DHHL NORTH KONA WELLS PROJECT – GIANULIAS WELL SITE

TMK: [3] 7-5-14:001

Moku of Kona, Island of Hawai‘i

DRAFT ENVIRONMENTAL ASSESSMENT

January 2025

Proposing Agency/Determining Agency:
State of Hawai‘i
Department of Hawaiian Home Lands
91-5420 Kapolei Parkway
Kapolei, Hawai‘i 96707

Prepared by:
Bowers + Kubota Consulting, Inc.
2153 North King Street, Suite 200
Honolulu, Hawai‘i 96819

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PROJECT SUMMARY TABLE

This Draft Environmental Assessment (EA) has been prepared in accordance with the requirements of Chapter 343, Hawai‘i Revised Statutes (HRS) and Hawai‘i Administrative Rules (HAR) Title 11-200.1 Environmental Impact Statement Rules.

Project Name:	DHHL North Kona Wells Project – Gianulias Well Site
Proposing Agency:	State of Hawai‘i Department of Hawaiian Home Lands 91-5420 Kapolei Parkway Kapolei, Hawai‘i 96707 Contact: Lilliane Makaila, Planner
Determining Agency:	Hawaiian Homes Commission 91-5420 Kapolei Parkway Kapolei, Hawai‘i 96707 Contact: Kali Watson, Chairperson
Authorized Agent (EA Preparer):	Bowers & Kubota Consulting, Inc. 2153 N King Street, Suite 200 Honolulu, Hawai‘i 96819 Contact: Malachi Krishok, Planning Project Manager Phone: (808) 836-7787
HRS §343 Trigger:	HRS §343-5(a)(1), use of State funds.
Project Location:	Ahupua‘a of Kahului 2, moku of Kona, island of Hawai‘i, Hawai‘i
Project Size:	128 acres (approx.) parcel; 3 acres (approx.) project area
Tax Map Key(s):	[3] 7-5-014:001
Landowner:	Cannery Commercial, LLC and AKT Kona Investors, LLC
Existing Use on Project site:	The Project site is primarily used for agriculture, with mature coffee trees interspersed with landscaped grass, some trees and shrubs. One single-family home is present on the Project site. The existing coffee farm and accessory uses will continue after the installation of wells.
State Land Use District:	Agriculture
County of Hawai‘i Zoning:	Agricultural District A-1a and Agricultural District A-5a
Special Management Area (SMA):	Outside of SMA
Flood Zone:	Zone X (Area outside the 500-year floodplain)

Proposed Action:	The Department of Hawaiian Home Lands is proposing to develop a new potable water source with the installation of two new wells near the Kealakehe – La‘i ‘Ōpua Planning Area in the North Kona District. The wells will be developed on a portion of the privately owned parcel identified above. The new wells will convey water to residents of the Villages of La‘i ‘Ōpua, a DHHL master planned community, and support the community’s continued development as outlined in the DHHL Kealakehe – La‘i ‘Ōpua Regional Plan (Final 2020). The proposed action supports DHHL’s mission and vision of creating vibrant and self-sufficient homestead communities by developing and delivering lands and homes to more native Hawaiian families. The wells will be installed in two phases. During Phase I, one exploratory well will be drilled and tested to determine its sustainable capacity and water quality. If the quantity and quality of sampled water is satisfactory, the project will proceed to Phase II. During Phase II, the exploratory well will be converted to a production well, a second production well will be drilled, a concrete storage tank will be installed, and ancillary structures necessary for well operations will be constructed at the Project Site.
Permits and Approvals Needed for the Project:	HRS §343 Review; HRS §6E Review; Community Noise Permit and Noise Variance Permit; National Pollutant Discharge Elimination System Permit (NPDES); Well Construction Permit; Pump Installation Permit; and Grading, Grubbing and Stockpiling Permits
Determination:	Anticipated Finding of No Significant Impact (AFONSI)

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AIS	Archaeological Inventory Survey
ALFRI	Archeological Literature Review and Field Inspection
amsl	above mean sea level
APE	Area of Potential Effect
BMP	Best Management Practice
CIA	Cultural Impact Assessment
CWRM	Commission on Water Resources Management
CZM	Coastal Zone Management
DHHL	Department of Hawaiian Home Lands
DOH	State of Hawai'i, Department of Health
DWS	County of Hawai'i, Department of Water Supply
EA	Environmental Assessment
EPA	Environmental Protection Agency
FCL	Formally Classified Lands
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawai'i Administrative Rules
HELCO	Hawaiian Electric Light Company
HRS	Hawai'i Revised Statutes
IAL	Important Agricultural Lands
IBA	Important Bird Area
KASA	Keauhou Aquifer System Area
KFS	Kona Field System
mgd	Millions of gallons per day
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
RD RUS	Rural Development Rural Utilities Service
SFHA	Special Flood Hazard Area
SHPD	State Historic Preservation Division
State	State of Hawai'i
USDA	United States Department of Agriculture
USGS	United States Geological Survey

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1.0 PROJECT DESCRIPTION

1.1 BACKGROUND

The Department of Hawaiian Home Lands (DHHL) is proposing to develop a new potable water source with the installation of two new wells near the Kealakehe – Laʻi ʻŌpua Planning Area in the North Kona District, island and County of Hawaiʻi on a privately owned parcel identified as TMK [3] 7-5-14:001 (the "Project Site"). See Figure 1-1. The new wells will convey water to residents of the Villages of Laʻi ʻŌpua, a DHHL master planned community, and support the community's continued development as outlined in the DHHL Kealakehe – Laʻi ʻŌpua Regional Plan (2020). The proposed action supports DHHL's mission and vision of creating vibrant and self-sufficient homestead communities by developing and delivering lands and homes to more native Hawaiian families.

The wells will be installed in two phases. During Phase I, one exploratory well will be drilled and tested to determine its sustainable capacity and water quality. If the quantity and quality of sampled water is satisfactory, the project will proceed to Phase II. During Phase II, the exploratory well will be converted to a production well, a second production well will be drilled, a concrete storage tank will be installed, and ancillary structures necessary for well operations will be constructed at the Project Site.

1.2 PURPOSE FOR ENVIRONMENTAL ASSESSMENT

Chapter 343 (Environmental Impact Statements), Hawaiʻi Revised Statutes (HRS), establishes a system of environmental review at the State and County levels to ensure that environmental concerns are given appropriate consideration in decision-making along with economic and technical considerations. The State of Hawaiʻi, Office of Planning and Sustainable Development's (OPSD) Environmental Review Program facilitates the environmental review process in Hawaiʻi.

This project triggers the State's environmental review process under HRS Chapter 343, as amended, and Title 11, Chapter 200.1 (Environmental Impact Statement Rules) of the State Department of Health's Hawaiʻi Administrative Rules (HAR), as amended (State of Hawaiʻi, 2019) because the action involves:

1. *Use of State Funds.* State funds would be used for the construction of the new well, tanks, and transmission lines.

DHHL is seeking federal financing assistance from the United States Department of Agriculture (USDA) Rural Development (RD) Rural Utilities Services (RUS) for Phase II of the project. In 2017, the USDA confirmed that the region is eligible for funding. The project aligns with USDA's program objectives, which are summarized below:

"USDA, Rural Development is a mission area that includes three federal agencies – Rural Business-Cooperative Service, Rural Housing Service, and Rural Utilities Service. The agencies have in excess of 50 programs that provide financial assistance and a variety of technical and educational assistance to eligible rural and tribal populations, eligible communities, individuals, cooperatives, and other entities with a goal of improving the quality of life, sustainability, infrastructure, economic opportunity, development, and security in rural America. Financial assistance can include direct loans, guaranteed loans, and grants in order to accomplish program objectives (USDA RD)."

As such, this Draft Environmental Assessment (Draft EA) document has being prepared in accordance with both Hawaiʻi Revised Statutes (HRS) Chapter 343 (HRS §343) and the National

Environmental Policy Act of 1969, as amended (NEPA). Pre-assessment consultation comments received as part of the preparation of this Draft EA document are included in **Appendix F.**

Applicant Background

The Department of Hawaiian Home Lands is governed by the Hawaiian Homes Commission Act of 1920 (HHCA), enacted by the U.S. Congress to protect and improve the lives of native Hawaiians (defined as individuals having at least 50 percent Hawaiian blood). The HHCA created a Hawaiian Homes Commission to administer certain public lands, called Hawaiian home lands, for homesteads. The Act was incorporated as a provision in the State Constitution in 1959 when Hawai'i was granted statehood and responsibility for the Commission and the Hawaiian home lands was transferred to the State. In 1960, the State Legislature created the Department of Hawaiian Home Lands (DHHL) to manage Hawaiian home lands and administer the provisions of the HHCA. The primary responsibilities of DHHL are to implement the HHCA and the programs, policies, and direction established by the HHC on behalf of the native Hawaiian beneficiaries of the Trust.

The significance of water to the success of the HHCA has been recognized since the passage of the Act. Under HHCA §221 and Hawai'i Revised Statutes §174C-49, the State Commission on Water Resource Management (CWRM) shall "reserve" water for future DHHL needs when issuing water licenses, based on DHHL projections. DHHL last provided its current and future water needs projections to CWRM for approval in 2017, which includes project water demand for the Villages of La'i 'Ōpua and is included in the Department of Land and Natural Resources (DLNR) 2020 State Water Project Plan Update. Furthermore, in 1991 the state Legislature passed what became Act 325, which recognized that, "[s]ince the passage of the Hawaiian Homes Commission Act in 1921, the shortage of available water has been one of the primary reasons for the failure of Administrators to settle native Hawaiians on Hawaiian homesteads…" As a result, Act 325 modified other state laws regarding water further increasing the rights of water to the Hawaiian Home Lands Trust.

In 2014, the HHC approved the first DHHL Water Policy Plan, which is the first policy on managing the water kuleana of DHHL since the passage of the HHCA. The Water Policy Plan's mission is "to ensure the availability of adequate, quality water to fully support self-sufficiency and self-determination in the administration of the HHCA, and the preservation of Hawaiian values, traditions, and culture."

The DHHL has also implemented its own planning system consisting of a General Plan, Island Plans, Regional Plans, Program Plans, and Special Area Plans, which are discussed in relation to the Proposed Action in Section 4.3.

Figure 1-1: Project Location Map

Determining Agency

The project is an "Agency Action" under the State's environmental review regulations because the project involves the use of State land and funds. The Hawaiian Homes Commission will serve as the "Approving Agency" for the processing of this environmental assessment document and currently anticipates a Finding of No Significant Impact (FONSI) determination.

Bowers + Kubota Consulting, Inc. (B+K) is serving as the "Authorized Agent" on behalf of DHHL (Applicant) in the preparation of this Draft EA. This Draft EA was prepared pursuant to Chapter 343, Environmental Impact Statements, HRS, as amended and the State Department of Health's Title 11, Chapter 200.1, HAR (Environmental Impact Statement Rules) (State of Hawai'i, 2019).

1.3 PROJECT PURPOSE AND NEED

The purpose of the Proposed Action is to develop additional potable water supply sources from within the North Kona region to allow for the continued development of La'i 'Ōpua. By securing additional supply sources, DHHL can then secure the water credits needed for future residential, community and commercial uses. These uses would provide more homes for DHHL beneficiaries, as well as parks, recreation spaces and create economic opportunities supporting the La'i 'Ōpua community's vision for their homestead's future in the decades to come.

The need for the Proposed Action is based on limited water resources in and around the La'i 'Ōpua area. Limited water resources stem from the region's arid climate, limiting potable water supply available from the County of Hawai'i, Department of Water Supply (DWS). This limited supply has led DWS to require water entitlements through developer agreements, where the developer can install a well and/or other necessary infrastructure to be dedicated to DWS in exchange for a set allocation of water for the future development (the "water credits") (Department of Water Supply, County of Hawai'i, Hawai'i Water Use and Development Plan, 2017). One water credit is equivalent to 600 gallons per day or one housing unit (Kealakehe-La'i 'Ōpua Regional Plan Update, 2020).

The result of these limitations is that following the completion of La'i 'Ōpua Village 4 Phase I 'Ākau and Phase II Hema, DHHL will not have enough water credits available from DWS for future homestead or commercial development at La'i 'Ōpua from now into the foreseeable future (Kealakehe-La'i 'Ōpua Regional Plan Update, 2020). Therefore, DHHL needs to establish an additional water source to receive water credits from DWS for future development.

Developing additional water sources for the continued development of La'i 'Ōpua has been identified as a priority project for DHHL and stakeholders in both the 2009 and 2019 Kealakehe – La'i 'Ōpua Regional Plans as the North Kona Water Source Development Project (Kealakehe-La'i 'Ōpua Regional Plan Update, 2020). In November 2014, DHHL submitted a water reservation request to the Commission on Water Resources Management (CWRM) (Department of Water Supply, County of Hawai'i, Hawai'i Water Use and Development Plan, 2017). In August 2015, CWRM approved the water reservation for 3.398 mgd in the Keauhou Aquifer System Area (ASYA) that services the North Kona region. The water request amount should meet the water demands needed for the full build-out of La'i 'Ōpua.

While a water reservation credit safeguards DHHL's access to potable water, it neither identifies a location of the water source nor includes how the water will be transmitted. DHHL owned lands in North Kona are not suitable for potable water wells. Therefore, they must partner with other landowners to develop water sources in more suitable locations.

In establishing a suitable location to install the wells, DHHL had to locate areas at high enough elevations a minimum of 0.25 miles away from existing DWS well sites to reduce pressure on groundwater resources and interference between wells. Further, the DWS prefers areas containing

"high-level" groundwater that meets federal and state drinking water standards and is not subject to saltwater intrusion. The areas must then have sufficient capacity to support a production well. Upon finding a suitable location, DHHL then needs to secure a water source development agreement with the landowner.

The Project Site is one of four potential well sites where DHHL could establish a water credit agreement with a landowner and DWS, while meeting the location and groundwater quality needs. A water credit agreement and source development partnership between the Landowners, DHHL and DWS will need to be finalized prior to well site development. Because of the costs associated with the proposed developments in Phase II, DHHL is seeking financial assistance from the USDA RD RUS.

1.4 REGIONAL SETTING AND PROJECT SITE

The Project Site (TMK [3] 7-5-014:001) is located within the Kona moku on the leeward, western slope of the Hualālai Volcano approximately 2.5 miles inland from the coast. The Project Site elevation is between 1,500-1,600 feet above mean sea level (amsl). Although modern mapping sources place the Project Site in the ahupuaʻa of Puaʻa, older maps and lineal descendant interviews place the site in the ahupuaʻa of Kahului (Spencer and Hammatt, 2019). The area surrounding the Project Site has historically been used for agricultural production, and currently much of the area is active coffee farms and coffee retail shops.

The Project Site is approximately 128 acres and owned by the Cannery Commercial, LLC and AKT Kona Investors, LLC (the "Landowners"). The site currently operates as an active coffee farm and will continue to after the installation of the wells. The Project Site is located near the town of Hōlualoa outside the designated Rural Transportation Oriented Design (TOD) boundary on the mauka, or upland, side of Māmalahoa Highway (Route 180) between mile markers four (4) and five (5). As shown in Figure 1-2, the Waiʻaha Springs State Forest Reserve abuts the mauka edge of the property. It is approximately six (6) miles south of the Villages of Laʻi ʻŌpua, three (3) miles east of Kailua-Kona, and ten (10) miles north of Kealakekua Bay.

1.4.1 Villages of Laʻi ʻŌpua

The Villages of Laʻi ʻŌpua (Laʻi ʻŌpua) is a 980-acre master planned community that consists of fourteen villages that will include single and multifamily residential units, recreational and community facilities, parks and preserves, and neighborhood- commercial complexes. Laʻi ʻŌpua was initially planned by the Housing and Community Development Corporation of Hawaiʻi in the early 1990's as an affordable housing project using State land. In 1997, a total of 572 acres was transferred from the State to DHHL and the remaining 408 acres are currently owned by various other landowners. Along with the acreage, a total of 241 units in water commitments were transferred to DHHL for future development (Kealakehe-Laʻi ʻŌpua Regional Plan Update, 2020).

As part of the regional planning process, a vision statement was crafted based on DHHL beneficiary feedback during the 2020 Kealakehe-Laʻi ʻŌpua Regional Plan update. This vision is reflective of what the community sees for the future of their homestead in the decades to come:

"Kealakehe – Laʻi ʻŌpua is a community with a strong sense of aloha, pride in their homestead and appreciation for the place. The community and DHHL support its people by promoting education, self-sufficiency, and providing additional homesteading opportunities for more native Hawaiian families in the Kealakehe – Laʻi ʻŌpua region."

Laʻi ʻŌpua includes lands designated for residential, community, commercial and conservation uses. There are over 260-acres of residential, 33-acres of community, 50- acres of commercial and 950-acres of conservation lands within the villages. The majority of the lands designated for residential

use occur within Villages 1 through 6 and Village 10, and include development of single and multi-family homes. La‘i ‘Ōpua is one of two communities within the planning area that have lands designated for community uses, which include spaces for parks and recreation, cultural activities, community-based economic development and other public amenities.

To date, Village 3 and the Community Hale have been completed. A total buildout of the remaining villages would potentially provide over 1,000 single family homes, 300 multi-family units, multiple park spaces, a hospital, and commercial centers. As shown in Figure 1-3, Villages 4 and 5 are proposed for the next phase of development, followed by Villages 1 and 2 (Kealakehe-La‘i ‘Ōpua Regional Plan Update, 2020).

Figure 1-2: Current Conditions in La‘i ‘Ōpua

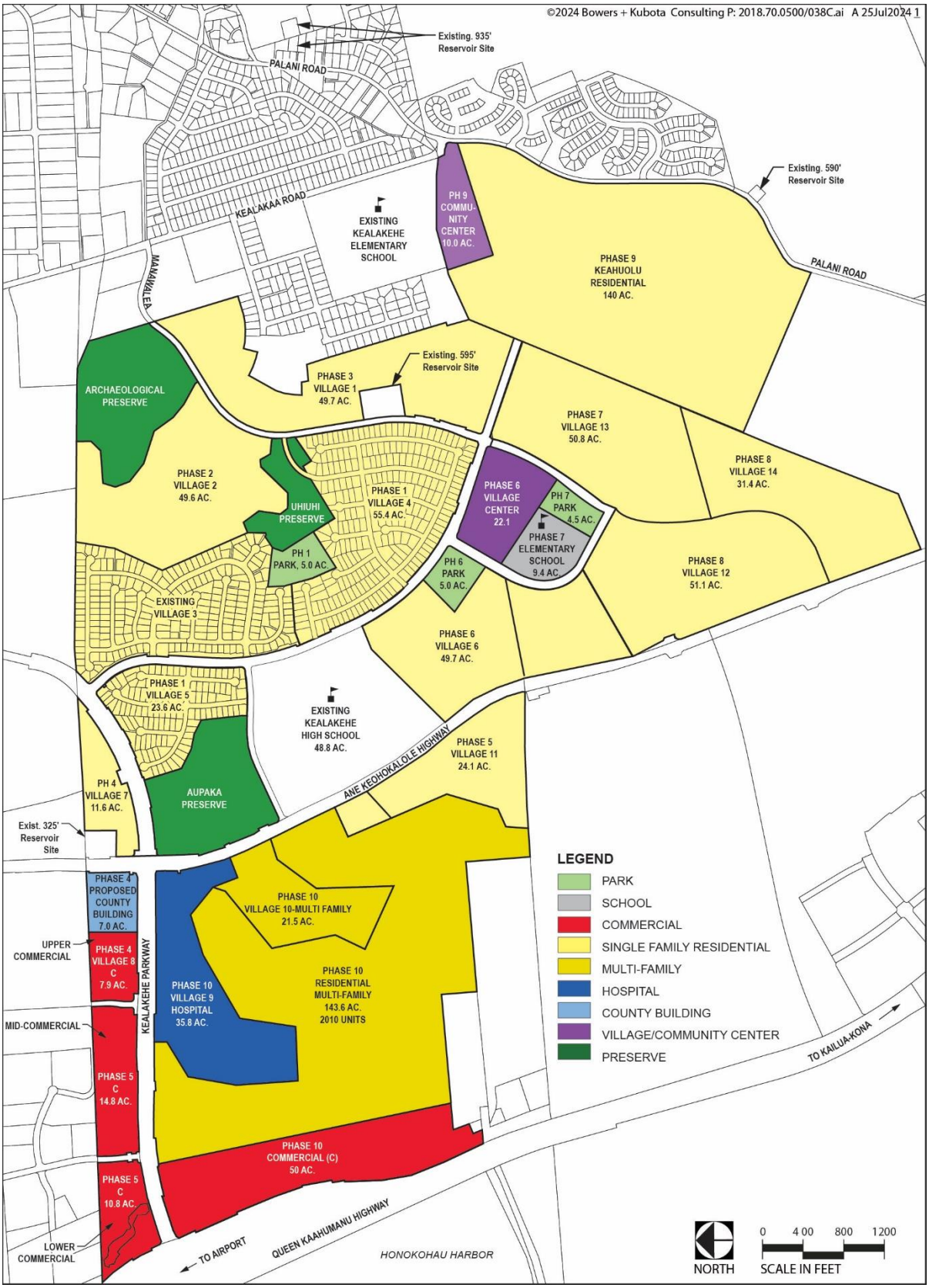
Photo facing west showing road with several completed houses in La‘i ‘Ōpua

Photo facing north-west showing fully developed residences

Photo facing north of existing road infrastructure within La‘i ‘Ōpua

Photo facing north-west showing a portion of community under construction

Figure 1-3: Villages of La'i 'Ōpua Full Build Out



1.5 DESCRIPTION OF THE PROPOSED ACTION

DHHL has entered into negotiation for an agreement with the Landowners to develop up to three (3) acres of the Project Site to install two new production wells and appurtenant site improvements accessory to the maintenance and operation of the wells, including a two (2) million-gallon reinforced concrete storage tank, pump control building, electrical lines and lighting, access road improvements, chain-link fencing, and water transmission lines (the "Proposed Action"). The wells will comply with the CWRM Hawai'i Well Construction & Pump Installation Standards (rev. 2004) and DWS standards.

The exact siting of the wells within the Project Site are still being finalized by DHHL and the Landowners. As the intent of an EA is to analyze impacts as early as possible in the planning process, constraints and sequences of events likely to result in narrowing the future options for site placement will be analyzed to ensure the Proposed Action has no adverse impacts on the resources found onsite.

The wells will be installed in two phases. During Phase I, a single exploratory well and corresponding well casing approximately 20-22 inches in diameter will be drilled. The well will then be tested to determine its water quality to ensure it meets HAR §11-20- 29 Rules Relating to Public Water Systems standards and the findings will be submitted to the State of Hawai'i, Department of Health (DOH), Clean Water Branch. The well's capacity to operate as a production well will also be tested to ensure it can produce up to two million gallons per day and nearby existing wells will be monitored to ensure the aquifer can support the additional wells. If the quality and quantity of sampled water are satisfactory, then the Proposed Action will proceed to Phase II.

Phase II consists of converting the exploratory well to a permanent production well; drilling and installing the second production well; and constructing the other site improvements accessory to the wells. Each well will be operated with a 700 gallon per minute pump with a submersible motor, and new electrical features will be installed to power the pumps. Under the original proportional share agreement, DHHL would retain two-thirds of the water produced and DWS would retain the remaining one- third for municipal use (Department of Water Supply, 2017).

As depicted in Figure 1-4, in addition to the wells, a two (2) million-gallon storage tank will be constructed to receive and store the extracted groundwater. The tank will be designed to comply with International Building Code Seismic Zone 4 and is anticipated to be approximately 105 feet in diameter and 40 feet high. A new dry well will be installed near the storage tank to capture any potential overflow through a discharge line. A single-story control building will be constructed to house the well's electrical and chlorination systems.

During the installation of these features, excavation work will be conducted in compliance with Hawai'i County Code, Chapter 10—Erosion and Sedimentation Control. Grading, grubbing and stockpiling permits will be obtained as applicable, depending on the conditions of the wells final siting.

Access to the Project Site is available via existing private roadways from Māmalahoa Highway. However, improvements to the existing private roadways or the construction of new private access roads within the Project Site may be needed based upon the final siting of the wells and accessory structures. Any roadway improvements or construction within the Project Site will comply with County development standards for private roadways.

Upon completing the construction of the storage tank and control building, the tank will be connected to the DWS main line located along Māmalahoa Highway via a new 16-inch transmission line. It is anticipated the new transmission line would be placed under the access road within the Project Site before connecting with the DWS main line. The transmission line will comply with DWS Rule 4 – Rules Regulating Water and Water System Requirements of Developments. The DWS Wai'aha Water System – Transmission Improvements Project was completed in June 2020, and upgraded

transmission waterlines from an 8-inch to 16-inch under Māmalahoa Highway near the Project Site (Consultation with County of Hawai'i DWS on 08/11/2021). These upgrades will ensure sufficient capacity to transmit potable water from the Project Site to DWS North Kona Water System for use throughout the region and La'i 'Ōpua. The Proposed Action is the Preferred Alternative because it meets the purpose and need, while being financially and technically achievable.

1.6 PRELIMINARY PROJECT COST AND TIMELINE

Phase 1 of the project will take approximately 18 months to complete. Phase 2 will require approximately 30 months to complete, beginning upon completion of Phase I well testing and approval.

Phase 1 is estimated to cost $9 Million and Phase 2 is estimated to cost $15 million.

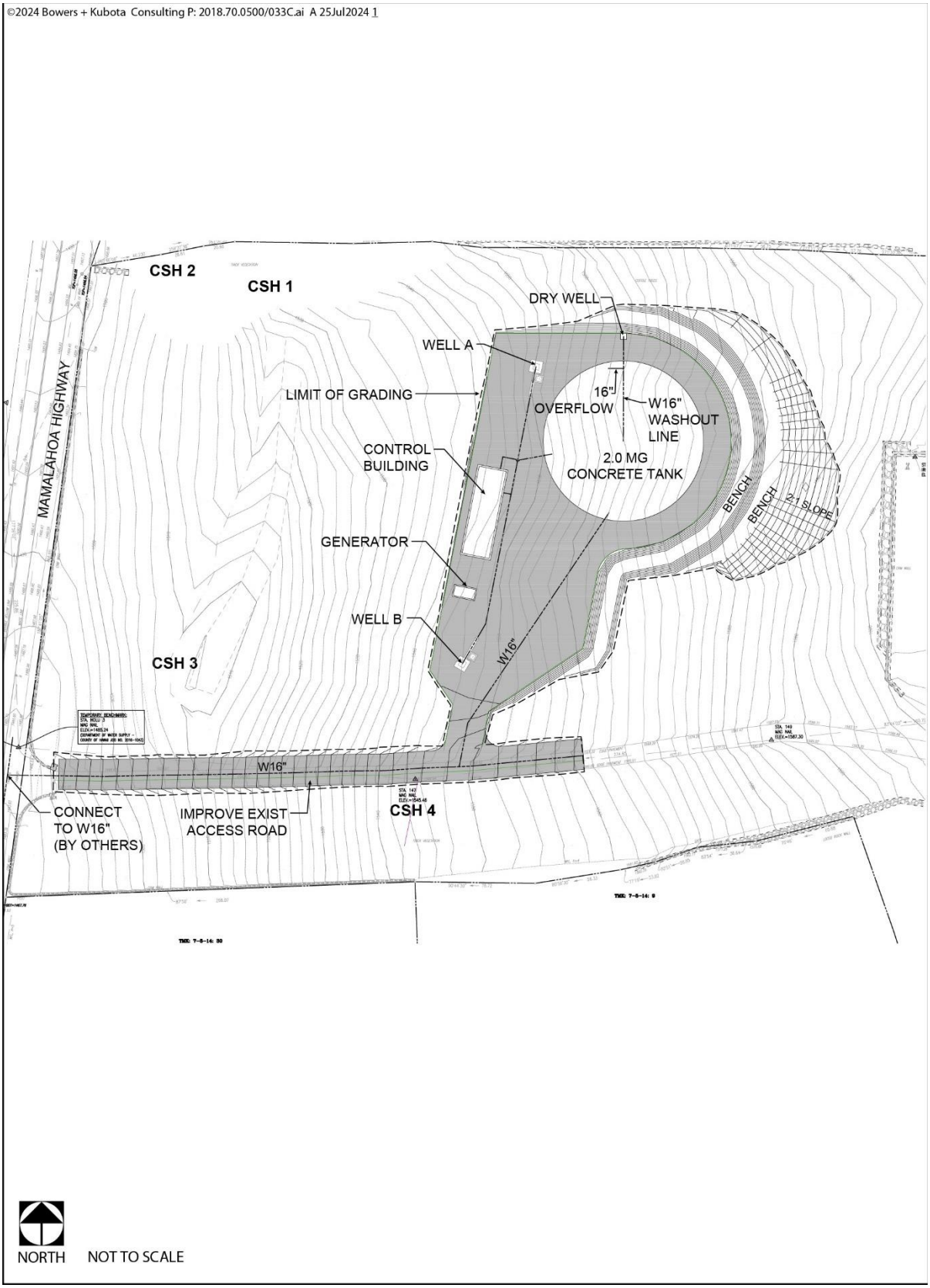
1.7 APPROVALS AND PERMITS

The Proposed Action will be subject to the following list of permits and approvals to be completed prior to the start of construction.

Table 1-1: Approvals and Permits

Permits/Approvals	Approving Agency
Federal	
NEPA	USDA RD RUS
Section 7 Consultation	U.S. Fish and Wildlife Service
NHPA, §106 Review	DLNR, State Historic Preservation Division
State of Hawai'i	
HRS, §343 Review	DHHL; Hawaiian Homes Commission
HRS, §6E Review	DLNR, State Historic Preservation Division
Community Noise Permit and Noise Variance	DOH, Indoor and Radiological Health Branch
Well Construction Permit	CWRM
Pump Installation Permit	CWRM
County of Hawai'i	
Grading, Grubbing and Stockpiling permits	Department of Public Works

Figure 1-4: Example Proposed Action Site Plan



2.0 ALTERNATIVES CONSIDERED

As a requirement of HAR §11-200.1-18 (2019), this chapter identifies and considers alternatives to achieve the Purpose and Need of the Proposed Action. These alternatives are described in this section and include a No-Action Alternative.

2.1 ALTERNATIVE 1: NO-ACTION

Under the No Action Alternative, the Project Site's existing conditions would remain. No new water wells would be built, thereby leaving DHHL and DWS without a new water source. DHHL would run out of water credits upon completing La'i 'Ōpua Village 4 Phases I and II and would be unable to complete the build out the remainder of La'i 'Ōpua. With the No Action Alternative, the Project Site would continue to operate as a coffee plantation with no short-or long-term impacts on the existing resources found on the Project Site.

However, this alternative fails to meet the purpose and need of the Proposed Action, which is to develop additional potable water supply sources within the North Kona region to support the continued development of La'i 'Ōpua. Further, it fails to meet DHHL's mission and vision of creating vibrant and self-sufficient homestead communities by developing and delivering lands and homes to more native Hawaiian families. Because of its failure to meet the purpose and need and DHHL's vision and mission, it is not a feasible alternative and was dismissed.

2.2 ALTERNATIVE 2: DELAYED ACTION

Developing additional water sources for the continued development of La'i 'Ōpua has been identified as a priority project for DHHL and stakeholders in both the 2009 and 2019 Kalakehe—La'i 'Ōpua Regional Plans. Additional water sources are needed to achieve DHHL's vision of creating a vibrant and self-sufficient community in the area and continuing to delay action would not meet DHHL's vision. Additionally, there are no existing activities or conditions in the Project Site or its vicinity that make delaying the Proposed Action more beneficial or reduce potential impacts. Because continuing to delay the Proposed Action would not meet DHHL's vision or the purpose and need, this alternative is not feasible and was dismissed.

2.3 ALTERNATIVE 3: ALTERNATIVE LOCATION

The lack of a suitable well site within existing DHHL land holdings and the need to partner with other landowners for the Proposed Action has been a constraint since 2009. DHHL has been working for over a decade to locate suitable sites for the Proposed Action and secure a water source development partnership. The Project Site is one of to two locations where DHHL has committed resources to develop partnerships and is suitable for the Proposed Action. As such, it is uncertain DHHL would be able to identify another location and secure a development agreement without continuing to delay or prevent the Proposed Action. Therefore, an alternative location would not meet the purpose and need and was dismissed.

3.0 AFFECTED ENVIRONMENT, LIKELY IMPACTS, AND MINIMIZATION MEASURES

As a requirement of HAR §11-200.1 and NEPA Section 102 (42 U.S.C. §4332(2)(C)), an EA must include a description of the affected environment, identify and analyze potential impacts, and propose mitigation measures to minimize potential impacts. This chapter describes the Project Site's geographical and environmental setting, identifies potential impacts produced by the Proposed Action, and discusses mitigation measures for each affected resource to minimize or eliminate any adverse effects.

3.1 SUMMARY OF IMPACTS

Table 3-1 provides a summary of the affected environment, potential impacts, and proposed mitigation measures. Short-term impacts are those anticipated during construction, and long-term impacts are those anticipated during operation of the Proposed Action. Cumulative impacts are those resulting from the development of La'i 'Ōpua, which is a secondary action of the Proposed Action, combined with other housing development projects proposed or under development within the Keauhou Aquifer System Area and North Kona District.

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Table 3-1: Summary of Potential Impacts

Affected Resource	Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation Measures
Land Use	None Anticipated	None Anticipated	None Anticipated, all future growth resulting from the Proposed Action and other developments are within designated growth areas	Final well location will be outside areas classified as Agricultural Lands of Importance to the State of Hawai‘i
Geology, Topography, and Soils	Clearing, grading and grubbing	None Anticipated	None Anticipated	Grading, Grubbing and Stockpiling permits per Hawai‘i County Code, Chapter 10—Erosion and Sediment Control; soil loss and erosion Best Management Practices (BMPs)
Hydrologic Resources	None Anticipated	Greater groundwater withdrawal from the Keauhou Aquifer System Area within the aquifer’s sustainable yield	Greater groundwater withdrawal from the Keauhou Aquifer System Area within the aquifer’s sustainable yield	Soil loss and erosion BMPs; Well Construction and Pump Installation Permits; Engineering Report compliant with HAR §11-20-29; NPDES permit, siting the wells outside the floodplain of Wai‘aha Stream
Biological Resources	Potential spread of invasive species; Temporary displacement of fauna species during construction phase	None Anticipated	None Anticipated	Invasive species control measures; fauna avoidance and impact reduction BMPs; biological resource training for crews; fauna resource buffers

Affected Resource	Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation Measures
Archaeological and Historic Properties	None Anticipated	None Anticipated	None Anticipated	Cultural resource training for construction crews; archaeological monitoring during construction; notify SHPD if cultural or historic resources are identified during construction; cease work immediately and contact SHPD, coroner and police if iwi kūpuna are identified during construction activities, and develop reinternment plan as appropriate
Cultural Resources and Practices	None Anticipated	None Anticipated	None Anticipated	Feasible actions by DHHL to protect Native Hawaiian rights are discussed and listed in section 3.7.2.
Scenic and Aesthetics	None Anticipated	None Anticipated	None Anticipated	None Required
Air Quality	Fugitive dust and construction related air pollutants	None Anticipated	None Anticipated	Air pollution control BMPs
Socioeconomics and Environmental Justice	None Anticipated	None Anticipated	Positively benefiting Native Hawaiian and low-income families by creating increased access to housing and economic opportunities	None Required
Acoustic Environment	Noise generated during construction	None Anticipated	None Anticipated	Community Noise permit; noise reduction BMPs; public informational meeting

Affected Resource	Short-term Impacts	Long-term Impacts	Cumulative Impacts	Mitigation Measures
Transportation and Traffic	Minor increase in traffic during construction phase	None Anticipated	Secondary impacts combined with reasonably foreseeable developments could result in increased traffic around La'i 'Opua	None Required
Natural Hazards	None Anticipated	None Anticipated	None Anticipated	Final well location will be outside the Special Flood Hazard Zone
Public Facilities and Infrastructure	None Anticipated	None Anticipated	Secondary impacts combined with reasonably foreseeable developments could increase demand on Keauhou Aquifer System Area, public facilities and infrastructure	None Required

3.2 LAND USE

3.2.1 Existing Land Use

The existing land uses within the Project Site primarily consist of private agriculture. Linear rows of mature coffee trees interspersed with grass, some landscaped trees and shrubs cover most of the site. One single-family home is present on the property. Figure 3-1 includes site photographs.

Figure 3-1: Site Photos

3.2.2 General Land Use Classifications

Figure 3-2 identifies the Project Site as within the State Land Use Commission Agricultural District . Figure 3-3 identifies the makai portions of the Project Site as Hawai'i County Code Agriculture District A-1a (minimum building site of one acre) Zone and the mauka portions as Agriculture District A-5a (minimum building site of five acres) Zone.

Figure 3-2: State Land Use

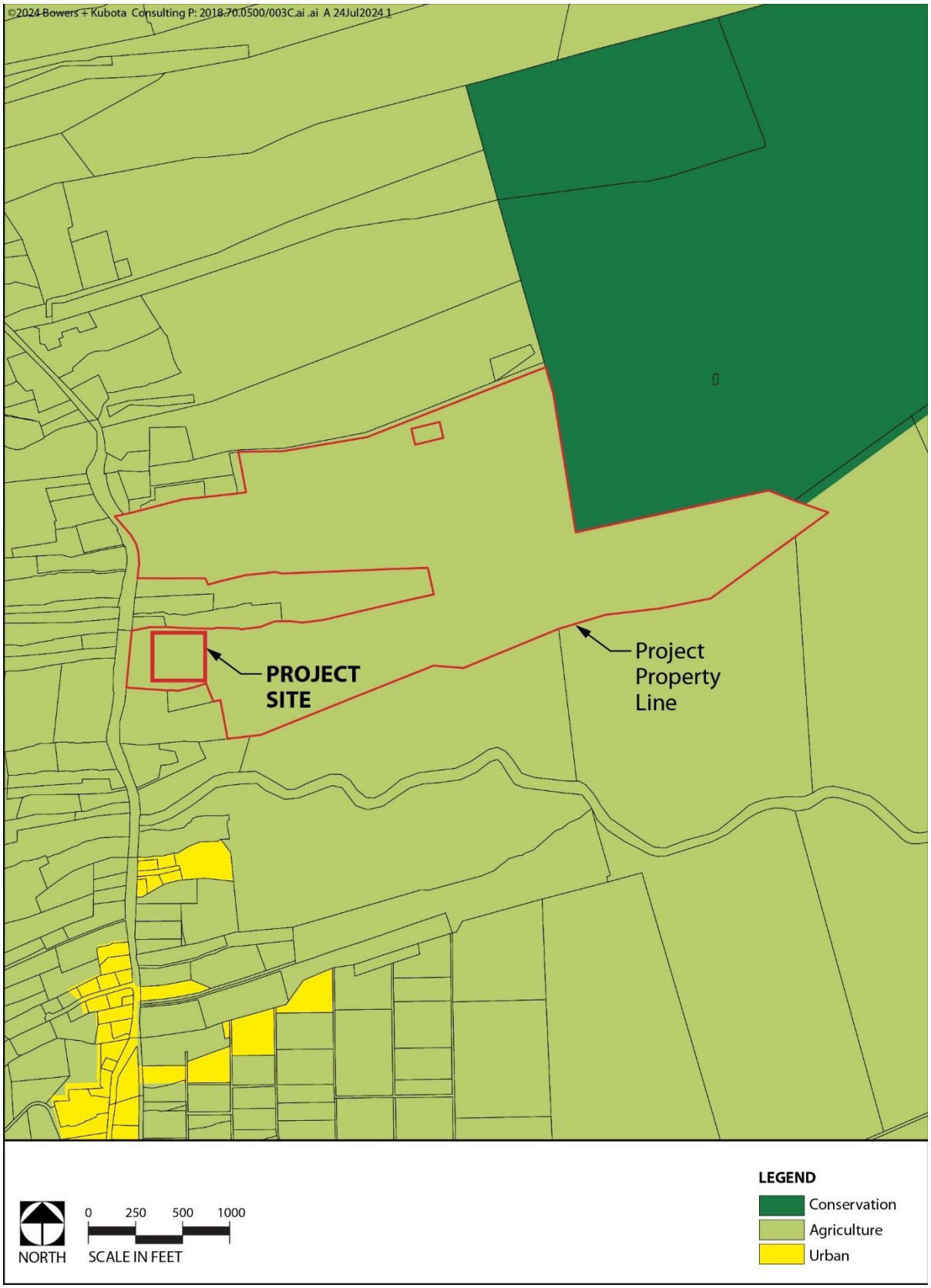
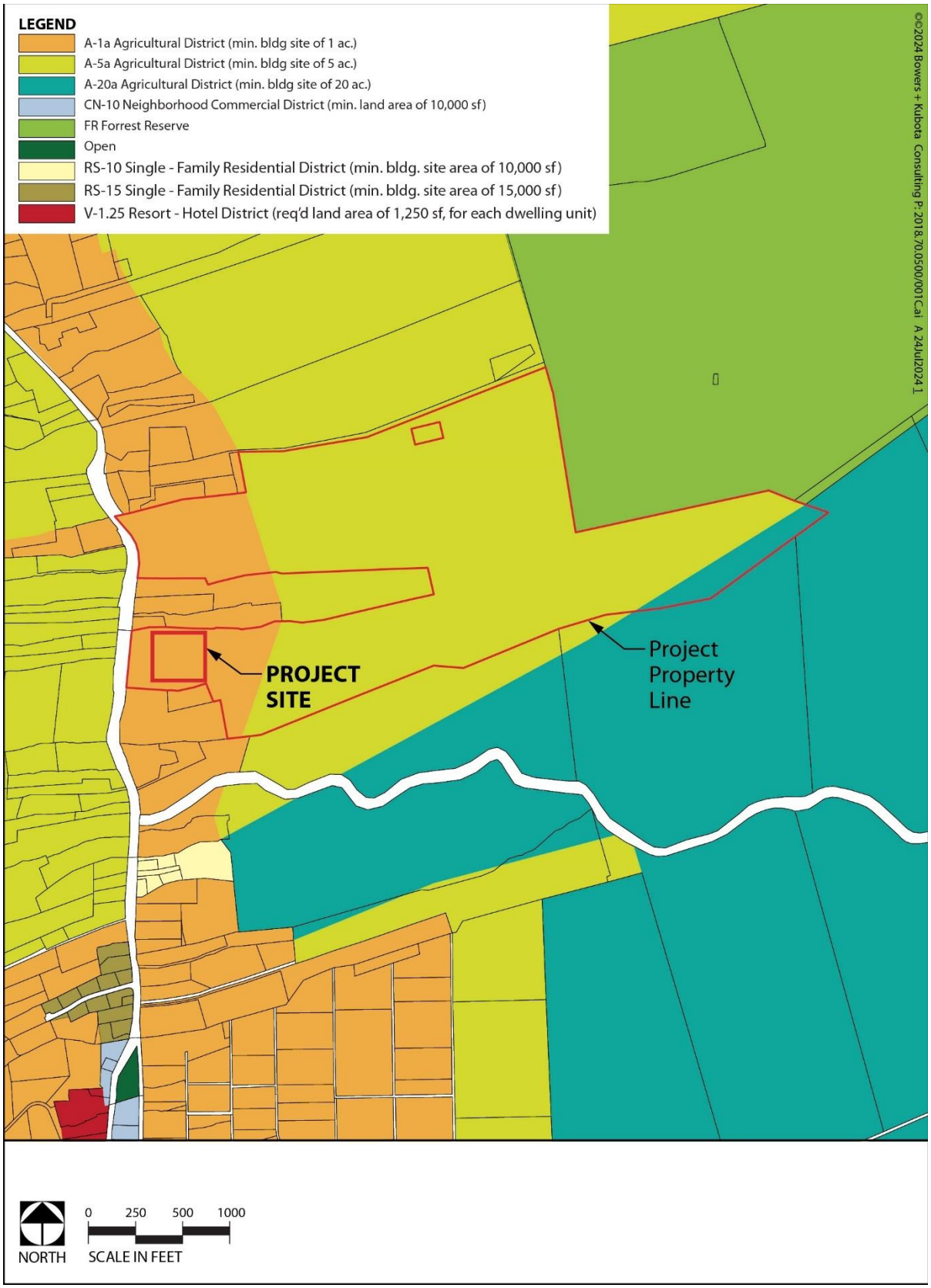


Figure 3-3: County Zoning Map



3.2.3 Agriculture Lands and Farm Lands

AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAIʻI

The Hawaiʻi State Department of Agriculture, Soil Conservation Service (SCS), USDA, and University of Hawaiʻi have created a classification system to identify Agricultural Lands of Importance to the State of Hawaiʻi (ALISH). The system has three ratings for agricultural lands that correspond to the SCS's national equivalents3:

> *"Prime Agricultural Land"* which is 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 sustain high yields of crops economically when treated and managed according to modern farming methods.
>
> *"Unique Agricultural Land"* which indicates agricultural land other than Prime that is valued for its unique high-value crops. In Hawaiʻi, some examples of high-value crops are coffee, taro, rice, watercress, and non-irrigated pineapple;
>
> *"Other Important Agricultural Land"* is any land other than "Prime or Unique Agriculture Land" that is of state-wide or local importance for the production of food, feed, fiber and forage crops.

