whole mountain, and there are many names applied

> to one, according to its delineations (*‘ano*). The part directly in back and in front of the summit proper is called the *kuamauna* , mountaintop; below the *kuamauna* is the *kuahea*, and makai of the *kuahea* is the *kuahiwi* proper. This is where small trees begin to grow; it is the *wao nahele*. Makai of this region the trees are tall, and this is the *wao lipo*. Makai of the *wao lipo* is the *wao ‘eiwa*, and makai of that the *wao ma‘ukele*. Makai of the *wao ma‘ukele* is the *wao akua*, and makai of there is the *wao kanaka*, the area that people cultivate. Makai of the *wao kanaka* is the *‘ama‘u*, fern belt, and makai of the *‘ama‘u* the *‘apa‘a*, grasslands.
>
> A solitary group of trees is a *moku la‘au* (a “stand” of trees) or an *ulu la‘au*, grove. Thickets that extend to the *kuahiwi* are *ulunahele*, wild growth. An area where *koa* trees suitable for canoes (*koa wa‘a*) grow is a *wao koa* and mauka of there is a *wao la‘au*, timber land. These are dry forest growths from the *‘apa‘a* up to the *kuahiwi*. The places that are “spongy” (*naele*) are found in the *wao ma‘ukele*, the wet forest.
>
> Makai of the *‘apa‘a* are the *pahe‘e* [*pili* grass] and *‘ilima* growths and makai of them the *kula*, open country, and the *‘apoho* hollows near to the habitations of men. Then comes the *kahakai*, coast, the *kahaone*, sandy beach, and the *kalawa*, the curve of the seashore—right down to the *‘ae kai*, the water’s edge.
>
> That is the way *ka po‘e kahiko* [the ancient people] named the land from mountain peak to sea. (Kamakau 1976:8–9)

Additional information about the ecological zones of Hawai‘i Island are detailed by Maly and Maly (2006) in relating the September 21, 1916, portion of the legendary account *Ke Ka‘ao Ho‘oniua Pu‘uwai no Ka-miki*. The quick and adept riddler, Ka-Miki finds himself at the court of the chief, Palikū-a-kīko‘oko‘o, where he was called to challenge Pīna‘au, the leading riddler of Hilo Palikū. As the contest unfolded, it was evident that both Ka-Miki and Pīna‘au were well-matched. In one such riddle, Ka-Miki named the various ecological regions of Hawai‘i Island then expressed to Pīna‘au that “if he could rise to the challenge of answering the riddle, his knowledge could be compared to one who has ascended to the summit of Mauna Kea” which in this story is named “mauna o Poliahu” (mountain of Poli‘ahu) (ibid.:11). While some of the terms described by Ka-Miki mirror that of Kamakau’s description, additional terms are given for the area extending from the lowland region and out into the horizon. Maly and Maly relate the following ecological zones as noted in that portion fo the account of Ka-Miki and provided a translation for each zone:

> 1–*Ke kuahiwi*; 2–*Ke kualono*; 3–*Ke kuamauna*; 4–*Ke ku(a)hea*; 5–*Ke kaolo*; 6–*Kawao*; 7–*Ka wao ma‘u kele*; 8–*Ka wao kele*; 9–*Ka wao akua*; *10–Ka wao lā‘au*; 11–*Ka wao kānaka*; 12–*Ka ‘ama‘u*; 13–*Ka ‘āpa‘a*; 14–*Ka pahe‘e*; 15–*Ke kula*; 16–*Ka ‘ilima*; 17–*Ka pu‘eone*; *18–Ka po‘ina nalu*; 19–*Ke kai kohola*; 20–*Ke kai ‘ele*; 21–*Ke kai uli*; 22–*Ke kai pualena*; 23–*Kai pōpolohua-a-Kāne-i-Tahiti*.
>
> 1–The mountain; 2–The region near the mountain top; 3–The mountain top; 4–The misty ridge; 5–The trail ways; 6–The inland regions; 7 and 8– The rain belt regions; 9– The distant area inhabited by gods; 10–The forested region; 11–The region of people below; 12–The place of *‘ama‘u* [fern upland agricultural zone]; 13– The arid plains; 14–The place of wet land planting; 15–The plain or open country; 16–The place of *‘ilima* growth [a seaward, and generally arid section of the *kula*]; 17–The dunes; 18–The place covered by waves [shoreline]; 19–The shallow sea [shoreline reef flats]; 20–The dark sea; 21– The deep blue-green sea; 22–The yellow [sun reflecting– sea on the horizon]; and 23– The deep purplish black sea of Kāne at Tahiti.

Legendary Accounts for the Pīhā Vicinity

While legendary accounts specific to Pīhā Ahupua‘a have not been identified, a few have been recorded for the adjacent lands including Maulua, located to the north of Pīhā Ahupua‘a. In relating the story for lands of Maulua, Maly and Maly (2006) detailed the following narrative taken from the story of Ka-Miki. As a preamble to this story, Maly and Maly (ibid.:13) explain:

> “*Kaao Hooniua Puuwai no Ka-Miki*” (The Heart Stirring Story of Ka-Miki) is about two supernatural brothers, Ka-Miki (The quick, or adept, one) and Maka-‘iole (Rat [squinting] eyes), who traveled around the island of Hawai‘i along the ancient *ala loa* and *ala hele* (trails and paths) that encircled the island. During their journey, the brothers competed in contests alongside the trails they traveled, and in famed *kahua* (contest arenas) and royal courts, against *‘ōlohe* (experts skilled in fighting or in other competitions, such as running, fishing, debating, or solving riddles, that were practiced by the ancient Hawaiians). They also challenged priests whose dishonorable conduct offended the gods of ancient Hawai‘i. Ka-Miki and Maka-‘iole were empowered by their ancestress,

> Ka-uluhe-nui-hihi-kolo-i-uka (The great entangled growth of *uluhe* fern which spreads across the uplands), a body-form of the goddess Haumea (the creative force of nature—also called Papa and Hina—who was a goddess of priests and competitors).

Ka-Miki Battles the Foremost ʻŌlohe, Maulua-a-pio

After passing thought he southern portion of the Hilo District, Ka-Miki and his companions, Makaʻiole, Keahialaka, and Hilo Hanakāhi make their way to the compound of the chief and foremost *ʻōlohe*, Maulua-a-pio (for whom the *ahupuaʻa* of Maulua was named). In attempting to secure a contest for Ka-Miki, Hilo Hanakāhi traveled ahead of his companions to meet with his teacher, Maulua-a-pio. A meeting was agreed upon and Ka-Miki was invited into the *hālau leʻaleʻa* of Maulua-a-pio where they partook in a meal and some *ʻawa*. After their feasting, Maulua-a-pio decided that he wanted to challenge the youthful Ka-Miki to a contest. In their first show of knowledge and wits, Ka-Miki began to name the winds associated with these lands, chanting thusly:

> *He lā makani ka hoʻi kāia o Koholālele, ke lele nei ka huna o ke kai iluna o nā pali, pali kahakā a ke koaʻe e lele ai i ka hoʻōulu a ka Ulumano ka makani hoʻoūlu-a o nā makalae. E ʻino, ʻino paha auaneʻi o Hilo, ʻino ke ala, ua ku nā pali laumania a ka lawaiʻa nihi ai kuʻukuʻu i ke kaula a ke ʻaki ala i ka niho! –*
>
> This is indeed a windy day at Koholālele, the sea mist flies above the cliffs, steep cliffs from which the tropic birds fly rising on the *Ulumano*, the wind which rises from the shores. It is perhaps a storm, a storm in Hilo, a storm along the paths on the sheer cliffs on which the fishermen tie their ropes and let them down to the nipping teeth [waves]. (Maly and Maly 2006:14)

Despite Ka-Miki declaring the presence of an impending storm, Maulua-a-pio rejects Ka-Miki's claim stating, "Where it the storm, all is calm, there are no waves upon the shore, the cool *Malanai* breeze blows along the cliff of the *hulaʻana"* (cliff trail which one swims). The two opponents continued their debate and in due time, they begin discussing the names of other *ʻōlohe* of the Hilo Palikū region.

> "**Kalele-a-Welokā** is the *ʻōlohe* who is filled with knowledge and strength, he is the *kaulana ʻāina* (champion who maintains peace in the land) of the chief Palikū-a-Kīkoʻokoʻo. He has a full muscular body, like the mysterious *koa* trees which surround Hilo, there is no other like him."
>
> Ka-Miki then told Maulua, "He is indeed a great warrior, but the Kona wind is coming to scatter the branches of this *koa* tree." Maulua told Ka-Miki, "Where is this Kona wind which will knock over the tall dark *koa* of Hilo? This wind may knock over the *koa* of *ʻUmikoa*, but not the great *ʻōlohe*, the *aʻu* (sword fish) which leaps upon the waves, the *ʻahi kananā* (fierce tuna fish) of the deep sea, the *manō niuhi* (great man eating shark) of the dark ocean depths!"
>
> Maulua continued debating with Ka-Miki, and Hilo Hanakāhi called to his teacher, "I have fully explained the nature of this one who is here before you. If you continue in this manner, you will become like the little pebble knocked over in *kōnane*, and set aside in a little bundle." Maulua did not answer, but instead leapt to try and surprise attack Ka-Miki. Though he tried all manner of *lua* (techniques), Maulua was worn out and bound by KaMiki, unable to move.
>
> Ka-Miki told Maulua, "You have been bound in the net, twined from the hair of Ka-uluhe-nui-hihi-kolo-i-uka." With a smile, Ka-Miki then thanked Maulua for the test, telling him, "You are one of the best competitors I have met, there is but one problem, you are quickly worn out, you have no strength (a play on the name of the land Maulua, where one becomes wearied from traveling the steep valley cliffs). Therefore, let this test between Ka-Miki and Maulua be ended, unless you be killed like one who travels the precipitous cliff trail of Nuʻalolo, falling like the fire brands of Kāmaile, or the flying fire darts, the fluttering tribute of Makua-iki. Because you are a teacher of Hilo Hanakāhi, my traveling companion, I will release you." (Maly and Maly 2006:15)

After defeating Maulua, Ka-Miki and his companions proceeded with their journey, challenging other *ʻōlohe* who resided in the areas beyond Maulua. While the above described narrative tells of the ancient trails, place names, and traditional activities, the following narrative describes a grueling battle taking place in the lands of Hilo Palikū between Poliʻahu, the goddess of the snow-covered mountain and her fiery rival, Pele.

Pele and the Snow-Goddess

This narrative provides a cultural understanding of volcanic eruptions and the creation of some of the unique geological formations found in this region. That portion of the story titled *Pele and the Snow-Goddess* that describes the movement of lava in this region, as retold by Emerson, is presented below:

> Poliahu and her friends had some down Mauna Kea to a sloping hillside south of Hamakua. Suddenly to their midst appeared a stranger of surpassing beauty. Poliahu welcomed her and the races were continued. Some of the legend-tellers think that Pele was angered by the superiority, real or fancied, of Poliahu. The ground began to grow warm and Poliahu knew her enemy.
>
> Pele threw off all disguise and called for forces of fire to burst open the doors of the subterranean caverns of Mauna Kea. Up toward the mountain she marshalled her fire-fountains. Poliahu fled toward the summit. The snow-mantle was seized by the outbursting of lava and began to burn up. Poliahu grasped the robe, dragging it away and carrying it with her. Soon she regained strength and threw the mantle over the mountain.
>
> There were earthquakes, shaking the great island from sea to sea. The mountains trembled while the tossing of waves of the conflict between fire and snow passed through and over them. Great rock precipices staggered and fell down the sides of the mountains. Clouds gathered over the mountain summit at the call of the snow-goddess. Each cloud was gray with frozen moisture and the snows fell deep and fast on the mountain. Farther and farther down the sides of the snow-mantle unfolded until it dropped on the very fountains of fire. The lava chilled and hardened and choked the flowing, burning rivers.
>
> Pele's servants became her enemies. The lava, becoming stone, filled up the holes out of which the red melted mass was trying to force itself. Checked and chilled, the lava streams were beaten back into the depths of Mauna Loa and Kilauea. The fire-rivers, already rushing to the sea, were narrowed and driven downward so rapidly that they leaped out from the land, becoming immediately the prey of the remorseless ocean.
>
> Thus the ragged mass of Laupāhoehoe was formed, and the great ledge of the arch of Onomea, and the different sharp and torn lavas in the edge of the sea which marks the various eruptions of centuries past.
>
> Poliahu in legendary battles had met Pele many times. She has kept the upper part of the mountain desolate under her mantle of snow and ice, but down toward the sea most fertile and luxuriant valleys and hillside slopes attest the gifts of the goddess to the beauty of the island and the welfare of men.
>
> Out of Mauna Loa, Pele has stepped forth again and again, and has hurled eruptions of mighty force and great extent against the maiden of the snow-mantle, but the natives say that in this battle Pele has been and always will be defeated. Pele's kingdom had been limited to the southern half of the island Hawaii, while the snow-maidens rule the territory to the north. (Westervelt 1916:60–62)

Historical Accounts of Pīhā and the Greater North Hilo District

Written accounts penned by early visitors to the Island of Hawai‘i offer insight into what life may have been like for the Kānaka Maoli of Pīhā and North Hilo. Such accounts describe North Hilo as incredibly verdant and rich in fresh, flowing water, which was frequently noted as carving through mountain streams and emptying into the sea. Also remarked upon was the surprising population that lived along the coast from South Hilo to Laupāhoehoe to the north of Pīhā, particularly in the vicinity of the many steep gulches. Many of the individuals who traveled north or south along the coast to or from the Hāmākua District commented upon the rugged terrain, inescapably treacherous and everlasting. Ever-flowing streams and waterfalls fed by frequent mountain rainfall allowed for richly cultivated ravines and gulches, splendidly planted in taro, banana, and occasionally sugarcane.

In 1823, British missionary William Ellis and other 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 2004)). Ellis estimated that at the time of his visit, about 2,000 people lived in 400 houses or huts along the coastline at Hilo Bay (ibid.). Ellis described the residential and land use practices he observed while in the Hilo ("Hiro") District, which is applicable to the study area vicinity, thusly:

> *Hiro*, which we had now left, though not so extensive and populous as Kona, is the most fertile and interesting division on the island.
>
> The coast from Waiakea to this place is bold and steep, and intersected by numerous valleys or ravines; many of these are apparently formed by the streams from the mountains, which flow through them into the sea. The rocks along the coast are volcanic, generally a brown vesicular lava. In the sides and bottoms of some of the ravines, they were occasionally of very hard compact lava, or a kind of basalt.

> This part of the island, from the district of Waiakea to the northern point, appears to have remained many years undisturbed by volcanic eruptions. The habitations of the natives generally appear in clusters at the opening of the valleys, or scattered over the face of the high land. The soil is fertile, and herbage abundant.
>
> The lofty Mouna-Kea, rising about the centre of this division, forms a conspicuous object in every view that can be taken of it. The base of the mountain on this side is covered with woods, which occasionally extend within five or six miles of the shore. . . rain is frequent in this and the adjoining division of Hamakua, which forms the centre of the windward coast, and is doubtless the source of their abundant fertility. The climate is warm. Our thermometer was usually 71° at sun-rise; 74° at noon; and 72° or 73° at sun-set. Notwithstanding these natural advantages, the inhabitants, excepting at Waiakea, did not appear better supplied with the necessaries of life than those of Kona, or the more barren parts of Hawai‘i. They had better houses, plenty of vegetables, some dogs, and a few hogs, but hardly any fish, a principle article of food with the natives in general. (ibid.:263-264)

Another early written account by Ellis describes the stretch of land between South Hilo and Laupāhoehoe, north of the current study area, as a fertile, verdant, and well-watered countryside with a sizeable population:

> The country, by which we sailed, was fertile, beautiful, and apparently populous. The numerous plantations on the eminences and sides of the deep ravines or valleys, by which it was intersected, with the streams meandering through them into the sea, presented altogether a most agreeable prospect. The cost was bold, and the rocks evidently volcanic. We frequently saw water gushing out of hollows in the face of the rocks, or running in cascades from the top to the bottom. (Ellis 1917:257)

In 1840, Lieutenant Charles Wilkes, head of the U.S. Exploring Expedition, traveled to northern Hilo and described the landscape of this region:

> The coast to the north of Hilo is slightly peculiar: it is a steep bluff, rising about two hundred feet; this is cut into small breaks here called “gulches,” within which the villages are generally situated, and the natives grow banana and taro. In some places they cultivate small patches of sugar-cane, which succeed well.
>
> These gulches are ravines, from eight hundred to one thousand feet deep, which have apparently been worn by water-courses: they extend back into the woods, and have made the country impassable for either vehicles or riders on horseback, for no sooner is one passed than another one occurs. There is no landing for boats, for all along the shore the surf beats on the rocks with violence. (Wilkes 1845:206)

Journalist Henry Martyn Whitney published the very first guide book to the islands in 1875, entitled *The Hawaiian Guide Book, For Travelers: Containing A Brief Description of the Hawaiian Islands, Their Harbors, Agricultural Resources, Plantations, Scenery, Volcanoes, Climate, Population, and Commerce*. An excerpt from his book describes his treacherous trek from Laupāhoehoe to Hilo, passing through the vicinity of the study area:

> From Laupahoehoe on the north to Puna on the south extends this large and fertile district [Hilo], where the trade winds are neutralized by the mountains, and where the rain falls in such abundance as to keep the land perpetually green to the water’s edge. Except at Hilo Bay, the coast is composed of bold bluff cliffs from a hundred to upwards of 1000 feet high; these are higher on the north and the pali, at Laupahoehoe, is a remarkable one. . .On the other cliff, one mile distant, you discern horsemen and decide that the road to Hilo lies over there, but how to get there. This wall extends inland for miles, a stream rolls down its precipitous valley, plainly one must go down before getting up the other side. At length the ribbon road wound downward on the shelving roof of the valley appears. From twenty minutes to half an hour will b occupied in the descent, according as you risk the neck of horse and rider. More than a score, some say fifty similar valleys, with twice this number of similar ribbon windings, miniature Alpine passes, lie between Laupahoehoe and Hilo village.
>
> Mountain torrents rush through each of these passes, and one of the wonders of this volcanic country lies in these gulches, with their gothic steeps that disrupt the land for three score miles or less, piercing the land’s centre. The number of waterfalls is beyond estimate, their height varies from tens to thousands of feet, and many of the streams literally *leap* into the sea. A mere sprinkle at the beach often increases, higher up the mountain, to a heavy rain, and the stream may rush in torrents for a mile and then resume the common course of a brook. It is not uncommon for the traveler to be detained by a swollen stream for half a day. In olden times the streams were crossed by stepping

> stones. "La Paz" says of this overland route: "As we rode along, the rain poured, rattling among the leaves, pattering among the impromptu pools and drains, the torrents tumbled from the hills or leaped through chasms, over frightful rocks, with a thundering sound that jarred the cavernous earth; the ocean waves came surging and groaning against the beetling cliffs like a wail of despair, and our horses kept tumbling over a corduroy road of mud ridges and holes of water, alternating with the regularity of rice rows; a succession of mud ridges and miniature hog wallows.
>
> "Before reaching the Scotchman's gulch, we passed a deep chasm, where some rough stone piers indicated where the apology for a bridge had formerly stood. Through this swept a mad and foaming torrent, near four feet deep, whirling and rushing past gigantic balsaltic bounders, a cataract above, a waterfall below; we passed between this Scylla and Charybdis, and came near being carried away by the foaming flood. We have crossed the Rocky Mountains six times, the Sierra Madre of Mexico often, the volcanic chain of Central America three times and the Andes twice; and we here most solemnly protest that we have never traveled a road that gave the traveler more ups and downs on a sliding scale than the pathway from Laupahoehoe to Hilo." (Whitney 1875:70–72)

The road to Laupāhoehoe from South Hilo was also described in George Bowser's *Hawaiian Kingdom Statistical and Commercial Directory* as a treacherous but beautiful journey, containing several adequate landings for boats, and prime agricultural land suited for the potential cultivation of commercial crops. Bowser (1880:536) writes:

> On the way to Laupahoehoe the road is not first-rate, even in the fine weather I enjoyed on my trip, besides which there are a great number of deep gulches, the sides of which are very steep. The track is certainly very rugged and uneven; but, then, to make up for it, the scenery with a parallel in the world. All the way from Hakalau to Laupahoehoe, the country is as yet unsettled by the white man, although in that stretch of about fourteen miles of coast, by a width of a great many miles inland, the land is suitable for the culture of sugar, coffee, wheat, oats, barley and many minor crops, and only wants the presence of capital and industry to make it a veritable paradise. Good landing can be obtained about every two miles along the coast, places which only require the expenditure of from three to ten thousand dollars to make the landing facilities good in any weather and all times of the year. The only inhabitants of this wide tract are some thirty native[s], who own among them about 3,000 acres, of which they cultivate about 150. The rest of the land belongs principally to the King and to members of the royal family.

King David Kalākaua (1990:284) described the lands of the northern portion of Hilo as he recounted the tale of 'Umi-a-Līloa presented in his book, the *Legends and Myths of Hawai'i*. His description of the region is taken from a time when North Hilo and Hāmakua were in the thick of the commercial sugar industry, but mentions the presence of scattered *lo'i kalo* and bananas:

> The northeastern coast of the island of Hawaii presents an almost continuous succession of valleys, with intervening uplands rising gently for a few miles, and then more abruptly toward the snows of Mauna Kea and the clouds. The rains are abundant on that side of the island, and the fertile plateau, boldly fronting the sea with a line of cliffs from fifty to a hundred feet in height, is scored at intervals of one or two miles with deep almost impassable gulches, whose waters reach the ocean either through rocky channels worn to the level of the waves, or in cascades leaping from the cliffs and streaking the coast from Hilo to Waipio with lines which seem to be molten silver from the great crucible of Kilauea.
>
> In the time of Liloa, and later, this plateau was thickly populated, and requiring no irrigation, was cultivated from the sea upward to the line of frost. A few *kalo* patches are still seen, and bananas grow, as of old, in secluded spots and along the banks of the ravines; but the broad acres are green with cane, and the whistle of the sugar-mill is heard above the roar of the surf that beats against the rock-bound front of Hamakua.

The early 19th century historical accounts describes traditional settlement locations appearing in clusters at the opening of the valleys or scattered over the *kula* lands. However, by the end of the 19th century, descriptions of sugar plantations and mills, and the use of horses to traverse this steep country side are evident. The transformation of these lands into large scale commercial agriculture was a direct result of the Māhele 'Āina if 1848, which paved the way for fee simple ownership of lands in Hawai'i.

The Legacy of the *Māhele ʻĀina* 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 *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, 1847 (King n.d.). Once the *Mōʻī* and his *aliʻi* accepted the principles of the Privy Council, the *Māhele ʻĀina* (Land 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, were recorded in the *Buke Mahele* (also known as the *Māhele* Book) (Soehren 2005). As this process unfolded the *Mōʻī*, who received roughly one-third of the lands of Hawaiʻi, 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 when the last chief was recorded in the *Buke Māhele* (*Māhele* Book), the *mōʻī* commuted about two-thirds of the lands awarded to him to the government (King n.d.). Unlike the *Mōʻī*, the *aliʻi* and *konohiki* were required to present their claims to the Land Commission to receive their Land Commission Award (LCAw.). The chiefs who participated in the *Māhele* were also required to provide commutations of a portion of their lands to the government to receive a Royal Patent that gave them title to their remaining lands. The lands surrendered to the government by the *Mōʻī* and *aliʻi* became known as "Government Land," while the lands that were personally 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) identified and claimed during the *Māhele* were "subject to the rights of the native tenants" therein (Garavoy 2005:524). Finally, 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 formally surveyed. This process expedited the work of the Land Commission.

As the *Mōʻī* and *aliʻi* made claims to large tracts of land during the *Māhele*, questions arose regarding the protection of rights for the native tenants. To address this matter, on August 6, 1850, the *Kuleana* Act or Enabling Act was passed, allowing native tenants to claim a fee simple title to any portion of lands which they physically occupied, actively cultivated, or had improved (Garavoy 2005). Additionally, the *Kuleana* Act clarified rights to gather natural resources, as well as access rights to *kuleana* parcels, which were typically land locked. Lands awarded through the *Kuleana* Act were and still are, referred to as *kuleana* awards or *kuleana* lands. The Land Commission oversaw the program and administered the *kuleana* as Land Commission Awards (Chinen 1958). Native tenants wishing to make a claim to their lands were required to submit a Native Register to the Land Commission, followed by Native Testimony given by at least two individuals (typically neighbors) to confirm their claim to the land. Upon successful submittal of the required documents, the Land Commission rendered their decision, and if successful, the tenant was issued the LCAw.

The *ahupuaʻa* of Pīhā (1 & 2) does not appear in the *Buke Māhele* and was never assigned or awarded during the 1848 division of lands. However, the ownership of Pīhā was the center of some controversy when the Trustees of Bishop Estate claimed that *ahupuaʻa* (along with other lands) had been continuously held and claimed by Bernice Pauahi Bishop's ancestors (Rowland 2018). To settle this dispute a compromise was reached by which the Minister of the Interior conveyed certain other lands to the Trustees, and they, in turn, conveyed the land of Pīhā (and other lands) to the Kingdom of Hawaiʻi. Thus, it was not until December 20, 1890, that Pīhā became part of the Government Lands of the Kingdom of Hawaiʻi. No claims were made for *kuleana* lands within Pīhā Ahupuaʻa during the *Māhele ʻĀina* of 1848.

Commission of Boundaries (1862-1876)

In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawaiʻi to legally set the boundaries of all the *ahupuaʻa* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Boundary Commission was authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents who learned of the boundaries from their ancestors. The boundary information was collected primarily between 1873 and 1885 and was usually given in Hawaiian and simultaneously transcribed into English. Although hearings for most *ahupuaʻa* boundaries were brought before the Boundary Commission and later surveyed by Government employed surveyors, in some instances, the boundaries were established through a combination of other methods. In some cases, *ahupuaʻa* boundaries were established by conducting surveys on adjacent *ahupuaʻa*. Or in cases where the entire *ahupuaʻa* was divided and awarded as Land Claim Awards and or Government-issued Land Grants (both which required formal surveys), the Boundary Commission relied on those surveys to establish the boundaries for that *ahupuaʻa*. Although these small-scale surveys aided in establishing the boundaries, they lack the detailed knowledge of the land that is found in the Boundary Commission hearings.

On February 8, 1875, on the application of J. Dominis, the agent of the Crown Lands and administrator for the estate of M. Kekuanaoa, the Boundary Commission met at the courthouse in Hilo to settle the boundaries of Pīhā Ahupuaʻa (Boundary Commission Vol. B pgs. 325-330). Several older residents of the area provided testimony at the hearing, including Ku, Hemahema, Kalaualoha, Kupahu, and D.H. Hitchcock (the Government Surveyor who surveyed the Pīhā boundaries). D.H. Hitchcock testified that he surveyed the boundaries of Pīhā Ahupuaʻa in October of 1874 with Ku as his *kamaʻāina* (person familiar with the land). Hitchcock also took Kalaualoha with him along a part of the Nanue boundary, and talked with Hemahema prior to the survey, but found that the recollections of Hemahema and Ku agreed regarding the boundaries, so he only took Ku with him. From the testimony, we learn the boundary between Kahuku and Pīhā *ahupuaʻa* was once marked by an "old trail" used by bird catchers to access the forest, and that the owner of Nanue Ahupuaʻa, Alapai, disputed the *mauka*-eastern boundary of Pīhā Ahupuaʻa as described by Ku and depicted by D.H. Hitchcock in Figure 11. We also learn the border between of Pīhā and the neighboring *ahupuaʻa* of Waikaumalo, to the north of the current subject parcel, was marked by Waikaumalo Stream from the sea to where Waikaumalo is cut off by Puuohua Ahupuaʻa. One named point along the stream, Paina Falls, is mentioned in the boundary description for Pīhā Ahupuaʻa in the vicinity of the current subject parcel (see Figure 11). The following summary of the 1875 Boundary Commission testimony for Pīhā concentrates on the Kahuku boundary of the *ahupuaʻa*.

Ku, described in the boundary commission records as "an old man" born during the time of Kamehameha I, stated that he had learned the boundaries of Pīhā from his grandfather, Hue, and his father, Mahiai, both of whom were bird catchers, and that his older brother, Koia, was once *konohiki* of the *ahupuaʻa*. Ku accompanied Hitchcock during the boundary survey and pointed out the boundaries to him, showing him a stone *ahu* at the *mauka* corner of Pīhā (where the *ahupuaʻa* is cut off by Humuʻula) that his brother had built during the reign of Kamehameha II. With regards to the trail along the Pīhā/Kahuku boundary, Ku testified that:

> …My grandfather made the road on Honohina to Moohalohalo, and I made the road to Hopuwai, Kahuku bounds Piha on Hilo side at shore, there is a small gulch there called Alanaio on boundary, thence runs up gulch a short distance above road to head of it, thence up old trail to Kaawau, thence bounded by Nanue up old trail to Nenelu old kauhale [group of houses], thence up trail to Waipahehoe a kahawai [stream/gulch] and kauhale, the old trail does not reach to the gulch, but turns to the left…(page 325)
>
> When cross-examined Ku clarified that:
>
> …Piha and Nanue join at Kawau cutting off Kahuku. I have stated that the mauka boundary of Nanue is at Kaahina not at Nahuina of Waipahoehoe. There is an old kauhale kalaiwaa [group of canoe carvers' houses] at this place, this is the boundary I have always known. Nanue had no old road. The birds in olden times belonged to Piha and not to Nanue. (page 326)

Hemahema, described as a "quite old man" in the testimony, stated that he had learned the boundaries of Pīhā from his father, Waiwai, who was the *konohiki* of "these lands to Pohakupua [six *ahupua* northwest of Pīhā]," and that he had gone bird catching with his grandfather on the lands. He testified that bird catchers from Pīhā and Maulua *ahupuaʻa* (adjacent to the northwestern *mauka* boundary of Pīhā) used to catch birds in common. With regards to the trail along the Hilo side boundary of Pīhā, Hemahema stated that:

> …Kahuku bounds Piha at the shore at Hilo side, a small gulch, boundary runs up trail to Nahuina where Piha and Nanue join and Kahuku ends, thence boundary runs up trail to Kaahina near Waipahoehoe, this is as far as I ever knew about Nanue…(page 327)
>
> When cross-examined Hemahema clarified that:
>
> …Nahuina and kumukawau are the same…From Kawau boundary between Nanue and Pīhā runs up old trail to Kaahina this is a far as I ever knew Nanue to run. It is where Hakai made a canoe. I heard from Kihili, Napihe and Kulaipahu that this was the mauka end of Nanue. Hapai ma said the same thing. (page 327)

Kalaualoha, described as an "old man" in the testimony, stated that he had learned the boundaries of Pīhā from "Kaulanahiai, Koia, and Waikane, now dead." Kalaualoha, who was the father-in-law of Alapai, the owner of Nanue Ahupuaʻa at that time, disagreed with the boundary testimony of Ku and Hemahema, and went with Hitchcock to point out what he believed to be the correct boundary between Nanue and Pīhā to be. Kalaualoha testified that:

> …Piha and Nanue join each other at Kawau an old trail into the woods, thence boundary runs up this trail to Waipahoehoe, thence boundary runs up this stream to Mahuia kauhale on Piha, thence boundary runs up to Koapololei, thence up old trail to upper edge of woods to Kalapaohelo, to a place called Kaluaalu…In olden times the birdcatchers used to go up the Honohina and Piha roads, they could not go up the Nanue as the road was so bad. The canoe road of Nanue ran to mauka of Kaahiwa, there it ended. But the roads on Honohina and Piha ran way mauka…(page 329)

Kupahu, the uncle of Alapai (the owner of Nanue Ahupuaʻa), who was described as a "quite old man" in the testimony, stated that he knew a little about the boundaries of Pīhā because he "went up the road to Kalapaohelo after beef" (page 329), and that Koia, his guide, pointed out the boundaries to him. Kupahu's testimony only addressed the *mauka*-eastern boundary of Pīhā where it joins Nanue. He stated that, "…Kahuku ends at Nahuina, and there Nanue and Piha join, Kumukawai is one name of this place…" (page 329).

At the conclusion of the testimony, it was decided by R. A. Lyman, the Commissioner of Boundaries, that the boundaries of Pīhā as given by Ku be accepted, and that the notes of the survey be filed (see Figure 11), and Certificate of Boundaries be issued accordingly.

Pīhā Ahupuaʻa During the Late Nineteenth and Twentieth Centuries

Following the signing of the 1875 Treaty of Reciprocity, a free-trade agreement between the United States and the Kingdom of Hawaiʻi, which guaranteed a duty-free market for Hawaiian sugar in exchange for special economic privileges for the United States, a number of new sugar plantations incorporated in the Islands. In 1878, Claus Spreckels, with W.G. Irwin & Company as its agent, established the Hakalau Plantation Company on 9,000 acres of land located along the North Hilo coast, 16 miles from Hilo (Dorrance and Morgan 2000). The fields of the Hakalau Plantation Company ranged from 250 feet above sea level along the shoreline bluffs to 2,000 feet above sea level at their western (*mauka*) limits. The Hakalau Mill, built-in 1890 on the shore at the foot of a 200-foot bluff within Hakalau Gulch, produced 5,000 tons of sugar annually during its early years (ibid.). The cane was sent on flumes from the various fields to the mill site, where it was then processed. Initially, until 1913 when a railroad connecting the plantation to the port at Hilo was built, the plantation shipped its product from the Hakalau Landing to Honolulu via inter-island vessels that anchored offshore. Laborer camps were established at various locations throughout the plantation's fields and were generally segregated by ethnicity. By the late-19th century, the company employed approximately 2,000 people for the harvesting and cultivation of sugarcane, and this labor force was compromised of a majority of Portuguese and Japanese immigrants (Forbes 2019; Kurisu 1995).

The Government Land of Pīhā Ahupuaʻa (containing 4,250 acres) was leased to the Hakalau Plantation Company by the Kingdom of Hawaiʻi on February 11, 1892, for a term of twenty years (see C.S.F. 449). The *makai* lands of the *ahupuaʻa* (up to the roughly 2,000-foot elevation contour), including the current subject parcel, were subsequently cleared by the plantation and used for the cultivation of sugarcane, while the upper lands were kept in forest and used for pasture. As the plantation's lease on its Pīhā lands was set to expire, the Territorial Government began the process of subdividing the *makai* section of the *ahupuaʻa* into homesteads. Government Lands such as Pīhā were made available to family farmers for homesteading purposes following the passage Land Act of 1895. The process for obtaining homestead lots was then clarified by the Organic Act of 1900, a law enacted at a time in the islands (and in the United States Congress) when there was growing concern regarding the consolidation of land ownership within the plantation system, and its reliance on foreign labor (Horowitz et al. 1969). Survey of the Pīhā homestead tract began in 1912 and was completed by 1913 (Figure 12), when the Survey Department of the Territory of Hawaiʻi reported that "the land of Piha was subdivided into 28 lots, comprising 393.81 acres, 5 miles of roads containing 20.44 acres, and flumes and ditches and remnant covering 5.95 acres" (Department of Interior 1914:65).

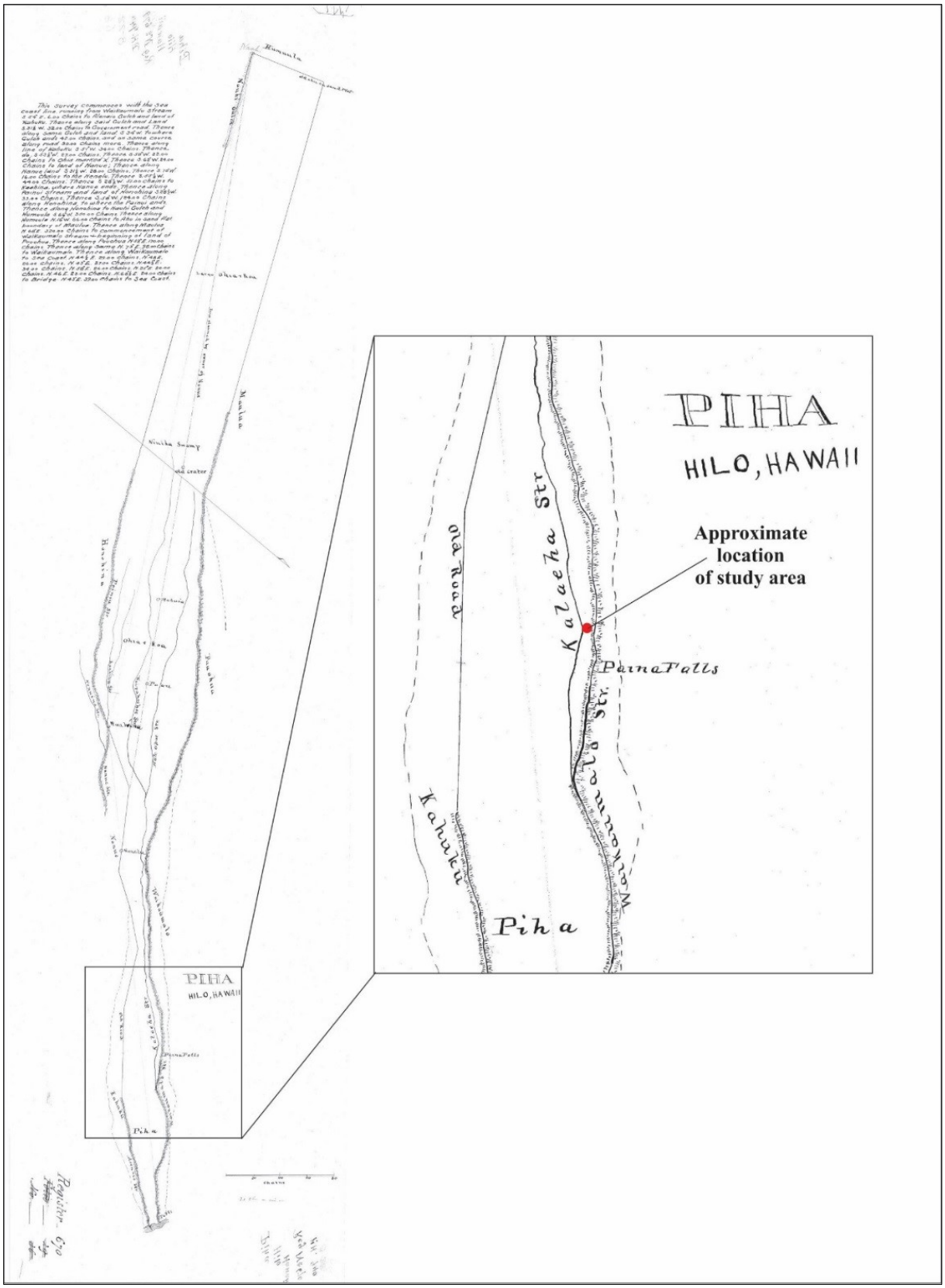

Figure 11. Hawai‘i Registered Map No. 670 (Hitchcock n.d.) showing Pīhā Ahupua‘a in ca. 1874, with the approximate location of the current study area indicated.