As shown in Figure 3-4, approximately 7.8 acres of Other Important Agricultural Land is present within the Project Site on the mauka corner of the parcel.

IMPORTANT AGRICULTURAL LANDS

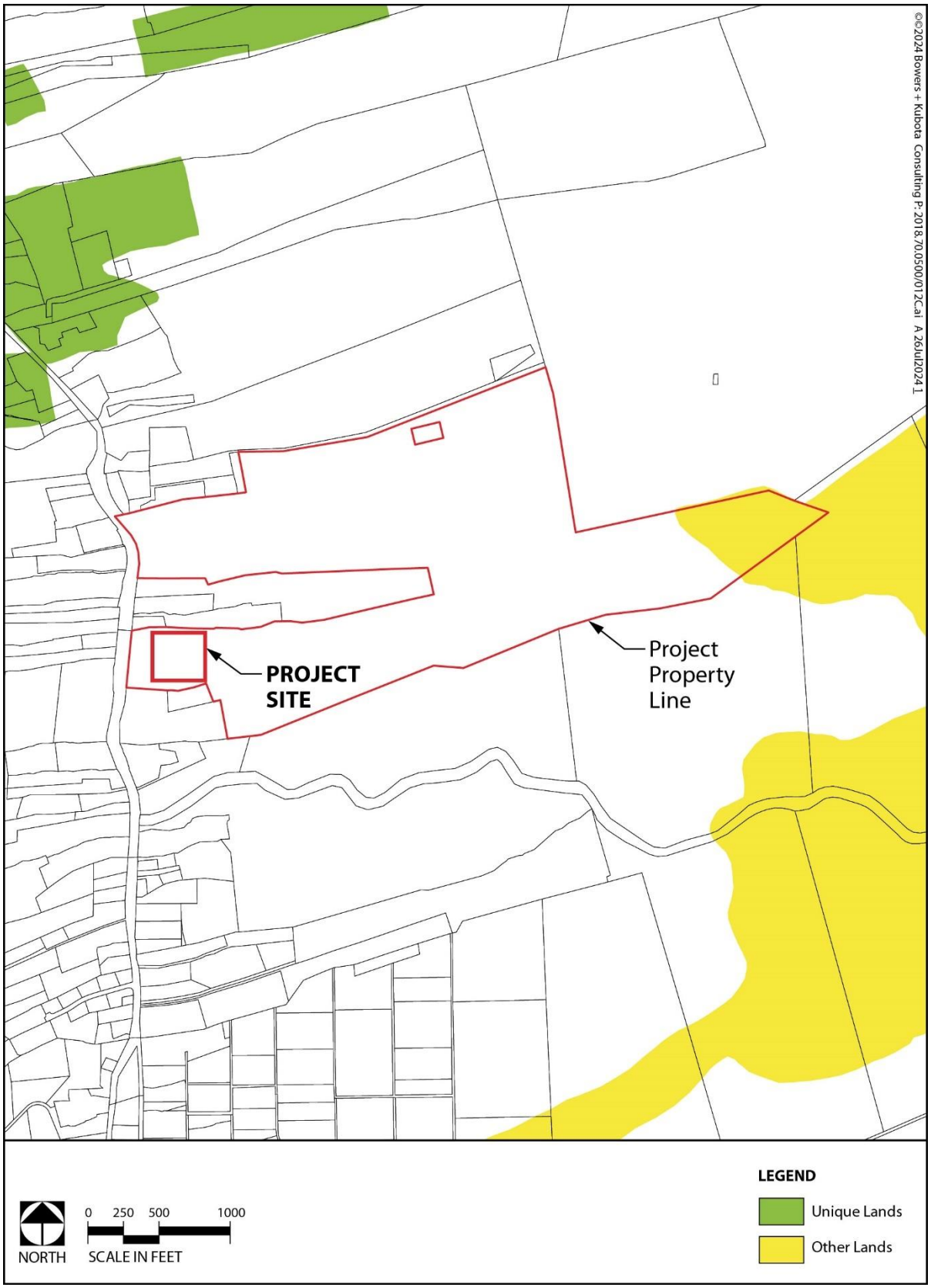
Important Agricultural Lands (IAL) is a voluntary program where landowners can apply to the State Land Use Commission to designate their lands as IAL (HRS 205-44). IAL are intended to promote, conserve and protect agricultural lands, and assure the future availability of suitable agricultural lands. No IAL are present within or around the Project Site, as the only IALs present on Hawaiʻi Island are located in South Kohala.

3.2.4 Formally Classified Lands

Formally Classified Lands (FCL) are "properties that are administered either by Federal, State, or local agencies, or have been given special protection through formal legislative designation" (USDA-RD). Examples of FCL include the National Park System, National Monuments, Coastal Zones, National Wildlife Refuges, and areas of state or local interest.

The Project Site directly abuts the Waiʻaha Springs Forest Reserve, which is part of the State of Hawaiʻi's Forest Reserve System. Forest Reserves are multi-use land areas that are managed by the State of Hawaiʻi to provide a variety of ecosystem services and public uses and benefits. While not directly adjacent to the Project Site, the Kaloko-Honokōhau National Historic Park is approximately six miles northwest of the project area.

Figure 3-4: ALISH Lands Map



Land Use Impacts and Mitigation Measures

Water storage tanks and associated accessory structures are permitted within the State Agricultural District and by the Hawai'i County Code Chapter 25—Zoning, so long as they do not pose a hazard or danger to the surrounding area and are approved by the Director of the Hawai'i County Planning Department (Section 25-4-11(a)(b)(c)). The Proposed Action will be installed in compliance with all relevant building codes to prevent any hazards to the surrounding area and construction would not begin prior to plan approval.

There will be no direct impacts to IAL or FCL, as neither land use occurs onsite. Additionally, DHHL would site the wells to avoid any impacts to Wai'aha Springs Forest Reserve. The Proposed Action is located approximately six miles away from Kaloko- Honokōhau National Historic Park and would therefore have no impact on the Park. However, the National Park Service previously had concerns regarding other groundwater resource uses near the Kaloko-Honokōhau National Historic Park. These concerns are discussed in Section 3.4.5.

The Proposed Action would affect approximately one to three acres of agricultural lands within the 128-acre Project Site. To avoid any impacts to the ALISH Other Important Agricultural Lands present, DHHL would site the wells outside of these areas so that no ALISH lands would be lost. Therefore, no short- or long-term adverse impacts to agricultural lands, IAL or FCLs are anticipated during construction or operation of the Proposed Action and no additional mitigation measures are required.

3.3 GEOLOGY, TOPOGRAPHY AND SOILS

3.3.1 Geology

Hawai'i Island is home to five volcanoes and is associated with volcanic eruptions and earthquakes. The Project Site is located on the western slope of the Hualālai Volcano, which last erupted between 1800-1801 and is now considered dormant. Flows from this last eruption originated on the northwestern ridge of the volcano at around 6,000 feet (the Ka'ūpūlehu flow) and at 1,500 feet (the Hu'ehu'e flow). These historic Hualālai flows extended from west of Kīholo Bay to Kaumo'o Point and much of the lava in this area has been since colonized by hardy vegetation and used for agriculture lands (Macdonald, GA., Abbot, A.T., and Peterson, F.L., 1983).

The U.S. Geological Survey (USGS) has developed a Lava-Flow Hazard Zones map and divided the island into zones based on the probability of coverage from future lava flows, with Zone 1 having the greatest risk and Zone 9 the least. The Project Site is located within Zone 4. While Hualālai Volcano is now considered dormant, its historic flows have typically covered large areas including the Project site.

3.3.2 Topography

The Project Site is located between 1,500-1,600 feet (amsl). The site slopes moderately west towards the ocean. Decades of coffee production has altered the existing landscape and topography of the Project Site, and there is evidence of bulldozing and other past earthwork within the site limits.

3.3.3 Soils

Figure 3-5 displays the USDA National Resources Conservation Services, Web Soil Survey and the Project Site has a mix of soils with two predominate soil types: Hua-Honuaulu complex and Honaunau hydrous silt. The Honuaulu series are formed in volcanic ash and used mostly for coffee and pasture lands (Bautista, O.M., Wilkenson, S., Hammatt, H.H., 2019). The majority of the site is composed of

Hua-Honuaulu complex, which is characterized by 20 to 40 percent slopes and is moderately well draining with low runoff properties. Honaunau hydrous silt is characterized by 10 to 20 percent slopes and is also moderately well-draining with low runoff properties.

The Land Study Bureau at the University of Hawai'i has developed a soils agricultural productivity rating system with the USDA. The system ranks soils within the State from A to E in terms of their over-all quality for agricultural productivity, with A being "very good" and E being "not suitable." As shown in Figure 3-6, most of the soil within the Project Site has been rated "C," which is midrange for agricultural productivity. There are a few small portions of "D" rated soil on the mauka edges of the site.

The National Earthquake Hazard Reduction Program has developed a soil classification system defining five soil types that help identify areas that will be most significantly affected by an earthquake. Earthquakes associated with tectonic or volcanic activity occur frequently in Hawai'i County, although many are too small to cause noticeable effects. "A" ranked soils represent hard rock that are able to reduce ground motions or shaking from earthquakes and "E" represent soft soils that amplify and magnify ground shaking and increase building damages and loss (State of Hawai'i 2023 Hazard Mitigation Plan). NEHRP has identified the Project Site as having "C" soils, which are very dense soils and soft rock that experience a moderate amount of ground shaking.

Geology, Topography, and Soils Potential Impacts and Mitigation Measures

The Proposed Action would not change the Project Site's potential exposure to geological hazards or prevent the use of any significant geological resources in the area. It will be constructed in accordance with County requirements and building codes relating to the onsite seismic conditions, and the appropriate American Water Works Association and American Concrete Institute standards. The entire island of Hawai'i, including the Project Site, are located within the International Building Code (IBC) Seismic Zone 4 which have the highest potential for seismic induced ground movement. The Proposed Action will comply with IBC Seismic Zone 4 building standards to reduce potential impacts created by earthquakes or seismic induced ground disturbances.

The Proposed Action would preclude between one to three acres of the Project Site from its current agricultural use for coffee production. However, it would not impact any A "very good" or B "good" ranked soils or prime agricultural soils or other agricultural uses in the area. Construction of the Proposed Action will require clearing, grubbing, and grading and the necessary permits will be obtained per Hawai'i County Code, Chapter 10—Erosion and Sediment Control. The exact amount of ground disturbance for the Proposed Action will be dependent on the topography and ground conditions of where the wells are sited and short-term. Efforts will be made to site the wells in a location on the Project Site that produces the least amount of ground disturbance.

Further, implementing construction of the Proposed Action in two phases will reduce surface disturbance and all excavation and grading activities will be regulated by the applicable provisions of the County's grading ordinances and any SHPD requirements for archaeological monitoring. Excavation and grading activities will incorporate best management practices (BMPs) to minimize soil loss and erosion to preserve existing conditions of nearby surface waters, such as:

- Silt fences;
- Dust fences;
- Slope stabilization;
- Temporary sediment basins;
- Temporary diversion berms and swales to intercept runoff;

- Use of compost filter socks;
- Truck wash down areas; and
- Slope protection.

Permanent sediment control measures will be used once construction is complete. No long- term adverse impacts to soils are anticipated during construction or operation of the Proposed Action and no additional mitigation measures are required.

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Figure 3-5: USDA Soils Map

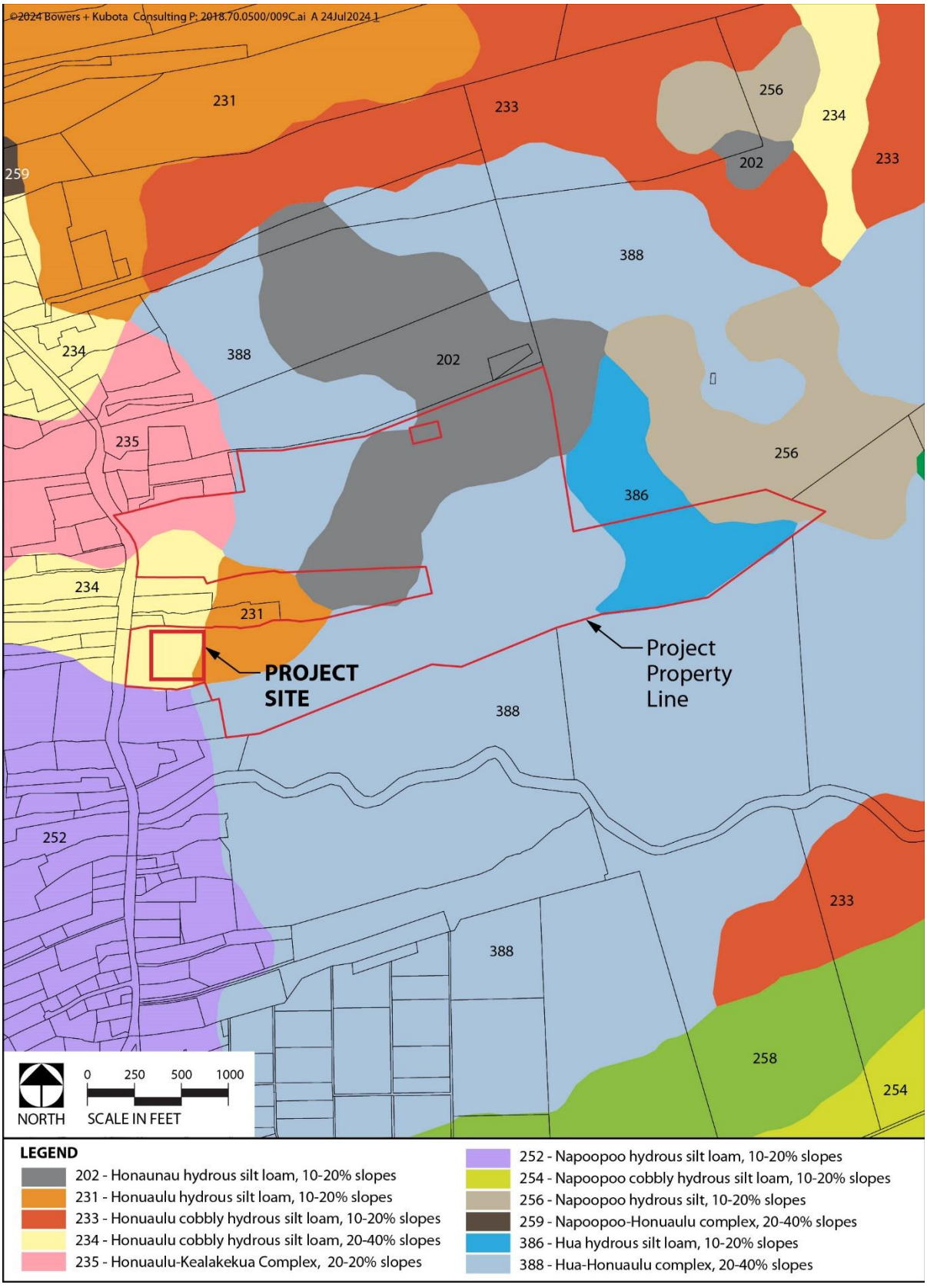
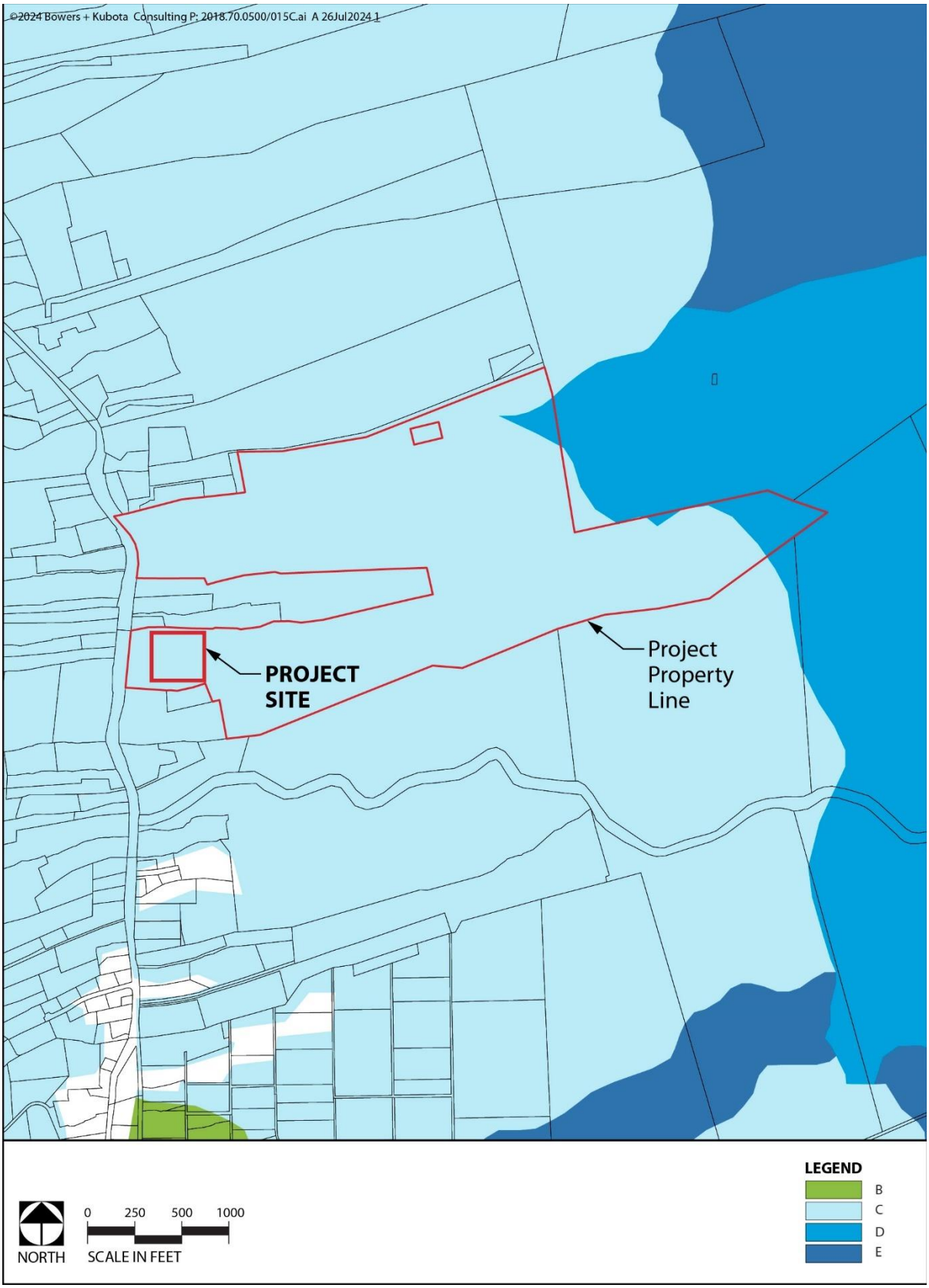


Figure 3-6: LSB Soils Map



3.4 HYDROLOGIC RESOURCES

3.4.1 Rainfall

On the North Kona coast, rainfall is generally between 20 inches at lower elevations and over 80 inches per year at higher elevations as shown in Figure 3-7. Mean annual rainfall near the Project Site is approximately 48 inches with rainfall amounts typically highest in August and September and lowest in July (SWCA Environmental Consultants, 2019).

3.4.2 Watershed, Surface Waters and Floodplain

The Project Site is located within the Waiʻaha watershed, which covers an area of 15.8 square miles. As shown in Figure 3-8, land uses within the watershed are primarily agricultural (67.5 percent), conservation (27.9 percent), urban (4.5 percent) and rural (0.1 percent) (Hawaiʻi Division of Aquatic Resources, 2008).

Surface water in the North Kona region is extremely limited and Waiʻaha Stream is the only perennial surface water in the watershed, due to its high permeability of basaltic lava flows from Mauna Loa and Hualālai Volcanos (County of Hawaiʻi, Department of Water Supply, 2017). Waiʻaha Stream crosses through the upper northeastern corner of the Project Site.

Waiʻaha Stream is 16.2 miles long ending one mile inland from the coast with most of its length within the stream's headwaters (County of Hawaiʻi, Department of Water Supply, 2017). The stream is classified as a Class 2 Inland Water per HAR §11-54 Water Quality Standards. Class 2 Inland Waters are "for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies". According to the Atlas of Hawaiian Watershed and their Aquatic Resources, of the five assessments conducted on the stream's aquatic life, none deemed it worthy of protection (Hawaiʻi Division of Aquatic Resources, 2008). There are eight declared diversions along the stream for agricultural or industrial purposes, with one diversion occurring in the vicinity of the Project Site (County of Hawaiʻi, Department of Water Supply, 2017).

3.4.3 Wetlands

According to the U.S. Fish and Wildlife Service, National Wetlands Inventory Online Wetlands Mapper, no wetland features occur within the Project Site. As shown in Figure 3-9. The closest wetland feature, a freshwater pond, is approximately 0.7 miles mauka.

3.4.4 Coastal Waters

The Project Site is located approximately 2.6 miles inland from the nearest coastline at an elevation of approximately 1,500 feet to 1,600 feet amsl. Waiʻaha Stream, which crosses through the Project Site, does not flow directly into the Pacific Ocean. Instead, the stream ends approximately one mile inland from the coast and has no direct connection or impact on coastal waters.

Figure 3-7: Rainfall on Hawai'i Island

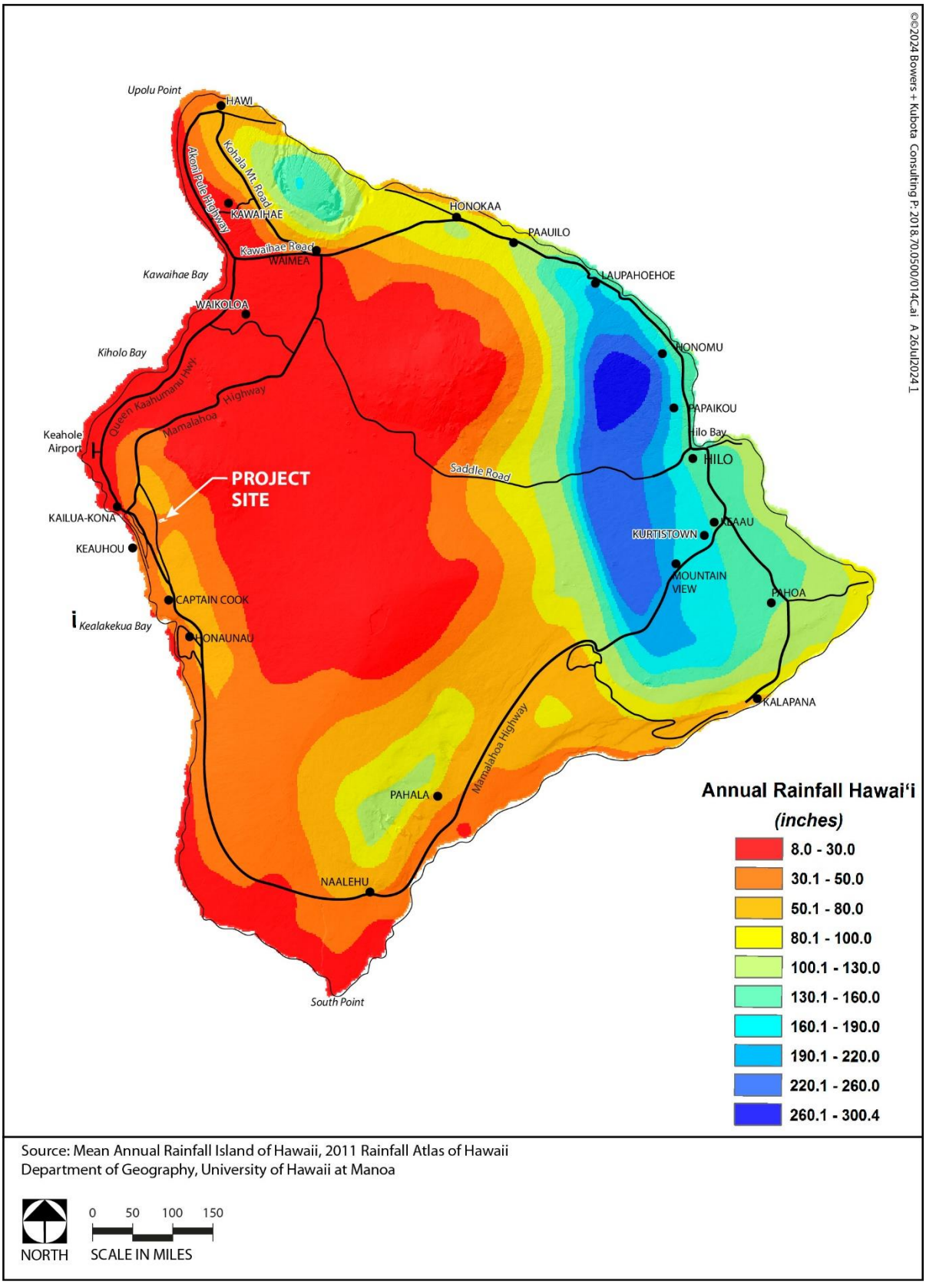


Figure 3-8: Watershed and Project Location Map

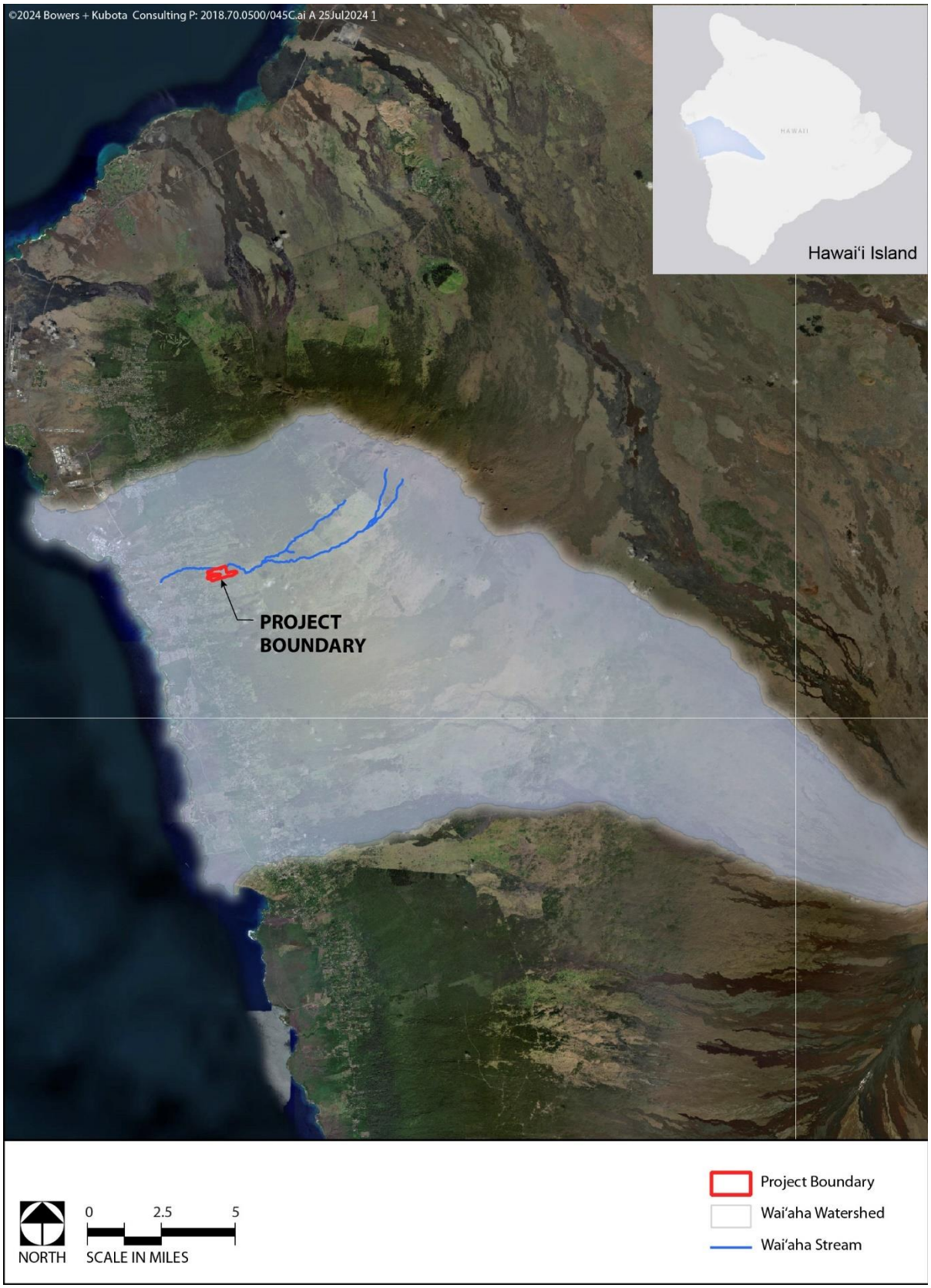
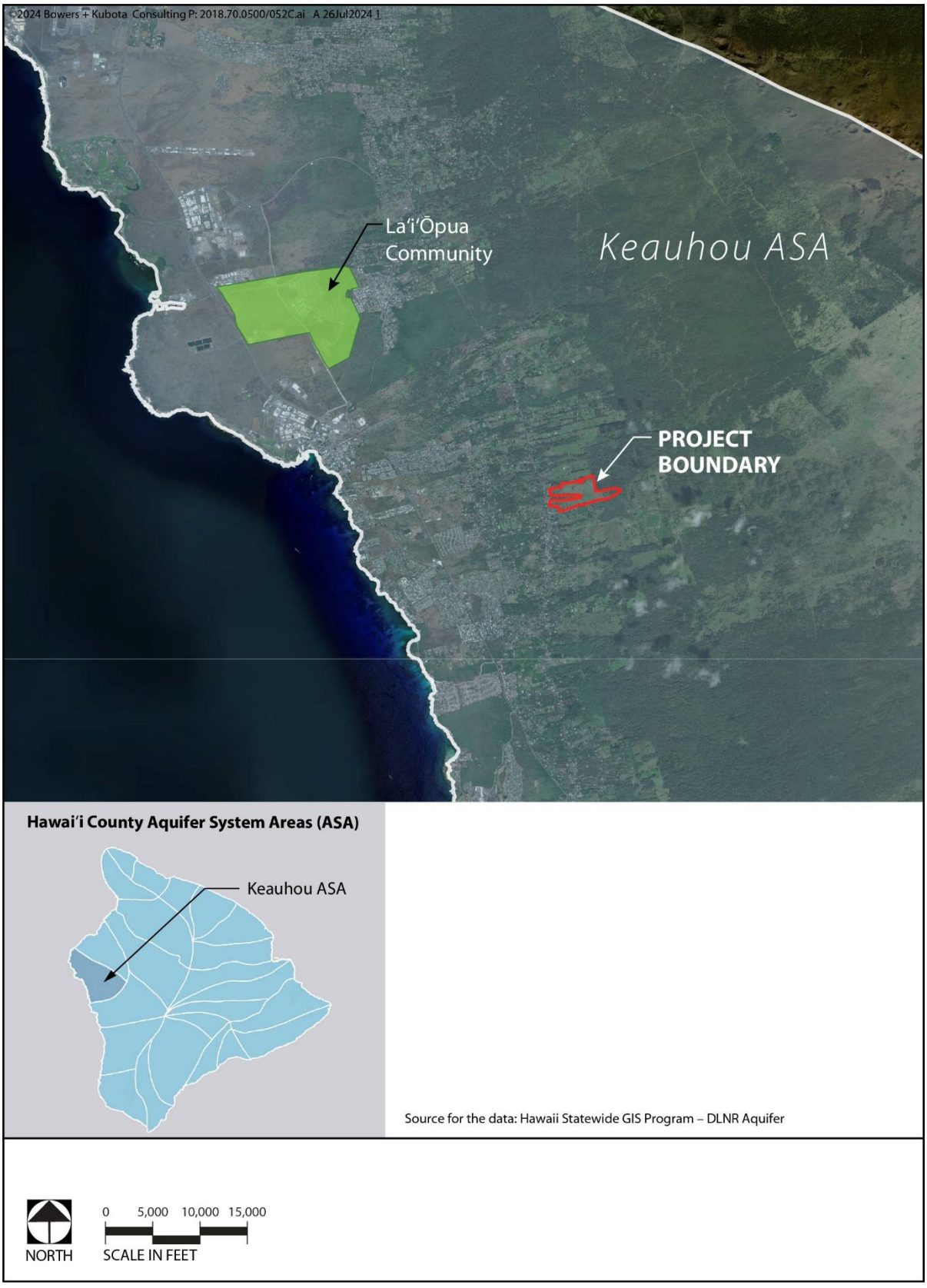


Figure 3-9: Wetlands Map

Figure 3-10: Hawai'i County Aquifer System Areas



3.4.5 Aquifer System

The Project Site is located within the Haulālai Aquifer Sector - Keauhou Aquifer System Area (KASA) as shown in Figure 3-10. The KASA extends over the western and southwestern flank of Hualāla Volcano and along the entire coastline from Mahai'ula to Keikiwaha point.

According to The Rainfall Atlas of Hawai'i, rainfall on the western slopes of Hualālai Volcano is the principal source of groundwater recharge in the area and in Hawai'i County groundwater is the primary source of drinking water. Within the KASA, two types of groundwater are present: basal and high-level groundwater. Basal groundwater is freshwater that "floats" on top of deeper seawater. High-level groundwater is a freshwater source that is contained in the island's volcanic rock layers by relatively impermeable geologic structures, like clay soils or less permeable volcanic rock (Giambelluca et. al., 2016). Basal groundwater extends 1.5 to 4.5 miles inland from the coast, while high-level groundwater is restricted to mauka of Māmalahoa Highway from Lalaoa to Ke'ei (Natural Energy Laboratory of Hawai'i Authority, 2018). High-level groundwater is considered pristine in quality, largely from the lack of saltwater intrusion like basal sources, with a chloride content ranging between 3 and 10 milligrams per liter. Chloride content is a measurement of freshness of Hawai'i's groundwater and this range is similar the chloride content of high elevation rainfall.

Following the discovery of high-level groundwater during the 1990's, DWS has shifted their priority to developing wells that use this groundwater type. Placement of wells utilizing high-level groundwater in the region range from 730 to 1,760 feet amsl with depths from approximately 1,000 to 1,780 feet, suggesting compartmentalization of this water source throughout the KASA area (Natural Energy Laboratory of Hawai'i Authority, 2018). DWS encourages development of future high-level wells in areas generally between 1,500 and 1,800 feet mauka of Māmalahoa Highway with a minimum of 0.25 miles between well sites. This reduces drawdown and interference between wells, creating greater water sustainability within the KASA region.

During the development of the Hawai'i County Water Use and Development Plan update, the National Park Service noted concerns regarding lower groundwater levels and increased pond salinity resulting from wells in the area intercepting groundwater and reducing flow through Kaloko-Honokōhau National Historic Park (County of Hawai'i, Department of Water Supply, 2017). The Kaloko-Honokōhau National Historic Park is an important natural and cultural resource located approximately six miles northwest of the Project Site. During pre-consultation for the Proposed Action, the National Park Service commented they did not believe groundwater withdrawal from the Project Site would impair or impact cultural or natural resources within the park.

According to the Commission on Water Resource Management's (CWRM) Water Resource Protection Plan 2019 Update, the KASA has a sustainable yield of 38 mgd (State of Hawai'i, Commission on Water Resource Management, 2019). Sustainable yield is the limit established by the CWRM for groundwater withdrawal from an aquifer without negatively impacting its long-term sustainability from the source. The CWRM adopted reservations of 3.398 mgd of water from the KASA for DHHL per its authority under HRS 174C-101. The water reservations may be used for various purposes in the planned development of DHHL's 1.51 acres of land occurring in the KASA, including the development of homesteads like La'i 'Opua under Section 221 of the Hawaiian Homes Commission Act.

EXISTING WELLS

The Proposed Action occurs within the DWS North Kona Water System, which depends heavily on groundwater wells as a water source. According to Hawai'i Water Use and Development Plan, Keauhou Aquifer System, the KASA has 47 production wells in the system area including 16 for municipal purposes, 12 for irrigation, one industrial, five agricultural and 13 drilled but unused

(County of Hawai'i, Department of Water Supply, 2017). The wells use both groundwater types and current pumping rates are approximately 15 mgd. The Proposed Action is anticipated to have a maximum daily demand of 1.1 mgd with the capacity to pump up to 2.0 mgd (Department of Hawaiian Home Lands, 2006).

Table 3-2 lists the municipal wells supplying potable water within five miles of the Project Site. Figure 3-11 shows the locations of the existing wells within the KASA. Wai'aha Well A is the closest operating well, located approximately 0.3 miles north of the Project Site.

Table 3-2: Existing Groundwater Wells*

Well No.	Well Name	Approx. Distance to the Project Site (miles)
3857-04	Wai'aha Well A	0.3
3657-01	Hōlualoa (Deepwell)	1.2
3957-01	Keopu Pu'uhonua Well (Keopu Deepwell)	1.6
4057-01	Keakuolū Well No. 1 (QLT)	2.8
3557-01	Kahalu'u Wells A	3.5
3557-02	Kahalu'u Wells B (Standby)	3.5
3557-03	Kahalu'u Wells C	3.5
3557-04	Kahalu'u Wells D	3.5
3557-05	Kahalu'u Shaft	3.5
4158-02	Honokōhau Well	3.5
4258-03	Hualālai Well	5.0

*Source: County of Hawai'i, Department of Water Supply. *Hawai'i County Water Use and Development Plan Update, Hawai'i Water Plan, Keauhou Aquifer System*. March 2017.

FUTURE WELLS

There are four future wells planned within the KASA, including the Proposed Action. One of the planned wells, the KS Well, is another of the sites selected for the future development of La'i'Ōpua as discussed in Chapter 1.2.

The KASA has a sustainable yield of 38 mgd and projected future water demands for the KASA indicate that by 2035 pumping rates will reach approximately 23 mgd, or around 60 percent of the aquifer's sustainable yield (County of Hawai'i, Department of Water Supply, 2017). Table 3-3 lists the future planned municipal wells within the vicinity of the Proposed Action. The closest of these wells, Wai'aha Well B, is over one mile from the Project Site.

Table 3-3: Proposed Potable Wells

Well Name	Estimated Pump Capacity (mgd)	Distance to Project (miles)
Proposed Action	2	N/A
KS Well IIA	1	5.25
Wai'aha Well B	1	1.35
Ota Well	1	2.31

3.4.6 Groundwater Contamination

Potential sources for groundwater contamination include untreated stormwater runoff and wastewater. Stormwater runoff can occur anywhere within the watershed and is a source of water pollution. Wastewater is often generated as a byproduct of agricultural or industrial activities or from Individual Wastewater Systems and Underground Injection Control sites.

No large-scale commercial agricultural or livestock operations, which may use substantial quantities of pesticides and herbicides that can be picked up in stormwater runoff, occur mauka of the Project Site. Groundwater recharge of the KASA occurs primarily on the slopes of Hualālai Volcano, mauka of the Project Site, and the area consists predominately of undeveloped land covered with shrub and forest vegetation.

Directly mauka of the Project Site is Waiʻaha Springs State Forest Reserve and land uses surrounding the site consist mostly of rural residential homes, small-scale agriculture and vacant land. Within the Project Site, land uses include coffee cultivation and one single- family residence. None of these land uses produce measurable amounts of potential contaminants. There are six (6) National Pollution Discharge Elimination System (NPDES) permitted facilities that discharge to Waiʻaha Stream, but these are all located makai of the Project Site. See Figure 3-12.

The County of Hawaiʻi does not have a sanitary wastewater collection system in the uplands of North Kona or along Māmalahoa Highway. As a result, wastewater disposal near the Project Site is primarily within Individual Wastewater Systems which have historically been cesspools. There is one cesspool present within the Project Site and five in the vicinity (Wai Wastewater and Alternative Innovations, n.d.). In 2017, Act 125 was passed by the Hawaiʻi State Legislature requiring all cesspools to be upgraded, converted, or connected to a sewer system by 2050.

The Project Site is located approximately 1.5 miles mauka of the Underground Injection Control line established by the DOH. The Injection Control line marks areas of the island where there are limits on the types of injection wells that can be installed, and the Project Site's location mauka of the line indicates no new injection wells can be installed nearby. Injection wells are typically used by individual wastewater treatment facilities to dispose of treated wastewater effluent into ground pits.