The Pīhā-Kahuku Homestead Road, located roughly 275 meters southeast of the subject parcel, was created as part of the Pīhā homestead subdivision, appears to follow the route of the older road described along the boundary between those two *ahupuaʻa* during the Boundary Commission hearings of 1875. The roads that bound the current subject parcel to the northeast and northwest (Stone Road and another unnamed road), while they may have been initially created by the plantation to access their fields between the Kalaeha and Waikaumalo stream gulches, were formalized as part of the creation of the homestead lots. Following the subdivision of the Pīhā homesteads, the Hakalau Plantation, now owned by C. Brewer & Co., brought up the question of the boundary between the homesteads and the adjoining lands owned or controlled by the plantation, which they felt had been encroached upon. Additional surveys of the Pīhā homestead tract, involving extensive triangulation work, were then made during the early part of 1914 until the matter was decided to the satisfaction of all parties involved (Department of the Interior 1914:521).

In June of 1914, the newly created Pīhā Homestead lots (see Figure 12) were sold at public auction to various individuals (Department of the Interior 1916:526). Grant No. 6566 for Lots 13 & 14 of the homesteads, containing a total of 28.63 acres and including the current subject parcel, was assigned to Manuel Ignacio on June 20, 1916. Because Lots 13 & 14 were purchased together, the actual boundaries between the two lots are not defined on any of the maps reviewed for this study. Based on the layout of the homesteads, however, it is likely that the current subject parcel was initially a portion of Lot 13. The 1914 survey map prepared for the Pīhā Homesteads shows the overall boundaries of both Lots 13 & 14. The roads accessing the homestead lots between Kalaeha and Waikaumalo stream gulches (Stone Road and another unnamed road) form the northeastern and northwestern boundaries of the study area, and a portion of Stone road and Kalaeha gulch forms the southern boundary (Figure 13). In 1914, Lots 13 & 14 were listed as containing 0.76 acres of roadways and 0.2 acres of flume. The Hakalau Plantation Company continued to grow sugarcane on lands in the vicinity of the current study area throughout the first half of the 20th century, but by the early 1940s, nearly forty percent of the sugarcane on the plantation was being cultivated by independent growers, some of whom had purchased Pīhā Homestead lots, such as Manuel Ignacio.

The Hakalau Plantation Company was a model for other sugar plantations and had a reputation for high production levels and providing quality work amenities (Kurisu 1995). While operating for over hundred years, the company only employed a half dozen managers, bringing stability to the plantation. One of these managers in particular, John Ross (1903-1942), is remembered for modernizing the plantation through construction and establishment of facilities including a school at Honohina, and also known for preserving ancient Hawaiian burial grounds (ibid.). During Ross' tenure as manager several plantation camps were established in the vicinity of the Pīhā Ahupuaʻa, including Kahuku Camp (Camp 17), located *makai* of the study area near the intersection of the Pīhā-Kahuku Homestead Road and the Old Māmalahoa Highway, and the Honohina and Nanue Camps (Camps 13 and 14), located *mauka* and south of the study area adjacent to the Nanue and Waiehu stream gulches.

In 1943, the neighboring Wailea Milling Company (also started by Claus Spreckels) merged with the Hakalau Plantation Company, making it the third largest sugar producer in the islands, and by 1944, the plantation had reached its maximum yields, producing 26,000 tons of sugar that year (Dorrance and Morgan 2000). County Tax records for Lots 13 & 14 (TMK: (3) 2-004:003), which go back to 1944, indicate that the current subject parcel was likely cultivated in sugarcane (leased to the Hakalau Plantation Company with a cane contract to the Wailea Milling Company) throughout the first half of the twentieth century. In 1944, Lots 13 & 14 are listed as being owned by Ella K. Breithaupt and containing 15 acres of sugarcane with 5 acres fallow, and 8.65 acres of waste land. On April 1, 1946, the Hakalau Mill, and the railroad connecting the plantation to Hilo, were severely damaged by a *tsunami* triggered by an earthquake in the Aleutian Islands. The mill was rebuilt, but the railroad shut down permanently. Following the *tsunami* the products of the plantation were trucked to the docks at Hilo for transport.

County tax records indicate that Lots 13 & 14 of the Pīhā homesteads (TMK: (3) 2-004:003) were cultivated in sugarcane throughout the 1950s with similar acreages of planted, fallow, and waste land as were reported in 1944. A 1954 USGS aerial photograph shows the study area, and the adjacent lots within the Pīhā homesteads, all planted in sugarcane (Figure 14). A map of the Hakalau Sugar Company plantation fields prepared during the mid-20th century indicates that the current subject parcel was formerly a portion of "Field 135" (Figure 15). In 1962, C. Brewer & Co. merged the Hakalau Plantation Company into the Pepeekeo Sugar Company, and the Hakalau Mill was shut down (Dorrance and Morgan 2000). According to County tax records, that same year, Graven Breithaupt Trustee of the Ella Breithaupt Estate, leased 6.9 acres of land within Lots 13 & 14 of the Pīhā Homesteads to Yoshinobu and Tsutayo Yamada for eighty years at a dollar per acre. A 1965 USGS aerial photograph shows the subject parcel and the surrounding homestead lots all planted in sugarcane (Figure 16). Subsequently, in 1969, sixteen acres of land within the homestead lot were leased to Komatsu Fujimoto for eight years at a rate of 240 dollars per year (in 1975 this lease was transferred to the K. Fujimoto Estate). By 1970, County tax records indicate that 10.63 acres within Lots 13 & 14 (including the current study area) had been rezoned as conservation land, while the other eighteen acres remained as agriculturally zoned lands.

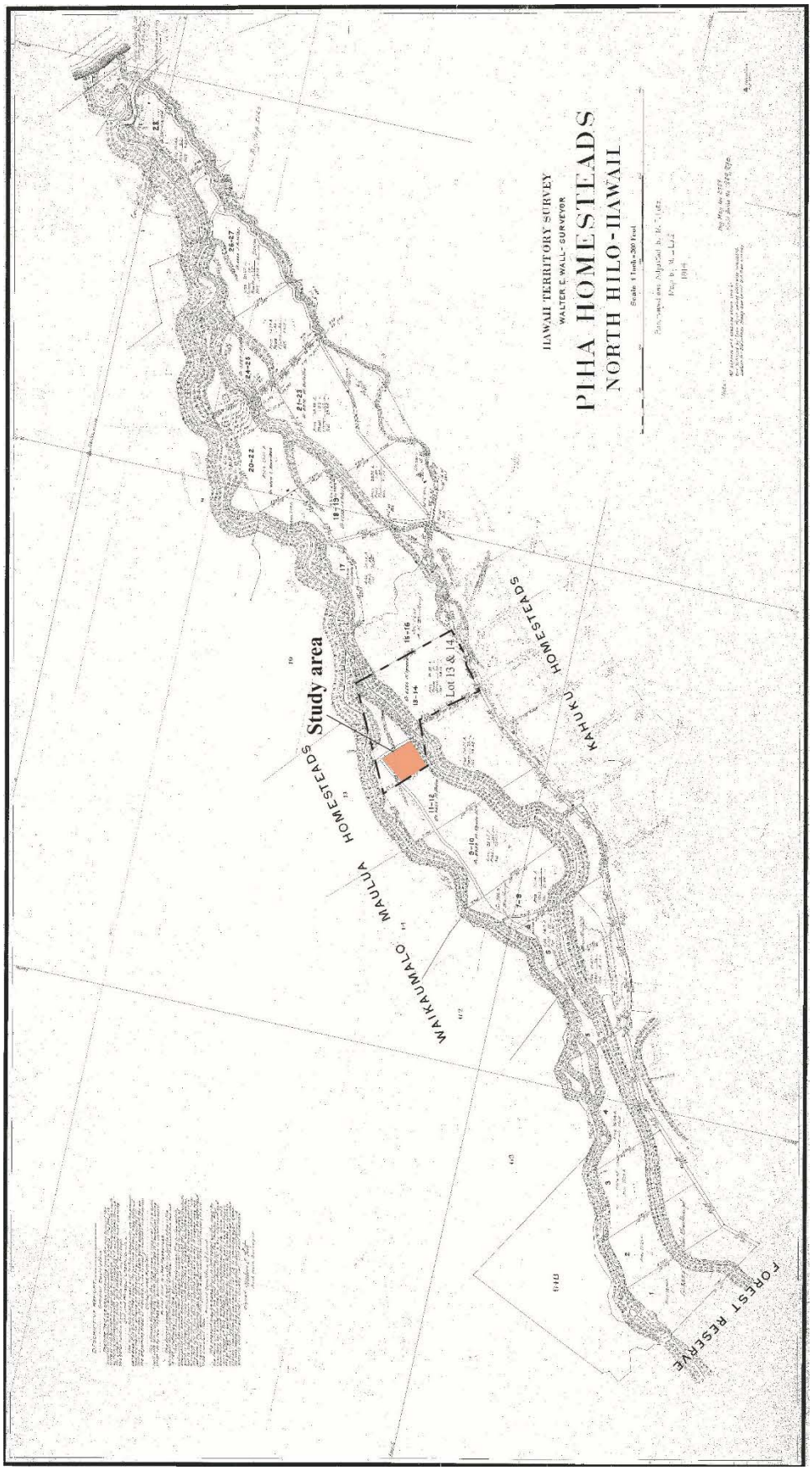

Figure 12. Map of the Pīhā Homesteads (Hawaii Registered Map No. 2568; Lutz 1914) showing the location of the current study area (shaded red with Lots 13 & 14 indicated by a dashed black line).

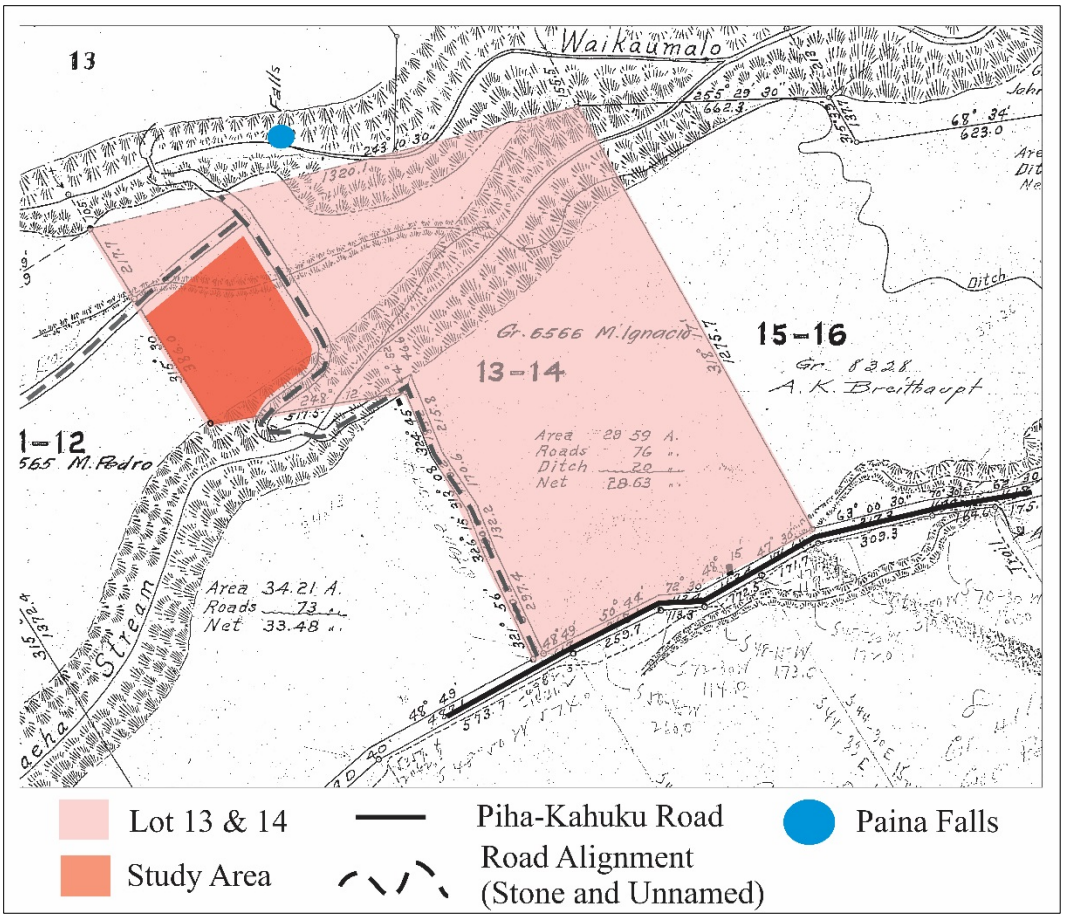

Figure 13. Portion of Hawai‘i Registered Map No. 2568 prepared by Lutz in 1914 showing a detail of the lands in the vicinity of the current study area (shaded dark red).

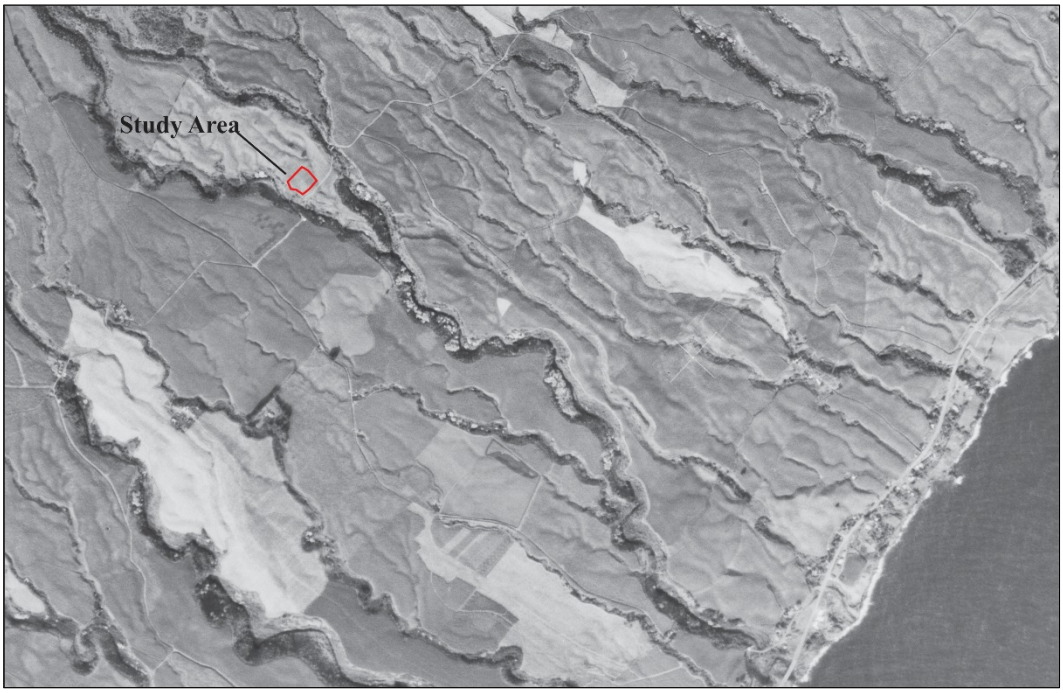

Figure 14. 1954 USGS aerial photograph showing extensive cane fields near the study area (outlined in red) vicinity.

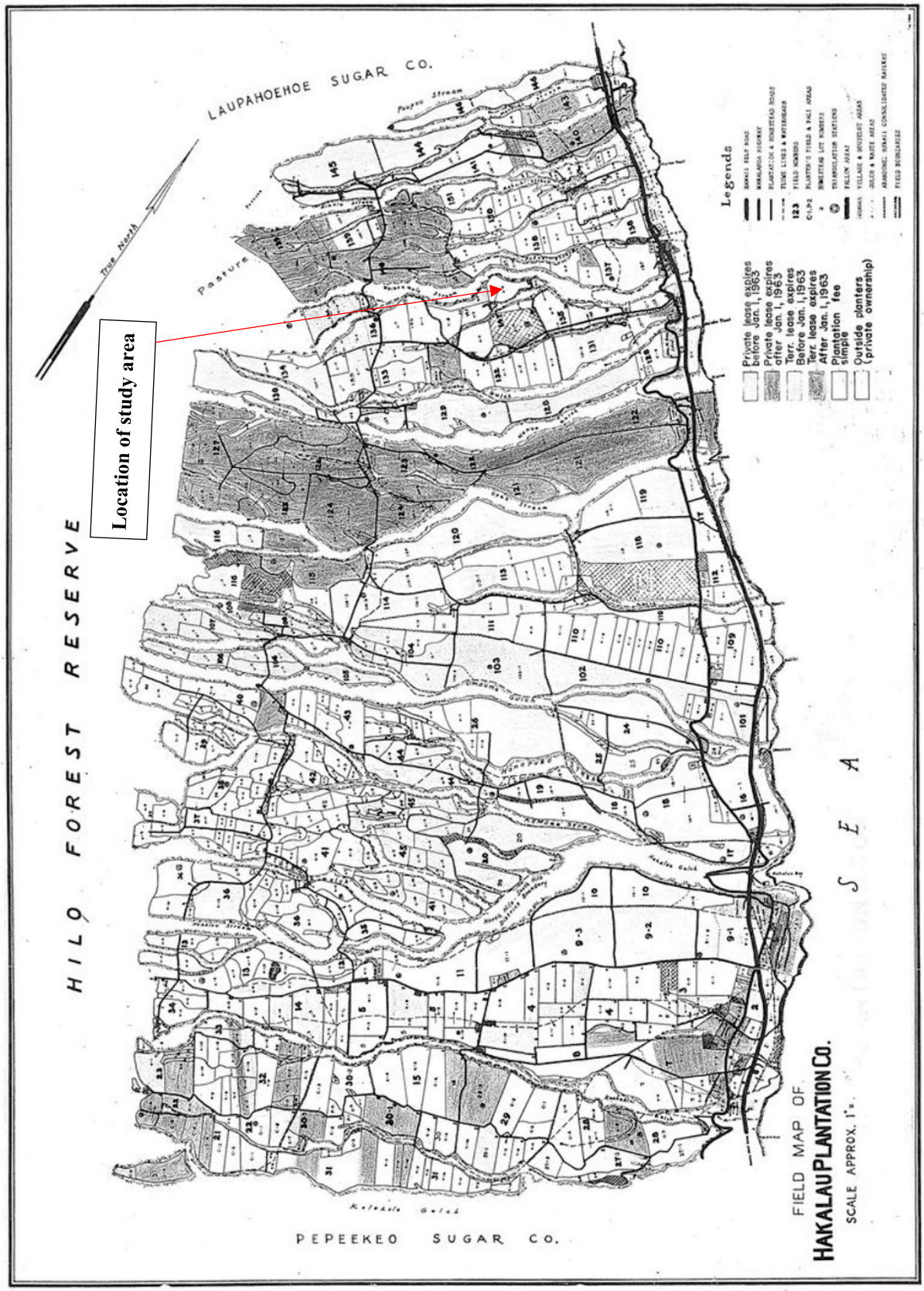

Figure 15. Undated (mid-twentieth century) Field Map of the Hakalau Plantation with the location of the current study area indicated (from https://www.hakalauhome.com/field-map.html).