Figure 3-11: Groundwater Wells Map

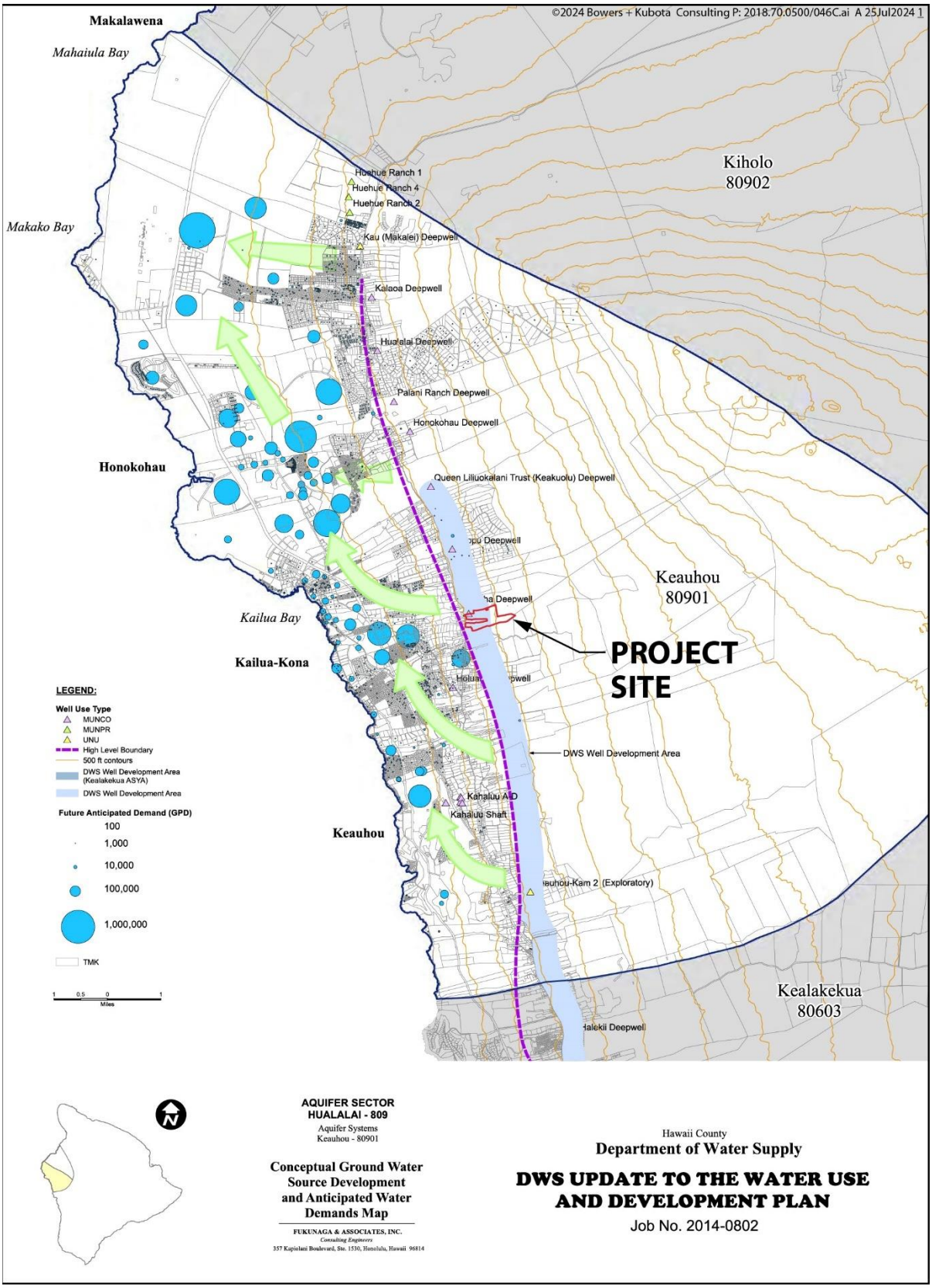
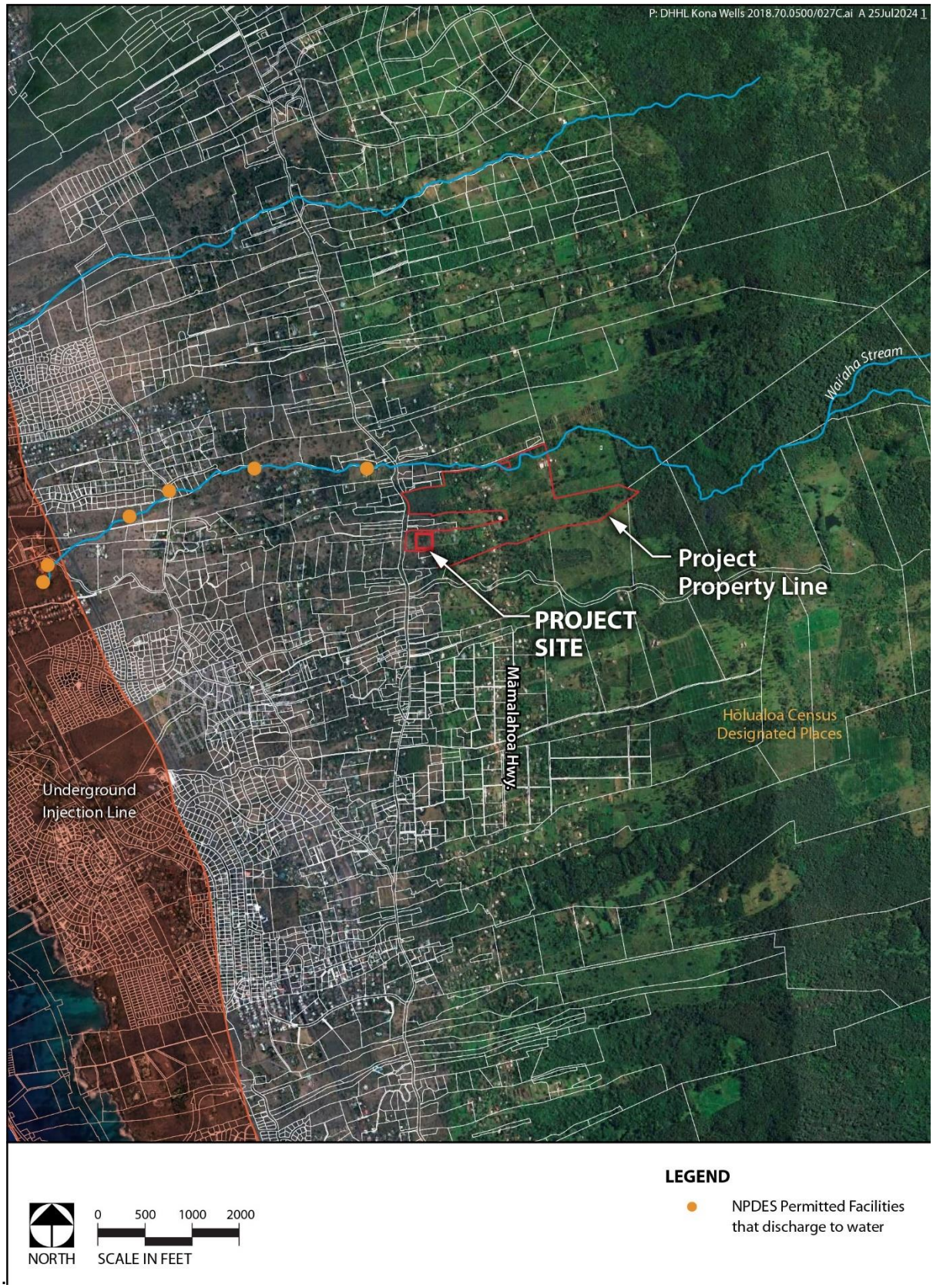


Figure 3-12: NPDES Contamination Injection Map



Hydrologic Resources Impacts and Mitigation Measures

The Proposed Action would not change the Project Site's potential exposure to rainfall or impact rainfall levels in the area. The Proposed Action would have no impacts on wetland features, as none occur in the Project Site. Those in the vicinity are mauka of the site and Māmalahoa Highway and would not be affected by the Proposed Action.

Wai'aha Stream crosses through the northwestern portion of the Project Site however, the Proposed Action would not impact this surface water source. The wells will be sited in a location away from the stream, and in an area that produces the least amount of ground disturbance to reduce potential impacts. BMPs like those described in Section 3.3.3 would be used during excavation and grading activities to minimize soil loss and erosion preserving existing surface and coastal water conditions. Permanent sediment control measures will be used once construction is complete. The exact amount of ground disturbance for the Proposed Action will be dependent on the topography and ground conditions of where the wells are sited. The total area disturbed will likely exceed one acre, and a NPDES permit will be obtained for the Proposed Action.

Prior to Phase I, Well Construction and Pump Installation Permits will be obtained for the Proposed Action. While the two final production wells will be closer than the DWS preferred 0.25 miles, during Phase I the well will be tested to ensure it can support the desired water quantity to be produced collectively between the two final production wells. Testing will ensure there would be minimal interference between the two wells. During Phase I testing, if the water quality or quantity is insufficient or there is interference with nearby wells the Proposed Action would not continue to Phase II.

Upon installation and operation of Phase II, pumping by the Proposed Action will result in lowering groundwater levels in the project area. The Proposed Action is anticipated to withdrawal a maximum of 2 mgd. This is within CWRM's approximately 3.4 mgd DHHL ground water reservation amount and is approximately five percent of the KASA's 38 mgd sustainable yield. If the Proposed Action and other additional proposed wells are developed, the future and existing wells would require an approximate total of 28 mgd (County of Hawai'i, Department of Water Supply, 2017). This is about 73 percent of the KASA's sustainable yield as determined by the CWRM, which is within the 90 percent sustainable yield limit. Thus, the Proposed Action would have minimal impact on the KASA or its long-term sustainability.

The DOH has strict requirements for new public drinking water sources. As such, the Proposed Action will comply with HAR §11-20-29 Rules Relating to Public Water Systems. An engineering report will be submitted to the DOH and approved before placing the Proposed Action online within the DWS's North Kona Water System. The report will identify all potential sources of contamination, evaluate alternative controls which could be implemented to reduce or eliminate contamination potential, and include a water quality analysis for all regulated contaminants.

3.5 BIOLOGICAL RESOURCES

A flora and fauna survey was conducted for the Proposed Action on December 6, 2018, by SWCA Environmental Consultants and is attached as **Appendix A**. The following is a summary of the findings. The survey area was focused on approximately five (5) acres of the Project Site; however, conditions and current land use (see Section 3.2.1) are consistent enough throughout the site that the survey's findings and mitigation measures can be applied across the entire area.

3.5.1 Flora

The Project Site is an altered landscape composed primarily of two vegetation types: landscaped vegetation and cultivated fields. Landscaped vegetation includes common ornamental species like Cuban royal palm (*Roystonea regia*) and weedy herbaceous species like maile honohono (*Ageratum conyzoides*) and artillery plant (*Pilea microphylla*). Cultivated fields cover most of the survey area and consist of cultivated coffee (*Coffee arabica*) with an understory of low-growing herbaceous species like artillery plant, maile honohono and kūkaepua'a (*Digitaria setigera*), a common native species. The vegetation types and species identified are not considered unique. No federally and/or state-listed threatened, endangered, or candidate plant species or rare Native Hawaiian plants were observed during the survey effort.

3.5.2 Fauna

The Project Site directly abuts the Wai'aha Springs Forest Reserve, which is part of the National Audubon Society's Kona Forests Important Bird Area (IBA). The IBAs Program is a global effort to identify and conserve locations that are vital to birds and other species to ensure ongoing biodiversity. The Kona Forests IBAs has no legal distinction or ability to directly impact land uses but is instead intended to enhance conservation by providing sites for Native Hawaiian fauna species to breed and/or forage.

Fauna observed during the survey consisted primarily of common avian species found in and around disturbed areas on the Island of Hawai'i. Of the 13 avian species observed onsite, one was the 'Io, or Hawaiian hawk (*Buteo solitarius*), which is an endemic and state- listed endangered species. Two individuals were observed flying above and through the Project Site, apparently using the area for foraging. The survey was conducted outside the 'Io's breeding season (March 1 through September 30); however, habitat onsite is unlikely to support nesting. The 'Io, as well as the cattle egret (*Bubulcus ibis*), house finch (*Haemorhous mexicanus*) and northern cardinal (*Cardinalis cardinalis*) observed during the survey are all protected by the Migratory Bird Treaty Act.

While not detected during the survey effort, within the Project Site there is suitable foraging and nesting habitat for the federally threatened and state-listed endangered nēnē, or Hawaiian goose (*Branta sandvicensis*). Additionally, no Hawaiian seabirds were detected during the survey but there is the potential for them to traverse the Project Site at night during the breeding, nesting and fledging seasons (March 1 to December 15).

The feral pig (Sus scrofa) was the only mammal detected however, the Asian mongoose (*Herpestes javanicus*), rat (*Rattus spp.*) and mouse (*Mus musculus*) are expected to occur. Additionally, present within the Project Site is suitable foraging and roost habitat for the federally and state-listed endangered 'ōpe'ape'a, or Hawaiian hoary bat (*Lasiurus cinereus semotus*). While not detected during the survey effort, suitable habitat indicates the potential presence of this species onsite. No native invertebrates were observed.

The Project Site does not contain any designated or proposed critical habitat for any threatened or endangered fauna species and is not expected to support any other listed species beyond those previously discussed.

Biological Resources Impacts and Mitigation Measures

The Proposed Action will adhere to BMPs during construction and operation to minimize impacts to flora and fauna resources found at the Project Site. Construction will be implemented in phases to control erosion and no landscape alterations will occur within the Flood Zone AE area or along Wai'aha Stream. No impacts are anticipated for aquatic resources, however in the extremely unlikely

event that accidental discharges occur the Department of Land and Natural Resources, Division of Aquatic Resources will be notified immediately.

Due to the prevalence of weedy, non-native plant species within the Project Site the following mitigation measures would be implemented as applicable to prevent the unintentional spread or introduction of new invasive species to the site:

- All construction equipment and vehicles would be washed and inspected before first entering the Project Site;
- Regularly washing and inspection of all construction equipment, vehicles and materials at a designated location for the presence of invasive or harmful non-native species by a qualified botanist or entomologist prior to entering the Project Site;
- Regularly clearing equipment, materials and personnel of excess soils and debris;
- Purchasing raw construction materials (e.g. fill) from on-island suppliers to avoid introducing non-native species;
- Maximizing use of native plant species or non-invasive species for landscaping and erosion control; and
- Sterilizing gear such as work boots, cutting tools, and vehicle tires to prevent the spread of fungal pathogens.

Potential impacts to fauna species are anticipated to be short-term and limited to the construction phases of the Proposed Action, which could temporarily displace individuals from the Project Site. However, suitable foraging, nesting and roosting habitat within the Waiʻaha Springs Forest Reserve is directly adjacent to the site and could be used by displaced individuals until construction is completed. To further reduce any potential impacts to biological resources, the following avoidance and mitigation measures would be used during the construction and operation of the Proposed Action:

- Conduct biological resource training as a component of safety training for project personnel before working onsite that identifies special-status species and measures to be taken by crews if found during construction or operation;
- Appropriate speed limits would be posted and implemented within the Project Site to avoid potential impacts to nēnē;
- Any nēnē found onsite during construction or operation would be avoided;
- Nesting bird surveys of the Project Site and areas directly adjacent would be conducted by a qualified biologist within 72 hours prior to initiating construction, tree trimming or tree removal activities or after three (3) or more consecutive days of inactivity;
- If a nēnē nest is found within a 150-foot radius of the Proposed Action, or a previously undiscovered nest is located within said radius after construction has started, all work would cease immediately, and the U.S. Fish and Wildlife Service would be contacted for further guidance;
- No vegetation clearing or construction activities would occur within 1,600 feet of any active ʻIo nests until the nest is determined inactive by a qualified biologist;
- Trees containing confirmed active or inactive ʻIo nests would not be trimmed or removed, as nests may be re-used for consecutive breeding seasons;

- Active nesting sites of other Migratory Bird Treaty Act protected species would be avoided until the nest is determined inactive by a qualified biologist;
- Nighttime construction work would be avoided during seabird fledging season (September 15 to December 15);
- External light fixtures would be downfacing and shielded to prevent disruption of seabirds in flight;
- Where applicable, automatic motion-controlled sensors would be used for external light fixtures;
- Trimming and removal of vegetation greater than 15 feet tall would be avoided during
- ʻopeʻapeʻa birthing and pupping season (June 1 and September 15); and
- Barbless materials would be used for any construction or operation fencing to avoid entanglement of ʻopeʻapeʻa.

No additional short- or long-term impacts are anticipated. Therefore, no additional mitigation measures are required.

3.6 ARCHAEOLOGICAL RESOURCES AND HISTORIC PROPERTIES

As required by HRS §343, HRS §6E-8, HAR §13-275 and HAR §13-276, an investigation was conducted to determine if any historic, cultural, or archaeological resources are present within the Project Site. Investigations were focused on approximately five (5) acres of the Project Site as shown in Figure 3-13: Focused Survey Area for LRFI / AIS.

The following is a chronological record of the investigations conducted by Cultural Surveys Hawaiʻi to identify and evaluate the potential of any historic, cultural, or archaeological resources being found onsite within the focused 5-acre study area:

- February 2019, the final Archaeological Literature Review and Field Inspection (LRFI) report was completed (see **Appendix B**);
- May 2019, as part of the HRS §6E-8 process the State of Hawaiʻi, Department of Land and Natural Resources, SHPD concurred with DHHL's request to conduct an Archaeological Inventory Survey (AIS) based on the findings of the LRFI.
- August 2019, a final Cultural Impact Assessment (CIA) and summary report was completed (**see Appendix C**), which is discussed in Section 3.7; and
- August 2020, an AIS was conducted following continued consultation with SHPD to determine the level of subsurface testing and a summary report was drafted (**see Appendix D**).

The following is a summary of the findings from these investigations.

3.6.1 Archaeological Literature Review and Field Inspection

The LRFI consisted of historical, cultural, and archaeological background research and a field inspection of the Project Site on November 20, 2018, to determine the likelihood of archaeological historic properties being affected by the Proposed Action.

Because of land uses during the pre-European Contact, Historic and post-European Contact periods, multiple archaeological studies conducted near the Project Site have documented the presence of

archaeological historic properties consistent with the region's agricultural past. Figure 3-14 shows the Project Site in relation to these past studies.

Table 3-4 provides a list of the previous archaeological studies and a summary of their findings. The proximity of these studies and their evidence of past agricultural and settlement use indicates there is potential for subsurface archaeological deposits to be present onsite.

The field inspection confirmed the Project Site has been completely altered by the development of the existing coffee plantation and associated driveway. Background research indicated no previously recorded historic properties are present, although the Project Site is located within the known limits of the Kona Field System (SIHP # 50-10-32- 06601). It is likely prior development of the Project Site disturbed any surface features associated with the Kona Field System and/or subsequent historic-era land use. While the Project Site has been heavily impacted by coffee development, four potential historic properties were located within the margins of the focused survey area during the field inspection as shown in Figure 3-15. The four identified sites were surface features including walls, a retaining wall, and possible berm that may represent historic and/or historically modified pre-European agricultural, habitation or animal husbandry sites.

In 2019, DHHL initiated consultation with SHPD and requested confirmation in determining if an AIS was required based on the LRFI's findings. In a letter dated May 14, 2019, SHPD concurred with DHHL's request to conduct an AIS to identify and document historic properties present within the Project Site and provide mitigation measures.

3.6.2 Archaeological Inventory Survey

In consultation with the SHPD, an AIS investigation was conducted to fulfill the requirements of HAR §13-276 to identify, document and assess any historic properties for integrity and site significance in accordance with HAR §13-275-6. The AIS involved background research, consultation with community members, agencies and Native Hawaiian Organizations, and field work.

The fieldwork component of the AIS was conducted intermittently between November 2019 and February 2020. It included a 100 percent pedestrian coverage of the Project Site, GPS data collection and subsurface testing. Subsurface testing was conducted at 13 test units to assess the potential for subsurface archaeological features, including but not limited to buried cultural deposits and or/culturally modified lava tubes. Test units were selected based on the presence of cultural materials detected during the LRFI. The number of test excavations chosen was based on consultation with SHPD and amended as appropriate during fieldwork efforts. **Appendix D** includes additional details on the survey and laboratory methodologies used to complete the AIS.

During the field work effort, three new historic properties were identified within the Project Site and are shown in Figure 3-16. Due to the characterization of soil deposition and prior ground disturbance within the Project Site, any large, intact subsurface deposits of cultural materials not associated with the surface features were not expected or located. The cultural materials encountered during subsurface testing were consistent with previous land use in the Project Site.

Some traditional lithic materials were encountered, including a piece of basalt adze, but no marine shell middens were present. The findings support the area was part of a pre- European Contact agricultural site with agricultural work activities and domestic artifacts found. Table 3-5 includes an overview summary of the AIS's findings.

Table 3-4: Summary of Previous Archaeological Studies

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Allen 1984	AIS	600+ acres in Puapua'a and Hōlualoa, TMKs: [3] 7-5-015:002 and 102 and 7-6-002:001 and 014	Documented 19 sites and site complexes associated with Kona Field System and cattle ranching (no State Inventory of Historic Places (SIHP) numbers assigned); majority recommended for no further work
Walsh and Hammatt 1995	AIS	5.9 acres in Hōlualoa 1 and 2, TMKs: [3] 7-6-009:014, 016, and 023	Documented six previously unidentified sites (SIHP #s -19662 through 19667) associated with Kona Field System and historic habitation, agriculture, ranching, and transportation; all sites recommended for data recovery
Haun and Henry 2001	AIS	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Documented 27 sites comprised of 349 features, representing wide variety of feature types associated with pre-Contact to historic agriculture, habitation, ranching, and transportation
Moore and Kennedy 2002	Archaeological Data Recovery	Hōlualoa 1 and 2, TMK: [3] 7-6-009:014	Data recovery conducted within portion of SIHP # -19667 indicated historic-era construction and modification of most features within site previously described as remnants of Kona Field System
Haun et al. 2003	Archaeological Data Recovery	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Data recovery indicated SIHP # - 22764 (platform) constructed between AD 1440- 1650; excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use
Desilets and Rechtman 2004	AIS	800-m-long corridor in Holualoa 1 and 2, TMK: [3] 7-6-008:005 por.	Survey identified one new historic property, SIHP # -24211, a rock wall-lined road that encompasses entire project area; background research indicates road constructed in late 1890s, presumably to provide grant recipients access to their parcels
Hammatt and Shideler 2006	LRFI	Cesspool Improvement Project at nine DOE schools, Kona School District	Study noted for Hōlualoa vicinity that many surface features found in inland areas were first constructed, heavily modified, or destroyed by historic use of land for cattle pasture and coffee cultivation
Wilkinson and Hammatt 2009	Archaeological Monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6- 005:015	No historic properties identified

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Rechtman 2013	AIS	29 acres in Hōlualoa 1-2, TMKs: [3] 7-6-008:005, 008, and 030	Identified 24 historic properties, including previously documented SIHP # -24211 (historic road) and newly documented SIHP #s - 29700 through -29722 associated with late pre-Contact through late historic agriculture, habitation, and ranching; data recovery and/or preservation recommended for four sites
Bautista et al. 2014	Archaeological Monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6- 005:015	No historic properties identified
Haun and Henry 2014	AIS	2.313 acres in Hōlualoa 1-2, TMK: [3] 7-6-010:005	Documented 14 newly identified sites (SIHP #s -30050 through - 30063) comprising 145 features associated with pre-Contact through historic agriculture, habitation, ranching, burial, rock art, and transportation; preservation recommended for burial (SIHP # -30060) and petroglyph (SIHP # -30061); data recovery recommended for SIHP # -30063 (pre-Contact/historic agricultural complex); monitoring of ground disturbance also recommended
Wilkinson et al. 2014	Archaeological Monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002 and 7-6-005:015	Identified SIHP # -29888, a modified lava tube located beneath the school

Table 3-5: Newly Identified Historic Properties

SIHP # (50-10-28)	CSH Site #	Function	Formal Type	Number of Features	Age
-31124	1	Agriculture/ Habitation	Complex	13	Pre- European Contact through Historic
-31125	3	Transportation	Causeway	1	Historic
-31126	4	Agriculture	Terrace	1	Pre-European Contact through Historic

Figure 3-13: Focused Survey Area for LRFI/AIS

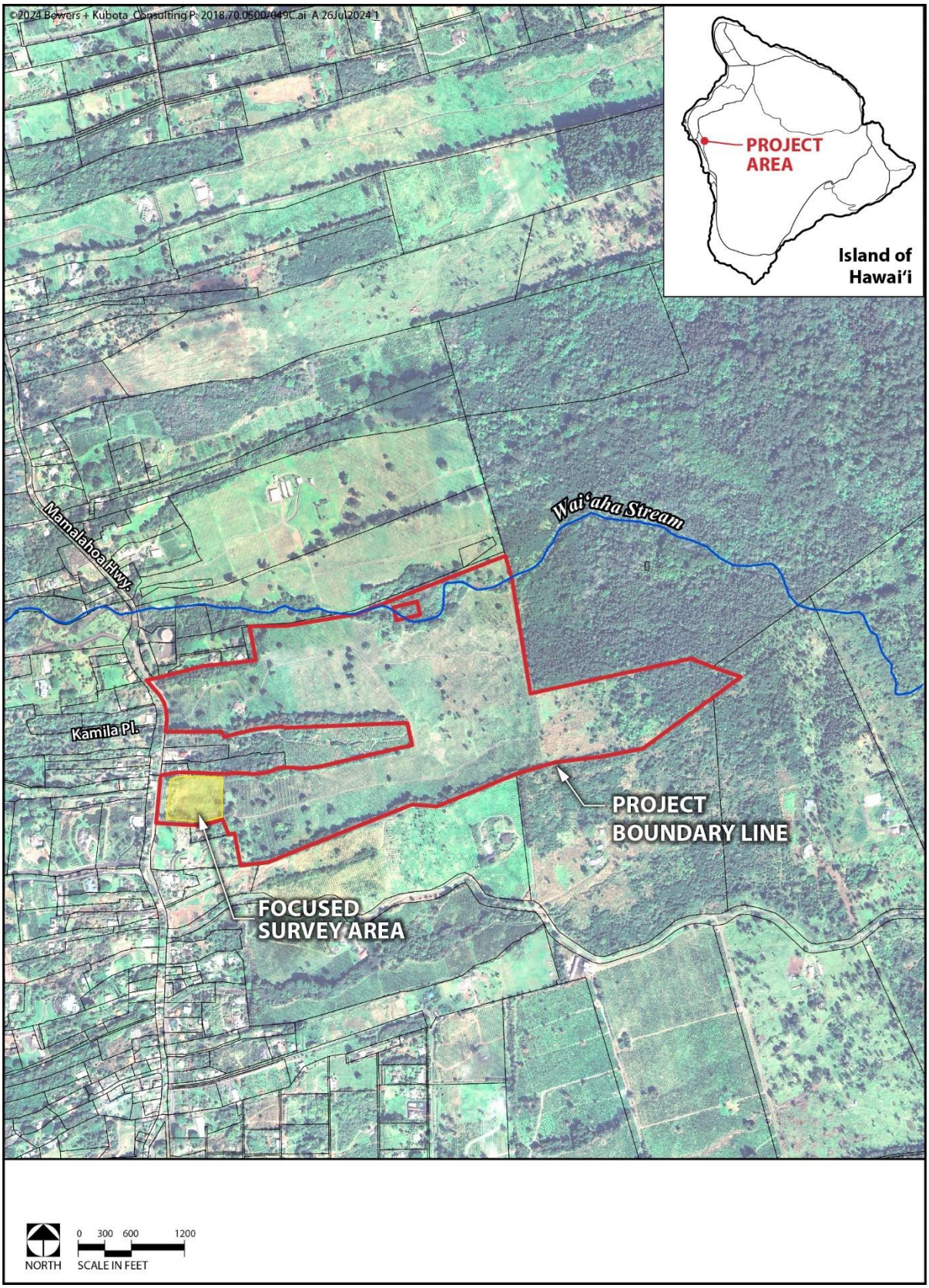
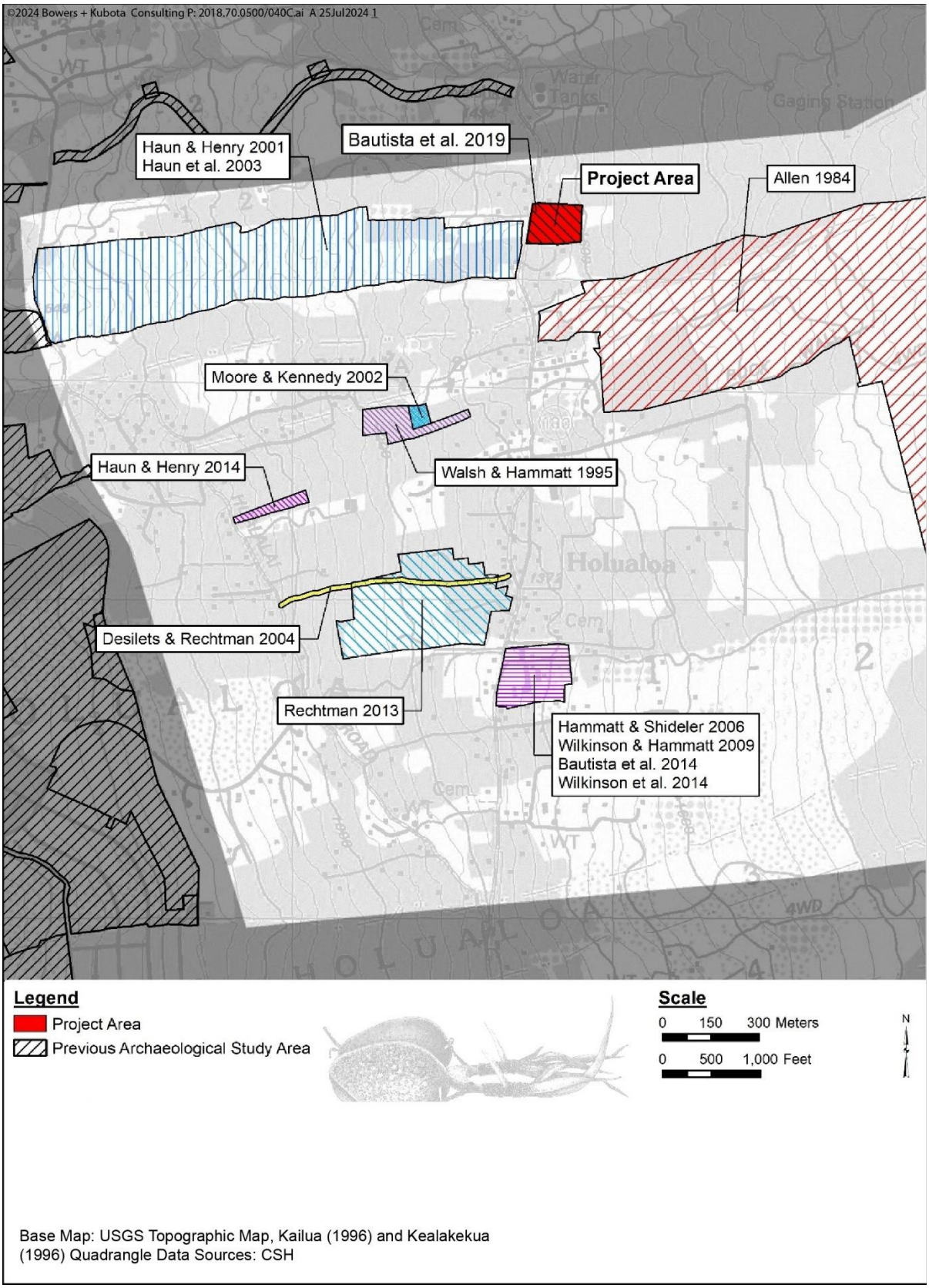


Figure 3-14: Locations of Previous Archaeological Studies Map



Archaeological Resources and Historic Properties Impacts and Mitigation Measures

Three historic properties were identified during the LRFI and analyzed during the AIS. The Proposed Action will adhere to BMPs during construction and operation to minimize impacts to the historic property resources found at the Project Site. Construction will be implemented in phases and the final well site will avoid these resources, if feasible.

If the final siting of the Proposed Action is outside the previously surveyed 5-acre focused area, coordination with SHPD will be resumed and additional investigations will be conducted as necessary to avoid or minimize impacts to historic, cultural or archaeological resources that may potentially be within the Project Site.

If the Proposed Action is sited within the focused survey area, the AIS will be finalized with SHPD prior to starting construction. The three historic properties identified during LRFI were adequately documented in the AIS. Thus, upon concurrence with SHPD, no further archaeological documentation or mitigation regarding the properties is required.

Regardless of the of the final siting location, the following mitigation measures would be implemented to prevent or minimize potential impacts on historic, cultural or archaeological resources:

- Conduct cultural resource training as a component of safety training for project personnel before working onsite. Training should include informing crews of the potential for inadvertent cultural finds including archaeological deposits and iwi kūpuna, or human remains.
- Conduct archaeological monitoring during ground disturbance activities during construction phase.
- If any cultural or historic resources are identified during construction activities, all work will cease in that area and the SHPD will be notified pursuant to HAR §13-280-3. A cultural preservation plan for proper cultural protocol, curation and long-term maintenance should be developed as appropriate.
- If iwi kūpuna are identified during construction activities, all work will cease immediately in that area and be cordoned off while the SHPD, coroner and the police department are notified pursuant to HAR §13-300-40. A reinternment plan should be developed as appropriate. As DHHL lands are recognized as tribal lands under the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990, any discovery iwi kūpuna must also follow NAGPRA protocols and statutory requirements.

Any additional mitigation measures established during the Section 106 consultation process would be implemented to further avoid or minimize potential impacts on any historic, cultural or archaeological resources that occur or may potentially be found within the Project Site. No additional short- or long-term impacts are anticipated. Therefore, no additional mitigation measures are required.

Figure 3-15: Potential Historic Properties

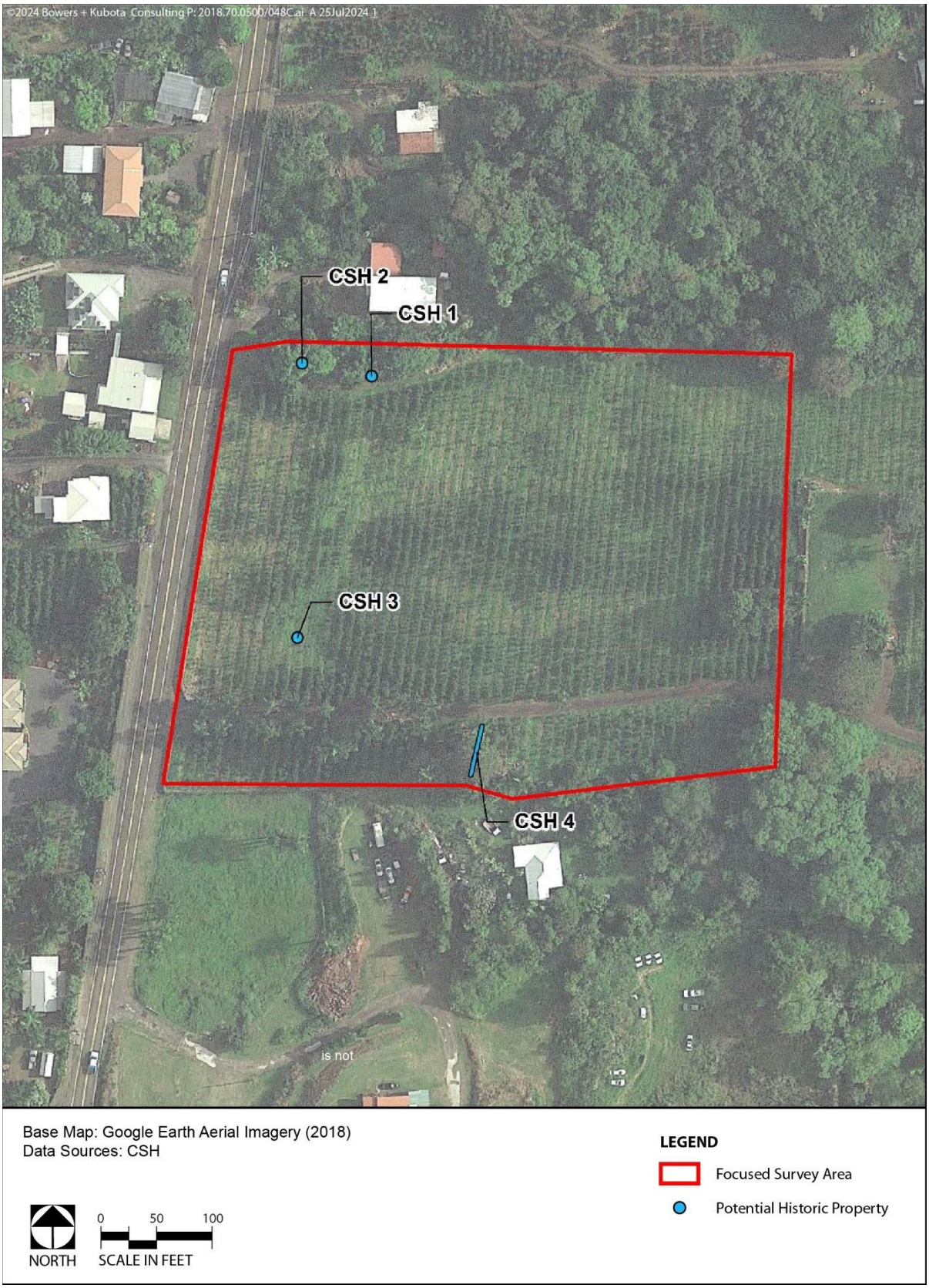
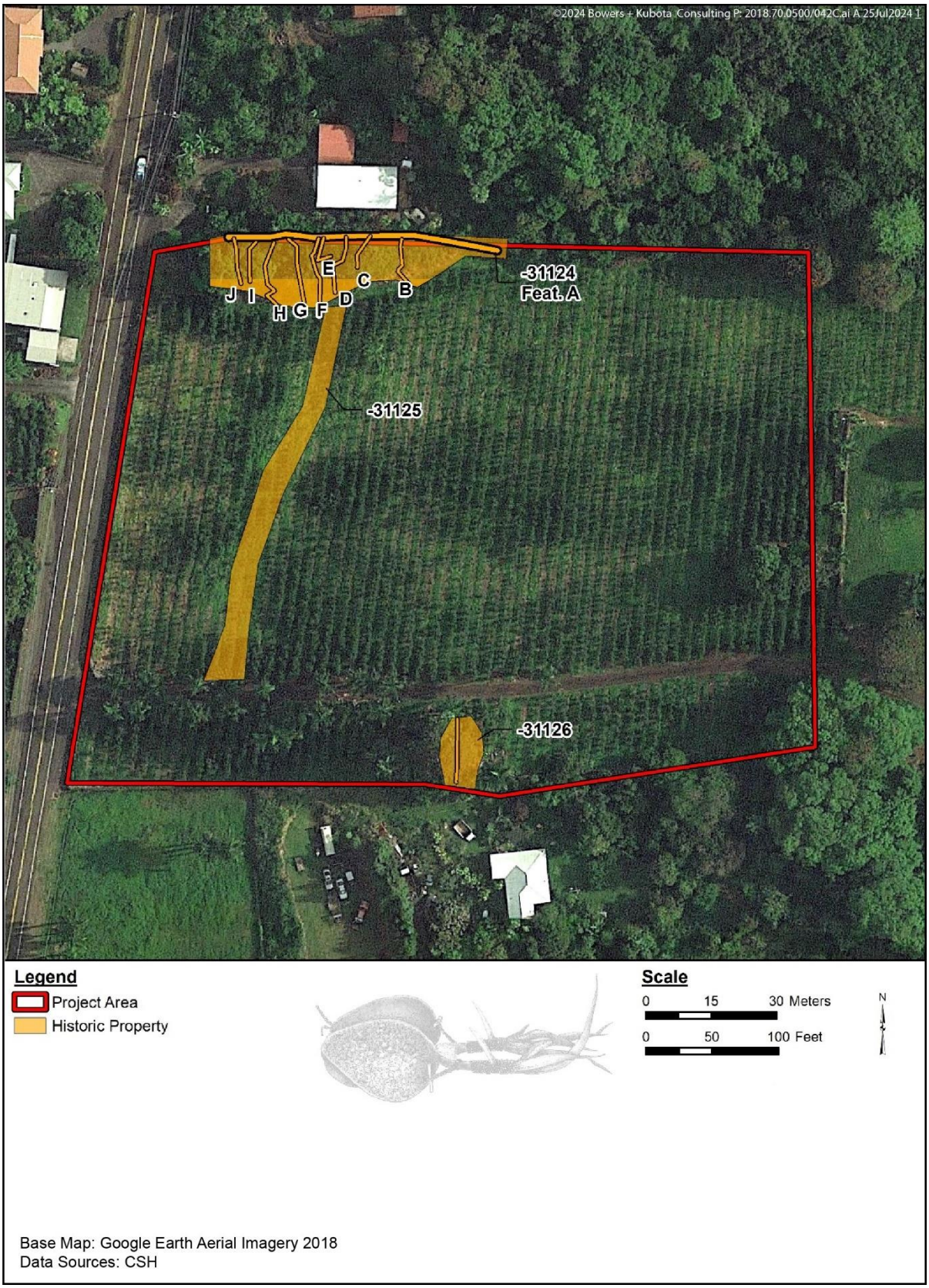


Figure 3-16: Newly Identified Historic Properties



3.7 CULTURAL RESOURCES AND PRACTICES

An investigation into cultural resources and practices was conducted as two-pronged approach in order to comply with HRS §343 and HAR §11-200.1 as well as Article VII, Section 7 of Hawai'i's State Constitution which "places an affirmative duty on the State and its agencies to preserve and protect traditional and customary native Hawaiian rights and confers upon the State and its agencies the power to protect these rights and to prevent any interference with the exercise of these rights" (Ka Pa'akai O Ka 'Āina v. Land Use Commission, 2000). As such, a Cultural Impact Assessment (CIA) and a separate Ka Pa'akai Framework Analysis were conducted to fulfill the statutory and constitutional obligations of DHHL in considering the Proposed Action.

3.7.1 Cultural Impact Assessment

A CIA was produced for this project by Cultural Surveys Hawai'i, Inc. in August 2019. The CIA involved background research of historic sources, maps, ka'ao (legends), wahi pana (storied places), 'ōlelo no'eau, oli, mele (songs), and traditional mo'olelo (stories). It also involved consultation with community members, agencies and Native Hawaiian Organizations to share their mana'o (thoughts/opinions) and 'ike (knowledge). These research and consultation efforts were redoubled through a separate Ka Pa'akai Framework Analysis, which was completed in 2024 in order to more fully understand the valued cultural, historical, or natural resources present and traditional and customary practices exercised within the Project Site or surrounding area. **Appendix C** contains the CIA and **Appendix E** contains the Ka Pa'akai Framework Analysis Report.

HISTORICAL OVERVIEW

The Project Site is located within the moku (district) of North Kona. Modern mapping places the Project Site within the Kahului 2 ahupua'a (traditional land division), but older maps place it within the Pua'a ahupua'a. Pua'a is commonly translated to mean "pig" but is also defined as "banks of fog or clouds, often as gathered over a mountain summit, a sign of rain and believed to be the cloud forms of Kama-pua'a" (Pukui, M.K. and Elbert, S., 1986).

During the pre-European Contact and early post-European Contact periods, Kona was known to support a relatively large population, was the residence of chiefs, and the center of political consolidations. The traditional Hawaiian political authority was centered in the Kailua-Keauhou area from at least the 15th century until the reign of Kamehameha I. This is consistent with many traditional mo'olelo, mele and ka'ao associating great Hawaiian chiefs with the region.

The Pua'a ahupua'a was part of a multi-zone cultivation area known as the Kona Field System (KFS) that ran mauka to makai from Kailua to Kealakekua. The KFS was the largest of the pre-European Contact Hawaiian agricultural systems and estimated to have covered approximately 54 square miles. One characteristic feature of the KFS was the kuaīwi walls, which were long, low linear mounds or "walls" used to form rectangular mauka/makai field boundaries. Scattered habitation sites and ceremonies took place throughout the larger field system, which was linked to coastal settlements by trails. Four heiau were recorded within the Pua'a ahupua'a, but none are within or adjacent to the Project Site.

The KFS' rectangular fields enabled native Hawaiians to maximize crop production by exploiting the altitude, temperature, and soil types in each segment. Thus, the KFS consisted of different zones—the kula, kalulu, 'āpa'a, and 'ama'u zones—that allowed for a variety of plants and trees to be cultivated. Foreign accounts of the KFS suggest that this elevational style of cultivation was not a technique commonly used on other Hawaiian Islands. The Project Site is located in the former kula zone, which was the lowest, most makai zone. Historic accounts of the kula zone characterize it as

open pasture lands planted with thatching grasses, ʻuala (sweet potatoes), sugarcane, ʻulu (breadfruit), kō (sugarcane), and wauke (paper mulberry).

Following European Contact, the Kona region changed rapidly. The Kailua-Keauhou region gradually lost its importance as a political center as Hawaiʻi's native population there declined dramatically, and the capital was moved to Lahaina then Honolulu. By the 1820's, the first missionaries arrived in Kona. Their presence and affiliation with Hawaiian royalty had significant influence on traditional religious practices and structures. In 1823, Reverends Thurston and Bishop were given land by Queen Kaʻahumanu to establish missions and later to build the first mission schools in the region. By the mid-1800s, the region's population decline led to a shift from subsistence farming to a market economy with the introduction of cash crops like coffee and pineapple, and cattle ranching.

Following the Māhele in the late 1840s and the Kuleana Act of 1850, there were several Land Commission Awards granted near the Project Site. However, as shown in Figure 3-19 there are no Land Commission Awards granted within or directly adjacent to the Project Site. This is likely due to Puaʻa being under dual ownership by Lot Kamehameha and the government at that time rendering the land unavailable for claim. Between 1852 and 1853, there are records of approximately 530-acres of government land sold to private land owners in the Kahalului 1, Puaʻa 2 and Puaʻa 3 ahupuaʻa. In 1855, a Royal Patent was given to Asa Thurston for the entire ahupuaʻa of Waiʻaha 1 as well as the land to the just south of the Project Site.

Maps produced by Emerson around the turn of the 20th century show that the Project Site remained undeveloped, and land use in proximity to the site consisted primarily of rural settlements and agriculture. In the early 1900s, the Project Site appears to have been part of a sugar plantation and the area around the site continued to slowly grow over the years with most of the land used for agriculture, ranching or rural settlements. Aerial photographs of the Project Site from the late 1970s show the continued use of the site and surrounding area for agriculture and ranching with scattered small-scale housing. This pattern of land use continues today.

TRADITIONAL OR CUSTOMARY PRACTICES AND TRADITIONAL CULTURAL PROPERTIES

Hawaiian oral traditions are passed down through word of mouth from one generation next and record details of Hawaiian history such as the people's connection to the land, their lifestyle, and traditional land tenure. These traditions can come in the form of songs, proverbs, sayings, stories, genealogies, or historic newspaper articles. The following moʻolelo, or stories, reference the area's water features and cultural practices.

The Ka Paʻakai Analysis Framework highlights the traditional and customary practices noted to occur within the project area ahupuaʻa and the larger landscape of Kona Akau that have originated from the select moʻolelo and kaʻao detailed in the report. The summary is framed by the last stanza of the ancient Hawaiian mele (chant), He Mele no Kāne, which is about the Hawaiian God Kāne, who shape shifts into water as one of his forms – "he wai e ola! Water is life. From this framing, the traditional and customary practices and traditional cultural properties are discussed and organized by the many manifestations of water sources that surfaced when analyzing the select moʻolelo and kaʻao presented in the report (See **Appendix E** for the full stories and context). A brief summary is included below:

- Cloud Formations – From the moʻolelo and ʻōlelo noʻeau reviewed, several practices are revealed to occur in the study area: of nānā ao (observing clouds) or kilokilo (to observe and forecast), ʻuala cultivation, and specifically, makawela method of cultivation.
- Forest and Streams – From the moʻolelo and ʻōlelo noʻeau reviewed, water in the form of streams, as well as drinking water derived from the niu grove of Helani come to surface.

Practices associated with these accounts convey that the practice of gathering freshwater, agricultural practices, maiʻa cultivation, and kalo cultivation occurred in the study areas.

- Rains - The recollection of inoa ua (rain names) detail that the Palahī Puaʻa, Kēhau, Nāulu, ʻAwa, ʻAwaʻawa, Kualau, Nahunahu, and Noe rains sources of wai ua that belong to the study areas and broader Kona Moku, each with various characteristics and qualities. In the account detailed by Malo, the Nāulu rain is associated with agricultural practices of ʻuala cultivation (Malo in Akana and Gonzales 2015:206; Kamakau 1869:1 from Nohopapa, 2024).
- Springs – From the moʻolelo reviewed, it is recorded that freshwater springs are significant features associated with the study area–the pūnāwai found in the uplands of Kahului, the spring associated with Helani in Kahaluʻu, the Waikuʻi spring at Kahaluʻu, and the Waiakekea spring near Waiʻaha and Kahului.
- Additional Practices: Agriculture and Fishing – Moʻolelo and historical accounts demonstrate that agricultural practices and religious ceremonies associated with agriculture were significant traditions that occurred in Kona. Regarding fishing practices, ʻEka is a named wind of Kona whose presence is an environmental indicator telling of signs optimal for fishing.
- Additional Practices: Recreation - Ka-Miki's moʻolelo tells a story of a game known by the name Hinakahua, and is said to be located in the Kahelo plains of Puapuaʻa Ahupuaʻa. The games associated with Hinakahua and therefore the broader ahupuaʻa of Puapuaʻa are maika (bowling), mokomoko (wrestling and boxing), leʻaleʻa (pleasurable pastimes), and hoʻopāpā (contest of wit and strength), (Maly 1999:11 from Nohopapa, 2024).
- Additional Resources – Moʻolelo reveals that several were available in the area, which is telling of the potential of associated practices that may have occurred in the study area. The resources mentioned include: ʻalā stones, loulu palms, and kauila trees.

The Ka Paʻakai Framework Analysis additionally includes Boundary Commission Testimony from all of the ahupuaʻa that the project area spans as well as Land Commission Awards granted in those ahupuaʻa. As noted in the previous section, no Land Commission Awards were granted within or directly adjacent to the Project Site. However, as the traditional or customary practices noted indicate, the resources of the project area may have been accessed and associated with practices. A section of the Ka Paʻakai Framework Analysis includes select excerpts from the Māhele Awards Books, including Native Testimony, Native Register and Land Commission Awards.

COMMUNITY CONSULTATION

On April 18, 2024, a kick-off meeting was held at the Kamehameha Schools Kahaluʻu Manowai (Ma Kai) site to share information about the Ka Paʻakai Framework Analysis for the proposed DHHL water source development project. Twenty-five individuals attended the public meeting and shared their contact information for future project updates. Between July and October 2024, individual consultation efforts were conducted to gather and summarize community manaʻo and data regarding local resources and customary practices. For this individual consultation effort, thirty-four individuals were contacted with thirteen committing to an interview. Interview format options included in-person, phone calls, or online interviews. Eleven individuals were unable to participate in the consultation process. Findings from the community consultation process have been anonymized and it is important to note that intellectual property shared through the process cannot and should not be reproduced, applied to other projects or studies, or utilized without free, prior, and informed consent are included in **Appendix E** and summarized in the Ka Paʻakai Framework Analysis section below.

Interview participants were prompted with three questions to fit the Ka Paʻakai Framework. The questions are as follows:

1) What are the valued cultural, historical, or natural resources in the project area and the extent to which traditional and customary native Hawaiian rights are exercised in the area?
2) What is the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action?
3) What feasible action(s), if any, to be taken to reasonably protect any identified cultural, historical, or natural resources, and exercise of traditional and customary native Hawaiian rights in the affected area?

The framing of community consultation in alignment with the Ka Paʻakai Framework allowed for the manaʻo documented, including potential impacts and mitigation recommendations, to be integrated into the analysis below.

3.7.2 Ka Paʻakai Framework Analysis

The court case *Ka Paʻakai o Ka ʻĀina v. State of Hawaiʻi Land Use Commission (2000)* established the fiduciary responsibility of state agencies to preserve and protect traditional and customary native Hawaiian rights pursuant to Article VII, Section 7 of the State of Hawaiʻi Constitution. The case upheld that the state and its agencies are obligated to protect the reasonable exercise of customary and traditional native Hawaiian rights to the extent feasible and are obligated to make an assessment of the impacts of these practices. The assessment must be independent of the developer or applicant and must include the following three factors, known as the 'Ka Paʻakai' framework:

1) What are the valued cultural, historical, or natural resources in the project area and the extent to which traditional and customary native Hawaiian rights are exercised in the area?
2) What is the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action?
3) What feasible action(s), if any, to be taken to reasonably protect any identified cultural, historical, or natural resources, and exercise of traditional and customary native Hawaiian rights in the affected area?

In 2024, a Ka Paʻakai Framework Analysis was conducted by Nohopapa Hawaiʻi, LLC for the Proposed Action. This analysis is summarized below and the full report is included as **Appendix E**.

1) WHAT ARE THE VALUED CULTURAL, HISTORICAL, OR NATURAL RESOURCES IN THE PROJECT AREA AND THE EXTENT TO WHICH TRADITIONAL AND CUSTOMARY NATIVE HAWAIIAN RIGHTS ARE EXERCISED IN THE AREA?

The Ka Paʻakai Analysis acknowledges that it is unreasonable to assume it is possible to inventory all traditional and customary native Hawaiian rights being exercised in a single area. To address the challenges of assembling an inventory of customs and valued resources in an area, and to relieve the burden from the community to come forward in a tight timeframe and under the assumption of un-requited knowledge sharing, the analysis, approaches the inventory through: (1) early and meaningful consultation; (2) primary source research; (3) the understanding that if a resource exists or can be restored then the right or practice exists; (4) consultation is an ongoing process that agencies compiling with Ka Paʻakai will continue to engage in.

The inventory findings with respect to the practices and associated resources in and around the Gianulias study area are organized under the following themes:

- Bird Catching
- Forestry and Hana Waʻa
- Mahi ʻai ʻana – Cultivation
- Trails and Connectivity
- Lawaiʻa & Waʻa (Paddling, Sailing, Voyaging)
- Kilo and Weather – Environmental Indicators
- Mea Wai - Water Resources and Collection
- Other Practices, including Hana Noʻeau, Beliefs, and Spirituality (not already included above)

The full inventory is included in **Appendix E.**

2) WHAT IS THE EXTENT TO WHICH THOSE RESOURCES – INCLUDING TRADITIONAL AND CUSTOMARY NATIVE HAWAIIAN RIGHTS – WILL BE AFFECTED OR IMPAIRED BY THE PROPOSED ACTION?

Hawaiian culture and traditional practices are rooted in an understanding that ʻohana (family) encompasses the natural world and there is no separation between the people and the land (Nohopapa, 2024). Because the land is part of the ohana, traditional Hawaiian customs and practices emphasize respect and care the ʻāina (land) and surrounding resources (Forman and Serrano, 2012 from Nohopapa, 2024). As such, traditional and customary practices often rely on resources – whether cultural, historical or natural – and it is important to understand that impacts these resources may also result in cultural impacts. Overall, interview participants feel that the current methods for water development do not allow for the continued care of resources, the traditional and customary Native Hawaiian practice of caring for wai (water) and Mālama ʻĀina.

The Gianulias parcel sits in the area identified in research as Kealakowaa, it was a staging place for Koa and other laʻau brought down from the uplands above the study area. In archival records this place, specific to Kahului Ahupuaʻa and the region of the study area was where ceremonies were held, a heiau and spring was located specifically for the process of harvesting koa, transporting them, and crafting them into waʻa. As noted in the Ka Paʻakai Analysis Framework Report, Kealakowaa is the only area in all of Kona identified for this use. Although hana waʻa and voyaging are not active practices on the site, development may impact access and use of this culturally and historically significant area.

Bird catching was extensively referenced in and above the study areas, caves, trails, springs and even specific forests, woods, and aʻa areas were discussed. Bird catching was for food and for hulu used in many hana noʻeau. Although bird catching is not viable now as a practice because of the scarcity of native bird species, the practice of Mālama ʻĀina so that resources are there when needed could be impacted.

Many springs, waterholes, and caves were referenced in consultation, and many were named in archival research through land testimonies and some moʻolelo. It is likely that some of these resources are located in the study areas and water source development may impact the downslope water features near the coast or offshore. Ma uka to ma kai connectivity of water was also a common theme in the analysis. Impacts could also include access for kanaka to gather wai from the study area or the uplands above for hoʻokupu and other traditional uses.

Historic records from the Boundary Commission also identified a families burial cave in the uplands. Because one was named, there is a potential that more burials exist in the vicinity. It is a traditional practice not to speak of one's ancestors with strangers and many burial locations have been forgotten in ʻohana or intentionally un-shared. No burials were identified through AIS for this project, however access to caves above the study area may be an impact.

3) WHAT FEASIBLE ACTION(S), IF ANY, TO BE TAKEN TO REASONABLY PROTECT ANY IDENTIFIED CULTURAL, HISTORICAL, OR NATURAL RESOURCES, AND EXERCISE OF TRADITIONAL AND CUSTOMARY NATIVE HAWAIIAN RIGHTS IN THE AFFECTED AREA?

Feasible actions by DHHL to protect Native Hawaiian rights include the following:

- DHHL will uphold its mandates as prescribed by law.
- DHHL will site water source development within the same ahupua‘a as it will be consumed whenever possible.
- DHHL and its beneficiaries want to support other Kona communities in their water independence. Efficiency and conservation measures in areas that are importing water are critical in appropriately valuing the resource and respecting the communities that are exporting water.
    - Conservation & efficiency measures for transportation, storage and consumption.
    - Water recycling.
    - Water conservation collaboration/partnership in public awareness campaign.
- Research, studies and monitoring should be planned for and funded that will be used to inform mitigation. Research and studies should be culturally informed. Appropriate thresholds should be identified and upheld.
    - Regional monitoring program with benchmarks and actions tied to those benchmarks.
    - The design of monitoring plans and the identification of benchmarks and actions should be culturally and community informed.
    - Propose management options if the trend is towards detrimental effects.
- Frequent, meaningful, and accessible updates regarding research, studies and monitoring practices should be available to stakeholders. DHHL will consider the formation of a hui open to stakeholders to advise water-related decision-making and aid in outreach to stakeholders at large.
- DHHL will make efforts to encourage more beneficiaries and members of the native Hawaiian community to be involved in the Boards of Water Supply meetings and to be members on the Boards of Water Supply so these important stakeholders are able to have more authority over water use.
- DHHL should commit financially and administratively to supporting community-managed water resource management.
- DHHL will advocate for and participate in the update of the Water Use and Development Plan for Hawai‘i County.
- DHHL will support and advocate for Commission on Water Resource Management (CWRM) analysis of water availability and revised sustainable yields, including a process that has substantial opportunity for public input.
- DHHL will advocate for CWRM to share more rigorous summaries of existing state of knowledge as published.
- DHHL will advocate for and participate in the update of the Statewide Framework for Updating the Hawaii Water Plan (Framework). The Framework was developed to provide guidance in the integration of the various components of the Hawaii Water Plan and to give additional direction to the various agencies responsible for the preparation of its constituent parts. This Framework was created in 2000 and is in need of update and revision.

- DHHL will aid in funding mālama ʻāina/watershed management efforts in affected ahupuaʻa to increase water recharge and to allow for mālama of places and areas critical for the continuation of native practices.
- DHHL will create a clear pathway for long-term access for native rights and customary practices on DHHL's lands and will look into its current ROE/land disposition process for activities such as mālama ʻāina and stewardship.
- DHHL will collaborate with stakeholders in the creation of a preservation plan for Kealakowaa, the protection of cultural, historical and natural resources associated with the Kona field system, and stewardship of the Kona upland forests. These efforts include contributions or resources in other areas or in the project parcel itself, towards the restoration of these valued resources in collaboration with cultural practitioners, lineal descendants, native tenants, beneficiaries, etc.

With consideration of the Ka Paʻakai Framework Analysis and by implementing mitigation measures to ensure the protection of traditional and cultural rights and practices, the Proposed Action is not anticipated to have a significant impact on cultural resources and practices.

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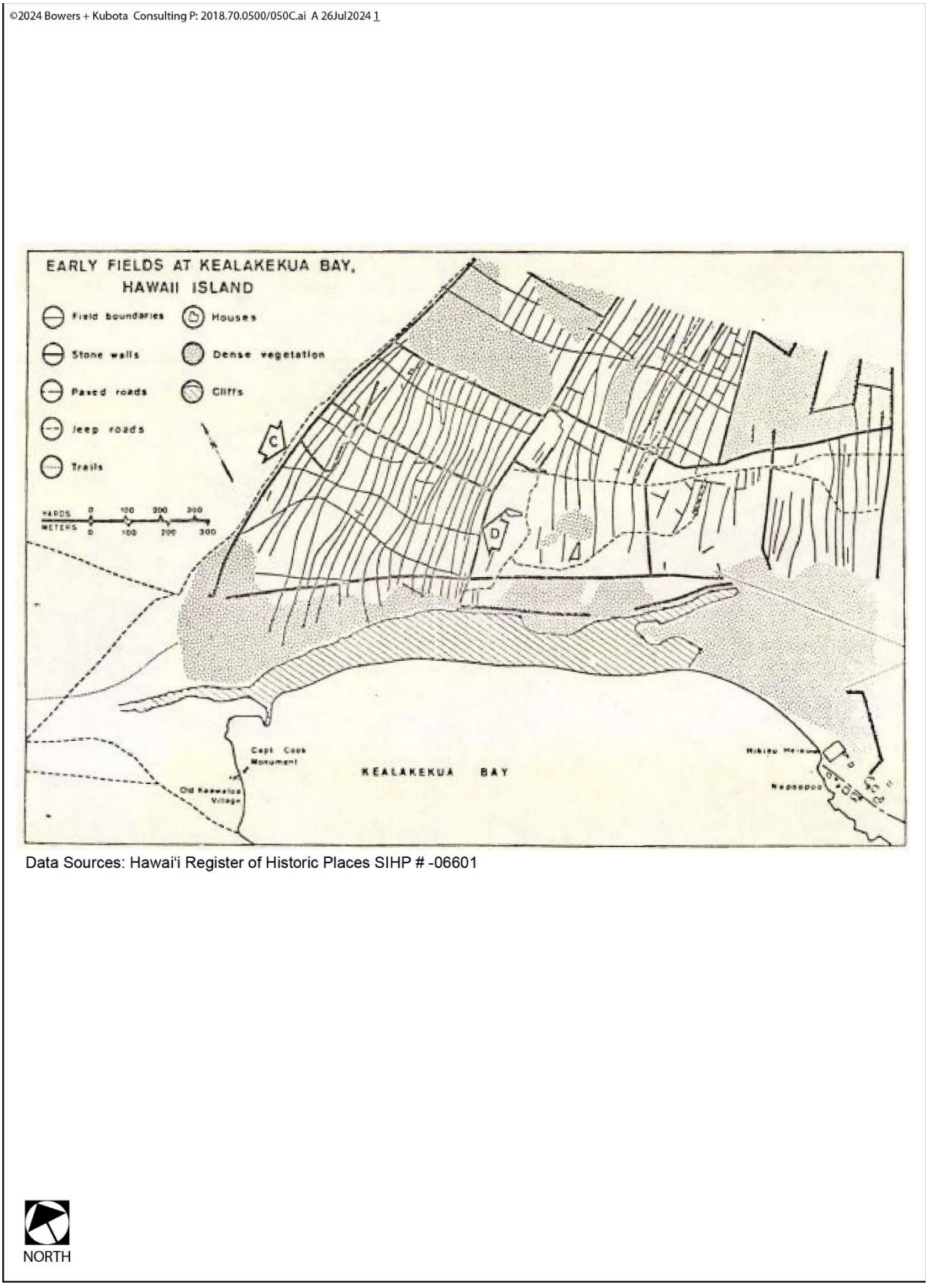
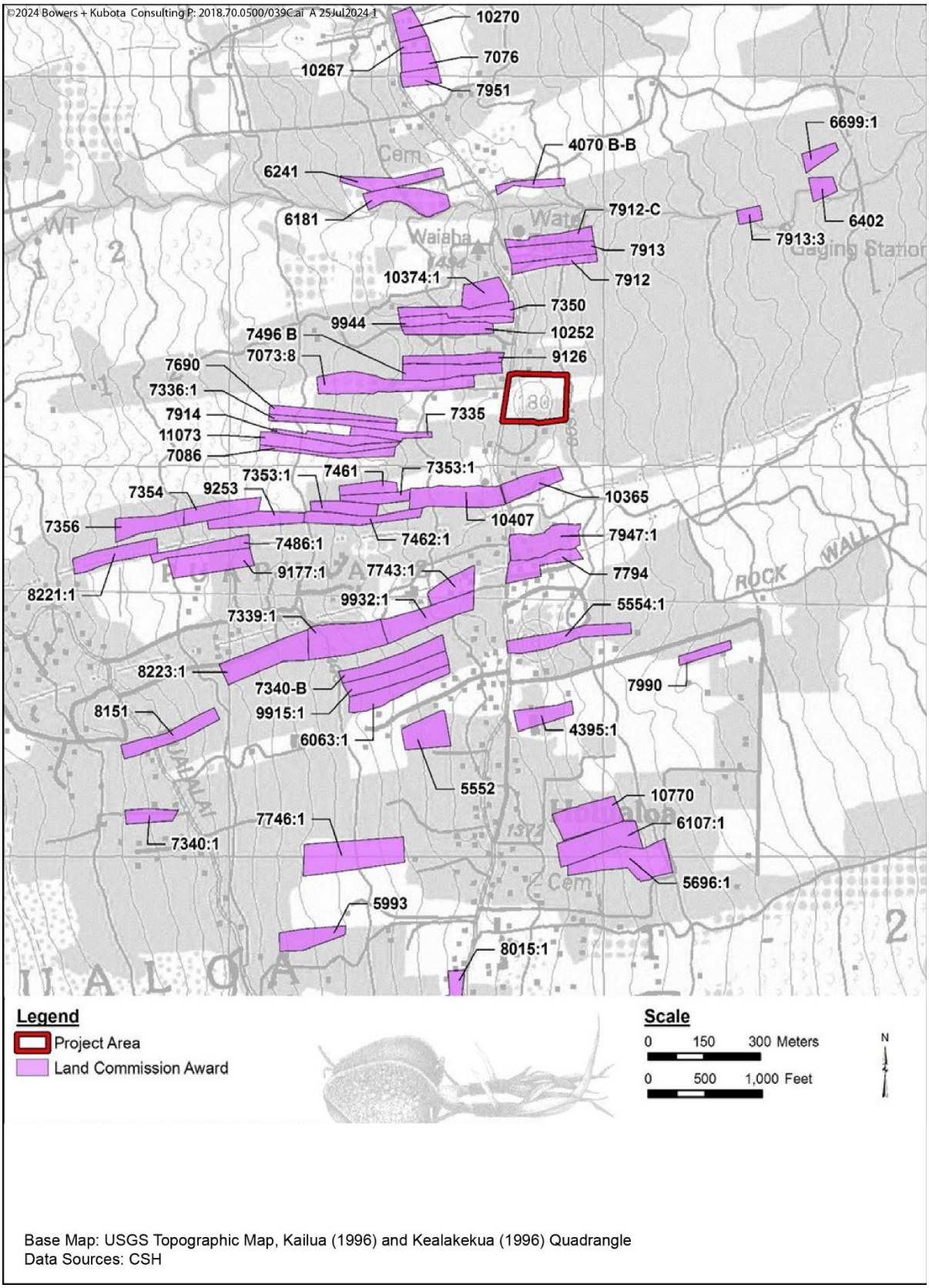
Figure 3-17: Kona Field Diagram



Data Sources: Hawai'i Register of Historic Places SIHP # -06601

Figure 3-18: Land Commission Awards Map



3.8 SCENIC AND AESTHETIC RESOURCES

The Project Site is not in or near visually sensitive areas or areas of high scenic values. At present, when standing along Māmalahoa Highway and looking mauka, the predominate view consists of rows of well-kept coffee trees with Hualālai volcano forming the backdrop. As shown in Figure 3-20, in the upper elevation of the Project Site, when looking makai, the view consists of the Pacific Ocean, Kailua town, and buildings scattered in a landscaped setting.

Figure 3-19: Mauka and Makai Photos

Mauka view of slopes upland of project site from existing access road

Mauka view of the proposed tank location from the Māmalahoa Highway

Makai view of the proposed tank location from north side of property

Makai view of project site from existing access road

Scenic and Aesthetic Resources Impacts and Mitigation Measures

The Proposed Action would not have substantial adverse impacts on visual resources. The proposed water storage tank is the tallest proposed structure, with a maximum height of approximately 40 feet. The storage tank will require cutting into the slope and grading, which will limit its visibility from a viewing position mauka of the final well-siting location. The final location of the Proposed Action would also be surrounded by rows of coffee trees consistent with the existing conditions to further minimize any potential visual impact. Therefore, no short- or long-term impacts are anticipated, and no additional mitigation measures are required.

3.9 AIR QUALITY

The current land use at the Project Site is a coffee farm and small-scale agriculture surrounds the area. The use of vehicles and agricultural equipment emit dust and other air pollutants. There are generally not more than a few vehicles operating at any given time, therefore air pollution generated by the current conditions is minor.

During volcanic eruptions, volcanic fog or "vog" may appear over the Kona coast. Vog produces emissions that include carbon dioxide, particulate matter and sulfur dioxide which can cause health related problems. The last volcanic eruption ended in 2018. Generally, the effects of vog are noticeable but do not generally exceed state and federal air quality standards near the Project Site. The nearest air quality monitoring station to the Project Site is in Kailua-Kona and air quality in the region is generally good (State of Hawai'i, Department of Health, n.d.).

Air Quality Impacts and Mitigation Measures

The Proposed Action is not expected to have adverse effects on air quality or impact potential for volcanic eruptions. During the construction phase, vehicles, machinery, and earthwork may emit fugitive dust and air pollutants. Emissions generated during construction would be short-term, temporary, and confined to the Project Site. To minimize any potential impacts, construction activities will implement BMPs to contain fugitive dust to the Project Site per HAR §11-60.1 Air Pollution Control. BMPs may include:

- Watering of exposed soils or stockpiles;
- Rapid covering or landscaping of bare areas, including slopes; and
- Using dust mats or constructing dust barriers or fencing.

No noxious odors are anticipated during the construction of the Proposed Action. If any were inadvertently produced, they would be consistent with the operation of construction vehicles and machinery.

At the end of construction, air quality would revert to baseline conditions as the operation of wells and pumps will be powered by electricity which does not directly produce air pollutants. In the event of a power outage, an on-site diesel-powered generator will supply electricity. The use of backup generators would lead to limited and short-term air pollution, confined to the Project Site. Use of diesel-powered generators in this capacity is anticipated to be infrequent and for a short duration of time only. Following the completion of the Proposed Action, no adverse effects are anticipated. Therefore, no additional mitigation measures are required.

3.10 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

This section assesses the Proposed Action's potential effects on socioeconomics and environmental justice, as established by EO 12898 – Federal Actions to Address Environmental Justice. The data used for this assessment is from the U.S. Census Bureau American Community Survey (ACS) 2015-2019.

As discussed in Sections 3.2 and 3.6, the Project Site and surrounding land area have been used predominately for residential and small-scale farm purposes. Table 3-6 provides details on the population and socioeconomic characteristics of the Kealakehe and Hualālai Census Tracts, which include La'i 'Ōpua and the Project Site respectively, and Hawai'i County as shown in Figure 3-21.

Kealakehe Census Tract 215.04 includes La'i 'Ōpua and other DHHL owned lands, and unsurprisingly has a substantially higher percentage of Native Hawaiian and Pacific Islander residents compared to Hualālai Census Tract and the County. The tract also has a higher percentage of residents under 18,

which may correspond as to why it has a lower rate of residents with higher education. Kealakehe Census Tract has lower median household incomes and higher unemployment compared to the other two areas. Hualālai Census Tract 215.02 has a greater share of white residents, skews older in median age, and has a higher median income compared to Kealakehe Census Tract and the County. Both census tracts have lower rates of people living in poverty then the County.

Currently, the Project Site operates as a coffee farm. The nearest cluster of retail businesses are located approximately ½ mile south of the Project Site along Māmalahoa Highway. There are currently little to no economic opportunities within La'i 'Ōpua, as only the Community Center and a single residential phase have been completed and the remainder of the community is still undeveloped. A few small-scale farms and vacation rentals are approximately two (2) miles north of the community. The primary businesses center for the greater region is in Kailua-Kona Town, located approximately four (4) miles west of the Project Site and La'i 'Ōpua.

Table 3-6: Socio-Economic Profiles at Kealakehe and Hualālai Census Tracts

	Census Designation		
	Kealakehe Census Tract (215.04) La'i 'Ōpua	Hualālai Census Tract (215.02) Project Site	Hawai'i County
Resident Population	5,932	3,876	200,629
Median age (years)	34.1	46.7	44.3
Population under 18	31.0%	19.1%	20.9%
Population over 65	14.4%	24.2%	23.2%
White+	40.0%	46.1 %	56.1%
Native Hawaiians and Pacific Islanders+	57.2%	28.6%	34.1%
Asian+	36.5%	53.6%	41.1%
Civilian unemployment rate	4.9%	3.7%	2.1%
People below the poverty level	20.8%	9.0%	10.4%
Language other than English	40.4%	16.0%	23.1%
Speaks English less than very well	12.4%	7.2%	6.3%
Median household income	$84,222	$81,540	$72,560
Housing units	1,935	1,997	90,673
Owner occupied	46.8%	59.6%	73.8%
Average household size (persons)	3.69	2.78	2.72
Median value of owner-occupied unit	$439,700	$884,900	$535,600
Bachelor's degree or higher	17.3%	28.6%	32.1%

Source: US Census Bureau (2023). Hawai'i Demographic Profiles and DHC Data, 2020 Decennial Census; Hawai'i 2018-2022 ACS 5-Year Estimates by Census Tracts (US Census); US Census Bureau Hawai'i Population Characteristics 2019; + alone or in combination

Socioeconomics and Environmental Justice Impacts and Mitigation Measures

The Proposed Action will not have a direct impact on population change at the Project Site, however, the water credits produced may impact population change in the Kealakehe Census Tract. North Kona has been designated within the County of Hawai'i's General Plan as an area that can accommodate additional population growth and La'i 'Ōpua's proposed residential, community and commercial lots are consistent with the General Plan's Urban Expansion and Low-Density Urban designations (Department of Hawaiian Home Lands, Kealakehe-La'i 'Ōpua Regional Plan Update, 2020). See Section 3.14.1 for further discussion on the socioeconomic and environmental justice impacts as a result of developing La'i 'Ōpua.

The Proposed Action is an allowable land use (see Section 3.2) and is unlikely to alter the socioeconomic profiles in or around the Project Site, aside from temporary and relatively minor construction employment and expenditures. Up to three (3) acres of the 128-acre Project Site will be converted for the Proposed Action; the remainder of the site will continue to operate as a coffee farm during construction and operation. Thus, no mitigation measures are required.

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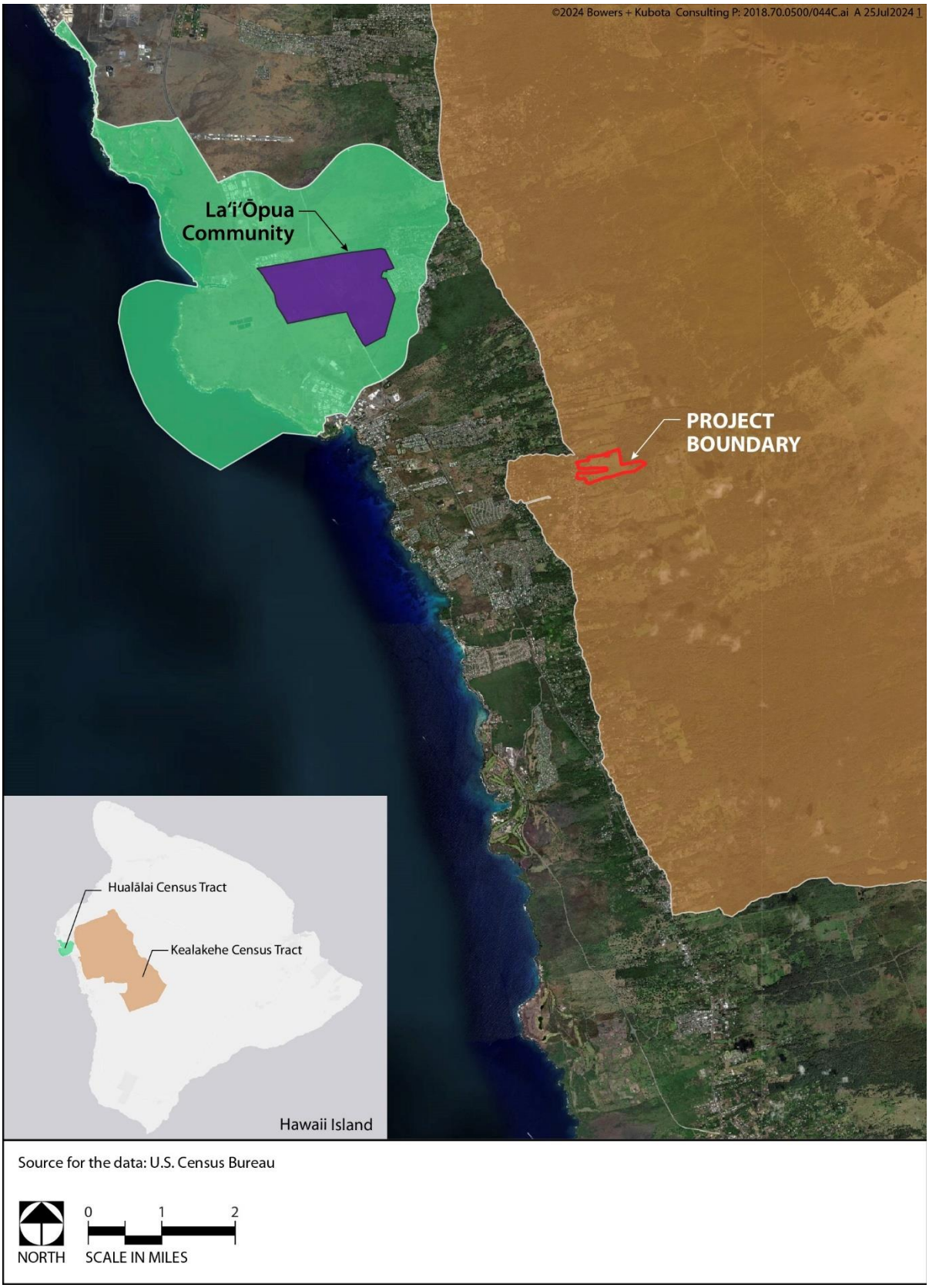
Figure 3-20: Census Tracts and Project Site/ La'i 'Ōpua Map



3.11 ACOUSTIC ENVIRONMENT

The acoustic environment surrounding the Project Site is consistent with agricultural and single-family residential land uses. Most of the noise in the area comes from automotive traffic on Māmalahoa Highway that borders the makai portion of the site. Additional noise may be generated by onsite and nearby agricultural activities. Much of the land in the vicinity of the Project Site is open space or small-scale farming which do not generate substantial amounts of noise.

The DOH requires contractors engaged in construction activities to comply with HAR §11- 46 Community Noise Control, which defines the maximum permissible sound levels that can be produced during construction depending on the surrounding land use as shown in Table 3-7. The Project Site falls within Class C and acceptable stationary noise levels are 70 dBA. This is comparable to the sound levels produced by a residential vacuum cleaner.

Table 3-7: Hawai'i Administration Rules §11-46 Noise Limits

Zoning District	*Noise Limit (in dBA)**	
	Daytime (07:00-22:00)	***Nighttime (22:00-07:00)***
Class A: Areas equivalent to lands zoned residential, conservation, preservation, public space, open space, or similar type.	55	45
Class B: All areas equivalent to lands zoned for multifamily dwellings, apartment, business, commercial, hotel, resort, or similar type.	60	50
Class C: All areas equivalent to lands zoned agriculture, country, industrial, or similar type.	70	70

* dBA stands for A-weighted sound levels. This measures the frequencies of sound a human ear can hear, not the level of volume from a sound.

Acoustic Environment Impacts and Mitigation Measures

The Proposed Action would have short-term impacts on the acoustic environment of the Project Site. Noise created would vary according to the action type (e.g. well drilling, accessory structure construction, grading and grubbing, well operations, etc.) and project phase, and is expected to exceed the property line noise limits.

To minimize impacts from noise, a Community Noise Permit would be obtained for the Proposed Action prior to initiating construction activities. The contractor would work with the DOH Indoor and Radiological Health Branch in accordance with the provisions of HAR §11-46 to develop and implement mitigation measures to reduce noise generated during the Proposed Action as part of the permit process. Possible mitigation measures may include:

- Noise-attenuating equipment, such as mufflers or silencing equipment;
- Insulating or enclosing motors during use;
- Installing portable noise barriers;
- Restricting hours of operation;
- Activity restrictions during night work; and/or
- Using the smallest size power equipment practicable during construction.

Well drilling may require at times a 24-hour operation schedule, and this may exceed nighttime sound levels set by HAR §11-46. A public informational meeting would be held for the affected residents and property owners and a noise variance will be sought from the DOH following consultation with neighboring residents if necessary.

Periodic inspections and maintenance work are expected to occur during operation of the Proposed Action, however any noise generated from this would be consistent with the existing conditions onsite. Noise generated by the pumps is expected to be minimal as they are electrically operated and located at the bottom of the encased production wells. The other accessory structures are expected to emit little to no additional noise. Therefore, no long-term impacts to the acoustic environment are anticipated after completion of the Proposed Action and no additional mitigation measures are required.

3.12 TRANSPORTATION AND TRAFFIC

Access to the Project Site would be from an existing driveway off Māmalahoa Highway (Route 180). Māmalahoa Highway is a two-lane state highway, and one of two highways in the area connecting Kailua-Kona with Waimea. The maximum traveling speed on Māmalahoa Highway is 30 or 35 miles per hour (mph) at the Project Site and traffic volumes on the road are categorized as low. The highway has wide shoulder lanes on both sides and lacks pedestrian lanes or crossings. There are no fixed bus routes along Māmalahoa Highway. Access within the Project Site will be via an existing private road, or one developed for the Proposed Action.

Impacts and Mitigation Measures

During construction activities, there would be a short-term increase in traffic on Māmalahoa Highway created by 1) construction workers commuting to/from the project site, 2) delivery of materials and equipment, and 3) removal of construction equipment, waste or debris. During construction, the number of vehicle trips associated with the Proposed Action are anticipated to be low and likely spread throughout the day to avoid crews entering or exiting the site during peak traffic hours. During operation of the production wells, traffic would return to the existing conditions as only a monitoring technician may make daily inspections to the Project Site and a maintenance crew would visit periodically to make repairs or manage landscaping.

During construction, intermittent delivery or removal of large equipment and materials may result in traffic delays along the highway. These kinds of deliveries and removals would be infrequent, and delays are anticipated to be brief. Adequate space exists within the Project Site so vehicle parking associated with the Proposed Action would not impact traffic on Māmalahoa Highway during construction or operation activities. Therefore, neither construction or operation of the Proposed Action would result in adverse effects on traffic and no additional mitigation measures are required.

3.13 NATURAL HAZARDS

3.13.1 Flooding

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) as shown in Figure 3-22, the majority of the Project Site is designated as Flood Zone X, which is defined as having a minimal risk of flooding. The portion of the Project Site that borders Waiʻaha Stream is designated as Flood Zone AE and is considered a Special Flood Hazard Area (SFHA).

The Project Site is located approximately 2.6 miles inland and outside the 3.2-foot and 6- foot sea level rise exposure areas.

3.13.2 Earthquakes and Volcanoes

Hawai'i Island is home to five volcanoes and is associated with volcanic eruptions and earthquakes. The Project Site is located on the western slope of the Hualālai Volcano, which last erupted between 1800-1801 and is now considered dormant (UHM SOEST, 2013). The U.S. Geological Survey has developed a Lava-Flow Hazard Zones map and divided the island into zones based on the probability of coverage from future lava flows, with Zone 1 having the greatest risk and Zone 9 the least. The Project Site is located within Zone 4. While Hualālai Volcano is now considered dormant, its historic flows have typically covered large areas including the Project site. Section 3.3 provides additional information relating to risk from earthquakes and volcanoes and applicable mitigation measures.

3.13.3 Tsunami

The Project Site is located approximately 2.6 miles inland and outside the tsunami evacuation zone.

3.13.4 Hurricanes and Tropical Storms

Records of hurricanes affecting the Hawaiian Islands show that these events are relatively rare. Since the 1950s, only one hurricane has affected Hawai'i County while storms with strong winds that are not classified as a hurricane or tropical storm are more common (Businger, S., 1998). Due to prevailing weather patterns in the region, most impacts from these storms have been on the leeward, or eastern, side of Hawai'i island and the Project Site is located on the windward, or western side.

3.13.5 Climate Change

According to the Intergovernmental Panel on Climate Change (IPCC), climate change impacts are affecting every region on earth in a variety of ways. This includes rising temperatures, intensification of the water cycle and changing rainfall patterns (IPCC, 2021). These changes are already being seen in Hawai'i. Statewide temperatures have been rising and 2019 was the hottest summer in recorded history. Additionally, rainfall has decreased over the past 35 years and may decrease an additional 10 percent by the end of the century (Frazier, A.G., et al., 2016). The IPCC have confirmed that climate change impacts are the result of human produced greenhouse gas (GHG) emissions, which include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and sulfur oxides (Frazier, A.G., et al., 2016).

Current land uses at the Project Site include a single-family home and small-scale coffee farming operation; neither land use generates substantial amounts of GHG emissions. According to the EPA, the amount of energy used by single-family home in the U.S. generates on average 7.5 metric tons of CO2 annually.[1] A study on coffee production at the farm level found coffee farming produces less than one pound of CO2 equivalents per acre with lower levels of production producing higher levels of GHG emissions due to carbon sequestration of the coffee and soils (Maina, et.al., 2015). Thus, coffee farming at the Project Site could potentially generate between 0.3 to 9 pounds of CO2 annually.

[1] A single-family home using 10,649 kWh/yr using EPA online greenhouse gas equivalence calculator Based on a single- family home using 10,649 kWh/yr using EPA online greenhouse gas equivalence calculator

Figure 3-21: FEMA FIRM Map

Natural Hazards Impacts and Mitigation Measures

Impacts and mitigation measures relating to natural hazards like earthquakes and volcanoes are discussed in Section 3.3.3. The Project Site's inland location is outside the tsunami evacuation and impact zones, and the control building and storage tank will be constructed in compliance with Hawai'i County Chapter 5A—Building Code to withstand wind speeds associated with hurricanes or tropical storms.

Although the proximity to Wai'aha Stream may pose a risk of flooding during extreme events, no substantial risk is anticipated under normal conditions. However, to reduce the risk of flooding, the portion of the Project Site that is designated as Flood Zone AE or directly adjacent to the SFHA will be avoided when selecting a site for the Proposed Action. To further prevent potential impacts from flooding, the Proposed Action will be constructed to minimize any potential infiltration of flood waters into the well system.

Climate change may result in water supplies becoming less reliable or resilient in the future. One of the guiding principles of La'i 'Ōpua is to create a self-sustainable homestead community, including renewable energy and water conservation initiatives. If the Proposed Action and other additional proposed wells are developed, the future and existing wells would require an approximate total of 28 mgd or about 73 percent of the KASA's sustainable yield. If rainfall is reduced by 10 percent, the future total need would be approximately 81 percent of the KASA's sustainable yield and if the USGS recharge rates are accurate, future and existing well use would be even less. Thus, the Proposed Action would have minimal impact on the KASA or its long-term sustainability even with rainfall reductions created by climate change.

The Proposed Action will not directly release any GHG emissions, however, its construction and operation will generate GHG emissions. GHG emissions generated during construction of the Proposed Action are anticipated to be relatively minor. Emission sources from construction would primarily be from equipment during the site clearing and well drilling actions. The amount of ground disturbance will be approximately three acres, and construction is anticipated to be periodic in nature lasting approximately 18 months for Phase I and 12 to 15 months for Phase II.

During the operation of the Proposed Action, electricity will be required to pump water from the wells. The amount of GHG emissions generated by electricity varies by the energy source type. In Hawai'i County, oil and renewables (e.g. solar, wind, hydroelectric, and biomass) are the primary energy sources. According to Hawaiian Electric, within Hawai'i County 43 percent of electricity is generated from renewable sources which produce zero or very small amounts of GHG emissions (Hawaiian Electric Company, 2021). The remaining 57 percent is generated from oil, which produces an average of 2.13 pounds of C02 per kilowatt hour (lbs C02/kWh) (U.S. Energy Information Administration, 2021).

Depending on the depth and pumping efficiency, a groundwater well may require between 537 and 2,270 kWh per million gallons pumped (Griffiths-Sattenspiel, B., Wilson, W., 2009). The Proposed Action is expected to pump 1.1 mgd with a maximum capacity of 2.0 mgd per day. It could therefore potentially require between 537 and 4,540 kWh per day of operation. Assuming 43 percent of this energy requirement is provided by renewable sources, the Proposed Action could potentially generate between 107 and 908 metric tons of C02per year. This is roughly the same amount of C02 generated by powering between 14 and 121 single-family homes for one year.

GHG emissions generated by the Proposed Action's operation will be reduced over time as the county continues transitioning to renewable energy resource portfolio standard. Act 15 (2018) set the goal of making the state carbon "net-negative" by 2045, and HRS §269-91 requires electric utilities to meet 100 percent of net sales through renewable sources also by 2045. There are currently seven

renewable energy projects under development for Hawai'i County that will assist in reaching this goal, and operation of the Proposed Action may generate little to no C02 within the project's lifespan.

The Proposed Action will use gravity fed transmission lines that do not require additional energy to pump the water to La'i 'Ōpua. Because high-level groundwater is considered pristine in quality, little to no water treatment is anticipated further reducing the amount of indirect GHG emissions produced by the Proposed Action.

Therefore, neither construction nor operation of the Proposed Action would result in adverse effects contributing to climate change impacts or other natural hazards and no additional mitigation measures are required.