In 1973, C. Brewer & Co. merged the Pepeekeo Sugar Company (including the lands of the former Hakalau Sugar Company, and presumably the cane grown within the subject parcel) into the Mauna Kea Sugar Company, combining under one corporate name what had once been five separate sugar plantations situated along the Hilo coast. County tax records indicate that the final lease for the cultivation of sugarcane within Lots 13 & 14 of the Pīhā Homesteads occurred on January 14, 1977. This lease of sixteen acres was to Chikako Fujimoto for a time period of "3 crops of sugar cane (6 yrs)" retroactive to October 23, 1976. A 1977 USGS aerial photograph shows most of the lands in the vicinity of the current subject parcel still planted in sugarcane (Figure 17), but it is not clear from the photograph if the current study area was still being cultivated. It appears that, following the rezoning of 10.63 acres of land within Lots 13 & 14 to conservation in 1970, the lands to the northwest of Kalaeha Stream gulch (including the current subject parcel) were left to fallow, while those to the southeast of the gulch remained in sugarcane cultivation. The Mauna Kea Sugar Company, later named Mauna Kea Agribusiness Company, continued to operate in the vicinity of the study area until the 1990s, harvesting its last crop in 1994 (Dorrance and Morgan 2000).

In 1998, following the closure of the plantation, it was determined by the County Planning Director (at the request of the landowner), that Lots 13 & 14 of the Pīhā Homesteads (TMK: (3) 2-004:003) originally consisting of two separate lots, and that based on the information contained in Land Patent (Grant) No. 6566 and Hawai'i Registered Map No. 2568 (see Figures 12 and 13), the reservation of the two 30-foot road public rights-of-way (Stone Road and the unnamed road) across those lots in 1914, divided one of those lots into two additional legal lots of record. Based upon this determination, Parcel 003 (Lots 13 & 14) was subdivided into its current configuration of TMK parcels (TMKs: (3) 2-004:003, 039, and 040 (see Figure 2), with the current subject parcel (Parcel 040) consisting of a 3.212-acre portion of the larger lot (situated in its western corner) bounded by the aforementioned Stone Road and unnamed road.

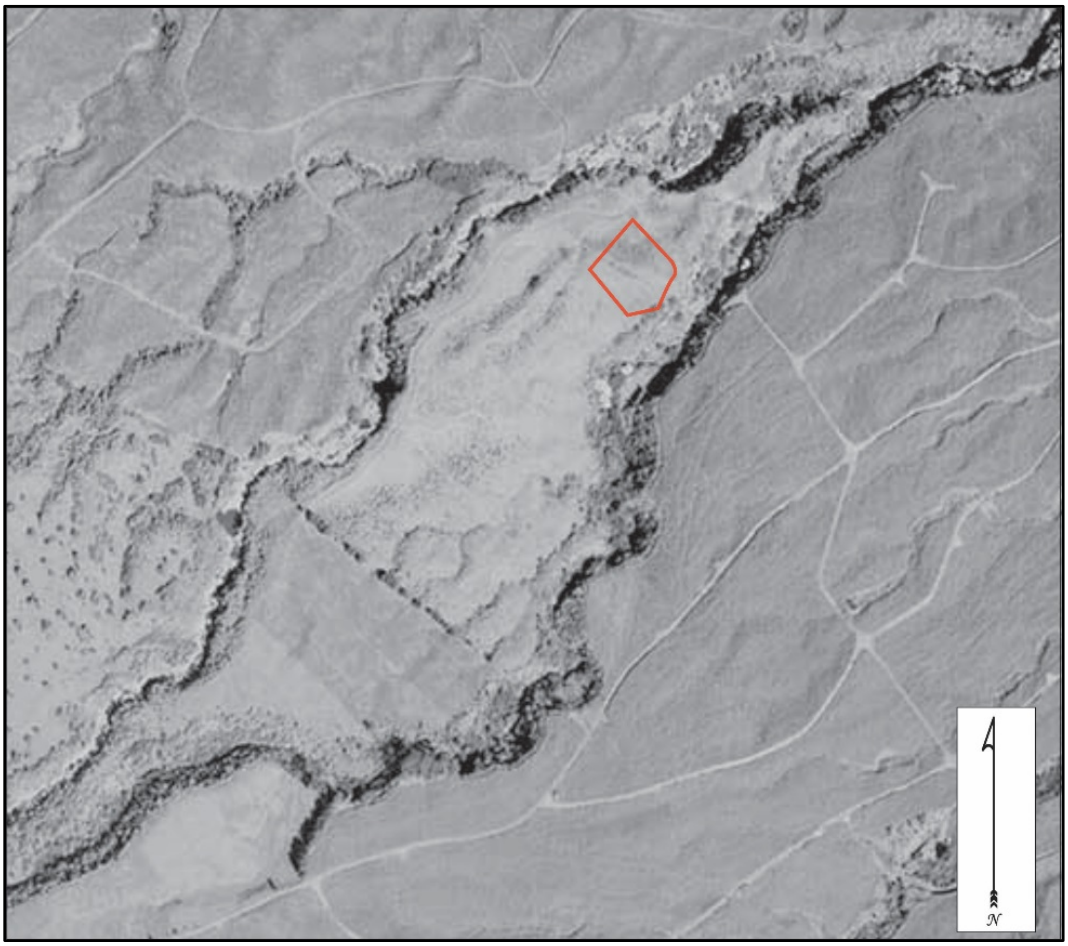

Figure 16. 1964 USGS aerial photograph with the study area (outlined in red).

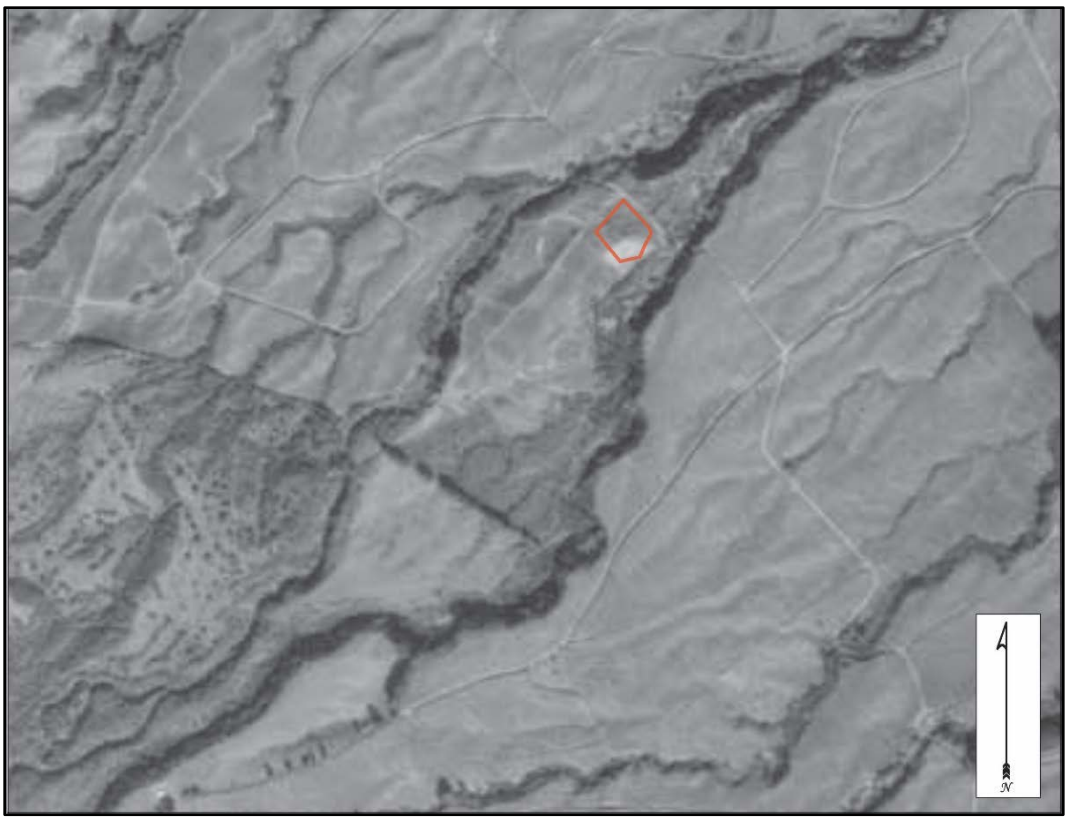

Figure 17. 1977 USGS aerial photograph with the study area outlined in red.

PREVIOUS STUDIES

Very few archaeological studies have been conducted within the district of the North Hilo at elevations similar to the current study area. The first archaeological work conducted in East Hawai‘i was that of the early-20th-century *heiau* researchers Thrum and Stokes (Stokes and Dye 1991; Thrum 1908). Neither investigator identified *heiau* within Pīhā Ahupua‘a or, or within the broader region between the town of Hilo and Laupāhoehoe Ahupua‘a. In the early 1930s, A. E. Hudson, working under the aegis of the Bishop Museum, also conducted archaeological investigations in East Hawai‘i, surveying primarily along the coast of the district (Hudson 1932). Hudson found little in the region *makai* of the study area, although he did note the presence of a 0.25-mile square area of taro terraces in the upper part of Hakalau Gulch to the east of the study area. According to Hudson (ibid.:218), there was formerly a *kōnane* board in the bottom of Hakalau Gulch, and the gulch was at one time a robber’s stronghold.

More recently, Walker and Rosendahl (Walker and Rosendahl 1994a, 1994b) conducted an archaeological study of some 595 acres of Hakalau Nui Ahupua‘a, South Hilo District, situated between Hawai‘i Belt Road and the 1,500-foot elevation contour. A low-level aerial (helicopter) survey was conducted over some of the uncultivated, forested portions of that study area, and other uncultivated areas were inspected using “variable-coverage (partial to 100%) variable-intensity ground survey” (Walker and Rosendahl 1994b:2). Walker and Rosendahl reported that the study area had been extensively modified during the Historic Period for sugarcane cultivation, and that no archaeological sites or “significant cultural materials of any kind” were found (Walker and Rosendahl 1994b:2).

Tomonari-Tuggle (1996) prepared a cultural resource overview for the Hakalau National Wildlife Refuge that included lands *mauka* of the current study area (but not Pīhā Ahupua‘a). Very little archaeological survey was undertaken as part of the study, but Tomonari-Tuggle (ibid.:67-72) does provide a predictive model for site distribution within the upland forests of Hilo. It was noted that the forest areas were used primarily for the collection of special resources, and that:

> …Traditionally these resources would have been birds (for feather work) and hardwoods (for tools and canoes). In historical times, birds and hardwoods would have continued as resources, with the addition of cattle for meat and hides. The upland forests may also have been transited by individuals going from the coast to the upper slopes or summit of Mauna Kea...

> These transitory activities would likely have left neither a substantial nor easily recognized archaeological record. Further, the density and rapid regrowth of vegetation in the rainforest would also make any remains virtually impossible to identify once abandoned. (ibid. 1996:67)

Specific site types discussed by Tomonari-Tuggle (ibid.) that might be encountered within the upland forests of the Hilo District include temporary shelters used by bird catchers, canoe builders, bullock hunters, scientists, travelers, surveyors, shrines or other religious structures, ponds and waterholes, roads and trails, bullock pits, surveyor's marks and ranch structures. She describes the lowest forest zone, above the current study area as the "Wet *ʻŌhiʻa* Zone," an area that was largely used as a source of specialized forest resources such as hardwoods for crafts or construction, and forest birds for feathers.

A review of reports and correspondence on file at the SHPD office in Hilo indicates that only one archaeological study has been conducted in the vicinity of the current study area, but that SHPD has previously written "no effect" letters for at least seven parcels within the Pīhā and Kahuku Homesteads. These "no effect" letters include a:

1. November 1, 1996 letter for TMK: (3) 3-2-004:025 (*Log No. 18344 Doc No. 9610ms04*); an
2. April 24, 1998 letter for TMK: (3) 3-2-004:027 (*Log No. 21307 Doc No. 9804PM15*); a
3. June 1, 1998 letter for TMK: (3) 3-2-004:039 (*Log No. 21050 Doc No. 9802PM03*); an
4. August 18, 1998 letter for TMK: (3) 3-2-004:041 (*Log No. 22025 Doc No. 9807ms17*); a
5. June 19, 2001 letter for TMK: (3) 3-2-004:043 and 044 (*Log No. 27706 Doc No. 0105ms08*); a
6. December 31, 2010 letter for TMK: (3) 3-2-004:045 (*Log No. 28884 Doc No. 0112PM10*); and an
7. April 17, 2013 letter for TMK: (3) 3-2-004:046 (*Log No. 2013.2304 Doc No. 1304SN05*)

Figure 18 below shows the location of all lots described above. The reason generally given for SHPD's belief that the proposed development of these parcels would have "no effect" on significant historic sites, was that a review of aerial photographs revealed that intensive cultivation of sugarcane had already altered the land. SHPD undertook no archaeological survey of the parcels listed above.

The only archaeological survey undertaken within the Pīhā homesteads was an archaeological assessment of a portion of Lot 1 (TMK: (3) 3-2-004:038 por.) conducted by ASM Affiliates (Clark 2018). This study of a five-acre area located *mauka* of the current study (see Figure 18) did not identify any archaeological sites, although Clark (2018) did note that the Pīhā-Kahuku Road passed near (but outside of) the eastern boundary of the study area. Additionally, ASM Affiliates (Tam Sing and Rechtman 2018) prepared a Cultural Impact Assessment report for TMK: (3) 3-2-004:038. A culture-historical background was prepared, and a single interview was completed. As a result of this study, it was concluded that the "proposed development of a single-family residence on TMK: (3) 3-2-004:038 will not result in impacts to any traditionally valued cultural or historical resources nor will it impact any traditional cultural practices or beliefs" (ibid.:26).

In June of 2019, ASM Affiliates (Kaʻuhane and Clark 2019) conducted an archaeological assessment of the 3.2-acre subject parcel, in which no archaeological resources were identified. Kaʻuhane and Clark (ibid.:i) concluded that given the negative findings, "the proposed construction of a single-dwelling on TMK: (3) 3-2-004:040 will not affect any historic properties."

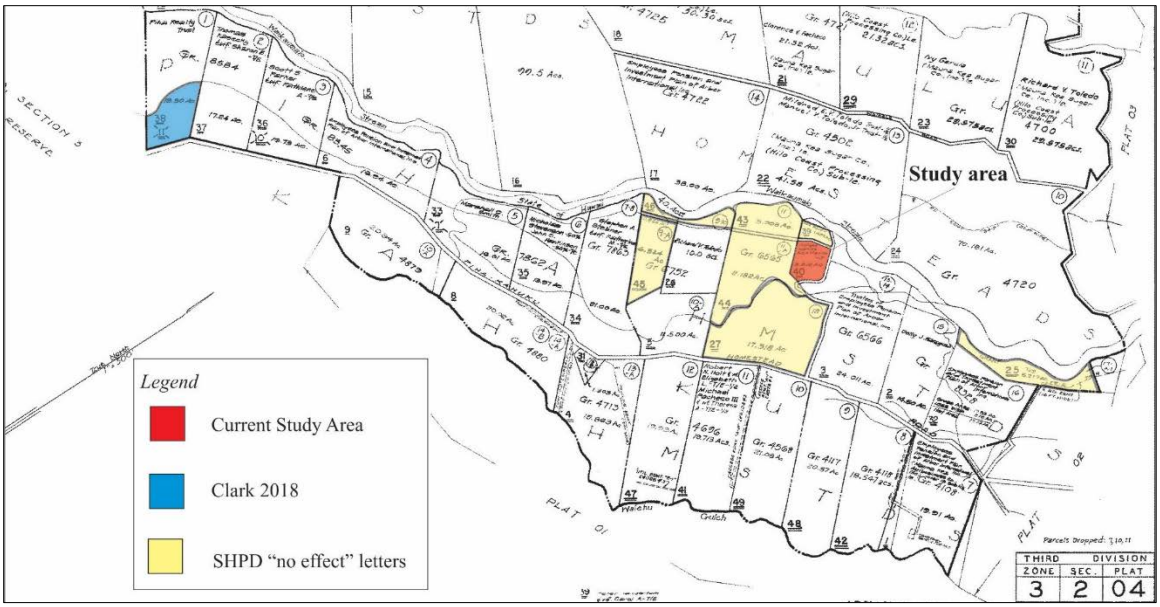

Figure 18. Locations of previous State Historic Preservation Division (SHPD) determinations of "no effect" and archaeological studies conducted in the vicinity of the current study area.

3. CONSULTATION

When assessing potential cultural impacts to resources, practices, and beliefs; input gathered from community members with genealogical ties and/or long-standing residency relationships to the study area is vital. It is precisely these individuals who ascribe meaning and value to traditional resources and practices. Community members may also possess traditional knowledge and beliefs 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 study area.

In an effort to identify individuals knowledgeable about traditional cultural practices and/or uses associated with the current subject property, a public notice was submitted to the Office of Hawaiian Affairs (OHA) for publication in their newspaper, *Ka Wai Ola*. The notice was submitted via email on June 25, 2019 and was subsequently published in the July 2019 issue. A copy of the public noticed is included as 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, eight individuals were contacted via formal letters, email and/or phone. Consultation letters were mailed on July 24, 2019, to William Ailā, Interim Chair for the Department of Hawaiian Home Lands (DHHL); a representative of KAHEA Environmental Alliance, a nonprofit organization; and a representative of the Office of Hawaiian Affairs (OHA), and to date, no response have been received. Additional consultation efforts were made with individuals of the Honohina and Pīhā communities via phone with Robert Nishimoto on July 11, 2019. Robert Nishimoto expressed that although he grew up in the area, he has moved away for a long time and does not know of any traditional cultural uses or practices in the current study area and recommended that ASM staff contact George "Masa" Hirowatari and his son George Jr. Hirowatari. On the 11th and 24th of July 2019, consultation efforts to were made with George "Masa" Hirowatari and George Jr. Hirowatari from which no responses were received. Kenneth Fujimoto was also contacted on the 11th and 24th of July via phone and email to which no responses were received. Jed Cariaga was recommended as being an avid hunter in the general vicinity of the study area and was contacted via phone on July 11th. Jed Cariaga agreed to an in-person interview, and on July 29, 2019, Jed and his partner Natalie Tavares shared their knowledge of the study area and a summary of his interview is presented below.

As part of the interview process and with the consent of the interviewees, the interviews were audio recorded for note taking purposes only (audio files not available). Upon completion of the interview, ʻIolani Kaʻuhane prepared an interview summary, which was emailed to the interviewees for review. With the approval of the interviewees, the finalized version of the summaries has been presented below.

JED CARIAGA

On July 29, 2019, an in-person interview was conducted by ʻIolani Kaʻuhane with Jed Cariaga and his partner Natalie Tavares, avid hunters and community members of the Pīhā region. Jed Cariaga grew up in the district of Kaʻū on the Island of Hawaiʻi where he learned from his father how to gather the natural resources from the area (*mauka* and *makai)* for subsistence. Natalie Tavares was born and raised on the island of Maui; Natalie accompanies Jed on various work gigs (house cleaning, landscaping, and animal control), fishing and hunting excursions, and trail maintenance in multiple areas of the North Hilo region including the general vicinity of the study area. Jed and Natalie developed friendships with the *kupuna*, or elders, of the Pīhā area such as the late Papa Souza, who described the old trail systems to access the upper portions of the Forest Reserve as well as access routes to neighboring *ahupuaʻa* (Honohina, Waikaumalo). The *kupuna* also shared their stories of plantation life and of the families that resided in the area with Jed and shared their knowledge of subsistence living and discussed the locations of where cultural and natural resources were situated. Over the years, Jed and Natalie have been hired by various landowners, who are often not from Hawaiʻi, for landscaping and animal control purposes and has developed a strong relationship with many of the current and new landowners that reside in the upper Pīhā-Kahuku region.

When asked about how Jed and Natalie knew of the general vicinity of the study area, Jed responded that he moved to Laupāhoehoe in 1992 and that he had a cousin that lived near Pīhā. Jed started hunting with his cousin in the upper portion of the Pīhā-Kahuku region within the Forest Reserve via the old trail that extended from the Pīhā-Kahuku Road and branched off from the old fence line. Issues occurred when disputes over access to the forest were blocked by landowners on the Honohina side of Pīhā. Another access road, Stone Road, allowed Jed and Natalie to shift their hunting activities to the Waikaumalo side of Pīhā between the Kalaeha and Waikaumalo stream gulches. Because Stone Road extended *mauka* and provided access to the forest, a region (including the current subject parcel) referred by Jed and Natalie as "conservation lands" is highly utilized by them for hunting purposes. As new landowners bought the parcels surrounding the west and northwest portions of the current subject parcel, Jed and Natalie have invested in developing healthy and working relationships with the people and have gained permission to access all the lands surrounding the current study area. Along with having permission for hunting, Jed mentioned that he also gets requests for animal control (feral pigs) and is often hired to work on people's properties within the study area to hand clear vegetation.

When asked about known cultural resources in the study area, Jed and Natalie shared that they have encountered many Historic Period archaeological sites and have come across a few sites that could be older in origin. They mentioned that the stream gulches are one of the ways that they access different *mauka* regions of the general vicinity of the study area and frequently visit the Kalaeha and Waikaumalo streams for the *ʻōpae* (shrimp) and freshwater prawns. In the general vicinity of the study area, Jed and Natalie describe seeing intact sections of the flume systems and associated concrete footings situated along the sloped ravine banks that have been constructed into the stream bed. They have seen rock walls constructed in the streams for bathing areas and have discovered freshwater springs that are near the subject parcel. Located *makai* (east) of the current subject parcel, Jed described an area where gravestones have been piled up, which was created by one of the late family members of the Pīhā Homesteads. Jed mentioned that when he saw it, he got spooked and left the area, and expressed that he didin't know if it was the family's personal graves or if it was the Japanese plantation workers. Jed also mentioned the various vegetation types that he has observed within the forest area and growing by the trails. He described anthurium and *ti*-leaf plants along the trails with opened areas of *kahili* ginger *(Hedychium gardnerianum*), Koster's curse (*Clidemia hirta*), and non-native trees that indicate the old trail segments and rest areas within the upper forest regions of Pīhā. While hunting in the upper forest regions of Pīhā, Jed and his friend discovered a *koʻi*, an adze, buried in the ground in one of the rest areas consisting of kahili ginger and *ti*-leaf. Jed also mentioned that there is a big lake in the upper *mauka* region of Pīhā that Papa Souza told him about. He shared that they (Japanese men) would ride their mules to the lake and smoke their meat and bring them back down for their families. The late Papa Souza continued to go in his older years and would share stories to Jed about the area's unique geological features and history.

When asked about the specific cultural practices conducted in the current subject parcel, Jed mentioned that the study area is situated in the general region of where he hunts for feral pigs. Over the years, Jed secured hunting and accessing rights with the surrounding landowners situated between the Forest Reserve and the current study area, allowing them to continue their hunting practices within the current study area without any disputes. As new landowners bought properties in their hunting region, they were able to keep their practice by creating partnerships associated with animal control and vegetation clearing activities that have developed into friendships. When asked about how they hunt for feral pigs, Jed and Natalie responded that within the vicinity of the current study area they use dogs and a knife to ensure the residents of the area feel comfortable with them hunting in the area. In other portions of Pīhā, they use dogs and a gun but expressed on one occasion while in the stream gulches they had a negative

experience while hunting with a 22-caliber rifle. Although they had permission to hunt but was near another property (outside of the boundaries), they had people shoot their guns and yell at them even though the landowner knew of Jed and was aware of him hunting in the area. Jed and Natalie expressed that it is stressful for them to diligently go through the proper channels in securing access and hunting rights from the property owners, and try to respect everybody, to still have to encounter contentious situations with other landowners.

When asked about their concerns or impacts that the development will have on their cultural practice, Jed and Natalie expressed that they are mostly concerned with access to the forest lands from Stone Road and the unnamed *mauka* road. Natalie mentioned that over the years the surrounding landowners have gained their trust and have allowed them to hunt in the close vicinity of the subject parcel, but has concerns of other local and Hawaiian families who want to access the forest will be denied even though public roads surround the subject parcel. Jed and Natalie mentioned that they had experienced new landowners denying them access on the roads that access the upper *mauka* portions but has been resolved through Jed and Natalie establishing relationships and gaining their trust. Another concern that they have is the new landowner not understanding their hunting practices and the unpredictable nature of where the pig and their hunting dogs might run off to or where the location of the kill might occur. Jed and Natalie explain that when you start hunting, and the dogs chase the pigs, sometimes we have to make the kill on the property. They asked if this occurs within the current subject parcel if the new landowner could allow them to take the pig off the property.

When asked if they knew of any cultural resources in the current subject parcel, Jed responded that he doesn't know of any cultural resources other than those outside of the parcel boundaries along the Kalaeha stream gulch, where freshwater springs located on the sloped banks of the ravine. Situated in the southwest corner of the subject parcel is a pile of trash consisting of an old structure (possible storage shed). Jed also mentioned that the adjacent parcels situated on the southwest side of the current subject parcel were previously farmed in dryland *kalo* that ended in the mid-1990s. He described that the rock mounds are still on the surface and aligned in rows. Jed and Natalie mentioned that they are the only people who have permission to hunt within the close vicinity of the study area but have concerns for others who don't have the relationship like them and want to access the forest and stream areas for subsistence purposes.

SUMMARY OF PRIOR RELEVANT INTERVIEWS

In April 2018, at the request of James Leonard on behalf of Mr. Pedro Pablo Ramos, ASM Affiliates (Tam Sing and Rechtman 2018) completed a Cultural Impact Assessment, as parts of the preparation of the EA being prepared to accompany a Hawai‘i Revised Statutes Chapter 343 Environmental Assessment and Conservation District Use Application (CDUA). Between March to April 2018, ASM staff contacted four individuals and members of the Breithaupt family. Only one individual conducted a phone interview, two individuals were not familiar with the study area, and the members of the Breithaupt family did not respond to ASM's interview request. As a result of these consultations, no traditional cultural uses or specific cultural practices were identified in the study area. However, it was noted that the hunting access points for the Pīhā-Kahuku region were restricted to the Mānā Road entry, situated 15.5 miles inland from the Mauna Kea Access Road. There are no formal *makai* access to Unit C (Pīhā-Kahuku section), the entrance to Unit C hunting area is publicly accessible by Mānā Road, where a hunter check station is present.

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 Paʻakai O Ka ʻĀina* v 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.

Summary and Conclusion

A review of the culture-historical background material reveals that the although Pīhā is not mentioned in traditional accounts, its history can be traced by its association with the greater *Hilo Palikū* region, which commemorated in several traditional *moʻolelo* and historical accounts. The illustrious landscapes of this region, characterized by its upright cliffs and *kula* regions served as an ideal landscape for habitation and cultivation, which has been described in historical accounts of the 19th century. Many of these historical accounts described the intimidating rugged coastline and deep gulches but noted that these lands were inhabited where suitable living conditions were found. It was also considered an idyllic environment to cultivate traditional crops such as *kalo* (taro), *ʻuala* (sweet potato), *maiʻa* (banana) and *kō* (sugarcane) coupled with an abundance of marine and freshwater resources that were easily accessible from the sheltered bays and streams.

Following the *Māhele ʻĀina* of 1848, the *ahupuaʻa* of Pīhā was relinquished by the Trustees of Bernice Pauahi Bishop Estate to the Hawaiian Kingdom Government where it retained as Government land. No claims were made for *kuleana* lands within Pīhā Ahupuaʻa during the *Māhele.* The Boundary Commission Testimonies for Pīhā in 1875 revealed that traditionally, the fertile upland forested areas of Pīhā, were used for the procurement of specialized

resources and were specifically utilized for bird-catching and the hewing and carving of *koa* wood for canoes, and that an old trail used by bird catchers extended along the boundary of Pīhā and Kahuku Ahupuaʻa. According to the testimony, a canoe road in Nanue Ahupuaʻa, extended *mauka* and lead to a place named Kaʻahina where canoes were made. The presence of these trails and their association with known traditional customs and practices in the area emphasize Pīhā's significance as a cultural landscape. Although the traditional cultural practices and craft specialization associated with these traditions are no longer actively practiced in Pīhā, recognition of these practices reinforces the importance of the *mauka* Pīhā lands to the Kānaka Maoli that once inhabited this area.

The privatization of land and the subsequent the Treaty of Reciprocity passed in 1875, were two significant events that were necessary for businessmen to stake their claim on a rapidly growing sugar industry. Development of the lands in and around the study area began in 1880 and rapidly accelerated during the late-19th century and through the 20th century as the commercial sugar industry infiltrated the district. As a result, the region underwent a series of unprecedented changes such as land clearing, the establishment of roadways and railroads to transport cane from the fields to coastal mills, and the construction of flumes to carry water to irrigate the cane fields. The Hakalau Plantation Company, established in 1878, leased the Government Land of Pīhā Ahupuaʻa (containing 4,250 acres) from the Kingdom of Hawaii in 1892 for a term of twenty years (see C.S.F. 449). The *makai* lands of the *ahupuaʻa* (up to the roughly 2,000-foot elevation contour), including the current subject parcel, were subsequently cleared by the plantation and used for the cultivation of sugarcane, while the upper lands were kept in forest and used for pasture.

Government Lands such as Pīhā were made available to family farmers for homesteading purposes following the passage Land Act of 1895 and later clarified by the Organic Act of 1900. In 1916, Manuel Ignacio was granted Lots 13 and 14 (containing 28.63 acres) of the newly created Pīhā Homestead lots. The Hakalau Plantation Company continued to grow sugarcane on lands in the vicinity of the current study area throughout the first half of the twentieth century, but by the early 1940s, nearly forty percent of the sugarcane on the plantation was being cultivated by independent growers, some of whom had purchased Pīhā Homestead lots, Such as Breithaupt family. In 1944, Lots 13 & 14 are listed as being owned by Ella K. Breithaupt and containing 15 acres of sugarcane with 5 acres fallow, and 8.65 acres of wasteland. On April 1, 1946, the Hakalau Mill, and the railroad connecting the plantation to Hilo were severely damaged by a *tsunami* triggered by an earthquake in the Aleutian Islands. The mill was rebuilt, but the railroad shut down permanently, and following the *tsunami*, the products of the plantation were trucked to the docks at Hilo for transport. County tax records indicate that Lots 13 & 14 of the Pīhā homesteads (TMK: (3) 2-004:003) were cultivated in sugarcane throughout the 1950s with similar acreages of planted, fallow, and wasteland as were reported in 1944.

In 1962, the Hakalau Plantation Company merged into the Pepeekeo Sugar Company, its southern neighbor, and the Hakalau Mill was shut down. According to County tax records, that same year, Graven Breithaupt Trustee of the Ella Breithaupt Estate leased 6.9 acres of land within Lots 13 & 14 of the Pīhā Homesteads to Yoshinobu and Tsutayo Yamada for eighty years at a dollar per acre. Subsequently, in 1969, 16 acres of land within the homestead lot was leased to Komatsu Fujimoto for eight years at a rate of 240 dollars per year (in 1975 this lease was transferred to the K. Fujimoto Estate). By 1970, County records indicate that 10.63 acres within Lots 13 & 14 (including the current study area) had been rezoned as conservation land, while the other 18 acres remained agriculturally zoned. In 1977 the final lease for the cultivation of sugarcane within Lots 13 & 14 of the Pīhā Homesteads consisted of 16 acres to Chikako Fujimoto for a time period of "3 crops of sugar cane (6 yrs)" retroactive to October 23, 1976. It appears that, following the rezoning of 10.63 acres of land within Lots 13 & 14 to conservation in 1970, the lands to the northwest of Kalaeha Stream gulch (including the current subject parcel) were left to fallow, while those to the southeast of the Gulch remained in sugarcane cultivation. The Mauna Kea Sugar Company, later named Mauna Kea Agribusiness Company, continued to operate in the vicinity of the study area until the 1990s.

While recreational hunting of introduced species of feral pigs is not recognized as a traditional Hawaiian cultural practice, it is a long-standing tradition practiced in the islands for over a century and a half (Maly and Burrows n.d.). The pigs originally introduced by the Polynesians were for the most part domesticated, and were an important food product and cultural resource in ancient Hawaiʻi, but they were not recreationally hunted (ibid.). Following the demise of the Polynesian-introduced pig and the population influx of introduced pig species, who thrived on a seemingly endless supply of forest plants, nearly every layer of the ancient *wao* (ecological zones) have been infiltrated thereby causing seriously degrading native forests. The recreational hunting program managed by DOFAW serves to mitigate decimation to native vegetation caused by feral pigs by allowing the public to hunt within designated hunting units within the reserve. Thus, the continuation of pig hunting within the Pīhā Section of the Hilo Forest Reserve will aid in maintaining the *mauka* lands in a more natural state.

According to Jed Cariaga and Natalie Tavares, they are the only hunters who have secured access and have gained permission from the surrounding landowners in the vicinity of the current study area and hopes that the new landowner considers developing a working relationship with them (Jed and Natalie) as well as other community members who want to gain access to the general vicinity for hunting purposes. Additionally, should individuals with genealogical and/or historical relationships with Pīhā wish to re-utilize its forest lands for the gathering of traditional cultural resources such as *koa* and *ʻōhiʻa* for timbers, or various other plants for medicinal and/or ceremonial purposes, this use should be encouraged. It is likely that restoring access to those with ties to the land who wish to access it and rejuvenate traditional resource procurement will aid in the rehabilitation of the forest. As such, this will only aid in the restoration of native vegetation which has been encroached upon and slowly overrun by invasive species.

It is concluded that given the proposed construction of a single-family residence on the subject property is not near the forest reserve, and should therefore, not impede access to the forest for pig hunting activities, it is not anticipated that the proposed development will impact any hunting practices. Given the above consultation and assessment, it is our conclusion that the proposed development of a single-family residence on TMK: (3) 3-2-004:040 will not result in impacts to any traditionally valued cultural or historical resources nor will it impact any traditional cultural practices or beliefs.

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APPENDIX A.
KA WAI OLA PUBLIC NOTICE

PĪHA AHUPUA‘A

ASM Affiliates is preparing a Cultural Impact Assessment (CIA) in support of an HRS Chapter 343 Environmental Assessment for a 3.26-acre property (TMK (3) 3-2-004:040), situated in Pīha Ahupua‘a, North 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 ‘Iolani Ka‘uhane ikauhane@asmaffiliates.com, or Lokelani Brandt lbrandt@asmaffiliates.com, phone (808) 969-6066, mailing address ASM Affiliates 507A E. Lanikaula Street, Hilo, HI 96720.

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Draft Environmental Assessment

Perry Single-Family Residence in the Conservation District at Pīhā

APPENDIX 4
Agricultural Management Plan

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Perry Single Family Residence and Farm
Conservation District Use Permit Application

AGRICULTURAL MANAGEMENT PLAN

Prepared For: Nicholas Perry and Rodrigo Gonzalez
Prepared by: J M Leonard Planning, LLC

December 2019

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AGRICULTURAL MANAGEMENT PLAN

I. INTRODUCTION

A. Project Location, Setting and Site Characteristics

The approximately 3.212-acre coastal property is located in the State Conservation District, General Subzone, in Ninole, North Hilo District, Island of Hawaii. The property is located near the 1,178-foot elevation at the western end of Stone Road, within the upper portions of the Pīhā Homestead Subdivision and is identified as TMK Parcel: (3) 3-2-04: 040. No streams or water features are found on the property; however, the prominent Waikaumalo Stream and its associated gulch extends along the northern boundary of the Pīhā Homestead Subdivision and the top of the gulch is about 200 feet from the property at its closest point. The smaller Kalaeha Stream which extends within the subdivision and eventually joins with the Waikaumalo Stream, is separated from the subject property by Stone Road that borders property along its northeast and southeast boundaries. The property is bordered by various other properties with homes and small-scale farming on the north, south and *mauka* directions. *Makai* of the Perry property is a vacant property. (See **Site Location and TMK Maps in Figures 1 and 2,** for Reference).

The property is located in a historically farming area which had been used for commercial sugar cane cultivation up to later part of the prior century, originally as part of the Hakalau Plantation Company operations, which were eventually acquired by C. Brewer and Company. From the historical maps of the area, however, it appears that that the subject property and nearby parcels were no longer cultivated and has remained fallow from about 1973 when these properties were included into the State Conservation District designated lands. Presently, the vegetation consists of a secondary shrubland and forest dominated by strawberry guava, Asian melastome and the native *uluhe* fern that has grown in after over a century of sugar cultivation.

The project site receives an average of about 187 inches of rain annually, with a mean annual temperature of approximately 68 degrees Fahrenheit. Winds in the area are dominantly northeast trades, replaced periodically by winds with a southerly component. The southerly winds are often accompanied by volcanic haze, or vog, during years when Kilauea Volcano is erupting.