3.14 PUBLIC FACILITIES AND INFRASTRUCTURE

3.14.1 Water Transmission

The Project Site is located within the North Kona Water System that consists of high, mid, and shaft-level groundwater wells; storage tanks; and an integrated transmission system that services DWS customers from Keāhole to Keauhou. As part of 2006 Water Master Plan, DWS recently completed the 16" *Wai'aha Water System Transmission Improvements Project* which upgraded the 8-inch transmission waterlines along Māmalahoa Highway between Water Pipe Road and Kamila Place, which includes the Project Site. Transmission waterlines along Māmalahoa Highway where the Proposed Action will be tied into the North Kona Water System are now 16-inches.

3.14.2 Sanitary Wastewater

The County of Hawai'i does not have a wastewater collection system in the uplands of North Kona or along Māmalahoa Highway. As a result, wastewater disposal near the Project Site is primarily within Individual Wastewater Systems which have historically been cesspools. There is one cesspool present within the Project Site.

3.14.3 Police, Fire Protection, Medical and Educational Facilities

The Project Site is located within the Hawai'i County Police Department's Kona District. The Kona Police Station is the nearest substation and is located approximately eight miles from the Project Site.

Hawai'i County Fire Department provides fire protection services for the county. Keauhou Fire Station (Engine 12) is the closest station located approximately five miles from the Project Site. The station provides fire, emergency medical services (EMS), and rescue capabilities. Additionally, there are full-time fire stations with EMS services located in Makalei, Captain Cook and Kona and on-call volunteer services operated out of Kalaoa.

Kona Community Hospital is the closest hospital, located approximately nine miles from the Project Site. The hospital is full-service, with 24-hour emergency services and an intensive care unit.

The Project Site is located within the Hawai'i State Department of Education's Kealakehe Complex which includes the Kealakehe Elementary, Intermediate and High Schools, Hōlualoa Elementary School, and Waikoloa Elementary and Middle Schools. The Complex also includes three public charter schools: Innovations, Kanu o ka 'Āina, and West Hawai'i Explorations (Hawai'i State Department of Education, 2021). Additionally, there are two private schools in the vicinity of the Project Site, Makua Lani Christian Academy and Kuleana Education Academy. Makua Lani Christian Academy provides educational services for elementary through high school students and Kuleana Education Academy serves elementary through middle school students.

3.14.4 Solid Waste

Solid waste services are provided by Hawai'i County Department of Environmental Management in some urban areas of the county. The closest facility to accept residential, commercial, government, and construction and demolition generated solid waste is the Pu'uanahulu (West Hawai'i) Landfill, which is located approximately 29 miles from the site. Where collection services are not provided by the County, waste may be self-hauled or collected by private companies and taken to Pu'uanahulu Landfill. Self-hauled waste is generally residential and can be taken to County operated transfer stations in Kailua, Keauhou, Ke'ei, Wailea and Miloli'i.

3.14.5 Electricity

Hawai'i Electric (HELCO) Keahuolu Substation provides electricity through 12.5 volt overhead lines along Māmalahoa Highway and distribution lines to portions of the Project Site.

Public Facilities Impacts and Mitigation Measures

The Proposed Action is not anticipated to substantially impact the demand for public facilities or infrastructure. The Proposed Action is intended to develop additional potable water supply sources from within the North Kona region to allow for the continued development of La'i 'Ōpua. Water from the Proposed Action will connect to the existing 16- inch transmission lines along Māmalahoa Highway, which are sufficient to accommodate the potential daily maximum withdrawal of 2.0 mgd. This amount combined with the other DHHL production well discussed in Section 3.4.5 would be sufficient for future proposed residential, commercial and community uses within La'i 'Ōpua. Completion of the Proposed Action will positively impact the resiliency of the North Kona Water System by creating a redundant source of water in the case of pump failures at other nearby wells.

During construction of the Proposed Action, a portable sanitary toilet will be located onsite with secondary containment measures and serviced per provider recommendations. During operation, the control building and pumps will be unmanned and not require a permanent or temporary sanitary waste disposal system. Mitigation measures discussed in Section 3.4.7 would also be used to prevent impacts from the single cesspool onsite.

Use of BMPs and Occupational Safety and Health Administration (OSHA) worksite safety requirements will be used during construction of the Proposed Action to minimize any potential impacts on local fire, police and medical facilities.

Solid waste generated by the Proposed Action is anticipated to be minimal as the wells will be sited in an area where no buildings will be demolished, and any excess soil produced from excavation activities will remain onsite. Any solid waste generated during construction of the Proposed Action would be taken to Pu'uanahulu (West Hawai'i) Landfill. As the control building and pumps will be unmanned during operation, no solid waste services are required to operate the Proposed Action.

During Phase I, electric needs will be provided by generators onsite. During Phase II, permanent electrical features to supply power to the pumps, control building and other accessory structures would be provided by tying into the existing distribution lines onsite or via new distribution lines connected to the existing overheads along Māmalahoa Highway. Power demands created by the Proposed Action would exceed the existing conditions, however they are anticipated to be within HELCO's capacity without adversely affecting service to other customers.

Therefore, the Proposed Action would have no short or long-term adverse impacts on public infrastructure or utilities and no additional mitigation measures are required.

3.15 SECONDARY AND CUMULATIVE IMPACTS

HAR §11-200 defines secondary or indirect impacts as "Effects which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable," while it defines cumulative impacts as "The impact on the environment which results from incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The context for analyzing these impact types is defined by actions within the "reasonably foreseeable future"; in this case developments seeking entitlements within the previous five years that would be constructed in the same timeframe as Laʻi ʻŌpua. The following section is a discussion of the potential secondary and cumulative impacts resulting from the Proposed Action and other planned development in the area.

3.15.1 Secondary Impacts

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

The Proposed Action would facilitate the development of Laʻi ʻŌpua and approximately 1,000 single family homes and 300 multi-family units for DHHL beneficiaries, supporting the agency's vision of creating vibrant and self-sufficient homestead communities by developing and delivering lands and homes to more native Hawaiian families. Kealakehe Census Tract, which contains Laʻi ʻŌpua, has a nearly 20 percent higher rate of Native Hawaiian and Pacific Islander residents compared to the entire County who could positively benefit from its development through access to more housing options and economic opportunities.

The Proposed Action could positively alter the socio-economic profile of Kealakehe Census Tract. Laʻi ʻŌpua is one of two communities within DHHL's landholdings with lands designated for community and commercial uses, which include community-based economic development and other public amenities. Laʻi ʻŌpua has a combined total of 83 acres designated for community and commercial purposes. Creating economic development opportunities alongside residential uses would support the community's vision for self-sufficiency and provide them a chance to work close to home as Hawaiʻi County's average commute time is longer than the national average (County of Hawaiʻi Draft General Plan, 2023).

Therefore, the Proposed Action is anticipated to have positive impacts on the socioeconomics of the region and environmental justice by assisting DHHL beneficiaries in achieving home ownership and providing them economic opportunities. While this amount of land would assist the community in establishing economic self-sufficiency, it is not substantial enough to have a direct effect on the level of commerce in Kailua-Kona, the primary commerce center for the region.

CULTURAL RESOURCES AND PRACTICES

The Proposed Action

HYDROLOGIC RESOURCES

The Proposed Action is anticipated to withdrawal a maximum of 2.0 mgd of high-level groundwater, which is approximately five percent of the KASA's 38 mgd sustainable yield. If the Proposed Action and other additional proposed wells are developed, the future and existing wells would require an approximate total of 28 mgd (County of Hawaiʻi, Department of Water Supply, 2017). This is about 73 percent of the KASA's sustainable yield as determined by the CWRM, which is within the 90 percent sustainable yield limit. If the sustainable yield is greater based on the USGS recharge rates,

future and existing well use would be even less of the KASA's sustainable yield. Thus, the Proposed Action would have minimal impact on the KASA or its long-term sustainability.

TRANSPORTATION AND TRAFFIC

Traffic generation resulting from La'i 'Ōpua would be gradual and increase in response to each phase of development. During the environmental review process for each of the subsequent phases of development, traffic patterns and generation would be analyzed and mitigated at that time as necessary.

PUBLIC FACILITIES AND INFRASTRUCTURE

Hawai'i County's sewer system is currently in place within La'i 'Ōpua, with County operated gravity main lines present under existing roadways in the community as shown in Figure 3-23. Lateral lines from future development would be connected to the gravity main lines at that time and sanitary wastewater would be pumped to Kealakehe Wastewater Treatment Plant (the "Plant") for treatment. As of February 2021, the Plant has the capacity to treat up to 5.3 million gallons of wastewater per day and receives an average of 1.8 million gallons per day with approximately 1,700 active connections (County of Hawai'i, Department of Water Supply, 2017).

Upon full buildout of La'i 'Ōpua, approximately 1,000 single family homes and 300 multi- family units for DHHL beneficiaries would be connected to the sewer system. These new connections could potentially generate a maximum of 0.68 million gallons of residential wastewater per day (County of Hawai'i Planning Department, Final Environmental Assessment, Makalapua Project District, 2019). This would bring the daily total of wastewater produced throughout the region to around 2.5 million gallons per day, which is within the operational capacity of the Kealakehe Wastewater Treatment Plant.

Development of La'i 'Ōpua will result in additional individuals and families living in the community, which could potentially increase the number of school-aged children within the Kealakehe public school system complex and impact local fire, police and medical facilities.

Most of the land designated for residential use occurs within Villages 1 through 6 and Village 10. To date, only Village 3 has been completed and Villages 4 and 5 are scheduled for the next phase of development. Thus, continued development of La'i 'Ōpua will occur in phases over time and a substantial increase in the number school-aged children in the short-term because of the Proposed Action is not anticipated.

An increase in the number of school-aged children in the future is possible, however the County's population is expected to increase by 50 percent by 2040 with or without the development of La'i 'Ōpua (County of Hawai'i Planning Department, Final Environmental Assessment, Makalapua Project District, 2019). It is likely that the public school system would expand during that timeframe and could accommodate an increase in school-aged children associated with La'i 'Ōpua as the community is developed. This expansion could be achieved through school impact fees which the State of Hawai'i, Department of Education (DOE) has the authority to collect via Act 245. In 2010, a West Hawai'i School Impact Fee District was adopted and while efforts to implement fee collection were suspended that same year, the DOE may resume efforts to collect these fees in the future. It is assumed services provided by other the public utilities would also be expanded by 2040 in response to the expected future population growth. Phasing development of La'i 'Ōpua over time would reduce the potential impacts on these other facilities.

Development of La'i 'Ōpua will result in additional individuals and families living in the community, but these may include residents already residing within other areas of Hawai'i County. With the closure of Hilo Landfill in 2019, all solid waste generated within the County is now taken to

Pu'uanahulu Landfill. As of January 2020, Pu'uanahulu Landfill is anticipated to have 50 to 100 more years of operational capacity based on existing solid waste generation of roughly 600 tons per day and onsite conditions (Hawai'i Public Radio, 2020). Thus, development of La'i 'Ōpua would have minimal impact on the Landfill.

The full development of La'i 'Ōpua will likely require around 23 Megawatts (MW) per day to power all the new residential development.[2] Currently, HELCO produces around 370 MW of energy per day using a variety of traditional and renewable energy sources and is working towards fully renewable energy production as discussed in Section 3.12.6 (Hawaiian Electric Company, 2021). Full buildout of the community would require approximately six percent of the existing power produced daily by HELCO, and approximately seven percent using only renewable energy sources currently operating and those approved for development to meet the 2045 renewable energy mandate (Hawaiian Electric Company, 2021). This would not adversely affect HELCO's ability to serve other customers.

These requirement percentages are assuming no renewable energy initiatives are implemented within the community or additional renewable projects are pursued by HELCO over the course of the community's full development. As part of their vision and values, La'i 'Ōpua outlined their desire to incorporate renewable energy sources to ensure their self-sufficiency. HRS §196-7 permits the installation of residential photovoltaic systems. Thus, the energy requirements from La'i 'Ōpua would likely be lower as the community would not be fully reliant on HELCO for power.

3.15.2 Cumulative Impacts

There are two housing projects proposed for development in the reasonably foreseeable future and one under construction within the North Kona District in vicinity of the Project Site: Makalapua Project District, Kaloko Heights and Kamakana Villages at Keahuolū.

The proposed Makalapua Project District is a an approximately 67-acre site located in Kailua-Kona approximately three miles south of the La'i 'Ōpua. The project is intended to be a mixed-use development including residential, hotel, commercial, and civic/community uses, creating approximately 300 residential units and 220 hotel rooms developed over the next 15 years. Kaloko Heights is a proposed affordable housing project intended to develop up to 111 residential units and a community center located approximately three miles north of the La'i 'Ōpua. Phase I of the project, which includes construction of roughly 80 units, is anticipated to be completed within the next two years.

Kamakana Villages at Keahuolū is a mixed-use, master planned community across 272-acres that includes development of up to 2,330 homes, school facilities and a neighborhood center. Kamakana Villages is located within one mile of La'i 'Ōpua and its development is planned to occur over the next 20 years. The first homes were made available to the public in 2018, and presently 170 apartments have been completed with approximately 250 residents occupying the site. The housing and surrounding infrastructure are all Silver LEED certified.

Cumulative impacts from developing La'i 'Ōpua, facilitated by the Proposed Action, and the other housing projects are potential increases in the demand on the KASA aquifer and public facilities and infrastructure through increased population. The Proposed Action and additional housing developments and their water use demands have been accounted for in the Hawai'i County Water

[2] Based on HELCO evaluation that their average residential utility consumer used 518kWh per month, times the number of units and converted from kWh to MW. Accessed September 20201. https://view.hawaiianelectric.com/2019-2020-sustainability-report/page/4-5

Use and Development Plan Update, Hawai‘i Water Plan, Keauhou Aquifer System and are within the estimated 28 mgd future demand total . See Figure 3-25. This future demand total is about 73 percent of the KASA’s sustainable yield as determined by the CWRM, which is within the 90 percent sustainable yield limit. Therefore, they would not adversely affect the KASA aquifer if all were fully developed.

Existing infrastructure, improvements and mitigations associated with the proposed projects would support the potential increase in population and the corresponding increase in demand on public facilities and infrastructure like roads, schools, medical facilities, and fire and police departments. Further, tax revenues generated from the housing developments would support improving and potentially expanding these County resources to better serve an increased population. Therefore, full development of the La‘i ‘Ōpua and the other projects would not adversely affect these resources.

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Figure 3-22: County Sewer Line Map

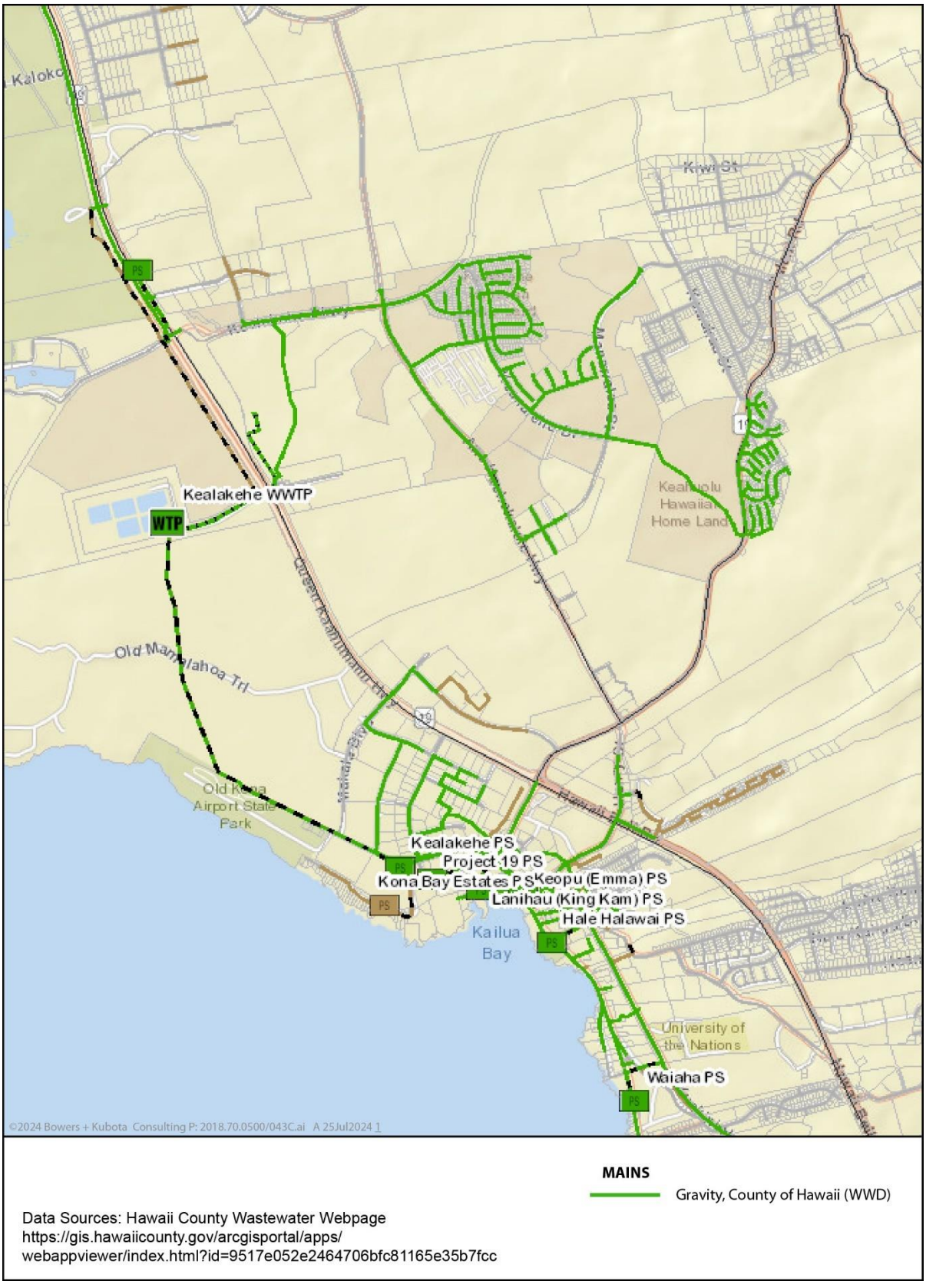
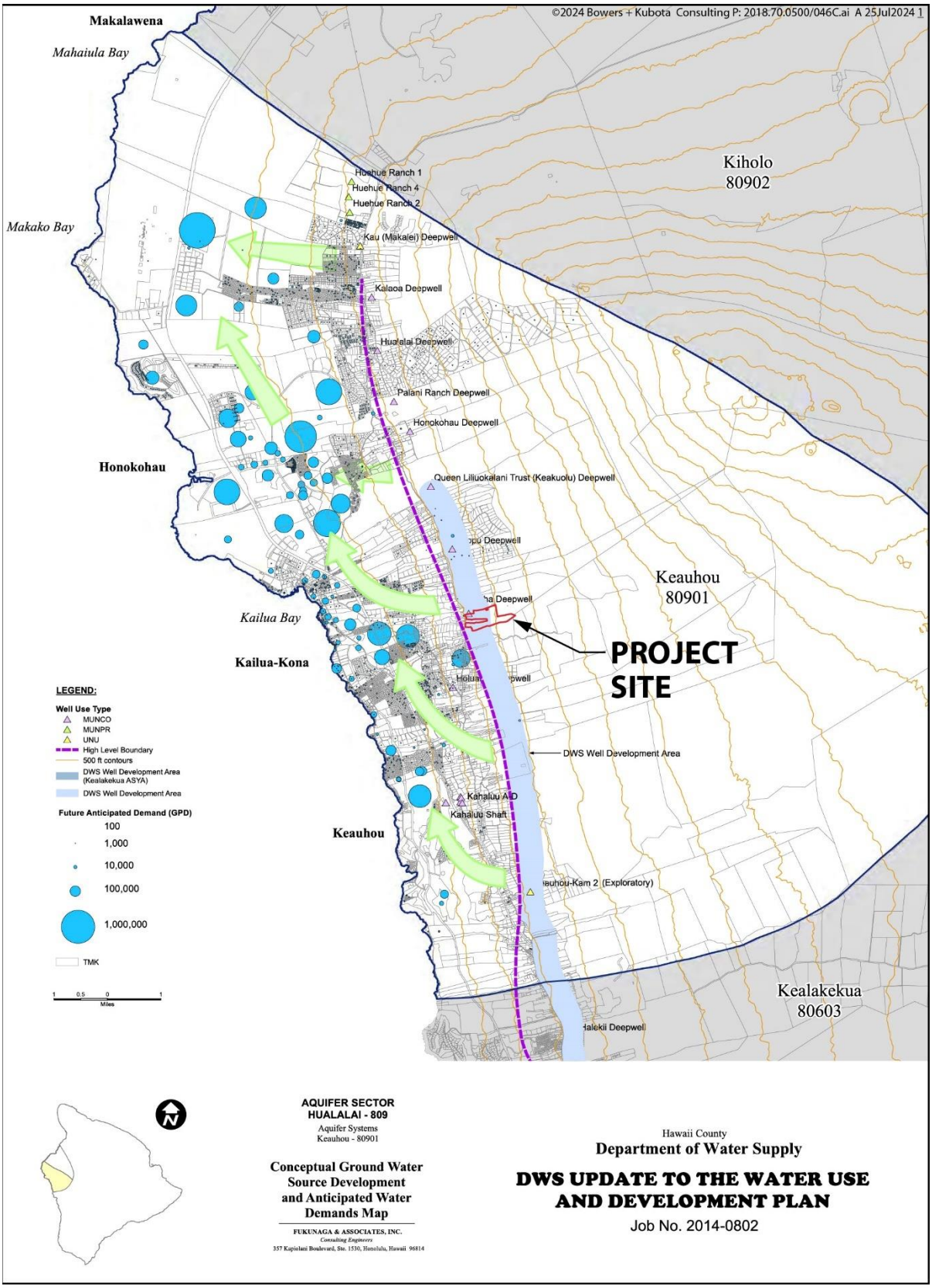


Figure 3-23: HDWS Update to Water Use Plan



4.0 RELATIONSHIP TO FEDERAL, STATE AND COUNTY LAND USE AND ENVIRONMENTAL POLICIES

This chapter provides a description of the relationship and compatibility of the Proposed Action to land use plans and policies. This chapter discusses the proposed project's conformance with pertinent Federal, State and County land use plans and policies, which include the National Environmental Policy Act (42 U.S.C. §4321), State Land Use District regulations, State Environmental Policy (Chapter 344, HRS), and the regulations, policies, and goals set forth by the County's General Plan, and Special Management Area (Chapter 205A, HRS).

4.1 FEDERAL LAWS

4.1.1 National Environmental Policy Act (42 U.S.C. §4321)

The purpose of the National Environmental Policy Act of 1969 (NEPA) was to create "a national policy which will encourage the productive and enjoyable harmony between man and his environment (Section 2)." NEPA covers all Federal agencies and actions, including projects where there is federal jurisdiction, land use, permitting, or funding, and requires NEPA be incorporated into federal decision making. Its primary legal mandates are:

- To require a consideration of environmental impacts related to federal projects and in the formation of federal rules and regulations (Section 102(2)(C));
- Agency cooperation between all levels of government and with other concerned public and private organizations (Section 101(a) and 102(2)(C)(D),(G)); and
- The federal government "use all practicable means and measures… to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of America (Section 101(a) and (204(4)).”

Discussion:

As discussed in Chapter 1, DHHL is seeking federal financing assistance from the USDA RD RUS for Phase II of the project. In 2017, the USDA confirmed that the region is eligible for funding. As such, the Proposed Action is subject to environmental review pursuant to both HRS §343 and NEPA.

The Proposed Action is compliant with the purpose and legal mandates required by NEPA. Potential short-term, long-term and cumulative impacts on the affected environment resulting from the Proposed Action have been analyzed and mitigation measures detailed throughout Chapter 3 would allow for this development without adversely affecting the existing or future environments, thus supporting a productive and enjoyable harmony between man and his environment. Additionally, government agencies and concerned parties were consulted as part of the environmental review process. Copies of the comments received are attached as **Appendix F.**

4.1.2 The Farmland Protection Policy Act of 1981 (7 U.S.C. §4201 et seq.)

The Farmland Protection Policy Act of 1981 (FPPA) aims to minimize the extent that federal programs contribute to the unnecessary conversion of agricultural land to other uses. The FPPA

stipulates that federal programs be compatible with state, local and private efforts to protect farmland. The USDA Natural Resources Conservation Service administers and provides oversight on the FPPA.

Discussion:

The FPPA does not apply to the Proposed Action because the Project Site does not contain any prime farmland, unique farmland, and land of statewide or local importance, as discussed in Sections 3.2.5.

4.1.3 The Endangered Species Act of 1973 (16 U.S.C. §1531 et seq.)

The purpose of the Endangered Species Act of 1973 (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. The ESA achieves this by prohibiting the "take" of species listed as threatened or endangered, except under Federal permit. It prohibits federal actions that are likely to jeopardize the continued existence of listed species or adversely modify designated critical habitat. Section 7 of the ESA requires federal agencies to consult with the USFWS and National Marine Fisheries Service to ensure that actions they authorize, fund or carry out are not likely to result in take or jeopardize the continued existence of listed species.

Discussion:

The USDA will consult with the USFWS per ESA Section 7 requirements prior to initiation of the Proposed Action. Mitigation measures discussed in Section 3.5.3 were developed with input from the USFWS during pre-consultation and would be implemented to minimize any impacts to listed species observed or anticipated to occur within the Project Site.

4.1.4 The Migratory Bird Treaty Act of 1918 (16 U.S.C. §§703–712)

The purpose of the Migratory Bird Treaty Act of 1918 (MBTA) is to ensure sustainable populations of protected migratory bird species through prohibiting take of a protected species without prior authorization by the USFWS. Section 10.12 of the MBTA defines "take" as "to pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect." The MBTA applies only to migratory bird species that are native to the U.S. or U.S. territories, and native migratory bird species are defined as those present as a result of natural biological or ecological process. Nonnative and human-introduced species are not protected by the MBTA.

Discussion:

No taking of any species protected by the MBTA occurring within the Project Site is anticipated during the construction or operation of the Proposed Action. Mitigation measures discussed in Section 3.5.3 would be used to ensure there are no impacts of any protected bird species observed or expected to occur within the Project Site.

4.1.5 Executive Order 13112 - Invasive Species

Executive Order (EO) 13112 – Invasive Species was signed by President Clinton in 1999 to prevent the introduction of invasive species, provide for their control and minimize the economic, ecological, and human health impacts that invasive species can cause. EO 13112 requires all federal agencies whose actions may affect the status of invasive species to identify such actions; prevent the introduction and spread of invasive species; and not authorize, fund, or carry out actions it believes are likely to cause or promote the introduction or spread of invasive species within the U.S. or elsewhere.

Discussion:

No introduction or spread of invasive species is anticipated during the construction or operation of the Proposed Action. Mitigation measures discussed in Section 3.5.3 would be implemented as applicable to prevent the unintentional spread or introduction of new invasive species to the Project Site. Therefore, the Proposed Action is compliant with EO 13112.

4.1.6 National Historic Preservation Act of 1966 (16 U.S.C. §470)

The National Historic Preservation Act of 1966 (NHPA) establishes the role of the federal government, in partnership with state and local governments, Native Hawaiian organizations and Indian Tribes, and private organizations and individuals in encouraging productive harmony between modern society and historic uses. This is achieved by Section 106 of the NHPA, which requires federal agencies to consider the effects of their activities on historic properties. Section 106 applies to federal construction projects, plans to manage or develop federally owned lands, and any federal approval of non-federal actions such as grants, licenses and permits. In addition, NHPA is applicable to any action that has the potential to affect properties listed on or are eligible for listing on the National Register of Historic Places.

Discussion:

As DHHL is seeking federal financing, the Proposed Action is considered a federal undertaking as defined in 36 CFR 800.16(y) and is subject to compliance with Section 106 of the National Historic Preservation Act. As such, the USDA will be responsible for initiating and coordinating the Section 106 process with the State Historic Preservation Division prior to initiating the Proposed Action. Any additional mitigation measures established during the Section 106 process would be implemented to avoid or minimize potential impacts on any historic, cultural or archaeological resources that occur or may potentially be found within the Project Site.

4.1.7 The Clean Water Act of 1972 (33 U.S.C. §1251, et seq.)

The objective of the Clean Water Act is to restore and maintain the physical, chemical and biological integrity of the nation's waters. Under the Clean Water Act, the Environmental Protection Agency (EPA) has implemented pollution control programs such as setting industry water quality and wastewater standards for all surface water contaminants. The EPA has delegated authority to the State of Hawai`i DOH Clean Water Branch (CWB) to administer the National Pollutant Discharge Elimination System (NPDES) program and to issue NPDES permits that are used to regulate impacts on surface waters.

Discussion:

A NPDES permit will be obtained for the Proposed Action. Additional mitigation measures discussed in Section 3.4.7 would be implemented to prevent contaminants from potentially entering and impacting surface or groundwater resources during construction or operation of the Proposed Action. Therefore, the Proposed Action is compliant with the Clean Water Act.

4.1.8 The Coastal Zone Management Act of 1972 (16 U.S.C. §1456) and Hawai'i Coastal Zone Management Act Chapter HRS §205A

The Coastal Zone Management (CZM) Act of 1972 authorizes states to develop and operate their own coastal management programs. In 1973, the State of Hawai'i Legislature passed Act 164 and in 1977 enacted HRS §205A, the Hawai'i CZM Program. The regulatory reach of HRS §205A is the entire state, including coastal waters out to the limit of the State's police and regulatory authority.

Unique to Hawai'i, each county has regulatory authority over Special Management Areas (SMAs) which are designated areas of concern that represent the most sensitive area of the coastal zone. The Hawai'i Coastal Zone Management Act focuses on ten policy objectives including recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection and marine resources.

Discussion:

The Project Site is located approximately 2.75 miles inland from the nearest coastline and outside of the SMA and coastal areas. As discussed in Section 3.4.4, Wai'aha Stream, which crosses through the Project Site, does not flow directly into the Pacific Ocean. Instead, the stream ends approximately one mile inland from the coast and has no direct connection or impact on coastal waters. Therefore, HRS §205A does not apply to the Proposed Action.

4.1.9 The Safe Water Drinking Act of 1974 (42 U.S.C. §300)

The Safe Drinking Water Act of 1974 was passed to protect public health by regulating the nation's public drinking water and its sources (e.g. rivers, lakes, reservoirs, springs, and ground water wells). The Safe Drinking Water Act authorizes the EPA to set national-based standards to protect against both naturally occurring and man-made contaminants that may be found in drinking water. The EPA works with states and water municipalities to ensure water quality standards are met. The CWB administers and enforces the Safe Drinking Water Act by regulating, permitting and enforcing federal and state standards for public drinking water sources.

Discussion:

No impacts to groundwater sources are anticipated during the construction or operation of the Proposed Action. Mitigation measures discussed in Section 3.4.7 would be implemented to prevent any impacts to drinking water developed as part of the Proposed Action and ensure compliance with all federal and state standards relating to public water systems. Therefore, the Proposed Action is compliant with and actively supports the Safe Drinking Water Act.

4.1.10 The Clean Air Act of 1970 (42 U.S.C. §7401 et seq.)

The Clean Air Act of 1970 regulates air emissions from stationary and mobile sources. The Clean Air Act authorizes the EPA to establish National Ambient Air Quality Standards to protect public health and welfare by regulating emissions of hazardous air pollutants. The State DOH Clean Air Branch (CAB) administers and enforces the Clean Air Act within the state by implementing air pollution control through permitting, monitoring air quality, and enforcing federal and state standards.

Discussion:

Mitigation measures discussed in Section 3.8.2 would be implemented to minimize impacts to air quality during construction and operation of the Proposed Action and ensure compliance with all federal and state standards relating to air pollution control. Therefore, the Proposed Action is compliant with the Clean Air Act.

4.1.11 Noise Control Act of 1972 (42 U.S.C. §7901)

The Noise Control Act of 1972 (Act) establishes a national policy to promote an environment free from noise that jeopardizes the health and welfare of the general public. Primary responsibility for noise control rests with state and local governments, but federal action is necessary for dealing with

major noise sources. The Act authorizes the establishment of noise emission standards for nearly all sources of noise.

Discussion:

Mitigation measures discussed in Section 3.10.2 would be implemented and a Community Noise Permit pursuant to HAR §11-46 would be obtained prior to initiating construction activities of the Proposed Action. Thus, the Proposed Action is compliant with the Noise Control Act and other state noise regulations.

4.1.12 Executive Order 12898, Environmental Justice

EO 12898 – Federal Actions to Address Environmental Justice (EJ) in Minority Populations Low-Income Populations. directs federal agencies to promote nondiscrimination in federal actions by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority populations and low-income populations in the United States and its territories and possessions. EO 12898 aims to provide improved access to public information or public participation for minority and low-income communities in matters relating to human health or the environment.

The Council of Environmental Quality (CEQ) guidance states that minority populations should be identified when the percentage of minority residents in the affected area exceeds 50 percent or is meaningfully greater than the percentage of minority residents in the general population (CEQ, 1997).

Discussion:

As discussed in Sections 3.9 and 3.14.1, the Proposed Action would result in secondary positive impacts on native Hawaiian residents with the development of Laʻi ʻŌpua. The population of Native Hawaiian and Pacific Islanders residing in Kealakehe Census Tract, where Laʻi ʻŌpua will be developed, is 55 percent of the tract's population. The purpose of the Proposed Action is to develop additional potable water supply sources from within the North Kona region to allow for the continued development of Laʻi ʻŌpua. Without the development of the Proposed Action, DHHL would not have enough water credits to develop Laʻi ʻŌpua in the foreseeable future.

By securing additional water supply sources, DHHL can then secure the water credits needed for future residential, community and commercial uses. These uses would provide not only more homes for DHHL beneficiaries, but also parks, recreation spaces and economic opportunities towards fulfilling Laʻi ʻŌpua's vision of what the community sees for their homestead's future in the decades to come. Therefore, the Proposed Action is compliant with EO 12898.

4.2 STATE OF HAWAIʻI PLANS AND POLICIES

4.2.1 The State Land Use Law (HRS §205)

The Hawaiʻi State Legislature adopted the State Land Use Law in 1961 to protect Hawaiʻi's valuable lands from development that resulted in short-term gains for a few and long-term losses to the income and growth potential of the State's economy. Accordingly, the Legislature established an overall framework of land use management. HRS §205 placed all lands within the State in one of four land use districts: Urban, Agricultural, Conservation, or Rural (the Rural District was added in 1963) and established the State Land Use Commission to administer the designated land use districts.

Discussion:

The Project Site is located within the Agriculture District. As discussed in Section 3.2.5, the Proposed Action is permitted within the State Agricultural District and by the Hawai'i County Code Chapter 25—Zoning, so long as it does not pose a hazard or danger to the surrounding area and is approved by the Director of the Hawai'i County Planning Department. The Proposed Action will be installed in compliance with all relevant building codes to prevent any hazards to the surrounding area and construction would not begin prior to plan approval. Thus, the Proposed Action is compliant with HRS §205.

4.2.2 Hawai'i State Plan (HRS §226)

The Hawai'i State Plan, HRS Chapter 226, as amended, is a broad policy document that guides all activities, programs and decisions made by State and local agencies by establishing a set of themes, goals, objectives, and policies meant to guide the State's long-term growth and development. The purpose of the plan is to: (1) improve the planning process; (2) increase the effectiveness of government and private actions; (3) improve coordination among agencies and levels of government; (4) provide for the use of Hawai'i's resources; and (5) guide the future development of the state.

Part I of the Plan references Overall Theme, Goals, Objectives and Policies and Part III references the Priority Guidelines; because Part II pertains primarily to internal government affairs it is not applicable to the Proposed Action and was not addressed. Of the 107 sections that comprise the HRS §226, six are directly applicable to the Proposed Action and discussed in the table below.

Table 4-1
Hawai'i State Plan Objectives and Policies

HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	C	I	N/A
PART I. OVERALL THEME, GOALS, OBJECTIVES AND POLICIES			
HRS § 226-1: Findings and Purpose			
HRS § 226-2: Definitions			
HRS § 226-3: Overall Theme.			
HRS § 226-4: State Goals.			
In order to ensure, for present and future generations, those elements of choice and mobility that ensure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:			
(1) A strong, viable economy, characterized by stability, diversity and growth that enables fulfillment of the needs and expectations of Hawai'i's present and future generations.	**X**		
(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.	**X**		
(3) Physical, social and economic well-being, for individuals and families in Hawai'i, that nourishes a sense of community responsibility, of caring and of participation in community life.	**X**		
Discussion: The Proposed Action provides the potable water resources required to enable the development of DHHL's Villages of La'i 'Ōpua. The Proposed Action will provide necessary resources to help create a community that provides native Hawaiian beneficiaries housing and homestead leases that may be passed on to future generations. The Proposed Action will also provide the water resource necessary to develop a master planned community that will create opportunities for individuals and groups to improve their economic, social and physical well-being.			
HRS § 226-5: Objectives and policies for population.			
§226-6 Objectives and policies for the economy--in general.			

Table 4-1
Hawai'i State Plan Objectives and Policies

HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	C	I	N/A
§226-7 Objectives and policies for the economy--agriculture.			
§226-8 Objective and policies for the economy--visitor industry.			
§226-9 Objective and policies for the economy--federal expenditures.			
(a) Objective: Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawai'i's economy.			
(b) To achieve the population objective, it shall be the policy of this State to:			
(1) Encourage the sustained flow of federal expenditures in Hawai'i that generates long-term government civilian employment;	**X**		
(2) Promote Hawai'i's supportive role in national defense, in a manner consistent with Hawai'i's social, environmental, and cultural goals by building upon dual-use and defense applications to develop thriving ocean engineering, aerospace research and development, and related dual-use technology sectors in Hawai'i's economy;			**X**
(3) Promote the development of federally supported activities in Hawai'i that respect statewide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawai'i's environment;	**X**		
(4) Increase opportunities for entry and advancement of Hawai'i's people into federal government service;			**X**
(5) Promote federal use of local commodities, services, and facilities available in Hawai'i;			**X**
(6) Strengthen federal-state-county communication and coordination in all federal activities that affect Hawai'i; and			**X**
(7) Pursue the return of federally controlled lands in Hawai'i that are not required for either the defense of the nation or for other purposes of national importance, and promote the mutually beneficial exchanges of land between federal agencies, the State, and the counties.			**X**
Discussion: For Phase II of the Proposed Action, DHHL is seeking federal funding from the USDA RD RUS. The Proposed Action is intended to develop a new potable water source for the development of La'i'Ōpua, providing DHHL beneficiaries with more lands and homes. The federal funds would be used in a manner respecting statewide economic concerns that are sensitive to the native Hawaiian community needs and would not result in adverse impacts on resources affected by the Proposed Action as discussed in Chapter 3.			
§226-10 Objective and policies for the economy--potential growth and innovative activities.			
§226-10.5 Objectives and policies for the economy--information industry.			
§226-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.			
§226-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.			
§226-13 Objectives and policies for the physical environment--land, air, and water quality.			
(a) Objectives: Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:			
(1) Maintenance and pursuit of improved quality in Hawai'i's land, air, and water resources.	**X**		
(2) Greater public awareness and appreciation of Hawai'i's environmental resources.	**X**		
(b) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:			
(1) Foster educational activities that promote a better understanding of Hawai'i's limited environmental resources.			**X**
(2) Promote the proper management of Hawai'i's land and water resources.	**X**		

Table 4-1
Hawai'i State Plan Objectives and Policies

HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	C	I	N/A
(3) Promote effective measures to achieve desired quality in Hawai'i's surface, ground, and coastal waters.	X		
(4) Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai'i's people.			X
(5) Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters.			X
(6) Encourage design and construction practices that enhance the physical qualities of Hawai'i's communities.	X		
(7) Encourage urban developments in close proximity to existing services and facilities.	X		
(8) Foster recognition of the importance and value of the land, air, and water resources to Hawai'i's people, their cultures and visitors.	X		
Discussion: The Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua. The Proposed Action has been included in the Hawai'i County Water Use and Development Plan update and would be within the sustainable yield of the area's underlying aquifer system, supporting proper management of Hawai'i's land and water resources. During construction, any potential impacts to air and water quality will be minimized using BMPs and project phasing.			
§226-14 Objective and policies for facility systems--in general.			
(a) Objective: Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, sustainable development, climate change adaptation, sea level rise adaptation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.			
(b) To achieve the general facility systems objective, it shall be the policy of this State to:			
(1) Accommodate the needs of Hawai'i's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.	X		
(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.	X		
(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.	X		
(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.	X		
(5) Identify existing and planned state facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards.			X
(6) Assess a range of options to mitigate the impacts of sea level rise to existing and planned state facilities.			X
Discussion: The Proposed Action fully supports the objectives and policies of HRS §226-14. The Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua, which will allow DHHL to accommodate the needs of their beneficiaries. It is designed to promote prudent use of groundwater resources and its operation is within the region's aquifer's long-term sustainable capacity.			
§226-15 Objectives and policies for facility systems--solid and liquid wastes.			
§226-16 Objective and policies for facility systems--water.			
(a) Objective: Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.			

Table 4-1
Hawai'i State Plan Objectives and Policies

HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	C	I	N/A
(b) To achieve the facility systems water objective, it shall be the policy of this State to:			
(1) Coordinate development of land use activities with existing and potential water supply.	X		
(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.	X		
(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.			X
(4) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.	X		
(5) Support water supply services to areas experiencing critical water problems.	X		
(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.			X
Discussion: The Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua. The Proposed Action has been included in the Hawai'i County Water Use and Development Plan update and would be within the sustainable yield of the area's underlying aquifer system. In August 2015, CWRM approved the water reservation for 3.398 MGD in the Keauhou Aquifer System Area (ASYA) that services the North Kona region. The water request amount should meet the water demands needed for the full build-out of La'i 'Ōpua.			
§226-17 Objectives and policies for facility systems--transportation.			
§226-18 Objectives and policies for facility systems--energy.			
§226-18.5 Objectives and policies for facility systems--telecommunications.			
§226-19 Objectives and policies for socio-cultural advancement--housing.			
(a) Objective: Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:			
(1) Greater opportunities for Hawai'i's people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more rental and for sale affordable housing is made available to extremely low-, very low-, lower-, moderate-, and above moderate-income segments of Hawai'i's population.	X		
(2) The orderly development of residential areas sensitive to community needs and other land uses.	X		
(3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawai'i's people.	X		
(b) o achieve the housing objectives, it shall be the policy of this State to:			
(1) Effectively accommodate the housing needs of Hawai'i's people.	X		
(2) Stimulate and promote feasible approaches that increase affordable rental and for sale housing choices for extremely low-, very low-, lower-, moderate-, and above moderate-income households.	X		
(3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.	X		
(4) Promote appropriate improvement, rehabilitation, and maintenance of existing rental and for sale housing units and residential areas.			X
(5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.	X		

Table 4-1
Hawai'i State Plan Objectives and Policies

HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	C	I	N/A
(6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.			**X**
(7) Foster a variety of lifestyles traditional to Hawai'i through the design and maintenance of neighborhoods that reflect the culture and values of the community.	**X**		
(8) Promote research and development of methods to reduce the cost of housing construction in Hawai'i.			**X**
Discussion: Without the Proposed Action, DHHL will not have enough water credits available from DWS for future homestead or commercial development at La'i 'Ōpua from now into the foreseeable future. Therefore, DHHL needs to establish an additional water source to receive water credits from DWS. This would allow DHHL to provide over 1,000 single family homes, 300 multi-family units, multiple park spaces, a hospital, and commercial centers at La'i 'Ōpua. La'i 'Ōpua will provide housing for native Hawaiian residents ranging from low-, very low-, lower-, moderate- and above moderate-income segments and the community is planned to reflect the culture and values traditional to Hawai'i.			
§226-20 Objectives and policies for socio-cultural advancement--health.			
§226-21 Objective and policies for socio-cultural advancement--education.			
§226-22 Objective and policies for socio-cultural advancement--social services.			
§226-23 Objective and policies for socio-cultural advancement--leisure.			
§226-24 Objective and policies for socio-cultural advancement--individual rights and personal well-being.			
§226-25 Objective and policies for socio-cultural advancement--culture.			
§226-26 Objectives and policies for socio-cultural advancement--public safety.			
§226-27 Objectives and policies for socio-cultural advancement--government.			
§226-101 Purpose. The purpose of this part is to establish overall priority guidelines to address areas of statewide concern.			
§226-102 Overall direction. The State shall strive to improve the quality of life for Hawai'i's present and future population through the pursuit of desirable courses of action in seven major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, quality education, principles of sustainability, and climate change adaptation.			
§226-103 Economic priority guidelines.			
§226-104 Population growth and land resources priority guidelines.			
§226-105 Crime and criminal justice.			
§226-106 Affordable housing.			
§226-107 Quality education.			
§226-108 Sustainability.			
Priority guidelines and principles to promote sustainability shall include:			
(1) Encouraging balanced economic, social, community, and environmental priorities;	**X**		
(2) Encouraging planning that respects and promotes living within the natural resources and limits of the State;	**X**		
(3) Promoting a diversified and dynamic economy;	**X**		
(4) Encouraging respect for the host culture;	**X**		
(5) Promoting decisions based on meeting the needs of the present without compromising the needs of future generations;	**X**		

Table 4-1 Hawai'i State Plan Objectives and Policies			
HAWAI'I STATE PLAN, CHAPTER 226, HRS (Key: C = Consistent, I = Inconsistent, N/A = Not Applicable)	**C**	**I**	**N/A**
(6) Considering the principles of the ahupua'a system; and	**X**		
(7) Emphasizing that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawai'i	**X**		
Discussion: The Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua. La'i 'Ōpua values the natural resources of the area and one of the community's visions includes self-sufficiency and increasing and conserving water resources is considered pivotal for the community's continued success. Further, the Proposed Action is a long-planned initiative intended to sustainably balance the needs of La'i 'Ōpua and the greater Kona District within the limits of the region's water resources. Thus, the Proposed Action is consistent with the provisions of the Hawai'i State Plan.			