Figure 1
Island and Regional Location Map **Agricultural Management Plan**
Perry Single Family Residence and Farm

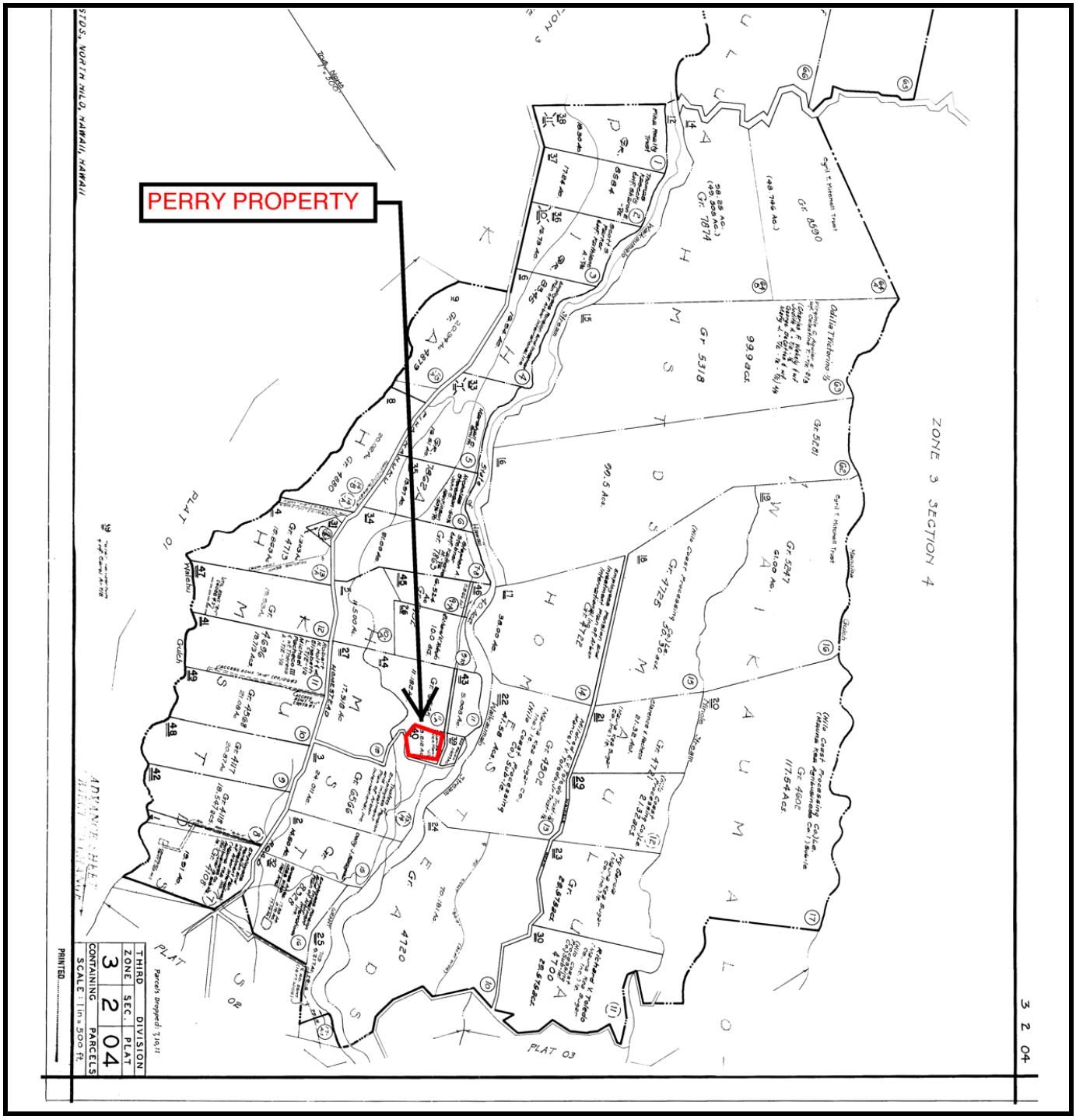

Figure 2
TMK Map (Parcel (3) 1-5-010:031) **Agricultural Management Plan**
Perry Single Family Residence and Farm

B. Perry Farm Agricultural Management Plan: Overview

The property owners, Nicholas Perry and Rodrigo Gonzalez, plan to establish, in accordance with this Agricultural Management Plan (Plan), a sustainable farm on approximately 2.5 acres of the property. The Plan seeks to serve as a guide in the process of establishing a sustainable an fully organic farm on lands which were once productive farm lands and are now fully covered in a thick vegetation consisting of primarily strawberry guava, Brazilian glory tree, lantana, *uluhe* fern, and a mix of primarily alien grasses and vines and shrubs. While the property had been in sugar cultivation for over a hundred years, it has remained fallow for over 40 years after being designated as part of the State Conservation District lands due to its proximity to the Waikaumalo and Kahaeha Streams and their associated gulches. Thus, this Plan has been prepared with a clear recognition of the particular environmental sensitivity of the area, and the environment characteristics of the site itself.

Overall, the Plan has been prepared with the goals of protecting the natural resources of the site and minimizing the potential impacts to the site and surrounding area, while creating a sustainable, healthy and productive farm environment for providing food and resources to the Perry family. In meeting these goals, the planned improvements to the property, particularly in reference to the farm operation and management, have been planned in accordance with the following planning objectives:

- Siting the farm related structural improvements in previously disturbed and relatively level areas to minimize the amount of grading required;

- Maintaining protective vegetative buffer areas along the downslope boundaries of the property, especially in the area of nearby streams, with the aim of minimizing the potential movement of soil from the property and potential impacts to nearby streams;

- Implementing construction related Best Management Practices (BMP's) for erosion and sedimentation control in conjunction with all farm related construction;

- Implementing a program for the systematic removal and control of the invasive and weedy species that cover or encroach into portions of property, replanting with native species that are common and appropriate to the area, and the long-

term monitoring of affected areas aimed at evaluating the effectiveness of the control methods;

- Implementing a phased, thus manageable, program for clearing orchard areas for planting, followed by immediate replanting of a suitable ground cover aimed at minimizing the potential for soil erosion from cleared areas;

- Implementing a program of Agricultural Best Management Practices (BMPs), as described in Section IV this Plan, aimed at maximizing the soil development and food and resource production while minimizing the potentially negative environmental or health related impacts that could otherwise result from farm-related activities.

Agricultural BMPs presented in this Plan have been formulated through consultation of the University of Hawai‘i-Manoa, College of Tropical Agriculture and Human Resource's *Best Management Practices to Manage Non-Point Pollution in Agriculture* (Abbas and Fares 2009). These include short-term practices meant to control erosion and sedimentation related to any ground disturbing activities. The Plan also includes recommended long-term practices for soil, nutrient, pest and crop management, including cultivation practices that seek to minimize tillage, add organic material to the soils and establish ground covers. These practices include planting trees in individual holes rather than grading or tilling the area and using the soil removed from holes to create a berm around individual plantings; maintaining an effective ground cover in disturbed portions of the orchard areas by means of replacing the existing scrub vegetation with an effective and erosion resistant groundcover; and adding mulch from onsite composting and green-waste plantings as a means of nutrient enhancement, soil retention and soil building. The BMPs for nutrient management included in the Plan are aimed at monitoring and regulating the application of nutrients to the soil according to the specific crop nutrient requirements. These practices include selecting and using the appropriate organic manure amendments, which can help build and stabilize soils while reducing the need for chemical nutrients. As part of the recommended BMPs for pest management, pests can be managed through integrated pest management strategy that stresses use pest-resistant crops, biological control, removal and eradication of affected plants, and, only where necessary, safe and effective storage, handling and application of organic pesticides. Finally, the Plan includes recommendations on regular and ongoing monitoring of the farm soil, water and plant conditions for early identification of potential environmental or biological threat, and for maintenance of optimum growing conditions for the selected crops.

II. DESCRIPTION OF PROPOSED AGRICULTURAL ACTIVITIES AND SUPPORTING FACILITIES

Among the supporting facilities for the farm would be a water storage tank that would be used for domestic and agricultural purposes and located adjacent to the house. The roof of the house is designed as an integrated roof catchment system that would direct all runoff to a 15,000 gallon storage tank located at the lower end of the shed-type roof. Within the house structure and separated from the living area of the home by a large lanai/carport area, would be a small greenhouse for planting starts and specialty plants and an agricultural workroom for the processing and storage of the farm produce. Additional farm related structures, as shown in the **Site Plan in Figure 3**, include a 144-sf farm utility shed and 120-sf chicken coop, which would be located adjacent to the driveway parking area and the area of the agricultural workroom and greenhouse. The farm/utility shed will be used to house the farm tools, equipment, animal feed, chemicals, fertilizers and soil supplements and the chicken-coop would be sized to house approximately a dozen hens. In addition, the property will be completely fenced with the use of an agricultural-type, wire-mesh fencing as a means of controlling intrusion from feral pigs that are particularly evident in the area. For reference, the **Floor Plan and Landscape Plan for the Residence/Farm Structures** are shown in **Figures 4 and 5**.

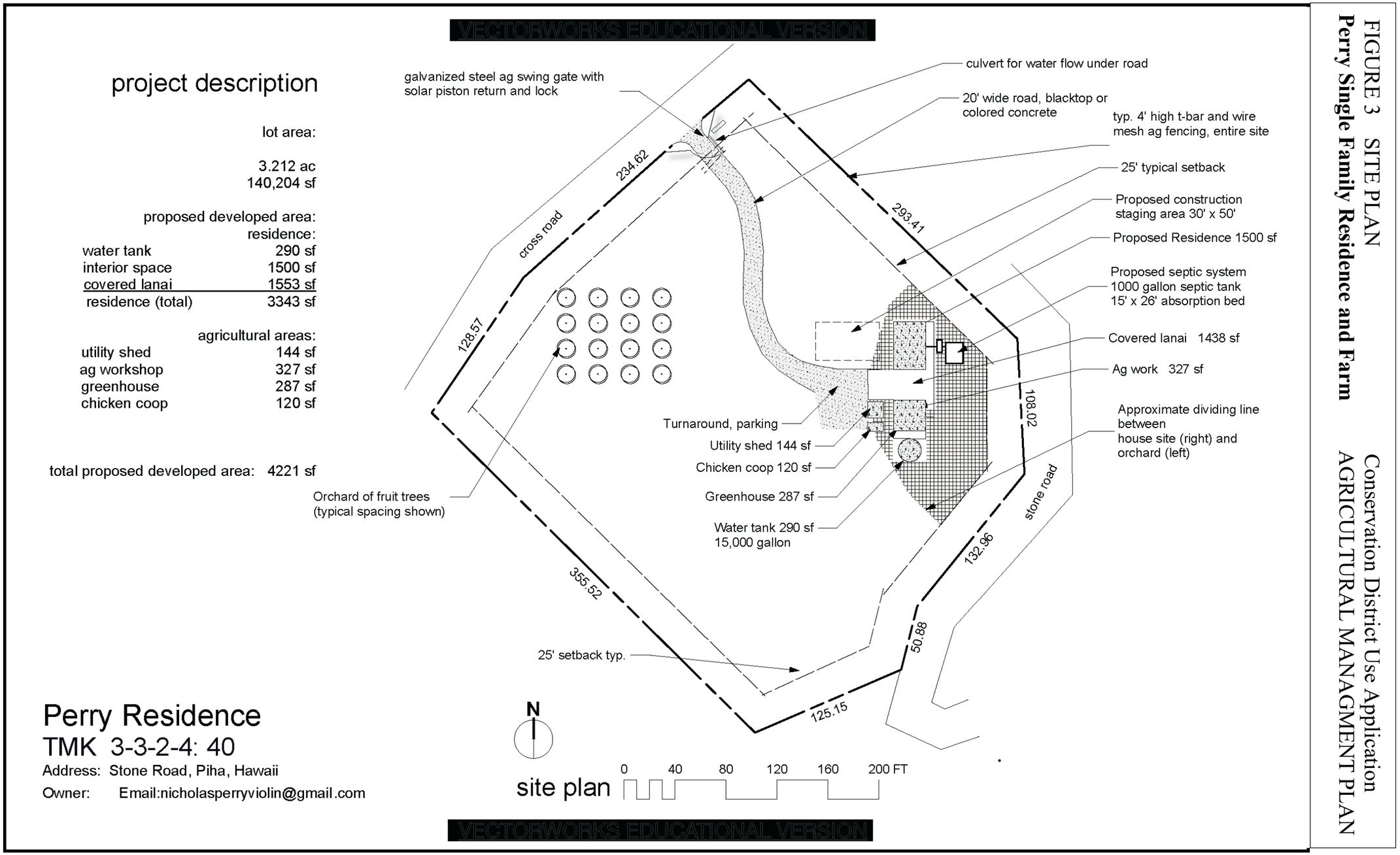

FIGURE 3 SITE PLAN
Perry Single Family Residence and Farm
Conservation District Use Application
AGRICULTURAL MANAGMENT PLAN

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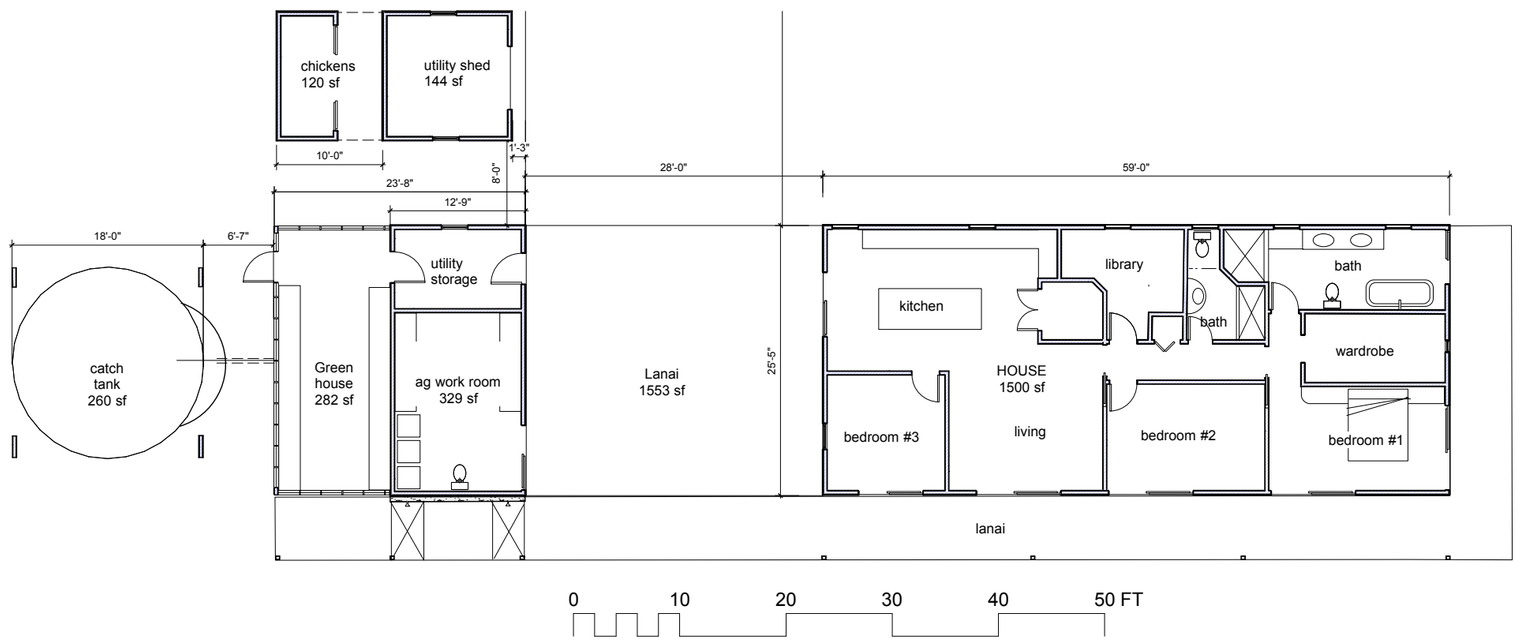

structures floor plan

Perry Residence

TMK 3-3-2-4: 40

Address: Stone Road, Piha, Hawaii

Owner: Email:nicholasperryviolin@gmail.com

Figure 4. STRUCTURES– FLOOR PLAN
Perry Single Family Residence and Farm

Conservation District Use Application
AGRICULTURAL MANAGMENT PLAN

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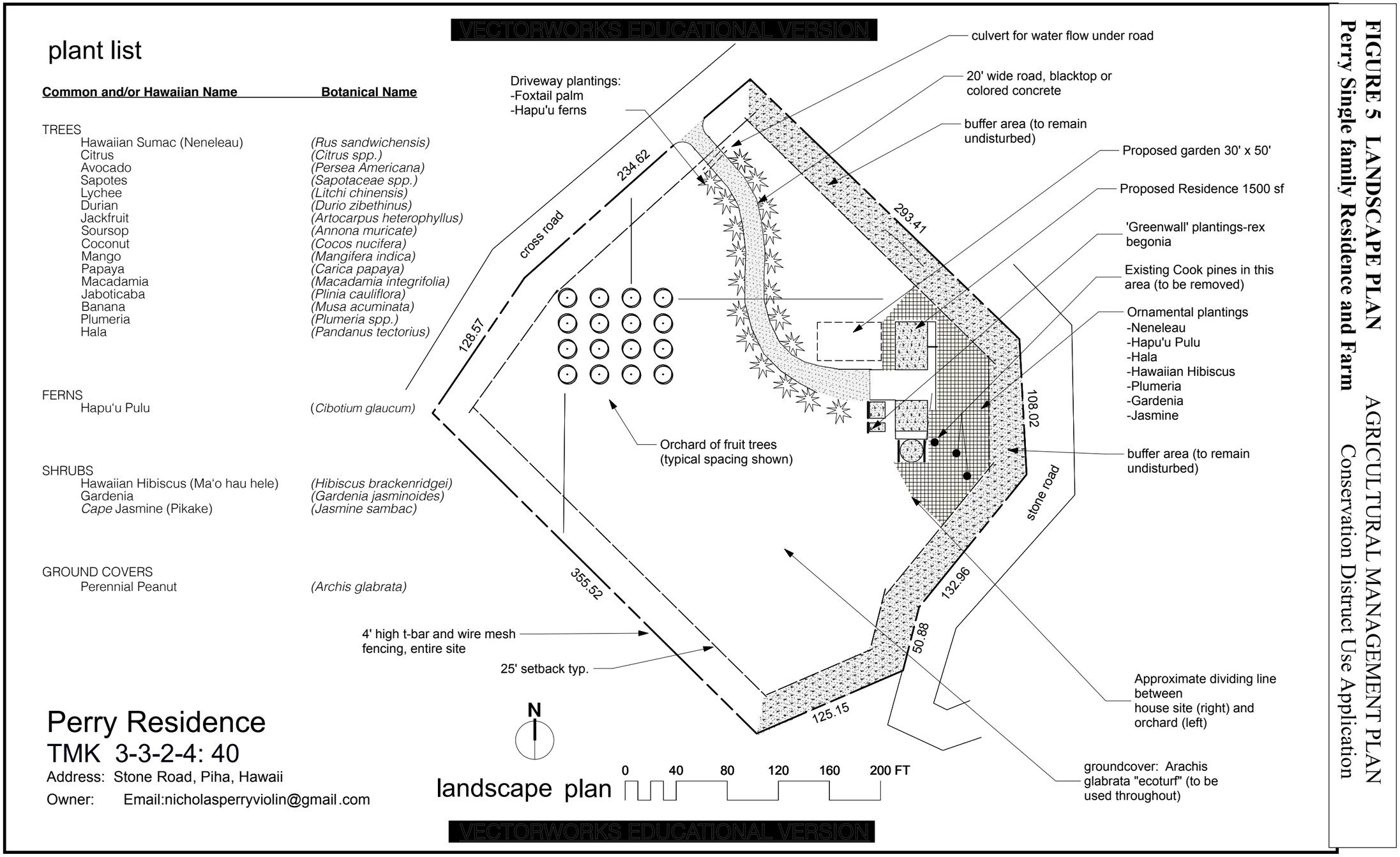

FIGURE 5 LANDSCAPE PLAN
Perry Single family Residence and Farm

AGRICULTURAL MANAGEMENT PLAN
Conservation Distruct Use Application

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III. ASSESSMENT OF AFFECTED NATURAL ENVIRONMENT AND RESOURCES

A. Existing Site Conditions

1. Existing Character and Land Use on the Property

The topography over much of the property is relatively level with the exception of the area of the steep embankments along the northern and eastern boundaries with Stone Road. As mentioned above, the existing vegetation on the property was disturbed many decades ago from sugar cultivation that occurred in the area and included nearly the entire parcel. The commercial sugar cultivation in the area, which extended over 100 years, ended in the early 1970's and the property has remained fallow since. The vegetation now consists of a mix of native and non-native trees and shrubs that are dominated by the invasive strawberry guava (Psidium cattleianum), Asian melastome (Melastoma candidum), and Koster‘s curse (Clidemia hirta), as well as the particularly common native uluhe fern (Dicranopteris linearis), which is found throughout the property, surrounding area and region. The general character of the site is seen in the **Site Photos found in Figure 6.** Currently the property is vacant and unused with the exception of the occasional pruning and weeding that is evident along the gravel access road, referred to as Cross Road, which extends from Stone Road at the property's northern corner.

2. Geology and Soils

The project site is on the southeastern flank of Mauna Kea. The lava flows that underlie it are dated from prior to 14,000 years before the present (BP), although areas several miles upslope have surface flows dated from as recently as 4,000 to 10,000 years BP (Wolfe and Morris 1996). All lava flows in this area are mantled with a thick layer of volcanic ash derived from Kohala and Mauna Kea volcanoes (USGS-HVO: 2009). The soils in the area are classified as Kaiwiki highly organic hydrous silty clay loam, 6 to 20 percent slopes, over most of the property, and Kaiwiki highly organic hydrous silty clay loam, 35 to 100 percent slopes on the eastern fringe, along the eastern boundaries with

FIGURE 6. SITE PHOTOS

Mauka view from near the northern property corner, showing the existing gravel access drive off Stone Road (referred to locally a Cross Road) on the right and the property to the left.

View east across the property in the direction of the proposed house site which would be in the area of the tall Cook pines shown in the background.

FIGURE 6. SITE PHOTOS

View southeast from near the eastern property boundary showing the typical uluhe fern groundcover found over much of the property.

View east from the area of the proposed house site toward the direction of the existing Cook pines (to be removed), Stone Road (not visible) and the Kalaeha Stream gulch in the distance.

Stone Road. The deep, ash-derived soils that developed in this geology and climate nurtured highly productive farming from early Hawaiian times through the century of sugarcane until today. Kaiwiki hydrous silty clay loams are fairly well drained but can have medium to high runoff (U.S. Soil Conservation Service 1973) and boggy conditions can quickly develop when these soils are compressed by cultivation, vehicles or other means.

3. Natural Water Features and Hydrology

As noted earlier, while there are no natural water features such as streams, springs, or ponds found on the property, Waikaumalo Stream and its tributary Kalaeha Stream are located on adjacent properties and extend to about 200 to 300 feet from the property at their closest points. The hydrology of the Island as a whole is such that freshwater in the saturated part of the aquifer forms a lens-shaped body underlain by the denser saltwater from the ocean, and between the freshwater lens and the underlying saltwater is a brackish-water mixing zone. Generally, the freshwater lens is thicker in regions where recharge rates are high or aquifer permeability is low, and thinner where recharge rates are low or permeability is high. This freshwater lens thins out dramatically towards the shoreline, although, on the windward portions of the Island it has generally been found to be sufficiently broad near the shore to be used as a source for potable water for more coastal properties with no access to the County water system. As noted, the property is located at about the 1,150 ft. elevation, making it potentially difficult and costly for well development, and is far removed from a potential connection to the County water system. As such, water for the property's domestic and agricultural use would be from a catchment system integrated with the home design.

4. Flora and Fauna

Flora

In an effort to describe the vegetative character of the site and determine if any rare or endangered species or critical habitats are present, a botanical survey was conducted of the entire property. The survey was conducted by Ron Terry, PhD as part of the preparation of the Draft

Environmental Assessment (Draft EA) and Conservation District Use Application (CDUA) for which this Plan has been prepared and is appended. As noted above, the entire property shows signs of being previously disturbed having been used for sugar cultivation during the prior century. Presently, the vegetation found across the property is a mixed native-non-native low-stature forest dominated by non-native strawberry guava (*Psidium cattleianum*), and Asian melastome (*Melastoma candidum*), and the native *uluhe* fern (*Dicranopteris linearis*),. Within the understory, non-native grasses, ferns and weeds dominate, including sword fern (Nephrolepis multiflora) and the highly invasive Koster's curse (*Clidemia hirta*). While a few native species such as *hapu'u pulu (Cibotium glaucum*), *neneleau* (*Rhus sandwicensis*), *pakahakaha* (Lepisorus thunbergianus) and *wawae'iole* (Lycopodiella cernua) are only found on the property in a few scattered locations, several native sedges and the ferns, particularly *kikawaio* (Christella cyatheoides) and *pala'a* (Sphenomeris chinensis) are more widely distributed. All of the native plants found on the property are commonly found in the region, on the island, and for most, throughout the Hawaiian Islands. No rare, threatened or endangered plant species, nor critical habitats were found to be present. Although a few common natives are present, the property was found to be heavily dominated by non-natives. Importantly, no *'ohia* trees were found to be present on the property, although some were viewed nearby, within the gulches on neighboring properties.

Fauna

During several visits in 2019 as part of the flora and faunal survey of the property, Dr. Terrry observed very few individual birds on the property and only four species: Japanese white-eyes (*Zosterops japonicus*), northern cardinals (*Cardinalis cardinalis*), spotted doves (*Streptopelia chinensis*), and striped doves (*Geopilia striata*). While Dr. Terry notes that long-term observations would probably reveal a wider range of bird fauna, the relatively low elevation leads to warm temperatures that promote mosquitos, which are inimical to most native birds. None were identified on the property, but it is highly likely that the property is occasionally utilized by the Hawai'i 'amakihi (*Hemignathus virens*), as some populations of this native honeycreeper appear to have adapted to the mosquito-borne diseases of the Hawaiian lowlands.

As with all of East Hawai‘i, several endangered native terrestrial vertebrates may be present in the general area and may overfly, roost, nest, or utilize resources of the property. These include the endangered Hawaiian hawk (*Buteo solitarius*), the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the endangered Hawaiian petrel (*Pterodroma sandwichensis*), the endangered band-rumped storm petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*).

Although there is no habitat for native waterbirds in the property, some may utilize nearby Waikaumalo Stream. Along the Hilo-Hāmākua Coast in general, waterbirds are found in streams, estuaries, natural and artificial ponds, and wetlands. The most common native waterbird is the indigenous black-crowned night heron, or ‘*auku‘u* (*Nycticorax nycticorax hoactli*). This bird is likely present at times in the general area of the property. It is also not unusual to spot the wide-ranging, friendly but endangered Hawaiian goose or *nēnē* (*Branta sandwicensis*) in various parts of the island. Far less likely to be seen in the property's streams are two endangered waterbirds that are occasionally present in the Hāmākua coast: the Hawaiian duck or *koloa maoli* (*Anas wyvilliana*), and the Hawaiian coot or *‘alae ke‘oke‘o* (*Fulica alai)*. Of these, only the *koloa maoli* is noted in streams somewhat similar to Waikaumalo. No waterbirds were observed during any of the field visits to the property.

Aside from the Hawaiian hoary bat, all mammals in the project area are all introduced species, including feral cats (*Felis catus*), feral pigs (*Sus scrofa*), small Indian mongooses (*Herpestes a. auropunctatus*) and various species of rats (*Rattus* spp.). Several species of non-native reptiles and amphibians are also likely present. Coqui frogs (*Eleutherodactylus coqui*) were heard. None of these non-native vertebrates are of conservation concern and all are deleterious to native flora and fauna.

Native fish, crustaceans, molluscs, insects and spiders may be present in the project area's streams. Stream biota will be protected by the long distances between the property and stream channels (200 to 300 feet, on adjacent properties) and the series of measures outlined above to prevent erosion and sedimentation and any other impacts to water quality.

5. Archaeological, Cultural, and Historical Resources

As part of the supporting studies for the CDUA, an Archaeological Assessment (AA) of the property, which included a full field survey of the entire property, was conducted by the archaeological firm, ASM Affiliates. Although the north, west and southern portions of the property were found to be largely overgrown with *uluhe* fern and tall grass, the ground visibility was generally adequate to identify and any historic properties that may have been present. As a result of the pedestrian survey, no archaeological resources were identified within the subject parcel. A copy of the **Archaeological Assessment Report** is included for reference within **Appendix A of the associated CDUA** for which this Plan has been prepared. It might be noted that, although there have been no archaeological studies of the surrounding properties, the State Historic Preservation Division (SHPD) has issued letters of "no effect" for at least seven parcels within the Pihā and Kahuku Homesteads, a few of which border the subject property. The reason generally given by SHPD, for the determination that development of these parcels would have "no effect" on significant historic sites, was that a review of aerial photographs revealed that intensive cultivation of the land had already fully altered the land. The only other archaeological survey undertaken within the Pihā Homesteads, which was conducted as part of an archaeological assessment for a property located *mauka* of the Perry property, also conducted by AM Affiliates (Clark 2018), also found no archaeological resources within the its study area. Given the findings of the 2018 Archaeological Assessment, the SHPD determination for other parcels within the subdivision, and the long history of extensive cultivation of the property, it was not unexpected that no features would be found on the subject property.

In order to determine if the proposed construction and use of the property could potentially impact any cultural resources or practices in the area, a Cultural Impact Assessment of the property and its history was prepared in August 2019 by ASM Affiliates. The Cultural Impact Assessment, which contains the archival and documentary research, as well as communications and interviews with those organizations and individuals having particular knowledge of the project area, its cultural resources, practices and beliefs, did not reveal any cultural resources or practices occurring on or near the site that may be affected by the construction of the proposed residence.

To elicit consultation as part of the Cultural Impact Assessment, a notice describing the action and location and inviting consultation was published in the Office of Hawaiian Affairs (OHA) newspaper *Ka Wai Ola* (March 2019). To date, there has been no response to this notice. In addition, consultation letters were mailed on July 24, 2019, to William Ailā, Interim Chair for the Department of Hawaiian Home Lands (DHHL); a representative of KAHEA Environmental Alliance, a nonprofit organization; and a representative of the Office of Hawaiian Affairs (OHA); to date, no responses have been received. Additional consultation efforts were made with individuals of the Honohina and Pīhā communities. One potential informant, Robert Nishimoto, said that while he grew up in the area, he moved away some time ago and did not know of any traditional cultural uses or practices of the property itself. He recommended that ASM staff contact three other local residents, who did not respond to ASM's outreach. Two local residents, Jed Cariaga and his partner Natalie Tavares, a couple originally from Kaʻū and Maui, were a contacted and agreed to discuss the proposed project.

Jed Cariaga and Natalie Tavares expressed their general concerns about landowners from elsewhere who move to the land and begin to block access or express concern about pig hunting in undeveloped Conservation lands near their properties. The couple hunt via an old trail that extends from the *mauka* end of Pīhā-Kahuku Road and branches off from the old fence line. They reported that there were disputes when access to the forest were blocked by landowners on the Honohina side of Pīhā. The couple said that another access road, Stone Road, allowed them to shift their hunting activities to the Waikaumalo side of Pīhā between the Kalaeha and Waikaumalo Stream gulches. Because Stone Road, in the area north of the Perry property, extends *mauka* and provides access to forested lands, the couple say they use it frequently to access potential hunting areas. When new landowners bought the parcels surrounding the Perry property, the couple said that they developed working relationships with the new residents to allow access for hunting through their properties. There is generally benefit for the owners, as Mr. Cariaga also gets requests for animal control (feral pigs) and is often hired to work on people's properties in North Hilo to hand clear vegetation.

The proposed construction of a single-family residence, orchard and garden on the subject property will not harm any cultural resources, nor will it impede access to the forest reserve for pig hunting or cultural utilization of

forest resources. The small size of the property, the lack of a true forest, and its location surrounded by roads, driveways and homes, gives it very minimal hunting value. The Applicant understands the practices of local hunters and appreciates and welcomes their efforts in reducing the feral pig population in the area, which can wreak havoc with gardens and orchards as well as native plants and is the reason that the owners plan to fence the entire property with an agricultural-type, wire-mesh fencing.

6. Aquatic Resources

Although there is no habitat for native waterbirds in the property, as noted above in reference to the faunal survey, some may utilize nearby Waikaumalo Stream. In the Hilo-Hāmākua Coast in general, waterbirds are found in streams, estuaries, natural and artificial ponds, and wetlands. The most common native waterbird is the indigenous black-crowned night heron, or ‘auku‘u (*Nycticorax nycticorax hoactli*). This bird is likely present at times in the general area of the property. It is also not unusual to spot the wide-ranging, friendly but endangered Hawaiian goose or nēnē (*Branta sandwicensis*) in various parts of the island. Far less likely to be seen in the property’s streams are two endangered waterbirds that are occasionally present in the Hāmākua coast: the Hawaiian duck or koloa maoli (*Anas wyvilliana*), and the Hawaiian coot or ‘alae ke‘oke‘o (*Fulica alai)*. Of these, only the koloa maoli is noted in streams somewhat similar to Waikaumalo. No waterbirds were observed during any of the field visits to the property.

Additionally, native fish, crustaceans, molluscs, insects and spiders may be present in the project area’s streams. Stream biota will be protected by the long distances between the property and stream channels (200 to 300 feet, on adjacent properties) and the series of measures outlined above to prevent erosion and sedimentation and any other impacts to water quality.

6. Recreational Resources

There are no parks or formal public recreational areas in the area of the property. The primary recreational resource in the area would be the State Forest Reserve which is located at the mauka end of Pīhā-Kahuku

Road, about 2 miles *mauka* of the subject property, and is occassionally used by residents as an area for hunting wild pig, for both subsistance and recreational purposes. Residents of the area have noted that they have been also using Stone Road to access the State owned forested areas between Waikaumalo and Kalahea Streams for hunting feral pigs, for both subsistence and recreational purposes. The planned agricultural and other uses of the property, however, would have no impact on Stone Road or the public's use of this road to access the State's forest lands and, consequently, would have no impact on the potential recreation resources of the area.

7. Scenic Resources

The primary scenic and open space resource in the project area is the generally open and scenic character of this rural-agricultural region comprised of clusters of farms and unused parcels bordered by the major streams that extend along and cross the large lot homestead subdivision.

In that the owners plan to return the land back into productive agricultural use as a subsistence farm together with a modest one-story home and small agriculture related structures, the proposed use would appear to be very much in keeping with the character of the region and surrounding area. In the process, the visual quality of the land would be changed from the existing mixed native-non-native low-stature forest, which is dominated by mostly non-native and invasive trees and shrubs and the common native *uluhe* fern, to that of a well-managed orchard environment, with most of the existing vegetation found along the steeper edges left undisturbed other than the gradual hand-removal of the invasive strawberry guava, Asian melastome, and Koster's curse, to be replaced with more of the native plantings commonly found on the property, such as the *neneleau* and *hapu'u pulu*. In this context, the proposed use would appear have little impact to the scenic resources of the area and would have the potentially positive impact of curtailing the spread of invasive species in the area and reintroducing native species that were once common to the area but had be displaced by the prior sugar cultivation on the land.

B. Assessment of Potential Environmental Threats

As part of a Draft Environmental Assessment (EA) prepared in support of the Conservation District Use Application for the proposed single-family residence and farm uses on the property, surveys were conducted of the flora, fauna, historical and cultural resources that may be found on the property and no rare, threatened or endangered species were found to be present. In the event that any unanticipated archaeological resources are unearthed within the project site during the proposed farm related activities, work in the immediate vicinity of those resources would be halted and SHPD would be contacted in compliance with Hawai‘i Administrative Rules (HAR13§13-280). The major potentially environmentally sensitive resources in the area of the property are the nearby streams that extend to the east and north of the property, along with their associated native fauna. Additionally, as noted above, several endangered or threatened native terrestrial vertebrates may be present in the general area and may overfly, roost, nest, or utilize resources of the property. These include the Hawaiian hawk, the Hawaiian hoary bat, the Hawaiian petrel, the band-rumped storm petrel, and the Newell’s shearwater

The precautions for preventing effects to water quality during construction and the farm operations listed in Sections IV-A and B will avoid impacts to stream organisms in Waikaumalo and Kalaeha Streams, which are located on adjacent properties. In order to avoid potential impacts to those endangered or threatened native terrestrial vertebrates listed above, the applicant will commit to certain conditions, which are expected to be proposed for the Conservation District Use Permit (CDUP) being sought by the applicant and which would be needed to implement the planned residential and farm related improvements. Specifically, these include:

- Construction will refrain from activities that disturb or remove shrubs or trees taller than 15 feet between June 1 and September 15, when Hawaiian hoary bats may be sensitive to disturbance.
- If land clearing occurs between the months of March and September, inclusive, a pre-construction hawk nest search by a qualified ornithologist using standard methods will be conducted. If Hawaiian hawk nests are present, no land clearing will be allowed until October, when hawk nestlings will have fledged.
- Any exterior lighting will be shielded from shining upward, in conformance with Hawai‘i County Code § 14 – 50 et seq., to minimize the potential for disorientation of seabirds.