4.2.3 The State Environmental Policy (HRS §344)

HRS §344 establishes an environmental policy that (1) encourages productive and enjoyable harmony between people and their environment, (2) promotes efforts that will prevent or eliminate damage to the environment and biosphere, (3) stimulates the health and welfare of humanity, and (4) enriches the understanding of the ecological systems and natural resources important to the people of Hawai'i.

HRS §344-3(1) states it shall be the policy of the State, through its programs, authorities, and resources to:

> *Conserve the natural resources, so that land, water, mineral, visual, air and other natural resources are protected by controlling pollution, by preserving or augmenting natural resources, and by safeguarding the State's unique natural environmental characteristics in a manner which will foster and promote the general welfare, create and maintain conditions under which humanity and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of the people of Hawai'i.*

Discussion:

The Proposed Action would require a maximum daily limit of 2 mgd of groundwater, which is within the long-term sustainable yield for the region's aquifer system. Thus, it would not detrimentally effect water resources in the North Kona District. Further, the Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua, which would allow DHHL to develop and deliver more lands and homes to native Hawaiian families fulfilling the social, economic and other requirements of the people of Hawai'i. Mitigation measures discussed throughout Chapter 3 would be implemented to avoid or eliminate impacts to the resources affected. Therefore, the Proposed Action is consistent with the purpose and objectives established by HRS §344.

4.2.4 The Hawai'i State Water Code (HRS §174C)

The State Water Code, HRS §174C, was enacted to protect Hawai'i's water resources. It is intended to address problems of water supply and conservation, and establishes the Hawai'i Water Plan as the guide for implementing this policy. The Hawai'i Water Plan consists of five constituent parts:

1. Water Resource Protection Plan: The plan is prepared by the CWRM and serves to protect and sustain statewide ground-and surface-water resources, watersheds, and natural stream environments.
2. State Water Projects Plan: The plan is prepared by the DLNR Engineering Division and provides a framework for planning and implementing water development programs to meet projected water demands for state projects.
3. Water Quality Plan: The plan is prepared by the DOH and serves to protect public health and sensitive ecological systems by preserving, protecting, restoring and enhancing the quality of ground and surface waters throughout the state.
4. Agricultural Water Use and Development Plan: The plan is prepared by the State Department of Agriculture and develops a long-range management plan that assesses state and private agricultural water use, supply and irrigation systems.
5. County Water Use and Development Plans: These plans are prepared separately by each county. They set forth the allocation of water based on proposed land uses to meet projected county-specific demands.

Discussion:

The most relevant of the Hawai'i Water Plan's five constituent plans to the Proposed Action are the Water Resource Protection Plan Update (2019), State Water Projects Plan Update (2020), and the Hawai'i Water Use and Development Plan Update—Keauhou Aquifer System (2017).

The Water Resource Protection Plan Update (2019) inventoried water resources of the State to determine their sustainable yields based on available data and recommend means of conserving and augmenting these resources. The Proposed Action is anticipated to require a maximum daily limit of 2 mgd. This is within the long-term sustainable yield for the Keauhou Aquifer System, which is not classified a Groundwater Management Area. Further, mitigation measures discussed in Section 3.4.7 would be implemented to ensure the Proposed Action does not create any adverse impacts on water resources.

The Proposed Action is intended to develop a new potable water source for the development of La'i 'Ōpua and the projected requirements are accounted for within the State Water Projects Plan Update (2020). The Proposed Action does not directly or indirectly impact other proposed State projects, but it would positively impact the resiliency of the North Kona Water System by creating a redundant source of water in case of pump failures at other nearby wells.

The County of Hawai'i, Water Use and Development Plan Update (2010) implemented a broad, uniform island-wide approach to evaluate conservatively the County's land use policies set forth in the County General Plan and Zoning Code. The plan provides scenarios for low, medium and high growth rates and estimated public water needs for the island for years in the future. The update identified two aquifer sectors to be considered for further evaluation and detailed assessment. One of the sectors identified was the Hualālai Aquifer Sector, Keauhou Aquifer System which would be directly impacted by the Proposed Action.

Per CWRM, the update consisted of two phases. Phase I refined the plan's water demand scenarios and projections. Phase II created source development strategies and scenarios; addressed how proposed source strategies may impact cultural uses and rights or other public trust purposes; and identified appropriate mitigation measures for potential impacts or alternative strategies. The Hawai'i Water Use and Development Plan Update—Keauhou Aquifer System (2017) combines the findings of the two phases into a single plan.

As discussed in Section 3.4, the Proposed Action is consistent with the Hawai'i Water Use and Development Plan Update—Keauhou Aquifer System (2017) plan. The maximum daily amount is accounted for in the plan's refined water demand scenarios and projections and would not adversely impact groundwater resources within the Keauhou Aquifer System. Nor would it adversely affect in any way cultural uses and rights or other public trust purposes. Instead, it would help facilitate the development of La'i 'Ōpua, which is designed to promote cultural education, self-sufficiency, and provide additional homesteading opportunities for more native Hawaiian families. Thus, the Proposed Action is consistent with the Hawai'i Water Plan and HRS §174C.

4.3 DEPARTMENT OF HAWAIIAN HOME LANDS (DHHL) PLANS

DHHL's planning system includes three tiers. The first tier (Tier 1) is the General Plan, which identifies statewide goals and policies to guide land management and programs. Tier 2 includes Strategic Program Plans, which focus on statewide programs and policies, as well as Island Plans with longer-term, island-specific land use goals based on the General Plan. Tier 3 includes Regional Plans and Area Development Plans, which identify and address issues and opportunities relative to existing homestead communities and future development in that region.

4.3.1 DHHL General Plan

The DHHL General Plan Update was adopted in 2022 as an update of the DHHL General Plan, which was initially adopted in 2002. The DHHL General Plan sets the vision and establishes goals and policies to guide the discussions and decision-making of the Hawaiian Homes Commission and the DHHL plans, programs, and policies for the next 20 years, taking the Trust to the planning horizon of 2040. The DHHL General Plan Update includes seven (7) priority topic areas under which goals, policies and monitoring and evaluation metrics are identified. The priority topic areas include:

- Land Use and Water Resources
- Infrastructure
- Housing
- Food Production
- Healthy Communities
- Natural and Cultural Resource Management
- Revenue Generation and Economic Development

The following section includes discussion of the Proposed Action's consistency with applicable goals and policies in the DHHL General Plan Update:

Goal WR-1: Implement water planning and management strategies that meet current needs and protect water resources for the future.

Policy:

- **WR-1A:** Implement the goals and policies from the DHHL Water Policy Plan.
- **WR-1B:** Incorporate watershed protection, water conservation, and recharge considerations in the use of groundwater and other water resources.

Goal IN-1: Provide and maintain infrastructure for homestead communities within resource limitations.

Policy:

- **IN-1A:** Design infrastructure to County standards and transfer systems to the Counties whenever possible for development within Residential, Commercial, and Industrial areas.
- **IN-1B:** Establish agreements with the Counties around infrastructure standards and licensing processes on Trust lands.

Discussion:

As discussed in Section 1.3 the Proposed Action is based on the need for additional water sources to service DHHL's planned future homestead development at La'i 'Ōpua. The Proposed Action would develop the additional water sources needed, while falling within the approved water reservations in the Keauhou Aquifer System Area in alignment with the goals and policies of the DHHL General Plan and HHC Water Policy Plan. DHHL will also be developing the wells and transmission lines up to County standards in order to dedicate the infrastructure to the County and obtain additional water credits from the County of Hawai'i.

4.3.2 Hawaiian Homes Commission Water Policy Plan

Program Plans fall under the second tier of DHHL's planning system and are statewide plans that inform or carry out general plan policies and priorities for specific functional areas, including water resource management. In 2014, the Hawaiian Homes Commission adopted the first policy on managing the water kuleana of DHHL since the passage of the Hawaiian Homes Commission Act. The Water Policy Plan's includes the following vision:

Our vision is that there will be adequate amounts of water and supporting infrastructure so that homestead lands will always be usable and accessible, to enable us to return to our lands to fully support our self-sufficiency and self-determination in the administration of the Hawaiian Homes Commission Act (HHCA), and the preservation of our values, traditions, and culture.

To achieve this, the Water Policy Plan establishes four priority goals:

1. Affirmatively communicate with beneficiaries regarding water decisions, performance, and water rights on a regional and annual basis.
2. Aggressively, proactively, consistently, and comprehensively advocate for the kuleana of the beneficiaries, DHHL, and HHC to water before all relevant agencies and entities.
3. Develop and manage a Water Assets Inventory (WAI).
4. Support watershed protection and restoration on DHHL lands and source areas for DHHL water.

Discussion:

The Proposed Action aligns with the vision and priority goals of the HHC Water Policy Plan. Primarily, the Proposed Action supports the vision of providing adequate water and supporting infrastructure to enable native Hawaiian beneficiaries to return to Hawaiian home lands in La'i 'Ōpua. Furthermore, by securing additional water supply sources and water credits needed for future residential, community and commercial uses, the Proposed Action is demonstrating DHHL's commitment to advocating for beneficiaries, DHHL and HHC water rights in coordination with CWRM and the County of Hawai'i Department of Water. The Proposed Action is included in the Hawai'i County Water Use

and Development Plan update (2017) and within the sustainable yield of the area's underlying the Keauhou Aquifer System Area as approved by CWRM. Without the Proposed Action, DHHL will not have any water credits available from the County DWS to develop additional homesteading in the North Kona region.

4.3.3 Hawai'i Island Plan

Island Plans also are included under the second tier of DHHL's planning system. The Hawai'i Island Plan was last updated in 2002 and provides DHHL with a comprehensive assessment of its lands on Hawai'i Island and aims to assess and recommend future uses for Hawaiian home lands on Hawai'i Island. The plan is organized by regions and identifies DHHL land tracts within those regions for priority development. The Proposed Action is located in the West Hawai'i Region and would provide water service to the high priority residential development of Kealakehe.

Discussion

The DHHL Hawai'i Island Plan designated development of the residential land holdings within the Villages of La'i 'Ōpua as a priority and the Proposed Action will support this by developing the water resources and connect to infrastructure necessary to develop homesteads and other DHHL lands in the region.

4.3.4 Kealakehe- La'i 'Ōpua Regional Plan

The third tier of the DHHL planning system includes Regional Plans, which assess land use development factors, identify issues and opportunities, and identify the region's top priority projects slated for implementation within the next five years. The Kealakehe-La'i 'Ōpua Regional Plan update was approved by HHC in 2020, which updates the previous 2009 Regional Plan. The *North Kona Water Source Development and Storage* priority project is included in the 2020 Regional Plan Update and includes four objectives:

- Develop additional water supply from sources within the region. In order to meet the various needs of the community, additional water credits must be secured for the desired expansion of the region. DHHL currently has enough water credits to complete its on-going development projects in the area (Village 4 'Ākau and Hema). In order to achieve the community's vision for the region, DHHL will need to secure additional water credits to support these development projects.
- Support Community Economic Development Projects. DHHL has identified lands that would be suitable for commercial uses in order to increase the economic self-sufficiency of the homesteads within the region. In order for these lands to be utilized for economic development projects, there must be appropriate allocation of water credits for these projects. As DHHL currently does not have any additional water credits available for development projects within this region, it is important that DHHL pursue actions to secure additional water credits to support these potential development projects.
- Build more homes for beneficiaries. DHHL has enough water credits to complete the Village 4 'Ākau and Hema developments. The remaining Villages illustrated in the Villages of La'i 'Ōpua Master Plan do not currently have water credits available for development. The community identifies providing additional homesteading opportunities for more native Hawaiian families in the Kealakehe-La´i ´Ōpua region as a priority in the vision for the region. In order for DHHL and the community to reach this vision, DHHL must secure additional water credits to support these developments.

- Develop Community Facilities to support the homesteads. Recent community input has identified a concern that a vibrant and thriving community requires more than just homes and infrastructure. The community wants to ensure that area for parks and recreation are included in the desired expansion of the region. In order to provide appropriate recreational spaces for the community, DHHL must secure additional water credits to support these needs. The Implementation Action Steps identified below concentrate on actions needed to develop wells on the property of the two private landowners.

Discussion:

The Proposed Action is consistent with the Kealakehe-Laʻi ʻŌpua Regional Plan. The Proposed Action is included as a priority project and as such implementation of the project directly aligns with the vision and objectives of the Regional Plan.

4.4 COUNTY OF HAWAIʻI PLANS AND POLICIES

4.4.1 County of Hawaiʻi General Plan

The County of Hawaiʻi General Plan (General Plan) is the County's long-range comprehensive plan that guides the pattern of future developments for the island. It provides a sound growth strategy that directs future opportunities related to land use, zoning amendments and capital expenditures. The General Plan was last updated and adopted by ordinance in 2005, and is organized into 13 elements, with policies, objectives, standards and principles for each element. The County of Hawaiʻi is in the process of updating the General Plan through 2045, and the revised version the Draft General Plan 2045 was released for public comment in September 2023. The public comment period closed, however the Final Revised General Plan Update is still pending final approval from the County Council. As such, the Proposed Action must address its consistency with the current 2005 amended version of the County of Hawaiʻi General Plan. Table 4-2 assesses the Proposed Action's consistency with relevant goals and policies of the presently adopted General Plan.

Table 4-2: Proposed Action's Conformance to the General Plan

Policy Description	
Economic	
Goal (b)	Economic development and improvement shall be in balance with the physical, social, and cultural environments of the island of Hawaiʻi.
Goal (c)	Strive for diversity and stability in the economic system.
Environmental Quality	
Goal (b)	Maintain and, if feasible, improve the existing environmental quality of the island.
Goal (c)	Control pollution.
Policy (a)	Take positive action to further maintain the quality of the environment.
Policy (c)	Advise the public of environmental conditions and research undertaken on the island's environment.

Policy Description	
Flooding and Other Natural Hazards	
Goal (e)	Reduce surface water and sediment runoff.
Policy (q)	Consider natural hazards in all land use planning and permitting.
Historic Sites	
Policy (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.
Policy (g)	Collect and distribute historic sites information of public interest and keep an inventory of sites.
Policy (h)	Aid in the development of a program of public education concerning historic sites.
Public Utilities – Water	
Policy (a)	Water system improvements shall correlate with the County's desired land use development pattern.
Policy (b)	All water systems shall be designed and built to Department of Water Supply standards.
Policy (c)	Improve and replace inadequate systems.
Policy (d)	Water sources shall be adequately protected to prevent depletion and contamination from natural and man-made occurrences or events.
Policy (e)	Water system improvements should be first installed in areas that have established needs and characteristics, such as occupied dwellings, agricultural operations and other uses, or in areas adjacent to them if there is need for urban expansion.
Policy (f)	A coordinated effort by County, State and private interests shall be developed to identify sources of additional water supply and be implemented to ensure the development of sufficient quantities of water for existing and future needs of high growth areas and agricultural production.
Policy (k)	Promote the use of ground water sources to meet State Department of Health water quality standards.
Land Use – Agriculture	
Policy (i)	Designate, protect and maintain important agricultural lands from urban encroachment.
Policy (j)	Ensure that development of important agricultural land be primarily for agricultural use.

The General Plan identifies actions to implement these policies in the North Kona District and specifically directs DWS to:

- Continue to pursue groundwater source investigation, exploration, and development in areas that would provide for anticipated growth and that would provide for an efficient and economic system operation.

Discussion:

As discussed in Section 1.5, the Proposed Action will construct two new potable water wells and ancillary improvements that will provide the DWS North Kona Water System with a new source of drinking water. The construction of the wells will have little direct impact on the General Plan's goals and policies, however, the secondary impacts from creating a new water source may provide new opportunities for economic development for the County, specifically in the La'i 'Ōpua development, where the native Hawaiian population may stand to benefit.

Prior to the construction of the Proposed Action, BMPs will be implemented to protect the environment from drainage, runoff, and noise, which includes applying for NPDES, noise, and grading, grubbing and stockpiling permits. An LRFI, cultural impact assessment, flora and fauna surveys were conducted in addition to the Division of Forestry and Wildlife (DOFAW) and SHPD being consulted with in preparation of this EA. Thus, the Proposed Action is consistent with the General Plan.

4.4.2 The Kona Community Development Plan – Amended 2019

The Kona Community Development Plan (CDP) was adopted by the County in September 2008 and amended in 2019. It expands on the broad development patterns set out in the General Plan and provides goals and actions for public facilities, infrastructure, and community services. The vision of the CDP is "a more sustainable Kona characterized by a deep respect for the culture and the environment and residents that responsively and responsibly accommodate change through an active and collaborative community."

Discussion:

The Proposed Action will be incorporated into the North Kona Water System and as a utility will support the planned growth of Kona as provided in the County's General Plan Land Use Allocation Pattern Guide and the Kona CDP's Official Kona Land Use Map. The Proposed Action is intended to develop a water source for the future development of La'i 'Ōpua, which is located within the Kona Urban Area where the CDP directs Kona's future development. Therefore, the Proposed Action is consistent and actively supports the CDP.

5.0 FINDINGS AND DETERMINATION

As a requirement of HAR §11-200.1-18 (2019), this chapter provides a description of the proposing agency's anticipated determination for the Project, including findings and reasons supporting the determination.

5.1 ANTICIPATED DETERMINATION

The proposing agency's analysis of the Proposed Action's primary, secondary, cumulative, and short and long-term effects on the environment would result in a determination of either: 1.) the action would have a significant impact on the environment and an Environmental Impact Statement Preparation Notice should be issued, or 2.) the action would not have a significant impact on the environment warranting a Finding of No Significant Impact (FONSI).

To support an anticipated determination, the project's effects on the environment are discussed in relation to the 13 Significance Criteria prescribed under the State Department of Health's Administrative Rules Title 11, Chapter 200.1. The results of the assessments conducted in the following Section 5.2 determine that the proposed project should not have a substantial adverse effect on the surrounding environment.

As a result, the Proposing Agency's anticipated determination is that the Proposed Action would not have a significant impact on the environment based on the criteria set forth in HAR §11-200.1-13, and therefore, through its review and evaluation of the overall impacts discussed in the DEA finds an anticipated FONSI determination is proposed for this Project.

5.2 SIGNIFICANCE CRITERIA FINDINGS

Potential impacts of the Proposed Action have been evaluated in accordance with the 13 significance criteria, pursuant to HAR §11-200.1-13. The following findings and reasons indicate that the Proposed Action will have no significant adverse impacts on the environment, and as a result, supports a Finding of No Significant Impact (FONSI) determination.

(1) Irrevocably commits a natural, cultural, or historic resource.

The Proposed Action would not irrevocably commit a natural, cultural, or historic resource. It is consistent with existing conditions and the surrounding environment and would not adversely affect the Keauhou Aquifer System Area (KASA) that services the North Kona region as discussed in Section 3.4.7. Contractors will adhere to mitigation measures described in Section 3.5.3 to avoid any potential impacts to federal- or state-listed species should they occur at the Project Site.

HRS §6E consultation with SHPD has been initiated by DHHL and will be completed prior to the start of construction. Mitigation measures discussed in Section 3.6.4 and any proposed by SHPD would be implemented to avoid or minimize impacts to any cultural resources or historic properties identified in the Project Site.

(2) Curtail the range of beneficial uses of the environment.

The Proposed Action would not curtail the range of beneficial uses of the environment. The wells will be sited in an area within the Project Site that produces the least amount of impacts on the site's environment. While it will result in reducing the amount of groundwater available within the KASA, the extraction rate would not cause the aquifer to exceed its sustainable yield as discussed in Sections

3.4.7. Nor would the Proposed Action contribute cumulatively to long-term adverse impacts on the KASA, as discussed in Section 3.14.2.

(3) Conflict with the State's environmental policies or long-term environmental goals established by law.

The Proposed Action would not conflict with the State's environmental policies or long-term environmental goals established by law as discussed in Chapter 4 Federal, State, and County Land Use and Environmental Policies and Permits Required. BMPs and other mitigation measures discussed throughout Chapter 3 would be implemented to avoid or minimize potential impacts associated with the Proposed Action during its construction and operation.

(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.

The Proposed Action would not have direct substantial adverse effects on the economic welfare, social welfare or cultural practices of the community and State. It would create secondary positive impacts on the State's social and economic welfare by establishing a new potable water source for the development of La'i 'Ōpua. This would allow DHHL to provide over 1,000 single family homes, 300 multi-family units, multiple park spaces, a hospital, and commercial centers for native Hawaiian families. Thus, creating a long-term positive effect on the economic and social welfare of the community and State. However, these positive impacts would not be substantial enough to have a direct effect on the level of commerce in Kailua-Kona, the primary commerce center for the region.

The Proposed Action would not substantially impact traditional cultural practices. As discussed in Section 3.7, there are no traditional cultural properties onsite but there are cultural practices and associated resources in the vicinity of the Project Site. Mitigation measures discussed in Section 3.7.2 would be implemented to avoid or reduce any potential impacts to cultural or historic resources that may occur and protect the exercise of traditional and customary native Hawaiian rights in the Project Site.

(5) Have a substantial adverse effect on public health.

The Proposed Action would not have a substantial adverse effect on public health. A Well Construction and Pump Implementation Permit will be obtained for the Proposed Action prior to construction. An engineering report will be submitted to and approved by the DOH CWB before placing the Proposed Action online within the DWS's North Kona Water System. The report will identify all potential sources of contamination, evaluate alternative controls which could be implemented to reduce or eliminate contamination potential, and include a water quality analysis for all regulated contaminants.

Short-term impacts to noise levels and air quality would be minimized by phasing construction of the wells and implementing BMPs to maintain compliance with applicable County and State policies and regulations as discussed in Sections 3.10.2 and 3.8.2, respectively.

(6) Involve adverse secondary impacts, such as population changes or effects on public facilities.

The Proposed Action would not result in adverse secondary impacts to the social environment or on public facilities. The Proposed Action would facilitate the development of La'i 'Ōpua with approximately 1,000 single family homes and 300 multi-family units for DHHL beneficiaries. This would result in secondary impacts such as potentially increasing the population within the Kealakehe Census Tract, which contains La'i 'Ōpua.

As discussed within the Kealakehe-La'i 'Ōpua Regional Plan , the areas proposed for La'i 'Ōpua are consistent with the State Land Use Districts, County General Plan designations, and County Zoning

Code. Where there may be land use inconsistencies, DHHL may preempt these pursuant to Hawaiian Homes Commission Act Section 204. Further, the areas are located within the North Kona CDP's Urban Area, where the CDP directs Kona's future growth. Therefore, secondary population change associated with the Proposed Action would be the result of planned and orderly development consistent with land use planning policies and ordinances.

The Proposed Action would positively affect the North Kona Water System by creating a redundant water source in case of pump failures at other nearby wells and would not impact other public facilities. As discussed in Section 3.14.1.4, the future development of Laʻi ʻŌpua would not adversely affect public facilities and infrastructure.

(7) Involve a substantial degradation of environmental quality.

The Proposed Action would not degrade environmental quality at the Project Site or surrounding area. The wells will be sited within the Project Site in an area that produces the least amount of impacts. Mitigation measures proposed throughout Chapter 3 would be implemented to avoid or minimize impacts on the site's environment.

While the Proposed Action will result in reducing the amount of groundwater available within the KASA, the extraction rate would not cause the aquifer to exceed its sustainable yield as discussed in Section 3.4.7. Nor would it contribute cumulatively to long-term adverse impacts on the KASA as discussed in Section 3.14.2.

(8) Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions.

The Proposed Action will not contribute cumulatively to substantial adverse effects upon the environment, as discussed in Section 3.14.2. While the Proposed Action is intended to develop a new water source that would result in the future development of Laʻi ʻŌpua, one third of the resulting groundwater would be used by the DWS for municipal uses in the North Kona Water System. Additionally, water use within Laʻi ʻŌpua has been accounted for in the Hawaiʻi Water Plan as discussed in Section 6.2.4. Thus, the Proposed Action would facilitate but does not involve a commitment for larger actions.

(9) Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.

The Proposed Action would not have a substantial adverse effect on rare, threatened, or endangered species or their habitats. No critical habitat occurs within the Project Site, and mitigation measures and BMPs discussed in Section 3.5.3 would be implemented during construction and operation of the Proposed Action to minimize impacts to species observed or with the potential to occur at the Project Site.

(10) Have a substantial adverse effect on air or water quality or ambient noise levels.

The Proposed Action would not have a substantial adverse effect on air or water quality or ambient noise levels. The Proposed Action will be constructed over two phases and a Well Construction and Pump Installation Permit will be obtained prior to construction. During Phase I, a single exploratory well will be drilled and then tested to ensure its water quality meets HAR §11-20-29 Rules Relating to Public Water Systems standards. If the quality and quantity of sampled water are satisfactory, then the Proposed Action will proceed to Phase II. Additional mitigation measures discussed in Section 3.4.7 would be implemented to avoid impacts on water quality during construction and operation of the Proposed Action.

Short-term impacts to noise levels and air quality would be minimized by phasing construction of the wells, implementing BMPs and obtaining a Community Noise Permit and Noise Variant Permit, if

applicable, to maintain compliance with relevant County and State policies and regulations as discussed in Sections 3.10.2 and 3.8.2, respectively.

(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.

As discussed in Sections 3.3, 3.4 and 3.12, the Proposed Action will not have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive or naturally hazardous area. The Project Site is located approximately 2.6 miles inland, outside the coastal zone, sea level rise exposure area and tsunami zone. While Waiʻaha Stream passes through the Project Site, the wells will be sited in a location away from the stream in an area that produces the least amount of ground disturbance and outside the SFHA designated within the site. Although the proximity to Waiʻaha Stream may pose a risk of flooding during extreme events, no substantial risk is anticipated under normal conditions.

The entire island of Hawaiʻi, including the Project Site, is located within the International Building Code (IBC) Seismic Zone 4 which have the highest potential for seismic induced ground movement. Therefore, the Proposed Action will comply with IBC Seismic Zone 4 building standards to reduce potential impacts created by earthquakes or seismic induced ground disturbances.

(12) Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in County or State plans or studies.

The Proposed Action would not have a substantial adverse effect on scenic vistas or viewplanes surrounding the Project Site. As discussed in Section 3.7, the Project Site is not in or near visually sensitive areas or areas of high scenic value. The tallest feature of the Proposed Action is approximately 40 feet in height and would be surrounded by rows of coffee trees limiting its visibility mauka of the Project Site

(13) Require substantial energy consumption or emit substantial greenhouse gases.

The Proposed Action will not require substantial amounts of energy during construction or operation, nor will it emit substantial amounts of greenhouse gases. As discussed in Section 3.12.6, the Proposed Action may require between 537 and 4,540 kWh per day of operation which is anticipated to be within HELCO's capacity without adversely affecting service to other customers. Assuming 43 percent of this energy requirement is provided by renewable sources, the Proposed Action could potentially generate between 107 and 908 metric tons of C02 per year. This is close to the same amount as powering between 14 and 121 single-family homes during that same timeframe. However, this amount of C02 per year will likely be reduced over time as the county continues transitioning to a renewable energy resource portfolio standard to reach "net-negative" by 2045. Thus, the Proposed Action may generate little to no C02 within the project's lifespan.

6.0 AGENCIES AND ORGANIZATIONS CONSULTED

As a requirement of HAR §11-200.1-18 (2019), this chapter identifies agencies, citizen groups, and individuals solicited in the preparation of the Draft EA. Consultation with various government agencies, officials, and community members were undertaken to obtain information on agency requirements and comments about potential community issues so that they could be addressed in this Draft EA. Consultation involved distributing a pre-assessment consultation letter with supporting documentation to various parties requesting their written comments. A listing of those parties consulted is below and those providing written responses have been identified with an "✓" symbol. Copies of written comments received and responses to these comments are included in **Appendix F.**

Federal Agencies

- ✓ U.S. Fish and Wildlife Service
- ✓ National Parks Service
- United States Department of Agriculture – Rural Development

State Legislature

- State Senate District 3, Senator Dru Mamo
- State House District 6, Representative Nicole E. Lowen

State Agencies

- Department of Agriculture
- Department of Business, Economic Development & Tourism
- Office of the Hawaiian Affairs
- Office of the Governor – West Hawai'i Representative
- Department of Health (DOH) – Office of the Director
- DOH Office of Environmental Quality Control
- Department of Land and Natural Resources (DLNR) – Board of Land and Natural Resources
- Department of Agriculture
- ✓ DLNR Commission on Water Resource Management
- DLNR State Historic Preservation Division – Adminstrator
- DLNR State Historic Preservation Division – Hawai'i Island Burial Council
- DLNR Po'o o Moku Keawe
- DLNR Division of Forestry and Wildlife

County Agencies

- County of Hawai'i Council
- Planning Department
- Department of Public Works
- Department of Water Supply
- ✓ Hawai'i County Police Department
- Hawai'i County Fire Department

Other Interested Parties

- La'i 'Ōpua Community Association
- Hawai'i Gas
- ✓ Hawaiian Electric Company
- Hawaiian Telecom
- Spectrum / Charter Communications

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8.0 LIST OF PREPARERS

The following is a list of BCH Design, a Bowers + Kubota Consulting staff who contributed in the development of this EA.

Name	Role	Years of Experience	Still With Company
Jared Chang	Planning Group Manager	18	Yes
Malachi Krishok	Planning Project Manager	9	Yes
Allen Kam	Planning Department Senior Manager	24	No
Matthew Kodama	Assistant Project Manager—Secondary Author	11	No
Sarah Harris	Senior Planner –Primary Author	9	No
Umeyo Momotaro	Planner—Support Staff	4	No
Veronica Leon	Assistant Planner—Support Staff	2	No
Ryan Andersen	Assistant Planner—Support Staff	1	No

APPENDICES

APPENDIX A

Flora and Fauna Survey Report

Gianulias Property Flora and Fauna Survey Report

FEBRUARY 4, 2019

PREPARED FOR

Belt Collins Hawaii LLC

PREPARED BY

SWCA Environmental Consultants

GIANULIAS PROPERTY
FLORA AND FAUNA SURVEY REPORT

Prepared for

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SWCA Project No. 49757.00

February 4, 2019

EXECUTIVE SUMMARY

Belt Collins Hawaii LLC requested that SWCA Environmental Consultants (SWCA) conduct a terrestrial flora and fauna biological resources survey for the proposed Gianulias property well site in North Kona, on the island of Hawai‘i.

This report summarizes the findings of the biological resources survey conducted for the project by SWCA Botanist Alex Lau and SWCA Wildlife Biologist James Breeden on December 6, 2018. The flora and fauna survey area is approximately 5 acres of a larger 130-acre property (TMK (3)-7-5-014-001) located in the town of Holualoa. All vascular plant species (and their relative abundance), vegetation types, and wildlife species were recorded.

The vegetation types and plant species identified during the survey are not considered unique. A total of 52 plant species were recorded. Only one indigenous plant species observed— kūkaepua‘a (*Digitaria setigera*) is considered common. Two of the species found—ti (*Cordyline fruticosa*), and coconut (*Cocos nucifera*) — were introduced by Polynesians prior to European contact. One of the species found—yellow wood sorrel (*Oxalis corniculata*)—was introduced, or possibly introduced, by Polynesians prior to European contact (Wagner et al. 1999). These species are not considered rare and are not federally or state-listed as threatened or endangered species, species proposed for listing, or candidate species. No federally or state-listed endangered plant species were observed in or near the survey area. Therefore, the proposed project is not expected to have a significant, adverse effect on terrestrial vegetation.

No federally or state-listed endangered birds were observed in the survey area. Thirteen bird species in total were observed in the survey area; only one of the bird species was native, and the rest are common, non-native introduced species. Four of the species—Hawaiian hawk (*Buteo solitarius*)—Cattle egret (*Bubulcus ibis*)—House finch (*Haemorhous mexicanus*) — and the northern cardinal (*Cardinalis*)—are protected under the Migratory Bird Treaty Act. No federally or state-listed endangered wildlife species were observed in or near the survey area; however, potential roosting trees for the Hawaiian hoary bat (*Lasiurus cinereus semotus*), a federally and state-listed endangered mammal, exist in the surrounding areas but were not recorded during the survey. Mitigation recommendations to address potential roosting habitat are outlined in the report. The survey area does not overlap critical habitat of any listed terrestrial faunal species. For these reasons, the proposed project is not expected to have a significant, adverse effect on terrestrial wildlife.

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Appendices

Figures

Tables

1 INTRODUCTION

Belt Collins Hawaii requested that SWCA Environmental Consultants (SWCA) conduct a terrestrial flora and fauna biological resources survey for the proposed well site at the Gianulias property in North Kona on the Island of Hawai‘i. The proposed project by the Department of Hawaiian Home Lands (DHHL) is a potential water source development site to provide water for North Kona residents.

This report summarizes the findings of the flora and fauna survey conducted for the project by SWCA Botanist Alex Lau and Wildlife Biologist James Breeden on December 6, 2018. The flora and fauna survey area is 5 acres on an agricultural property off Māmalahoa Highway.

2 DESCRIPTION OF THE SURVEY AREA

The survey area is on the west end of the island of Hawaii, on Māmalahoa Highway in the town of Holualoa. The flora and fauna survey focused on a 5-acre area within a larger 130-acre agricultural property Tax Map Key (TMK) (3)-7-5-014-001 (Figure 1). The property consists primarily of cultivated coffee fields and landscaped vegetation. The survey area is private agricultural land currently being farmed for coffee production. Decades of coffee production has altered the landscape and replaced the natural habitat with coffee fields and landscaping.

Mean annual rainfall for the survey area is approximately 48 inches (1,225 millimeters [mm]). Rainfall is typically highest in August and September and lowest in July (Giambelluca et al. 2013).

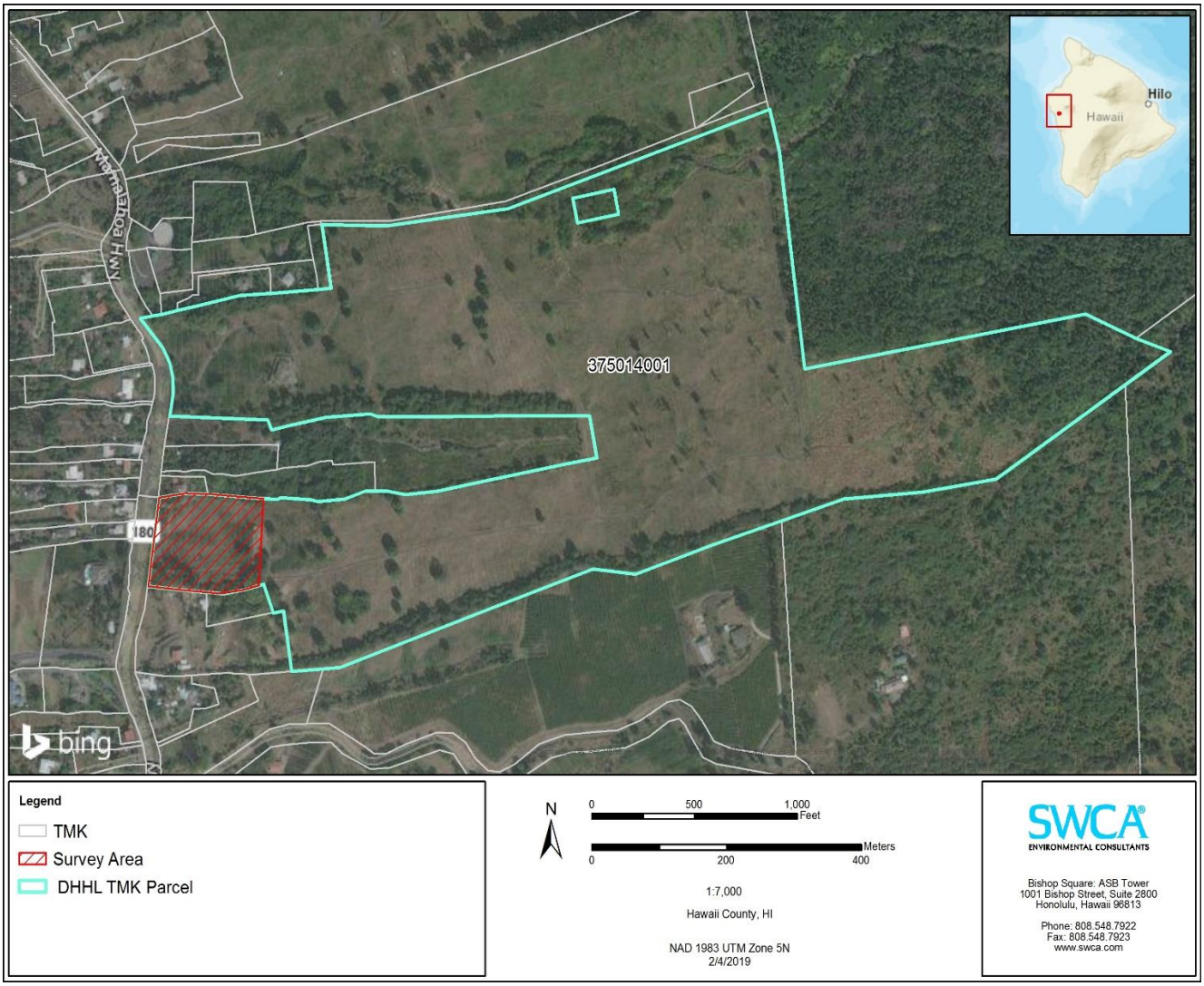

Figure 1. Survey area.

3 METHODS

SWCA reviewed available scientific and technical literature regarding natural resources in and near the survey area. This literature review encompassed a thorough search of referenced scientific journals, technical journals and reports, environmental assessments, environmental impact statements, relevant government documents, U.S. Fish and Wildlife Service (USFWS) online data, and unpublished data that provide insight into the area's natural history and ecology. SWCA also reviewed available geospatial data, aerial photographs, and topographic maps of survey area.

3.1 Flora

SWCA conducted a pedestrian flora (botanical) survey to document all vascular plant species and vegetation types present in the survey area. Areas more likely to support native plants (e.g., rocky outcrops, gulches, and shady areas) were more intensively examined.

Plants recorded during the survey are indicative of the season (rainy versus dry) and the environmental conditions at the time of the survey. It is likely that additional surveys conducted at a different time of the year would result in minor variations in the species and abundances of plants observed.

3.2 Fauna

Fauna surveys comprised of a meandering pedestrian (foot) ground survey of the survey area. Ground surveys were conducted on December 6, 2018, and consisted of visual observations (aided by 10 × 42–mm binoculars) and auditory vocalization identifications. All birds, mammals, reptiles, amphibians, fish, and invertebrate species seen or heard, and any sign (scat or tracks), were noted. Field surveys for the endangered Hawaiian hoary bat, or ʻopeʻapeʻa (*Lasiurus cinereus semotus*), were conducted by noting areas of suitable foraging and roosting habitat as indicators of potential presence; acoustic surveys were not conducted.

4 RESULTS

4.1 Flora

No federally and state-listed threatened, endangered, or candidate plant species or rare native Hawaiian plant species were observed in the survey area. In all, 52 plant species were recorded in the survey area, one of which is native to the Hawaiian Islands (Appendix A). The native species is kūkaepuaʻa (*Digitaria setigera*), and it is common. Two of the species found—ti (*Cordyline fruticosa*), and coconut (*Cocos nucifera*) — were introduced by Polynesians prior to European contact. One of the species found—yellow wood sorrel (*Oxalis corniculata*)—was introduced, or possibly introduced, by Polynesians prior to European contact (Wagner et al. 1999). Appendix A provides a list of all plant species observed by an SWCA botanist during the December 6, 2018, survey.

The vegetation in the survey area consists of two vegetation types: landscaped vegetation and cultivated fields.

4.1.1 Landscaped Vegetation

Landscaped areas in the survey area consisted primarily of a row of Cuban royal palm (*Roystonea regia*) along the entrance road. These palms are typically 40 feet tall or taller. The understory in this area consisted of herbaceous weedy species such as maile honohono (*Ageratum conyzoides*) and artillery plant (*Pilea microphylla*).

4.1.2 Cultivated Fields

The majority of the survey area consisted of cultivated coffee (*Coffea arabica*). Most of the coffee plants were between 5 and 12 feet tall, maintained in rows. Portions of the site are used for growing papaya (*Carica papaya*). The canopy in these areas is entirely occupied by coffee, with a low-growing understory of diverse herbaceous weeds (Figures 2 and 3), including artillery plant, kūkaepua‘a, maile honohono, and hairy honohono (*Commelina benghalensis*).

Figure 2. Landscaped vegetation.

Figure 3. Cultivated coffee fields.

4.2 Fauna

The fauna observed in the survey area includes species that are endemic, and nonnative introductions. The endemic species often require specific niche habitats and are frequently locally abundant where they occur. The nonnative introduced species tend to be more generalist and often occupy a broad range of habitats.

4.2.1 Avifauna

The birds observed in the survey area are species commonly found in around disturbed areas 3 feet (1 meters[m]) above sea level on the island of Hawai‘i. In all, 13 bird species were documented, four of which are protected by the Migratory Bird Treaty Act (MBTA) (Table 1). Of these 13 species, one species is endemic, and 12 are nonnative introductions (see Table 1). The Hawaiian hawk or Io (*Buteo solitarius*) is a federally and state-listed endangered bird that was detected during ground surveys. One Hawaiian hawk was observed soaring over the survey area, and one Hawaiian hawk was observed flying approximately 10 feet (3.1 meters [m]) above the ground through the survey area. Forage and nest habitat for the Hawaiian goose or nēnē (*Branta sandvicensis*) is present in the survey area. The federally and state-listed species are discussed in more detail in Section 4.2.5.

Table 1. Birds Observed by SWCA in and near the Survey Area

Common Name	Scientific Name	Status*	MBTA-Protected
Cattle egret	*Bubulcus ibis*	NN	X
Common myna	*Acridotheres tristis*	NN	
Feral chicken	*Gallus*	NN	
Hawaiian hawk	*Buteo solitarius*	E	X
House finch	*Haemorhous mexicanus*	NN	X
Japanese white-eye	*Zosterops japonicus*	NN	
Kalij pheasant	*Lophura leucomelanos*	NN	
Northern cardinal	*Cardinalis*	NN	X
Saffron finch	*Sicalis flaveola*	NN	
Spotted dove	*Spilopelia chinensis*	NN	
Wild turkey	*Meleagris gallopavo*	NN	
Yellow-fronted canary	*Crithagra mozambica*	NN	
Zebra dove	*Geopelia striata*	NN	
	Total species	**13**	**4**

* Status: E = endangered and endemic, NN = nonnative permanent resident.

4.2.2 Mammals

The feral pig (*Sus scrofa*) was the only mammal detected during the surveys. No other mammals were observed during the ground surveys, although small Asian mongoose (*Herpestes javanicus*), rat (*Rattus* spp.), and mouse (*Mus musculus*) are expected to occur.

The potential for the presence of Hawaiian hoary bat was assessed based on the presence of suitable habitat and vegetation types; no acoustic survey was conducted. Hawaiian hoary bats forage and roost in pastures, croplands, orchards, forests, and developed lands such as golf courses, urban areas, and suburban yards. Hawaiian hoary bats are solitary and roost in exotic and native woody vegetation. They could forage throughout the survey area and roost in the trees of the survey area's 5 acres. The birthing and pup-rearing season typically occurs between June 1 and September 15. It is common for adult females to leave flightless young unattended in "nursery" trees and shrubs while foraging.

4.2.3 Terrestrial Reptiles and Amphibians

No terrestrial reptiles or amphibians are native to Hawai'i, and no reptiles or amphibians were detected during the surveys.

4.2.4 Insects and Other Invertebrates

Fifteen invertebrate individuals were observed during the survey, and 12 were identified to the genus or species level. All invertebrates observed are non-native introductions. The species observed include: yellow crazy ant (*Anoplolepis gracilipes*), an unidentified black ant, double spotted spiny spider (*Thelacantha brevispina*), honey bee (*Apis* sp.), citrus swallowtail (*Papilio xuthus*), passion butterfly (*Agraulis vanillae*), monarch butterfly (*Danaus plexippus*), cabbage white butterfly (*Pieris rapae*), one unidentified yellow butterfly, one unidentified gray butterfly, aedes mosquito (*Aedes* sp.), common pillbug (*Armadillidium vulgare*), an unidentified black and white wasp (*Vespidae*), Hawaiian garden

spider (*Argiope appensa*), and leaf-footed bug (*Euthochtha* sp.). All are common on the island of Hawai‘i.

4.2.5 Special-Status Fauna

Special-status fauna refers to wildlife species listed by the USFWS and the State of Hawai‘i as threatened, endangered, or candidate. The survey area does not encompass any designated or proposed critical habitat for threatened or endangered fauna species. The following section discusses the special-status species observed in the survey area and the special-status species that have the potential to occur in the survey area based on historical records, and available habitat.

4.2.5.1 HAWAIIAN HAWK

One special-status species—Hawaiian hawk—was detected during the field surveys. One was observed soaring over the survey area, and one was observed flying through the survey area approximately 10 feet (3.1 m) above the ground. The Hawaiian hawk is the only broad-winged hawk that breeds on the Big Island of Hawai‘i (U.S. Fish and Wildlife Service [USFWS] 2012). They can be found from sea level to above 8,990 feet (2,740 m) (Pyle and Pyle 2009). Surveys in 2007 indicated that approximately 3,085 Hawaiian hawks inhabited the Big Island (Gorressen et al. 2008). These hawks construct their nests approximately 2 months before laying eggs, and the nests may be used for several years as the hawks add new material. Nest trees are typically 32.81 to 78.74 feet (10.0–24.0 m) in height, and the nests are typically located 11.48 to 59.06 feet (3.5–18.0 m) above the ground. Nest trees have a diameter at breast height averaging 19.68 inches (50 centimeters [cm]), although some trees with a diameter at breast height of 4.02 inches (10.2 cm) are used. Nests are constructed on stable platforms such as on top of birds-nest ferns (*Asplenium nidus*), in the crotches of tree trunks, on branches 7.87 to 19.67 inches (20–50 cm) in diameter, and at the intersections of the trunks and branches smaller than 7.87 inches (20 cm) in diameter (Griffin et al. 1998).

4.2.5.2 HAWAIIAN GOOSE

The Hawaiian goose is known to occupy various habitat types ranging from beach strand, shrubland, and grassland to lava rock at elevations ranging from coastal lowlands to alpine areas (Banko 1988; Banko et al. 1999). The Hawaiian goose has an extended breeding season, with eggs reported from all months except May, June, and July, although most of the birds in the wild nest during the rainy (winter) season between October and March (Banko et al. 1999; Kear and Berger 1980). Hawaiian geese nest on the ground in a shallow scrape in the dense shade of a shrub or other vegetation. During molt, adults are flightless for a period of 4 to 6 weeks. Molt occurs after hatching of eggs, such that the adults generally attain their flight feathers at about the same time as their offspring. When flightless, goslings and adults are extremely vulnerable to predators such as dogs, cats, and mongoose. From June to September, family groups join others in post-breeding aggregations (flocks), often far from nesting areas.

4.2.5.3 HAWAIIAN HOARY BAT

Hawaiian hoary bats are known to occur in native, non-native, agricultural, and developed landscapes (U.S. Department of Agriculture 2009; USFWS 1998). Hawaiian hoary bats forage in open, wooded, and linear habitats with a wide range of vegetation types. These animals are insectivores and are regularly observed foraging over streams, reservoirs, and wetlands up to 300 feet (100 m) offshore (U.S. Department of Agriculture 2009). Hawaiian hoary bats typically roost in trees greater than 16 feet (5 m) with dense canopy foliage or in subcanopy when canopy is sparse, with open access for launching into flight (Gorresen et al. 2013; U.S. Department of Agriculture 2009). Hawaiian hoary bats have been documented roosting in avocado (*Persea Americana*) Chinese banyan (*Ficus microcarpa*) trees. These

and trees similar in structure provide suitable Hawaiian hoary bat roost habitat in the landscaped vegetation and cultivated fields vegetation types within the survey area. Suitable Hawaiian hoary bat forage habitat is present, and foraging may occur over the landscaped vegetation and cultivated field vegetation types within the survey area.

5 POTENTIAL IMPACTS

5.1 Hawaiian Hawk

Because nesting was not detected and is unlikely in the survey area, impacts to nesting individuals, chicks, and eggs are unlikely. Foraging hawks may be temporarily displaced from the survey area during construction because of the presence of human noise and activity. However, because the area is residential, it is likely that local hawks are habituated to human noise and may not be greatly affected. The surrounding area provides a relatively large area of homogeneous habitat suitable for Hawaiian hawk foraging. Because of this, it is likely that sufficient prey would be available nearby until construction is completed. After construction, birds are expected to return to the survey area to forage.

5.2 Hawaiian Goose

Direct impacts to the Hawaiian goose could occur during vegetation removal if a nest is damaged or goslings are separated from adults. However, direct impacts are unlikely to occur because conservation measures would be implemented as described in Section 6.2.2.

In the short term, the human noise and disturbance associated with construction activities could temporarily displace the Hawaiian goose from nesting and/or foraging habitats. Displacement from available nesting and/or foraging habitat could impact the health of these individuals; however, because a small amount of foraging habitat would be removed, it would not likely affect nest success or population growth. Furthermore, foraging and nesting habitat is available adjacent to the survey area, into which the Hawaiian goose could move.

5.3 Hawaiian Hoary Bat

Direct effects to bats would occur only if a juvenile bat that is too small to fly but too large to be carried by a parent was present in a tree that was cut down. Construction work will be limited to approximately 1 acre for the installation of a ground water well, and trees may be cut down to make room for the water wells. However, direct impacts are unlikely to occur because conservation measures would be implemented as described in Section 6.2.3.

6 AVOIDANCE AND MINIMIZATION MEASURES

6.1 Flora

Overall, the vegetation in the survey area has been disturbed from previous and current land use activities. The vegetation types and species identified are not considered unique. One of the observed plant species is native to the Hawaiian Islands and is commonly found. No plants listed as threatened or endangered were found during the survey, and no designated plant critical habitat occurs in the area. Therefore, the proposed project is not expected to have a significant adverse effect on flora (botanical) resources.

Weedy, nonnative plant species are common in the survey area. Most of these weedy species are widespread in Hawai‘i, and their control is not expected to result in a significant decrease in their number or distribution. However, construction activities are known to spread invasive species to new areas through the movement of vehicles and materials. For this reason, SWCA recommends the following invasive species minimization measures to avoid the unintentional introduction or transport of new invasive plant species to Hawai‘i Island and/or the survey area:

- All construction equipment and vehicles should be washed and inspected before entering the survey area.
- Construction materials should also be washed and/or visually inspected (as appropriate) for excessive debris, plant materials, and invasive or harmful non-native species (plants, amphibians, reptiles, and insects).
- Inspection and cleaning activities should be conducted at a designated location. The inspector should be a qualified botanist and/or entomologist who is able to identify invasive species that are of concern relevant to the point of origin of the equipment, vehicle, or material.
- When possible, raw materials (e.g., fill and construction materials) should be purchased from a local supplier to avoid introducing non-native species not present on the island.

If landscaping occurs as part of the project, native Hawaiian plants or non-invasive plants should be used to the maximum extent possible. If native plants do not meet landscaping objectives, plants with a low risk of becoming invasive could be substituted. Additional information on selecting appropriate plants for landscaping can be obtained from the following online sources:

- Plant Pono: http://www.plantpono.org/
- Native Plants Hawai‘i: http://nativeplants.hawaii.edu/

6.2 Fauna

Regular on-site staff should be trained to identify special-status species that have the potential to occur on-site and should know the appropriate measures to be taken if they are present. To minimize potential impacts to fauna, measures should be followed, as detailed in the following sections. The measures can also be found at https://www.fws.gov/pacificislands//articles.cfm?id=1494897.

6.2.1 Hawaiian Hawk

- If work must be conducted during the March 1 through September 30 Hawaiian hawk breeding season, have a qualified biologist conduct a nest search of the survey area and surrounding areas immediately prior to the start of construction activities.
- Pre-construction surveys for Hawaiian hawk are valid for 14 days. If disturbance for the survey area does not occur within 14 days of the survey, an additional survey is required.
- No vegetation clearing or construction activities should occur within 1,600 feet of any active Hawaiian hawk nest until the chicks have fledged.
- No trimming or cutting trees containing an active or inactive Hawaiian hawk nest is allowed, as nests may be re-used for consecutive breeding seasons.

6.2.2 Hawaiian Goose

- Hawaiian geese should not be approached, fed, and/or disturbed.
- If Hawaiian geese are observed loafing or foraging within the survey area during the Hawaiian geese breeding season (September through April), a qualified biologist should survey for nests in and around the survey area prior to the resumption of any work. Surveys should be repeated after any subsequent delay of work of 3 or more days.
- If a nest is found within a 150-foot (46-m) radius of proposed work, or a previously undiscovered nest is found within said radius after work begins, all work should cease immediately and the USFWS should be contacted for further guidance.
- In areas where Hawaiian geese are known to occur, speed limits should be posted and implemented, and project personnel should be notified of their presence.

6.2.3 Hawaiian Hoary Bat

- If felling of standing trees occurs during the bat breeding season, direct impacts could occur to juvenile bats that are too small to fly but too large to be carried by a parent. To minimize this impact, no trees taller than 15 feet (4.6 m) should be trimmed or removed between June 1 and September 15.
- The use of barbless wire is recommended for all fence construction to avoid entanglement of Hawaiian hoary bats.

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APPENDIX A

Survey Plant List

Table A-1 provides an inventory checklist of plant species observed by SWCA on December 6, 2018, in the survey area for the Gianulias property flora and fauna survey. The plant names are arranged alphabetically by family and then by species in three groups: dicots, monocots, and pteridophytes. The taxonomy and nomenclature are in accordance with Wagner et al. (1999), Wagner and Herbst (2003), and Staples and Herbst (2005). Recent name changes are those recorded in Wagner et al. (2012).

Table A-1. Checklist of Native Plants Observed in the Survey Area of the Gianulias property proposed well site on December 6, 2018.

Family	Scientific Name and Authorship	Hawaiian and/or Common Name	Status
DICOTS			
Anacardiaceae	*Schinus terebinthifolius* Raddi	Christmas berry, wilelaiki, nani o Hilo (Moloka‘i)	X
Araliaceae	*Schefflera actinophylla* (Endl.) Harms	octopus tree, umbrella tree	X
Asteraceae	*Ageratum conyzoides* L.	maile hohono, maile honohono, maile kula	X
Asteraceae	*Bidens alba* var. *radiata* (Sch.Bip.) Ballard ex Melchert	Spanish needle, beggartick	X
Asteraceae	*Conyza canadensis* var. *pusilla* (Nutt.) Cronquist	horseweed, lani wela, ilioha, ‘awi‘awï, pua mana	X
Asteraceae	*Pseudelephantopus spicatus* (B.Juss. ex Aubl.) C.F.Baker	elephant's-foot	X
Asteraceae	*Sigesbeckia orientalis* L.	small yellow crown-beard	X
Asteraceae	*Synedrella nodiflora* (L.) Gaertn.	nodeweed	X
Begoniaceae	*Begonia hirtella* Link		X
Bignoniaceae	*Jacaranda mimosifolia* D.Don	jacaranda	X
Bignoniaceae	*Pyrostegia venusta* (Ker Gawl.) Miers		X
Bignoniaceae	*Spathodea campanulata* P.Beauv.	African tulip tree, fountain tree	X
Buddlejaceae	*Buddleja asiatica* Lour.	huelo ‘îlio, dog tail, butterfly bush	X
Caricaceae	*Carica papaya* L.	papaya, mïkana, hē‘ï, milikana, papaia, pawpaw	X
Caryophyllaceae	*Drymaria cordata* var. *pacifica* M.Mizush.	pipili, pilipili	X
Convolvulaceae	*Ipomoea alba* L.	moon flower, koali pehu	X
Convolvulaceae	*Ipomoea obscura* (L.) Ker Gawl.	morning glory	X
Euphorbiaceae	*Euphorbia hirta* L.	hairy spurge, garden spurge, koko kahiki	X
Euphorbiaceae	*Phyllanthus tenellus* Roxb.		X
Fabaceae	*Chamaecrista nictitans* subsp. *patellaria* var. *glabrata* (Vogel) H.S.Irwin & Barneby	partridge pea, laukï	X

Family	Scientific Name and Authorship	Hawaiian and/or Common Name	Status
Fabaceae	*Mimosa pudica* var. *unijuga* (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, pua hilahila	X
Fabaceae	*Neonotonia wightii* (Wight & Arn.) Lackey		X
Lamiaceae	*Hyptis pectinata* (L.) Poit.	comb hyptis	X
Lauraceae	*Persea americana* Mill.	avocado, alligator pear	X
Malvaceae	*Sida rhombifolia* L.		X
Melastomataceae	*Clidemia hirta* var. *hirta*	Koster's curse	X
Moraceae	*Ficus microcarpa* L.f.	Chinese banyan, Malayan banyan	X
Myrtaceae	*Psidium guajava* L.	common guava, kuawa, kuawa keʻokeʻo, kuawa lemi, kuawa momona, puawa	X
Oxalidaceae	*Oxalis corniculata* L.	yellow wood sorrel, ʻihi ʻai, ʻihi ʻawa, ʻihi maka ʻula, ʻihi mākole	P?
Passifloraceae	*Passiflora edulis* Sims	passion fruit, purple granadilla, purple water lemon, liliko‘i	X
Plantaginaceae	*Plantago lanceolata* L.	narrow-leaved plantain, English plantain, buckhorn	X
Rosaceae	*Eriobotrya japonica* (Thunb.) Lindl.		X
Rubiaceae	*Coffea arabica* L.	Arabian coffee	X
Rutaceae	*Citrus reticulata* Blanco	Mandarin orange, tangerine	X*
Urticaceae	*Pilea microphylla* (L.) Liebm.	artillery plant, rockweed	X
MONOCOTS			
Agavaceae	*Cordyline fruticosa* (L.) A.Chev.	kï, ti	P
Arecaceae	*Archontophoenix alexandrae* (F.Muell.) H.Wendl. & Drude	king palm	X
Arecaceae	*Cocos nucifera* L.	niu, ololani, coconut	P
Arecaceae	*Livistona chinensis* (Jacq.) R.Br. ex Mart.	Chinese fan palm, fountain palm	X
Arecaceae	*Roystonea regia* (Kunth) O.F.Cook		X
Commelinaceae	*Commelina benghalensis* L.	hairy honohono, dayflower	X
Cyperaceae	*Cyperus rotundus* L.	nut grass, kili‘o‘opu, mau‘u mokae	X
Cyperaceae	*Kyllinga brevifolia* Rottb.	kili‘o‘opu, kaluhā, manunēnē, mau‘u mokae	X
Cyperaceae	*Kyllinga nemoralis* (J.R.Forst. & G.Forst.) Dandy ex Hutch. & Dalziel	kili‘o‘opu, mau‘u mokae	X
Poaceae	*Axonopus compressus* (Sw.) P.Beauv.		X
Poaceae	*Digitaria setigera* Roth	kūkaepua‘a, mau‘u kūkaepua‘a, itchy crabgrass	I

Family	Scientific Name and Authorship	Hawaiian and/or Common Name	Status
Poaceae	*Eleusine indica* (L.) Gaertn.	wiregrass, mānienie aliʻi	X
Poaceae	*Urochloa maxima* (Jacq.) R.D.Webster	Guinea grass	X
PTERIDOPHYTES			
Nephrolepidaceae	*Nephrolepis brownii* (Desv.) Hovenkamp & Miyam.		X
Polypodiaceae	*Phlebodium aureum* (L.) J.Sm.	laua'e haole, rabbit's-foot fern, golden polypody	X
Pteridaceae	*Pityrogramma calomelanos* (L.) Link	silverfern, silverback fern	X
Pteridaceae	*Pteris vittata* L.	ladder brake, cliff brake, Chinese brake	X

Notes: P = Polynesian introduced; P? = probably Polynesian introduced but possibly introduced in historic times; I = indigenous; I? = probably indigenous but possibly naturalized; E= endemic; E? = probably endemic but possibly naturalized (Wagner et al. 1999:126-127); X = non-native; X* = non-native cultivated.

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APPENDIX B

Archaeological Literature Review and Field Inspection Report

Draft
Archaeological Literature Review and Field Inspection for the North Kona Well Construction Project, Kahului Ahupua‘a, North Kona District, Hawai‘i Island TMK: [3]7-5-014:001 por.

Prepared for
Belt Collins Hawaii LLC
on behalf of
Department of Hawaiian Home Lands

Prepared by
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Reference	Archaeological Literature Review and Field Inspection for the North Kona Well Construction Project, Kahului Ahupua‘a, North Kona District, Hawai‘i Island, TMK: [3] 7-5-014:001 por. (Bautista et al. 2019)
Date	February 2019
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: PUAA 2
Investigation Permit Number	CSH completed the field inspection under archaeological fieldwork permit number 18-15, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	Department of Hawaiian Homelands (DHHL); Hawai‘i County Water Department; United States Department of Agriculture (USDA), SHPD
Land Jurisdiction	Private
Project Proponent	DHHL Andrew H. Choy Acting Planning Program Manager Department of Hawaiian Home Lands 91-5420 Kapolei Parkway, Kapolei, HI 96707 P.O. Box 1879, Honolulu, HI 96805 Phone: (808) 620-9279 Fax: (808) 620-9559 Email: Andrew.H.Choy@hawaii.gov
DHHL Planning and Engineering Consultant for the Project	Belt Collins Hawaii LLC (BCH) Joanne E. Hiramatsu | Senior Associate | Director of Planning Belt Collins Hawaii LLC 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA T: 808.521.5361 | Direct: 808.846-3309 | F: 808.538.7819 | www.beltcollins.com <http://www.beltcollins.com/>
Project Location	The project area is located in the town of Hōlualoa on the *mauka* (upland) side of Māmalahoa Highway (Route 180) between mile markers 4 and 5. The project area is depicted on portions of the Kailua (1996) and Kealakekua (1996) U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles on Hawai‘i Island (Figure 1), tax map plat (Figure 2), and a 2018 aerial photograph (Figure 3).
Project Description and Related Disturbance	Plans are to drill a possibly 24-inch diameter hole for a new well and grade the site for construction of a 2-million-gallon tank and an associated control building; an access road and installation of underground utilities would also be included (Figure 4).

Project Area Geographic Extent	The project area comprises a 5.38-acre portion of overall 128.419-acre parcel at TMK: [3] 7-5-014:001. This portion of the parcel comprises the southwest corner of the parcel fronting Māmalahoa Highway. The proposed well site would comprise a smaller acreage within the 5.38-acre project area.
Historic Preservation Regulatory Context	Due to federal funding (USDA), this project is a federal undertaking as defined in 36 CFR 800.16(y) requiring compliance with Section 106 of the National Historic Preservation Act (NHPA) and the National Environmental Policy Act (NEPA). The project is also subject to Hawai‘i State environmental and historic preservation review legislation (Hawai‘i Revised Statutes [HRS] §343 and HRS §6E-8 and HAR §13-275, respectively).
Document Purpose	This investigation was conducted—through historical, cultural, and archaeological background research and a field inspection of the project area—to determine the likelihood that archaeological historic properties may be affected by the project. This document is intended to facilitate the project's planning and support the project's historic preservation review compliance. This investigation does not fulfill the requirements of an archaeological inventory survey (AIS) investigation, per HAR §13-276. This information also supports DHHL's consultation with the SHPD regarding the project's necessary historic preservation review steps pursuant to HAR §13-275.
Built Environment	The project area is located along the *mauka* side of the old Māmalahoa Highway. Land use in this area is generally for residence and agriculture (see Figure 3). Almost the entire project area (and overall TMK parcel 001) has been previously impacted by the development of a coffee plantation possibly overlying elements of the Pre-contact Kona field system. A rock wall defines the western boundary of the project area along Māmalahoa Highway. The rock wall extends *mauka* a short distance along the southern boundary, where it is replaced by a hog-wire fence that continues upslope beyond the project area. The northern project area boundary is generally defined by a historic stone wall (likely a modified remnant of the former Kona Field System). The eastern project area boundary generally follows the 1600 foot elevation and is not marked . An iron gate along the highway near the southwestern corner of the property accesses an asphalt driveway extending *mauka* through and beyond the project area. The interior of the project area is characterized by linear rows of mature coffee trees. Signs of mechanical disturbance were observed along the margins of the project area.
Natural Environment	The project area is located on the leeward, western slope of Hualālai Volcano, approximately 2.5 miles back from the coast at an

	elevation of 1,500–1,600 ft above mean sea level (amsl). This area receives mean annual rainfall of approximately 50 inches (Giambelluca et al. 2013). Waiaha Stream, an intermittent waterway, is located 0.4 km (0.25 mi) north of the project area. Vegetation between the coffee rows and fronting the property along the Māmalahoa Highway are cut grass and/or weeds. A variety of introduced species are present along the northern and southern property boundaries; notable plants included Christmas berry (*Schinus terebinthifolius*), African tulip (*Spathodea campanulata*), various avocado (*Persea americana*), and assorted vines. Tī plant (*Cordyline terminalis*) was also observed, particularly along the northern boundary. Rows of palm trees line the lower portion of the asphalt driveway through the project area. Soil series maps indicate most of the project area is covered with Honuaulu extremely rocky silty clay loam, 12 to 20% slope (HVD) (Figure 5). According to Sato et al. (1973:19), “the Honuaulu series consists of well-drained silty clay loams that formed in volcanic ash. These are gently sloping to moderately steep soils on uplands . . .. Honuaulu soils are used mostly for coffee and pasture. Small areas are used for macadamia nuts, bananas, citrus fruits, avocados, and truck crops.” A small area at the southeastern corner of the project area overlaps Kealakekua very stony silty clay loam, 6 to 20% slopes (KRD) (see Figure 5). The Kealakekua series soils also consist “of well-drained silty clay loams that were formed in volcanic ash. These are gently sloping to moderately steep soils on the uplands . . . . . Kealakekua soils are generally used for pasture, coffee, macadamia nuts, and woodland. Small acreages are used for truck crops” (Sato et al. 1973:26–27).
Background Research Methods	Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Hawaiian Mission Children’s Society Library and Archives, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2000). This research provided the environmental, cultural, historic, and archaeological background for the project area.
Background Research Summary	The project area is located in the traditional land division of Kahului 2. The project area is situated within the Kona Field System (State

	Inventory of Historic Places [SIHP] # 50-10-32-06601). An Archaeological Cover Sheet for the Hawaii Register of Historic Places does not indicate submission to the Review Board nor nomination to the NRHP (Appendix A). The Feature Description Form associated with the Cover Sheet is signed by T. Stell Newman and dated 15 May 1974. Understood to be the largest of the pre-Contact Hawaiian agricultural systems, the Kona Field System has been estimated to cover approximately 139 square (sq) km on the western slopes of Mauna Loa and Hualālai. One characteristic feature of this non-irrigated field system was the *kuaīwi* wall. *Kuaīwi* were long, low, linear mounds or "walls" extending *mauka-makai* (mountains to sea) to form field boundaries. The interior fields were used to plant crops such as *kalo* (taro), while other crops such as sugarcane were planted atop the *kuaīwi* forming windbreaks. The traditional features of the Kona Field System were commonly altered and/or repurposed in historic-era agricultural practices. Associated habitation and ceremony took place throughout the larger field system, which was linked by trails to coastal settlements. Early historic accounts by Kamakau (1992), ‘Ī‘ī (1959), and Ellis (1969) describe the prominence of Hōlualoa a short distance to the south as a home to chiefs, a populous district with abundant food resources. However, a marked decline in the native population had occurred by the mid-1800s, a result of contact with western diseases and considerable migration to town centers such as Kailua and Honolulu. During the mid-nineteenth century in the land division known as the Māhele, Kahului 2 was awarded to and retained by the *ali‘i* (chief) Kamaikui under Land Commission Award (LCA) 8516-B:3. A cluster of *kuleana* or commoner awards were granted within Kahului 2 just downslope of Māmalahoa Highway and the project area (Figure 6); the records for these awards indicate land uses such as habitation, agriculture, and cattle ranching. No *kuleana* awards are indicated within the project area, despite the widespread occurrence of awards throughout the surrounding area. By the end of the nineteenth century in Kona the traditional subsistence settlement pattern was eclipsed by new patterns focused around commercial agriculture (especially coffee) and ranching. Coffee farming expanded greatly across leeward Hawai‘i; the project area is within what remains the Kona coffee belt today. This transition was greatly facilitated by an influx of immigrants into the area who established communities of small farmers that engaged in commercial coffee farming and a variety of sideline occupations.

	Historic maps and aerial photographs (Figure 7 through Figure 12) provide a cultural context and chronology of the changing landscape of the project area and the surroundings. A portion of an 1888 map of North Kona (see Figure 7) depicts clusters of LCA parcels along the government road in the project area, but none overlap it and there are no signs of any development within the project area. A portion of an 1891 map of North Kona (see Figure 8) shows the project area within Kahului and identifies Land Grants in the vicinity; no grants or developments are indicated within the project area. A 1906 map of Hawai‘i Island (see Figure 9) depicts the project area located on the interface of sugar plantation and cattle grazing lands. The Kona Sugar Company operated in the vicinity from 1881-1904 and utilized a railroad; in 1908 the Kona Development Company attempted to resurrect the plantation and railroad, but the venture only lasted until 1926 (Dorrance and Morgan 2000:112). Portions of the 1924 USGS quadrangle maps (see Figure 10) indicate the growth of the surrounding area, depicting the railroad and Kona Mill downslope, schools to the south, and numerous trails throughout the area and structures clustered along the highway. This map depicts a structure, possibly a dwelling, within the project area and another along the northwestern project area boundary. Portions of the 1959 and 1960 USGS quadrangle maps (see Figure 11) illustrate little change in the vicinity of the project area; most notable is the lack of the structure previously depicted near the center of the project area (see Figure 10); the structure adjacent to the north still appears to be present. A 1977 orthophoto (see Figure 12) indicates the continued use of the area for agricultural (and perhaps ranching) pursuits. Discrete agricultural fields are visible within the project area. It is unclear in this image if the dwelling adjacent to the north is still present.
Prior Archaeological Studies Summary	Previous archaeological studies in the vicinity of the project area are presented in Figure 13 and summarized in Table 1. Of these, five studies are located within 0.8 km (0.5 miles) of the current project area: Allen (1984), Walsh and Hammatt (1995), Haun and Henry (2001), Moore and Kennedy (2002), and Haun et al. (2003). In 1984 Paul H. Rosendahl, Inc. (PHRI) undertook a reconnaissance survey of over 600 acres south and upslope of the current project area (Allen 1984; see Figure 13). The survey documented 19 archaeological sites and site complexes (not assigned SIHP numbers). Documented feature types included walls, terraces,

	mounds, small platforms, modified outcrops, enclosures, an artifact scatter, a cave, and a water tank foundation. These features were attributed to the pre-Contact Kona Field System and historic ranching activity. Three sites were recommended for testing, and the remainder were recommended for no further work. In 1994 CSH recorded six sites in a 5.9-acre project area on the Puapua‘a/Hōlualoa border southwest of the current project area (Walsh and Hammatt 1995; see Figure 13). Two agricultural complexes (SIHP #s 50-10-37-19666 and -19667) comprising 91 features were identified as remnants of the Kona Field System. Four sites (SIHP #s -19662 through -19665) comprising 11 features were associated with historic habitation, agriculture, ranching, and transportation. All of the six documented sites were recommended for data recovery. In 2002, Archaeological Consultants of the Pacific, Inc. undertook data recovery at SIHP # -19677 located within the northeastern portion of the Walsh and Hammatt (1995) project area (Moore and Kennedy 2002; see Figure 13). The results indicated many features previously thought to have been remnants of the Kona Field System were actually historic constructions associated with coffee cultivation. Furthermore, it was determined that many Kona Field System features existing within the site had been heavily modified for use in coffee cultivation after 1930. In 2001, Haun and Associates conducted an AIS of an 87-acre parcel located in Kahalui 1 and 2 just *makai* (seaward) of the current project area (Haun and Henry in 2001; see Figure 13). The survey identified “12 historic ranching walls or enclosures, an historic railroad trestle [SIHP # -07214], an historic road with a retaining wall, two agricultural enclosures, two agricultural terraces, a modified outcrop, an agricultural wall, a small agricultural complex with 11 features, two permanent habitation platforms [SIHP #s -22762 and -22764], a temporary habitation modified outcrop [SIHP # -22763], two permanent habitation platforms [SIHP #s -22762 and -22764], a complex of 33 features interpreted as remnants of the Kona Field System, a complex of 181 historic clearing features related with sugarcane cultivation, and a complex of 101 features that roughly correspond to six Land Commission Awards in the *mauka* portion of the project area [SIHP # -22780]” (Haun et al. 2003:1). In 2003, Haun and Associates conducted data recovery at SIHP #s -22764 (rectangular platform) and -22780 (habitation and agriculture complex) within the Haun and Henry (2001) study area (Haun et al. 2003; see Figure 13). SIHP # -22764 was shown to have been

	constructed between AD 1440-1650. Excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use throughout the site, including repurposing of pre-Contact features in historic times.
Fieldwork Effort and Findings	CSH Project Supervisor Olivier M. Bautista, B.A., and CSH Project Director Sarah Wilkinson, B.A., completed the field inspection on 20 November 2018 under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. The field inspection required 2 person-days to complete and included pedestrian sweeps of the project area. Photographs were taken of the general project area. Archaeological features and other points of interest were also photographed and located with a Garmin GPSMAP 64s handheld unit (accuracy +/- 2-5 m). Four potential historic properties were encountered during the field inspection (CSH 1 through CSH 4; Figure 14). The field inspection confirmed the project area surface has been completely altered by the development of the existing coffee plantation and associated driveway (Figure 15 through Figure 17). The majority of the project area comprises north-south oriented linear rows of mature coffee trees. The rock retaining wall along the western side and a portion of the southern side of the project area is modern (Figure 18), as is the hog wire fence that continues *mauka* from the rock wall terminus along the southern boundary (Figure 19). The eastern or *mauka* side of the project area is not demarcated. The eastern half of the northern property boundary is defined by a low, dry-stacked rock wall extending *mauka-makai* and located just across the property boundary on the adjacent lot. It is possible this wall once continued west along the western half of the northern property boundary, possibly crossing over into the project area. Extensive archaeological features are visible just across this wall on the adjacent property. These features, and probably the wall itself, are likely remnants of the pre-contact Kona Field System (SHIP # 50-10-32-06601). The pre-Contact features of the Kona Field System were commonly repurposed for historic-era agricultural practices. The area along the western half of the northern property boundary is heavily disturbed and thickly vegetated. A short (2-3 m) segment of a cross-slope, dry-stacked rock wall (CSH 1) was identified within this thick vegetation just within the project area bounds (see Figure 14, Figure 20, and Figure 21). This wall remnant cannot extend more than 10-15 m north from the project area as a private residence is present just beyond the line of vegetation. Further west along the northern project area boundary, a section of a *mauka-makai* dry-stacked rock wall (CSH 2) was encountered within the thick vegetation just inside the project area (see Figure 14 and Figure 22).

	It is unclear whether this segment of rock wall extends all the way to the cross-slope CSH 1 wall segment, and/or is a remnant portion of the *mauka-makai* wall located just outside the project area along the eastern half of the northern boundary. There is an indication of bulldozing from within the project area all along the northern project area boundary, directly up to the edge of the *mauka-makai* wall(s) in some places (Figure 23 and Figure 24). Small basalt boulders are present along the project area side of the wall; these materials may represent stones pushed out of the coffee planting area to the margin of the property, and/or may be collapse or disturbed material from the *mauka-makai* wall. Scattered fragments of historic glass, ceramics, and scrap metal were identified within the project area in the disturbed area between the rows of coffee and the wall. Some topographical undulations were noted within the lower portion of the project area. There is a long, north-south oriented undulation that appears almost as a berm (CSH 3; see Figure 14 and Figure 25); this feature extends nearly the entire length between the driveway and northern margin of the project area and is of a generally consistent width with a fairly level surface. A potential alignment of stones was observed at one location near its southern end (at the location marked “CSH 3” on Figure 14). Just upslope of this feature is an elongated depression. Near the mid-point of the southern project area boundary a north-south oriented rock retaining wall (CSH 4) was observed along the downslope edge of a pocket of dense vegetation (see Figure 14 and Figure 26). The age and nature of this wall are presently undetermined.
Potential for Project Effect on Historic Properties	Background research indicates no previously recorded historic properties are present within the project area, though it is located within the known limits of the Kona Field System (SIHP # 50-10-32-06601). It is likely that prior development of the property for agricultural purposes disturbed any surface features associated with the Kona Field System and/or subsequent historic-era land use throughout most of the property, including a potential dwelling once located in the central portion of the project area. CSH 1, CSH 2, and CSH 4 are potential historic properties located within the margins of the project area. Disturbed or intact subsurface deposits associated with pre-Contact and/or historic land use may still be present anywhere within the project area but may be concentrated in and around the vicinity of the former structure.
Recommendations	Consultation with SHPD is recommended regarding project historic preservation requirements. This consultation effort would confirm

	whether an AIS is needed and aid in development of an SHPD-informed AIS subsurface testing strategy.

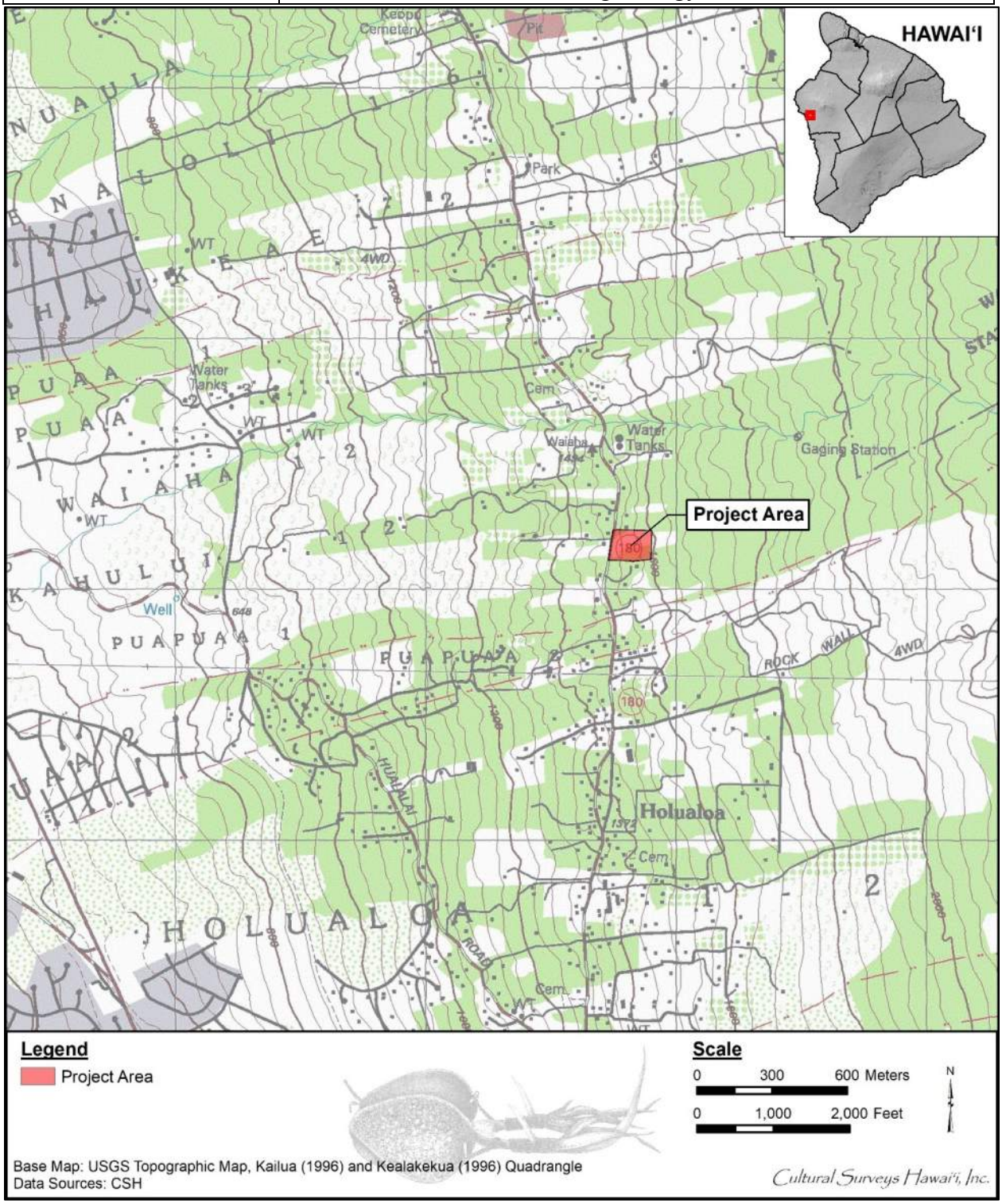

Figure 1. Portions of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles, showing the location of the project area

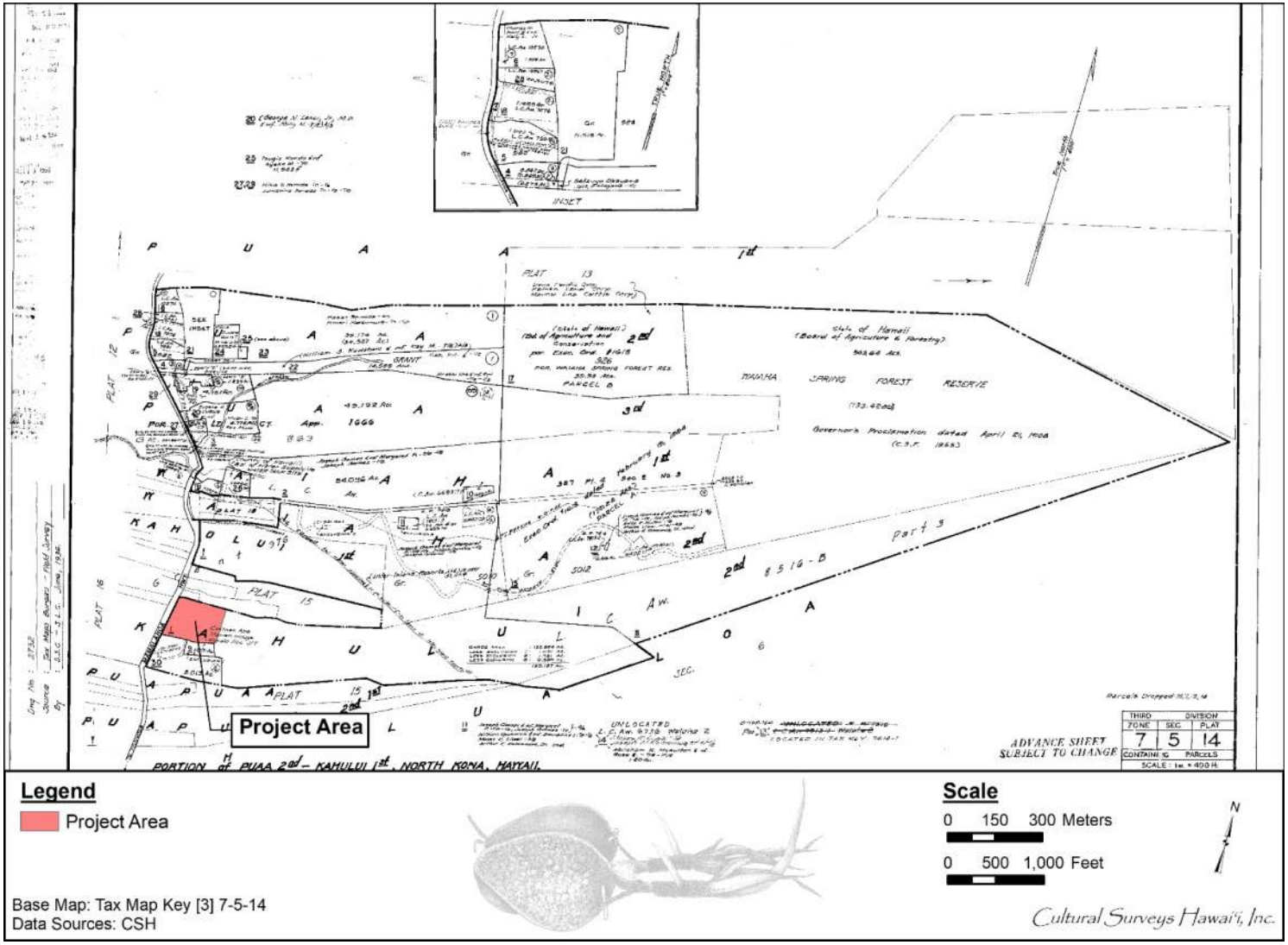

Figure 2. Tax Map Key (TMK) [3] 7-5-14 showing the project area (Hawai‘i TMK Service 2010)