III. ASSESSMENT OF NATURAL HAZARDS

A. Flooding and Flood Related Hazards

In relation to potential for flooding or flood related risks, the floodplain status for many areas of the Island of Hawai‘i has been determined by the Federal Emergency Management Agency (FEMA), which produces the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM). The flood zones for this region were recently mapped, and digital maps and reports are available from the Department of Land and Natural Resources at http://gis.hawaiinfip.org/fhat/. The property, as shown on the **Flood Hazard Assessment Report (FHAR) Map in Figure 7,** is within Flood Zone X, areas outside the mapped 500-year floodplain. Also, being at and above the 1,150-foot elevation, the property is at no risk of tsunami inundation, and it is outside both the tsunami evacuation and any dam evacuation zone. Additionally, proposed action does not appear to be affected in any way by stream flooding, which is restricted to the steep channels of the off-property Waikaumalo and Kalaeha Streams and does not overtop the high stream banks. The proposed home site, farm buildings and driveway are not near and are topographically separated from these two streams, and the driveway does not have to cross either.

Flood Hazard Assessment Report

www.hawaiinfip.org

Perry Property FHAR Map

Property Information

COUNTY:	HAWAII
TMK NO:	(3) 3-2-004:040
WATERSHED:	WAIKAUMALO
PARCEL ADDRESS:	ADDRESS NOT DETERMINED NINOLE, HI 96773

Notes:

Flood Hazard Information

FIRM INDEX DATE:	SEPTEMBER 29, 2017
LETTER OF MAP CHANGE(S):	NONE
FEMA FIRM PANEL:	1551660450F
PANEL EFFECTIVE DATE:	SEPTEMBER 29, 2017

THIS PROPERTY IS WITHIN A TSUNAMI EVACUTION ZONE: NO
FOR MORE INFO, VISIT: http://www.scd.hawaii.gov/

THIS PROPERTY IS WITHIN A DAM EVACUATION ZONE: NO
FOR MORE INFO, VISIT: http://dlnreng.hawaii.gov/dam/

0 200 400 ft

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.

If this map has been identified as 'PRELIMINARY', please note that it is being provided for informational purposes and is not to be used for flood insurance rating. Contact your county floodplain manager for flood zone determinations to be used for compliance with local floodplain management regulations.

FLOOD HAZARD ASSESSMENT TOOL LAYER LEGEND
(Note: legend does not correspond with NFHL)

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD - The 1% annual chance flood (100-year), also know as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. SFHAs include Zone A, AE, AH, AO, V, and VE. The Base Flood Elevation (BFE) is the water surface elevation of the 1% annual chance flood. Mandatory flood insurance purchase applies in these zones:

- **Zone A:** No BFE determined.
- **Zone AE:** BFE determined.
- **Zone AH:** Flood depths of 1 to 3 feet (usually areas of ponding); BFE determined.
- **Zone AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined.
- **Zone V:** Coastal flood zone with velocity hazard (wave action); no BFE determined.
- **Zone VE:** Coastal flood zone with velocity hazard (wave action); BFE determined.
- **Zone AEF:** Floodway areas in Zone AE. The floodway is the channel of stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without increasing the BFE.

NON-SPECIAL FLOOD HAZARD AREA - An area in a low-to-moderate risk flood zone. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

- **Zone XS (X shaded):** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- **Zone X:** Areas determined to be outside the 0.2% annual chance floodplain.

OTHER FLOOD AREAS

- **Zone D:** Unstudied areas where flood hazards are undetermined, but flooding is possible. No mandatory flood insurance purchase apply, but coverage is available in participating communities.

FIGURE 7 FHAR MAP Agricultural Management Plan
Perry Residence and Farm

B. Geologic and Volcanic Hazards

In terms of exposure to geologic hazards, the entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. The volcanic hazard for the project area, as assessed by the U.S. Geological Survey, is determined to be in Zone 8 on a scale of descending risk from 1 to 9 (Heliker 1990:23). The relatively low hazard risk for this area is because Mauna Kea is an inactive volcano. Zone 8 includes areas that have had no lava flows in the last 750 years, and only a few percent covered by lava in the past 10,000 years. Thus, the risk of volcanic hazard here is very low.

The entire Island of Hawai‘i experiences high seismic activity and is at risk from major earthquake damage (USGS 2000), especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 2006 and the more recent 6.9 quake of May 2018 demonstrated. The portion of the property site proposed for improvement is on a slightly flattened topographic ridge that descends into shallow valleys on either side. There are appropriate setbacks to surrounding steeper slopes, and there does not appear to be a substantial risk at the site from subsidence, landslides or other forms of mass wasting.

IV. DESCRIPTION OF AGRICULTURAL BEST MANAGEMENT PRACTICES (BMP'S)

The following description of BMP recommendations for the farm implementation and operation is taken from the University of Hawaii-Manoa, College of Tropical Agriculture and Human Resource (CTAHR), *"Best Management Practices to Manage Non-Point Pollution in Agriculture",* F. Abbas and A. Fares, June 2009, and from University of Hawaii-Manoa, College of Tropical Agriculture and Human Resource (CTAHR), *"Integrated Pest Management for the Home Gardens: Insect Identification and Control",* R. Ebesu, July 2003.

A. Short-term BMPs (During Implementation)

During the implementation of the farm related improvements, comprising the, construction of the residence with the farm related facilities and the tree

plantings; the primary threats to the environment during these activities would be from the potential for generating particulate dust, erosion and sedimentation as a result of the planned grading activities, which would be concentrated in the areas of the house site and the access drive. As noted, no grading would be associated with the implementation of the orchard areas, as trees would be planted in individual holes with the soil bermed around the tree planting and then protected with mulch. Furthermore, there would be no disturbance to the native ground cover during the process of removing the concentration of invasive trees on the property which are found mostly in the steeper portions along the property boundary and within the proposed buffer area. Consequently, the BMPs to be implemented during this period would be similar to those followed for most construction related activities, which would include:

- Minimizing the total amount of land disturbance required which will be delineated to construction contractor prior to the commencement of any onsite work.
- Construction activities with the potential to produce potential stormwater run-off will not be allowed during periods of unusually heavy rains or storm conditions.
- Prior to the start of construction, contractors will implement erosion and dust control measures to prevent any sediment from leaving the construction areas, especially in the direction of the nearby streams.
- Graded areas will be replanted or otherwise stabilized, as soon as possible following grading activity.

As noted, the ground conditions on the property are such there should be deep ash-derived soils present and given the geologic conditions, there is a medium to high potential for soil erosion present once the soils are exposed. A key component of the Agricultural Management Plan for the property will be to build the soil environment, especially in areas planned for tree plantings and to retain those soils that are present by implementing practical erosion control methods as part of the orchard area clearing and tree planting process. This is the same challenge that the plantation farmers faced in the past and appears to be addressed by avoiding those areas of steeper slopes and retaining an undisturbed vegetative buffer area along these areas, measures which are included as part of the long-term BMPs listed in the following section.

B. Long-term BMP's (Following Implementation/Ongoing)

The BMPs listed below that would be implemented as part of the ongoing farm operations, are designed to minimize the potential environmental and health impacts by curtailing the potential movement of sediments, nutrients, pesticides, or other potential pollutants, while maximizing the efficient use of resources and optimizing crop production. These Long-term BMPs pertaining to soil, water, nutrient, and pest management also require ongoing data collection, record keeping and monitoring to insure their effective implementation.

Soil Management. Effective Soil Management BMPs are aimed at minimizing the potential for soil erosion, surface water run-off, soil compaction or soil loss. The emphasis is placed on cultivation practices that minimize tillage, add organic material to the soils and establishes ground covers. As proposed for the orchard areas of the Property, these objectives would be achieved by integrating the following BMP's for soil management, including:

- Limiting cleared areas to manageable sections, which would be cleared by hand;
- Avoiding cultivating areas of steep slopes
- Creating individual holes for the tree plantings rather than grading or tilling the area for cultivation;
- Creating a soil berm around the individual tree plantings;
- Re-establishing an effective and erosion resistive ground cover in the cleared areas;
- Adding mulch plantings from onsite composting of green-waste around individual plantings; and
- Maintaining vegetative barriers that would remain undisturbed, along the downslope boundaries of planted areas.

The existing ground conditions in the areas where new trees are to be planted, have deep ash-derived soils which have a moderate potential for ponding or soil erosion. The potential of soil erosion on the farm can be effectively eliminated through the integration of the above measures as part of the long-term cultivation practices for the farm. Those soils that are present or added to at the tree plantings can be retained in place by avoiding areas of steep slopes and implementation of the BMPs listed above.

Water Management. The BMPs for water management are generally focused on effective irrigation management, that are aimed at ensuring that the specific crop water requirements are met, while avoiding overwatering and the potential for soil, nutrient, or chemical movement. The BMPs for water management are also aimed at achieving an effective use of the available resources so as to minimize the potential impacts to the ground resources. As noted previously, because of the consistently heavy rainfall in the area, no irrigation system is deemed necessary nor planned for the orchard areas. A portable water system can be used during prolonged dry periods, especially during the early grow-in stage, if needed. In doing so, any watering that is needed, can be directed to the area of the root-ball, thus minimizing the potential for overwatering and soil or nutrient movement for the area of tree planting. Although the demand for water for irrigation purposes is expected to be relatively small, the water that would be used would be collected on-site through the roof catchment system, rather from an on or off-site well, and thus would have no impact on ground water resources.

Nutrient Management. BMPs for nutrient management seek to monitor and regulate the application of nutrients to the soil according to the specific crop nutrient requirements. Nutrient management also includes the selection and use of appropriate organic manure amendments, which can help build and stabilize soils while reducing the need for chemical nutrients. Additionally, effective nutrient management involves the following practices:

- Understand the principles for nutrient management
- Understand the existing soil characteristics, fertility reserves, and nutrient requirements.
- Calibrate the application equipment in order to be able to effectively monitor the rate of nutrient application.
- Implement BMPs for nutrient application (i.e, precautionary measures) to avoid the potential for nutrient leaching.
- Implement BMPs for soil and water conservation to minimize the potential for soil or nutrient movement.

Also, when using livestock manure as a nutrient source, the following should be considered:

- Local, state and federal laws and regulations must be followed during manure application.
- Precautionary measures should be taken to control against accidental leakage, spillage, or runoff from the manure storage site, especially if sited near a water body or source.
- Certain manures, such as chicken manure, can be volatile and contribute a noxious odor to the environment through ammonia emission and efforts should be taken to reduce emissions during manure storage and application.

Pest Management (Pesticide Storage, Handling and Application). The safe and effective handling of pesticides is as important to personal health and safety as it is to environmental protection. The BMPs related to the safe storage, handling and application of pesticides that should be integrated as part of the farm operations, include the following:

- Buy pesticides in small quantities.
- Store them in a secured area.
- Dispose of them in accordance with federal, state, and local regulations.
- Maintain application equipment in working condition and calibrate to ensure recommended rates are applied
- Make sure that the pesticide applicator knows the exact location in the field to be treated.
- Avoid unnecessary application of pesticides.
- Avoid overspray and drift, especial when in close proximity to surface waters.
- Avoid pesticide application when soil moisture status is high, to prevent possible runoff or deep percolation.
- Avoid irrigation right after a pesticide application.
- Establish buffer zones to maintain a safe-distance from wells and surface water (50-100 feet recommended) and do not apply pesticides in buffer zones.
- Avoid repetitive use of the same pesticide, which may lead to pesticide resistance in the pest.
- Read and follow safety directions and maintain appropriate Material Safety Data Sheets.
- Use appropriate protective equipment specified on the pesticide label to minimize unnecessary exposure.

- Formulate a safety plan to provide emergency hand and eye wash facilities for personnel who might be accidentally exposed to pesticides.
- Have a pesticide first-aid kit available when handling pesticides.

Integrated Pest Management (IMP). IMP is a holistic approach to pest management that can reduce the use of pesticides that may potentially impact the environment or the health and safety of those handling them. A successful IPM program involves the application of a mix of cultural, biological and chemical control methods, including pest monitoring, identification and control; the result of which can provide a program for effective pest management with fewer pesticide applications. Essential elements of an effective IPM program include the following:

- Selection of pest-resistant crops.
- Maintaining strict sanitary conditions.
- Including biological controls with mulching.
- Implementing effective insect identification and control.*
- Removal, and eradication of affected plants.
- Effective control and timing of pesticide applications.

*[For Reference on IPM Insect Identification and Control, See: IPM for Home Gardens: Insect Identification and Control, College of Tropical Agriculture and Human Resources (CTAHR), University of Hawaii-Manoa, Honolulu, Ebesu, R., July 2003.]

V. DESCRIPTION OF RESOURCE CONSERVATION MEASURES

Native Vegetation and Natural Habitats

While the existing vegetation on the property includes a mix of native and non-native trees and shrubs that are dominated by the invasive strawberry, Asian malastome, and Koster's curse, as well as the particularly common native *uluhe* fern, which is found throughout the property, and other native trees and plants such as *hapu'u pulu*, *neneleau*, *pakahakaha*, and *wawae'iole* that are occasionally found in scattered locations, a botanical survey of the property determined that there were

no threatened or endangered plant species present, nor were there any critical native habitats found. Also, while there are no water features on or crossing the property, the prominent Waikaumalo Stream and the smaller Kalaeha Stream extend near the property, about 200 to 300 feet away at the closest points, and serve as the primary natural resource in the area, providing a natural habitat for several aquatic species and are likely visited by native waterfowl.

While the relatively small scale of the farming and the distinct topographical and physical separation makes it unlikely that agricultural activities planned for property would have any impact on the nearby streams, several measures are proposed as a part of this Plan that would minimize any potential impact to these natural resources as a result of either ground water infiltration or soil movement. These include measure aimed at minimizing the use of chemical applications for weed control or fertilization, such as the use of on-site generated compost and organic fertilizers and implementing an IPM system for pest control; and measures aimed at the control the erosion of soil from the site, such as avoiding the need for large scale cultivation by planting trees in individual holes, creation of a soil berm and mulching in the area of tree plantings and the prompt establishment of effective and durable groundcovers in the any exposed areas.

Soil and Water Conservation

In that no grading or grubbing is planned in the course of clearing the orchard areas, all new tree plantings will be placed in individual holes and surrounded with a berm of soil, and those areas which are cleared for tree plantings will be replanted with the use of a highly erosion resistant ground cover, such as the perennial peanut, there should be little or no potential for erosion of soil from the site. Likewise, the garden plantings will occur in a defined garden area and contained within raised beds which would effectively retain all soils in place. many of the measures recommended in this Plan, such as the use of composted mulch and organic fertilizers, in addition to helping retain soils in place, are also aimed at further building and enhancing the soil regime.

With regard to water conservation, the area is generally subject to high levels of rainfall throughout the year such that there should be little need for irrigation throughout the farm. What water that would be used for irrigation purposes would be collected on-site from a roof-top water catchment system. Never the less, the need for irrigation can be minimized through a use of regular mulching in the garden and orchard areas, which would have the additional benefit of building

the soil regimen and weed control in these areas. Any additional watering required, especially following the initial plantings or during prolonged dry periods, can be managed with the use of a portable watering system, which would have the benefit of eliminating the need of the laying of irrigation lines and minimizing the potential for over watering in targeted areas. In this way, an effective conservation of soil and water resources can be achieved throughout the farm area.

VI. SCHEDULE AND SEQUENCE OF ACTIVITIES

As noted, a key component to the overall Agricultural Management Plan for the Perry property involves the sequential and phased clearing of the planned orchard sections, the planting of a diverse mix of tropical fruit and nut trees, and the systematic replacement of the existing ground cover in cleared areas, with a highly erosion and weed-resistant ground cover using the "Eco-turf" variety of the perennial peanut; which is a nitrogen fixing legume that would provide additional nutrients to the soil.

In conjunction with this effort, all shrubs and trees from the cleared areas will be cut, chipped, and composted on site to be used as mulch material in the orchard and garden areas. Sequentially, as shown **General Implementation Timetable in Table 1,** the phased clearing of the orchard sections and replanting in the orchard areas, which would take place following the implementation of the necessary access and utility improvements and construction of the planned residence, farm related facilities and the establishment of the garden area; each of which would take place sequentially in the first year following receipt of the necessary permits and approvals. Concurrent with the planting of the orchard areas, a process of removing invasive trees from the project perimeter of the property will be undertaken over a period of 3-5 years. The perimeter area will also be monitored to insure that, once removed, the invasive plants or trees have not intruded into these or the orchard areas and the native plantings in this area are able be reestablished, especially along the perimeters and steeper areas of the property.

TABLE 1. GENERAL IMPLENTATION TIMETABLE

ACTION	TIME-FRAME IN MONTHS / (Years)
Obtain Construction Plan Approval/Permitting	10 months
Clearing/Grading of Defined Access and Construction Areas	1 months
Construction of Residence/Utility Shed/ Chicken-Coop/Water Catchment and Storage System	8 months
Implementation of the Garden Area	2-3 months
Phased Clearing of Orchard Sections	Ongoing (2-3 Years)
Planting of Fruit Trees and "Eco-turf" Groundcover in Cleared Areas	Ongoing/Concurrent (2-3 Years)
On-site Composting of Cleared Vegetation	Ongoing/Concurrent (2-3 Years)
Systematic Removal of Invasive Trees/Shrubs at Property Perimeter	Ongoing (3-5 Years)

Note: Action items with time-frames listed in months are sequential and those occurring over years are concurrent.

VII. ONGOING MONITORING AND MAINTENANCE ACTIVITIES

As noted, the complete property will be fenced, using a 4-ft. high, t-bar and wire-mesh agricultural fencing, in order to prevent the intrusion of feral pigs that are common to the area and could otherwise cause extensive damage to orchard and garden areas. The fencing around the entire perimeter will need to be monitored regularly, especially following the initial installation, to ensure that portions have not been broken or compromised. Feral pigs that have customarily used pathways across the property will look for opportunities to breach the fencing, typically by digging beneath the fence in areas where the ground is depressed.

Additionally, regular and ongoing monitoring of the farm soils, water and plant conditions is an important component to identifying potential environmental or biological threats early on; to ensure the effective use of available resources; and to

maintaining optimum growing conditions for the selected garden trees and plants. Close monitoring of the site conditions is also an essential component of and effective IPM program in order to identify the early signs of invasive pests to be managed and beneficial organisms to be encouraged. Ongoing monitoring of those areas cleared of invasive species is also required to ensure the effectiveness of the control methods being applied.

Those areas to be monitored on a regular basis as part of the ongoing farm operations, include the following:

- Tree plantings for signs of nutrient deficiencies and invasive pests;
- Ground conditions for signs of erosion, especially in and around areas that have been irrigated or watered;
- Soil conditions, especially around tree plantings, for signs of overwatering, chemical build-up or nutrient deficiencies; and
- Areas cleared of invasive species for signs of regeneration or introduction of other weed species that are finding opportunity in newly cleared areas.

Similarly, regular monitoring and maintenance of the farm facilities and equipment are important to maintaining safe environmental conditions, especially in the storage of potentially harmful chemicals or volatile compounds; for the safe and effective application of chemicals in the cultivated areas; and the efficient use of available resources. Those areas that require special attention in terms of regular inspection and maintenance include:

- Buildings and the storage areas used for storing fertilizers and chemicals to ensure that they remain dry, safe and secure;
- Application equipment to insure they remain in working conditions and are properly calibrated so that recommended rates are applied; and
- Water storage facilities and equipment to identify any signs of leakage.