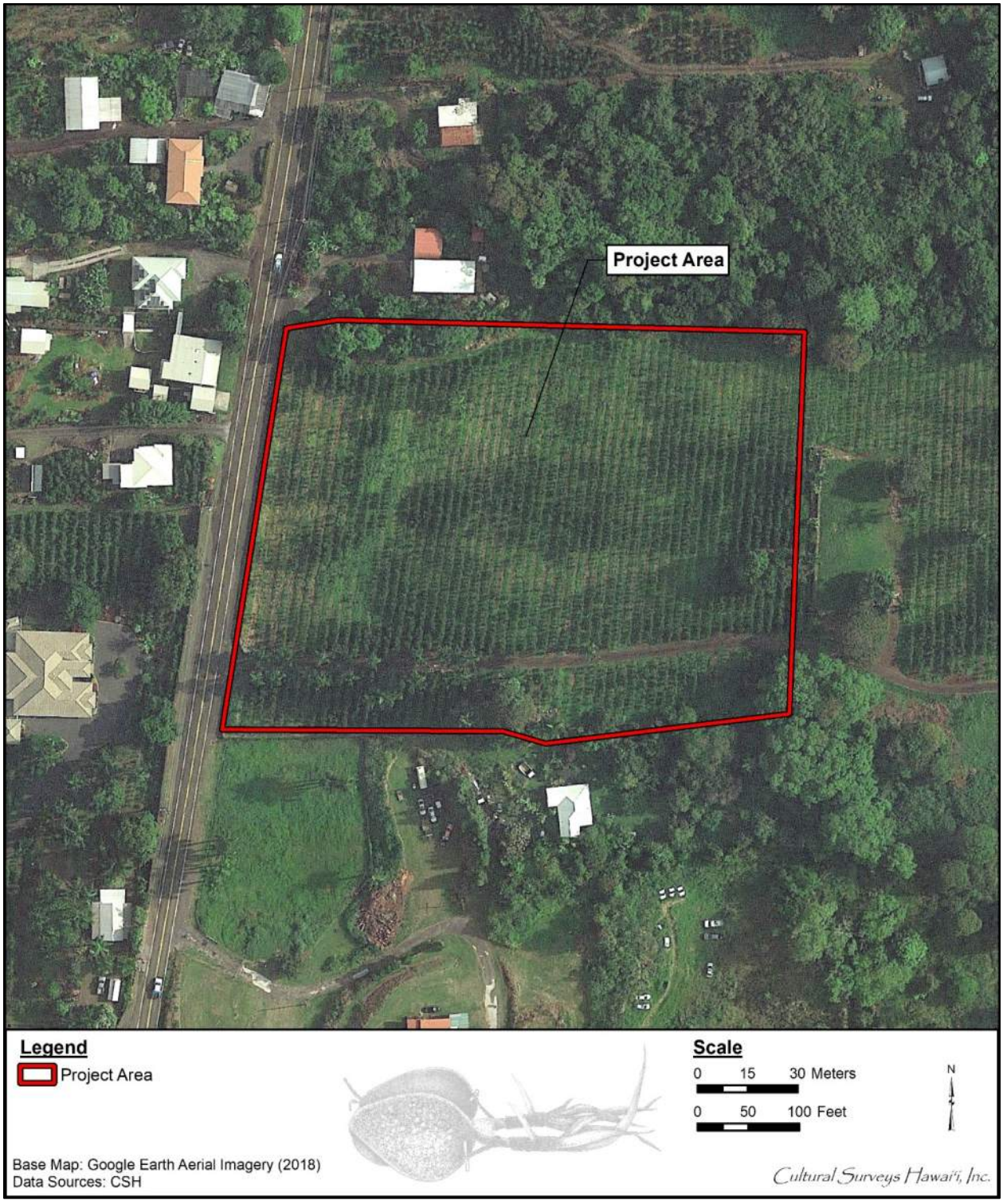

Figure 3. Aerial photograph of the project area (Google Earth 2013)

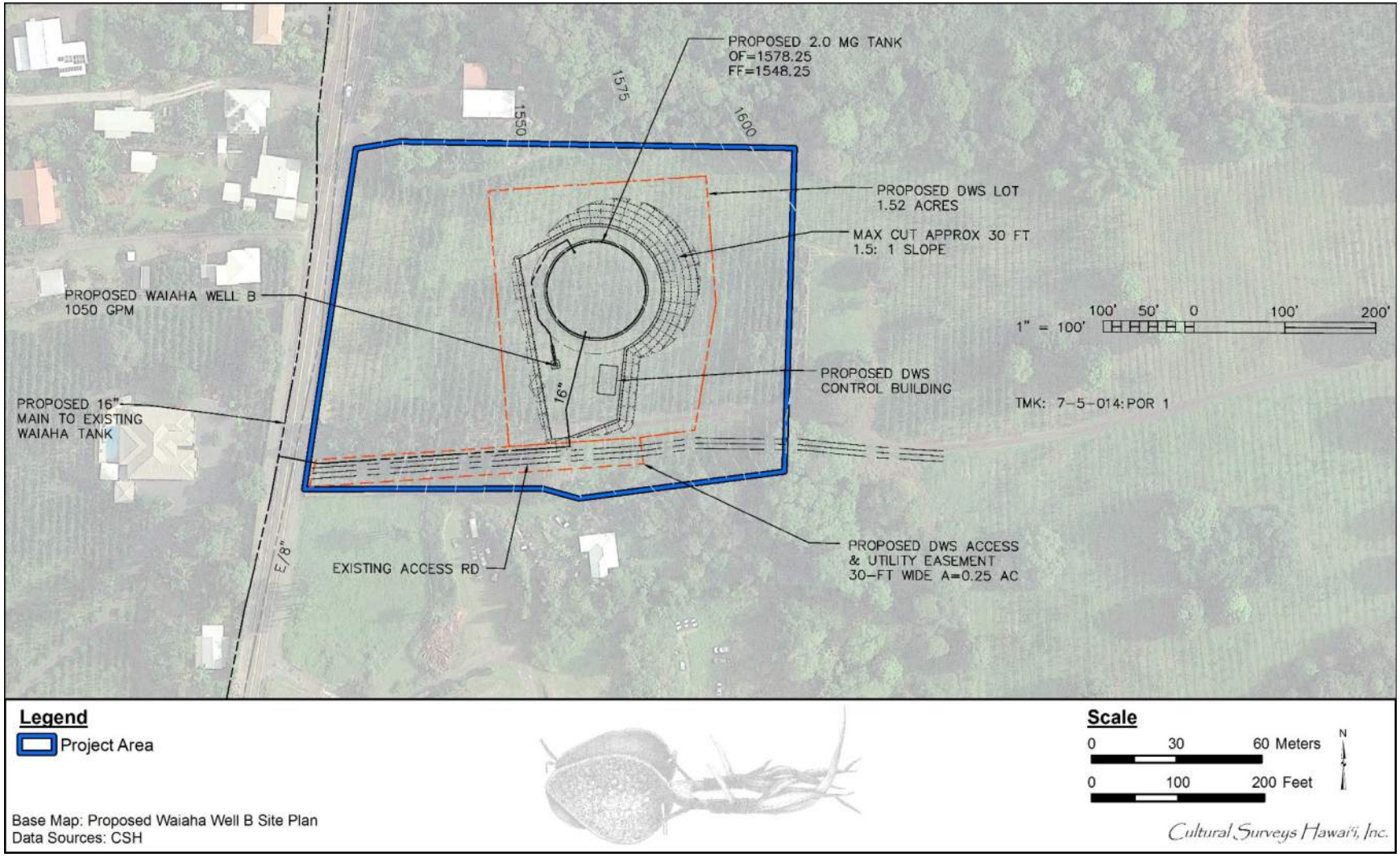

Figure 4. Preliminary project site plan (courtesy of client) in relation to the project area

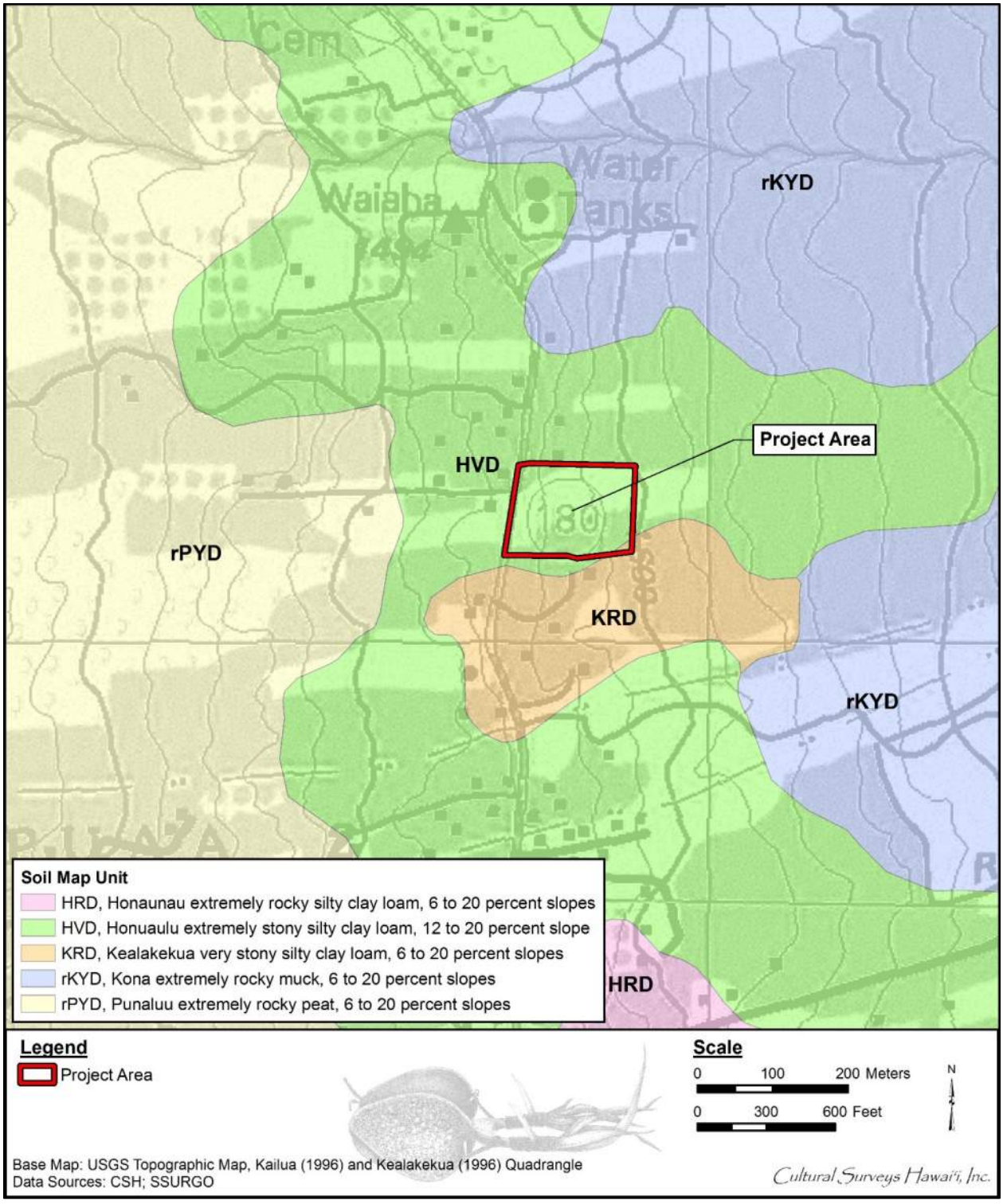

Figure 5. Overlay of *Soil Survey of the State of Hawaii* (Sato et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001)

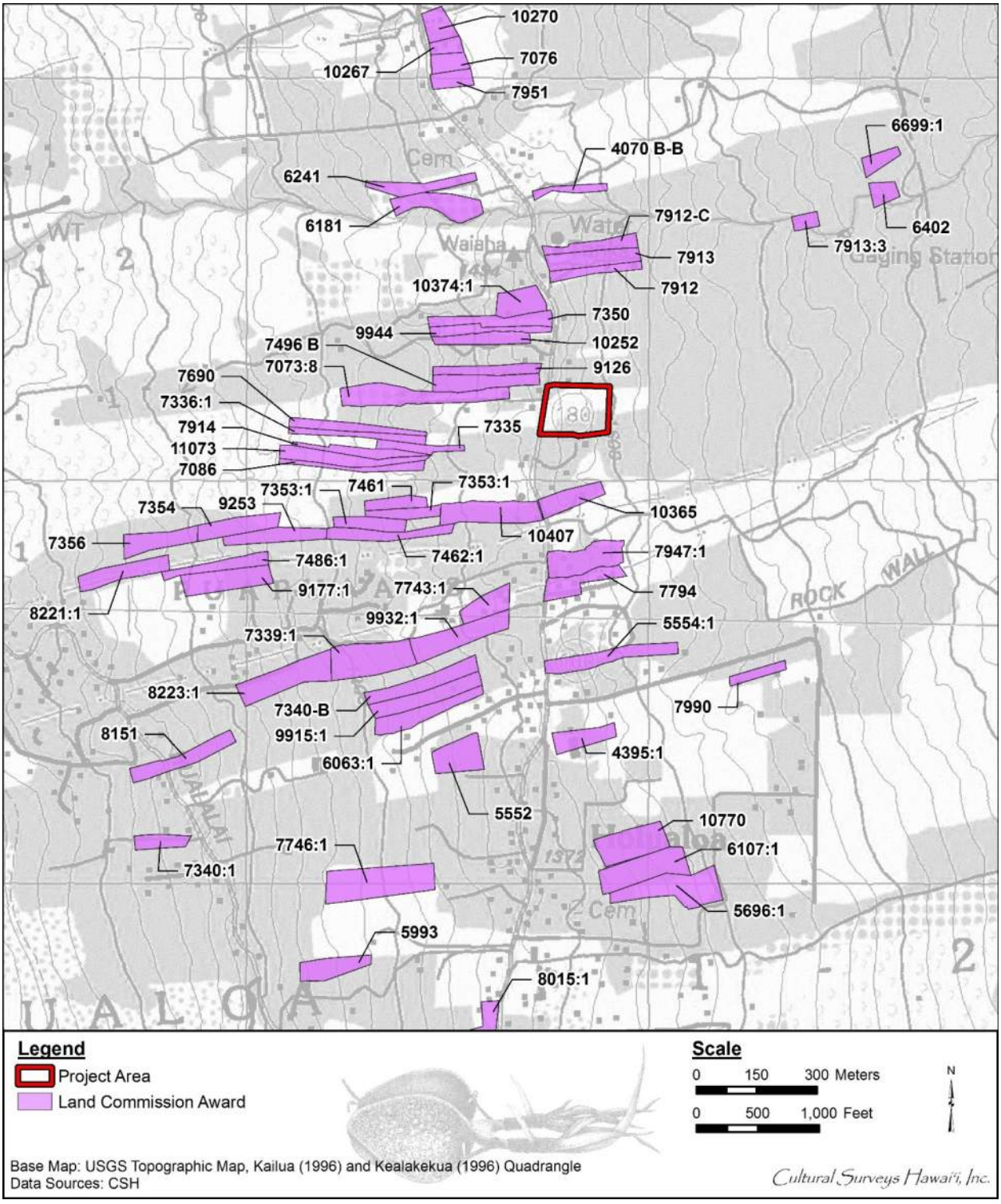

Figure 6. Portions of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles, showing the location of the project area and nearby LCA parcels

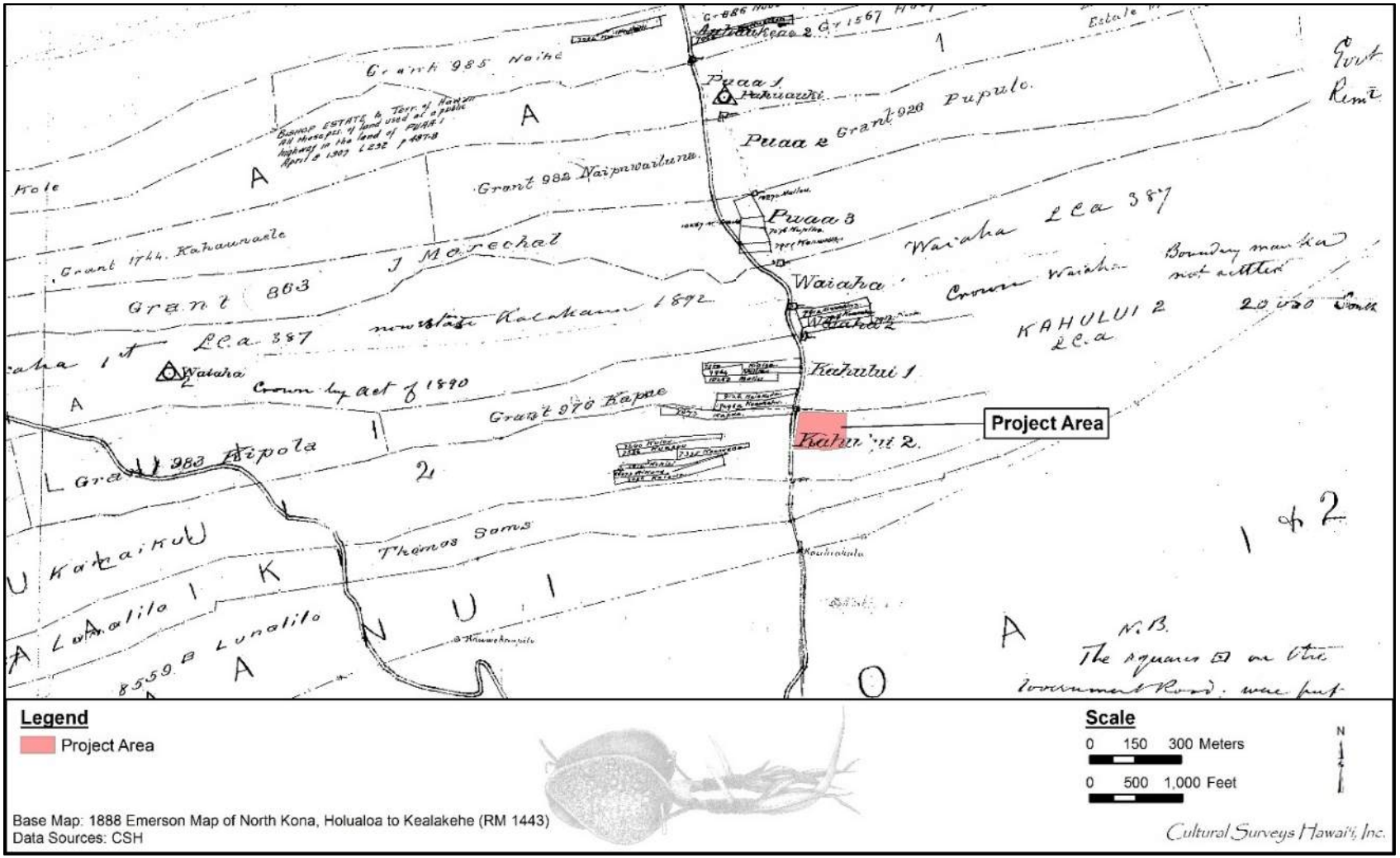

Figure 7. Portion of 1888 Emerson map of North Kona showing the project area; while clusters of LCAs are depicted in the vicinity along the road, none overlap the project area and there are no signs of any development within the project area

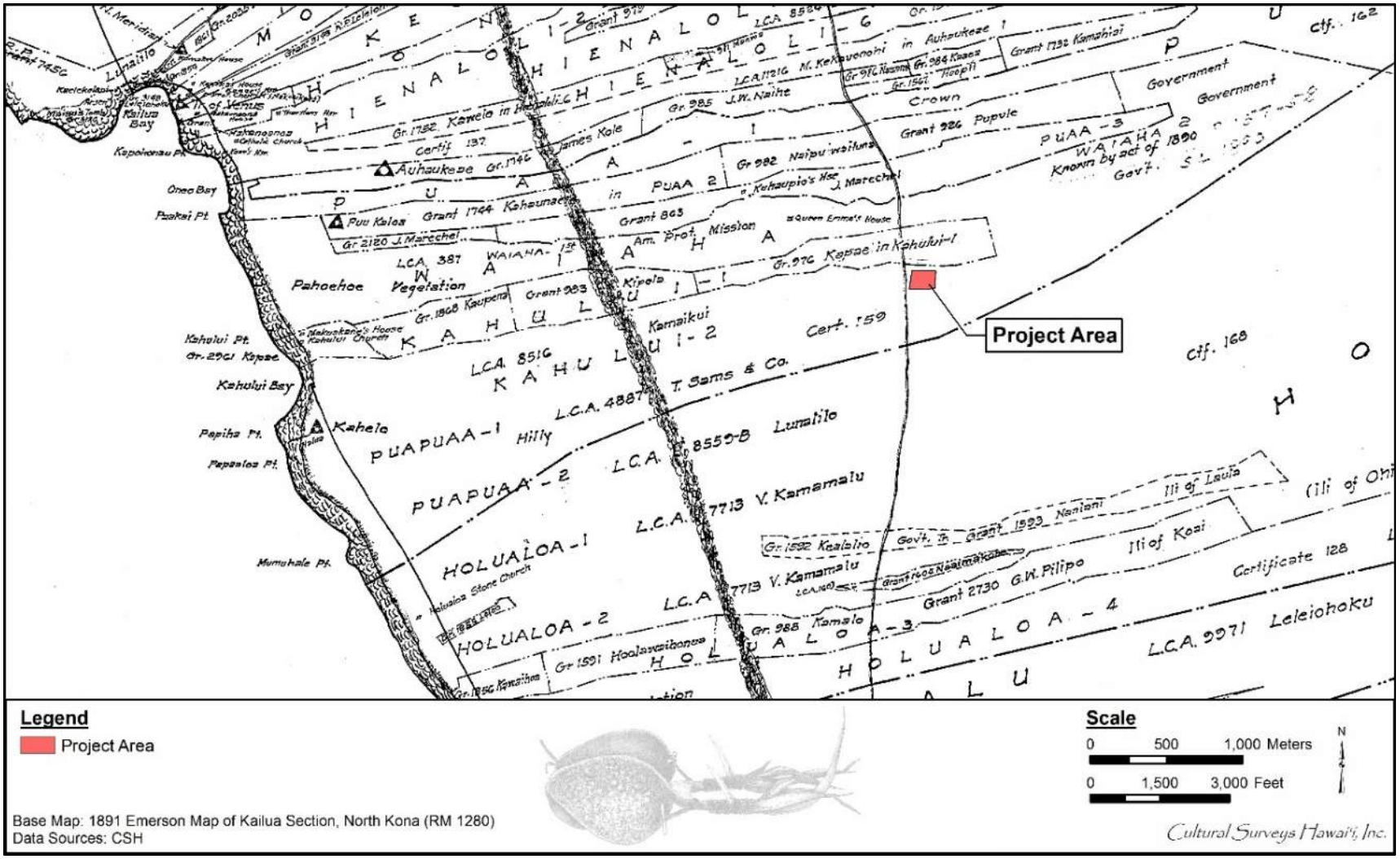

Figure 8. Portion of 1891 Emerson map of North Kona showing the project area within Kahului (awarded to Kamaikui); while there are numerous land grants depicted throughout the area, none overlap the project area and there are no signs of any development within the project area

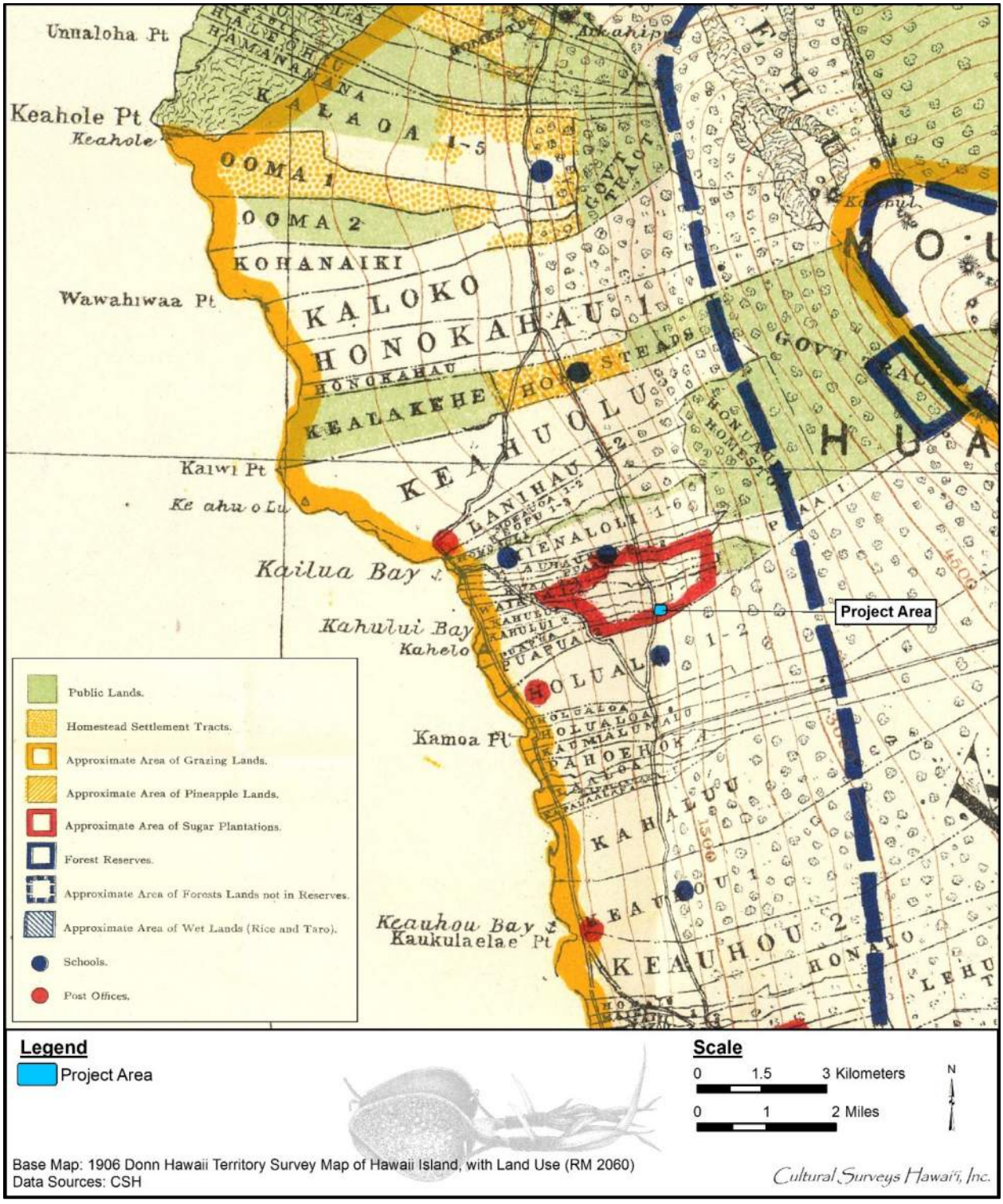

Figure 9. Portion of 1906 Donn Hawaii Territory Survey map of Hawaii Island showing location of project area along the southern bounds of sugar plantation lands and in relation to schools and post offices

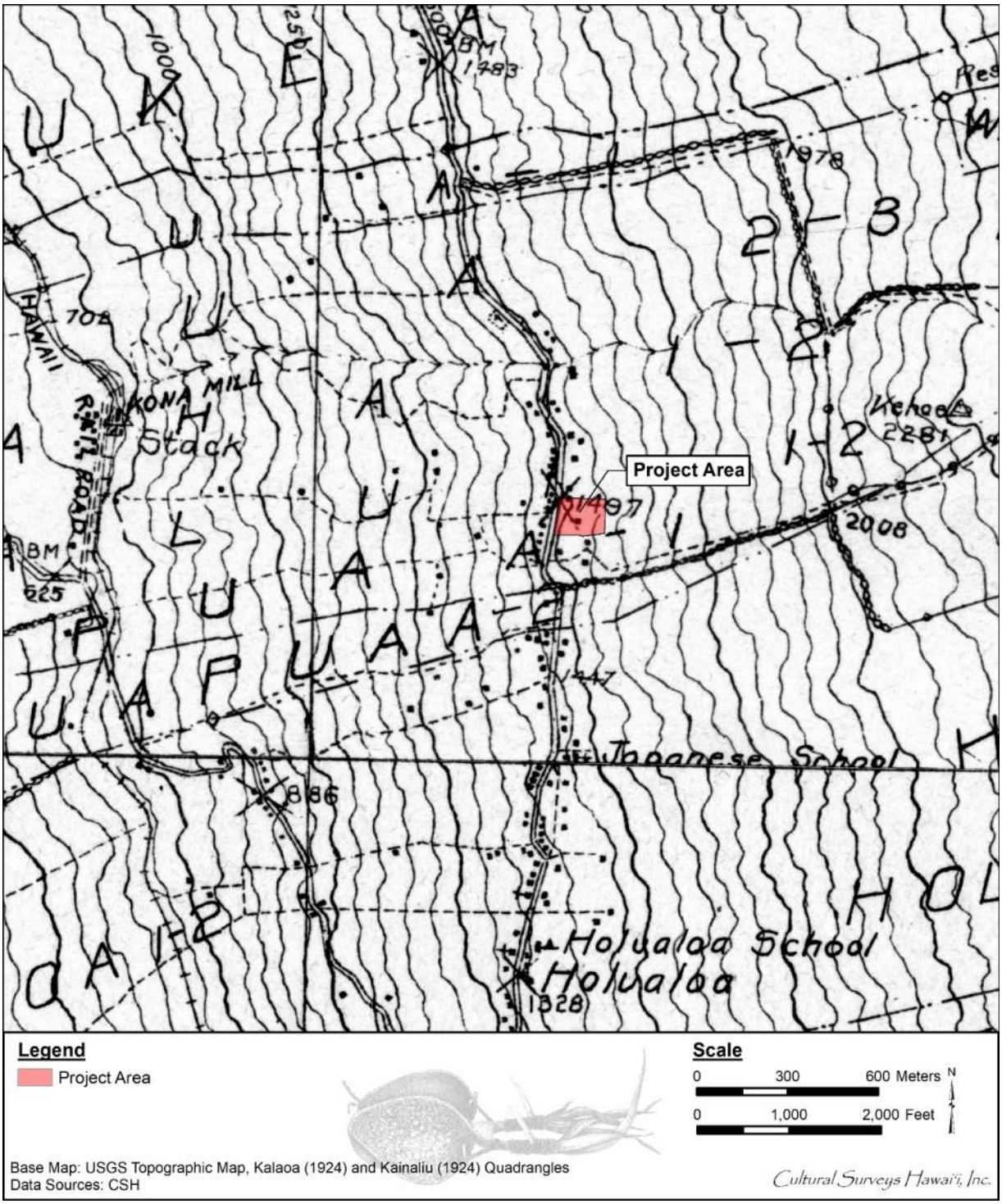

Figure 10. Portions of the 1924 Kalaoa and Kainaliu USGS 7.5-minute topographic quadrangles showing the location of project area in proximity to developments including schools, trails, the Hawaii Railroad, and the Kona Mill; structures (possibly residences) are indicated near the center of the project area and along the northwestern boundary

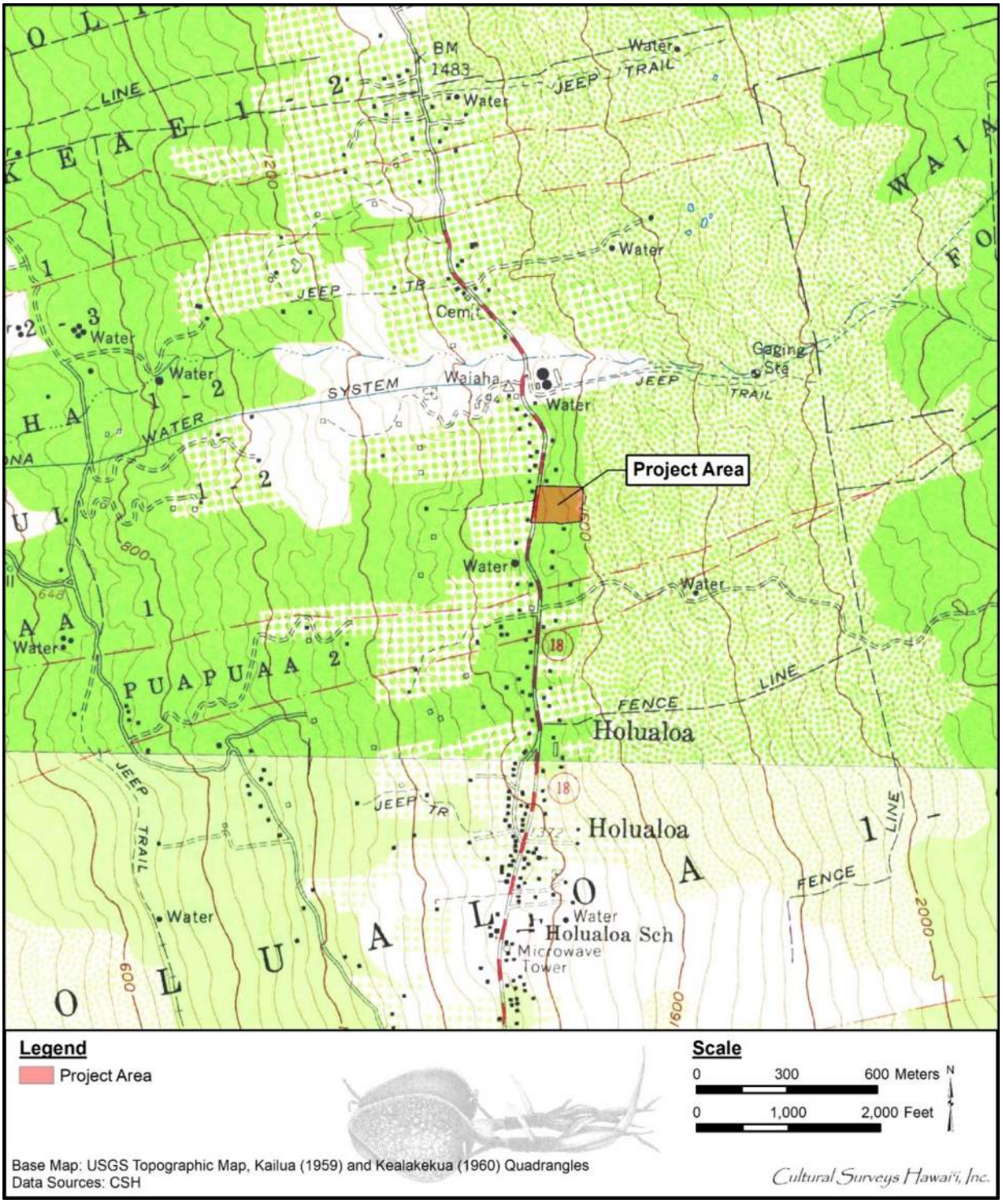

Figure 11. Portions of the 1959 Kalaoa and 1960 Kainaliu USGS 7.5-minute topographic quadrangles showing the location of project area in relation to area development; the structures shown on the 1924 map within the project area (see Figure 10) are not depicted

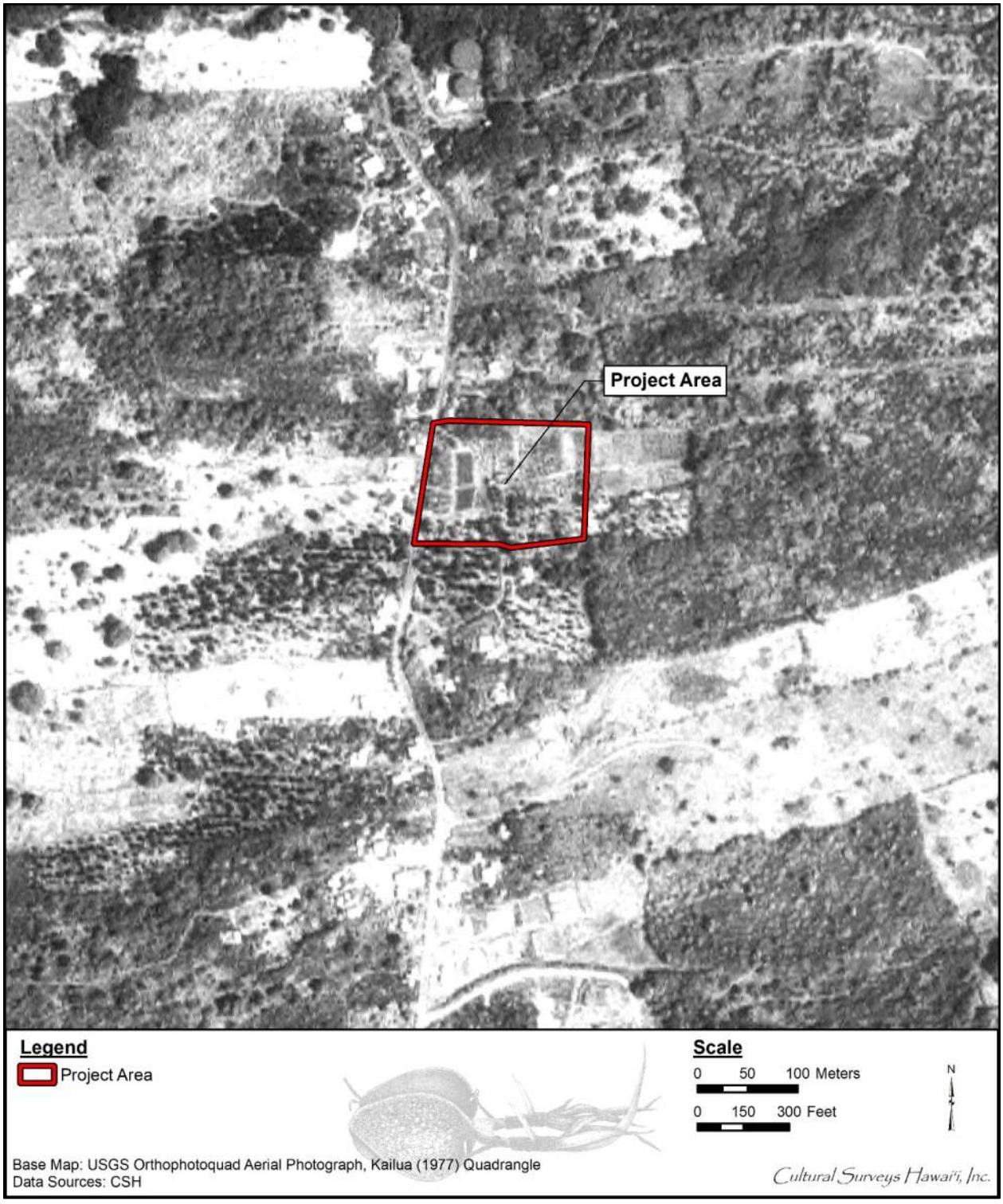

Figure 12. 1977 USGS Orthophoto, showing the continued use of the surrounding area for agriculture and ranching and the development of the project area into discrete agricultural plots

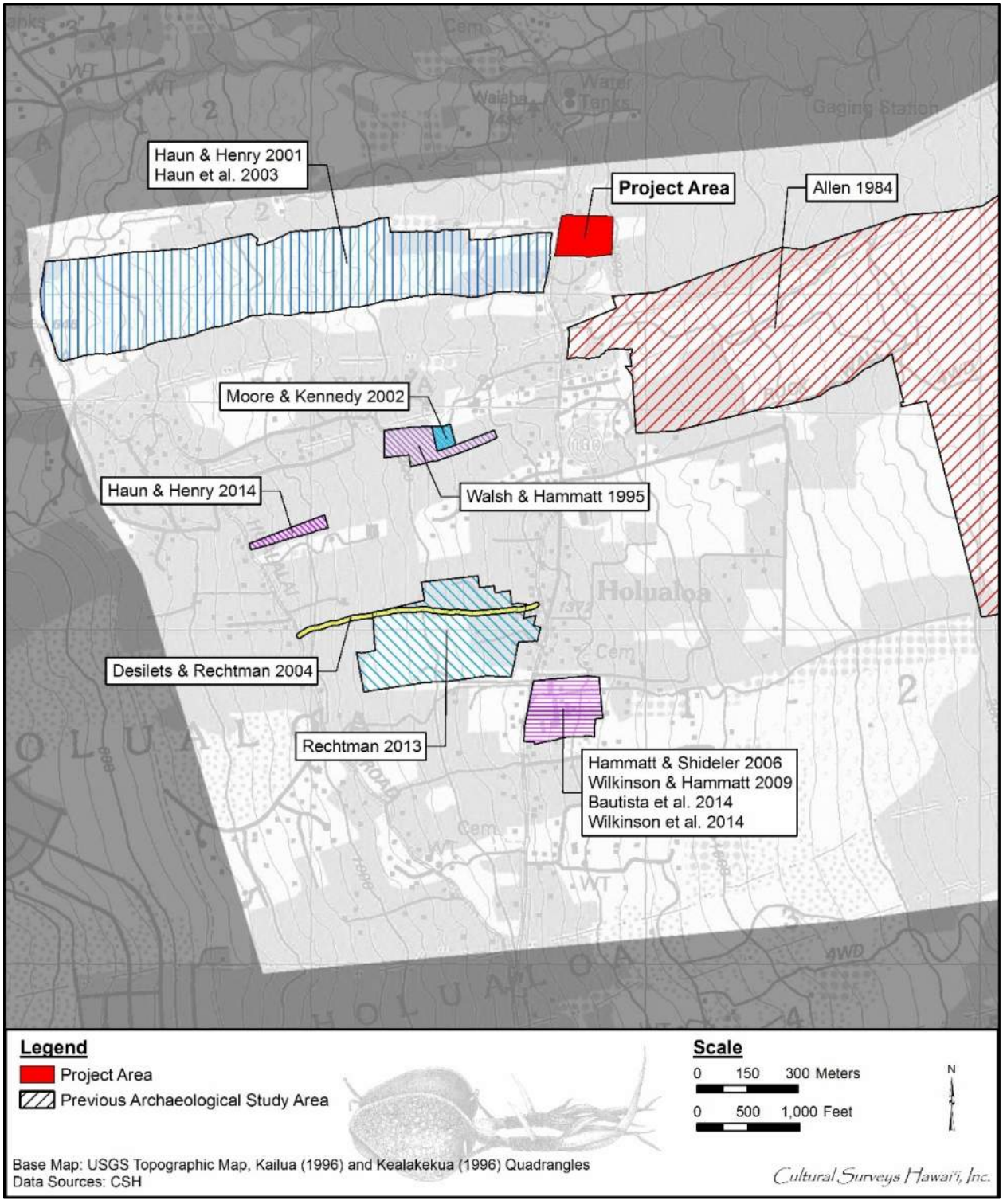

Figure 13. Portions of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles, showing the location of previous archaeological studies in the vicinity of the project area

Table 1. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Allen 1984	Archaeological reconnaissance survey	600+ acres in Puapua‘a and Hōlualoa, TMKs: [3] 7-5-015:002 and 102 and 7-6-002:001 and 014	Documented 19 sites and site complexes associated with the Kona Field System and cattle ranching (no SIHP numbers assigned); majority recommended for no further work
Walsh and Hammatt 1995	Archaeological inventory survey	5.9 acres in Hōlualoa 1 and 2, TMKs: [3] 7-6-009:014, 016, and 023	Documented six previously unidentified sites (SIHP #s 50-10-37-19662 through 19667) associated with the Kona Field System and historic habitation, agriculture, ranching, and transportation; all sites recommended for data recovery.
Haun and Henry 2001	Archaeological inventory survey	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Documented 27 sites comprised of 349 features, representing a wide variety of feature types associated with pre-Contact to historic agriculture, habitation, ranching, and transportation.
Moore and Kennedy 2002	Archaeological data recovery	Hōlualoa 1 and 2, TMK: [3] 7-6-009:014	Data recovery conducted within a portion of SIHP # -19667 indicated historic-era construction and modification of most features within the site previously described as remnants of the Kona Field System
Haun et al. 2003	Archaeological data recovery	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Data recovery indicated SIHP # -22764 (platform) constructed between AD 1440-1650; excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use
Desilets and Rechtman 2004	Archaeological inventory survey	800-m-long corridor in Holualoa 1 and 2, TMK: [3] 7-6-008:005 por.	Survey identified one new historic property, SIHP # -24211, a rock wall-lined road that encompasses entire project area; background research indicates road constructed in late 1890s, presumably to provide grant recipients access to their parcels
Hammatt and Shideler 2006	Archaeological literature review and field check	Cesspool Improvement Project at Nine DOE Schools, Kona School District	Study noted for Hōlualoa vicinity that many surface features found in inland areas were first constructed, heavily modified, or destroyed by historic use of land for cattle pasture and coffee cultivation

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Wilkinson and Hammatt 2009	Archaeological monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Rechtman 2013	Archaeological inventory survey	29 acres in Hōlualoa 1-2, TMKs: [3] 7-6-008:005, 008, and 030	Identified 24 historic properties, including previously documented SIHP # -24211 (historic road) and newly documented SIHP #s -29700 through -29722 associated with late pre-Contact through late historic agriculture, habitation, and ranching; data recovery and/or preservation recommended for four sites
Bautista et al. 2014	Archaeological monitoring report	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Haun and Henry 2014	Archaeological inventory survey	2.313 acres in Hōlualoa 1-2, TMK: [3] 7-6-010:005	Documented 14 newly identified sites (SIHP #s -30050 through -30063) comprising 145 features associated with pre-Contact through historic agriculture, habitation, ranching burial, rock art, and transportation; preservation recommended for the burial (SIHP # -30060) and petroglyph (SIHP # -30061), and data recovery recommended for SIHP # -30063 (pre-Contact/historic agricultural complex); monitoring of ground disturbance also recommended
Wilkinson et al. 2014	Archaeological monitoring report	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002 and 7-6-005:015	Identified SIHP # -29888, a modified lava tube located beneath the school

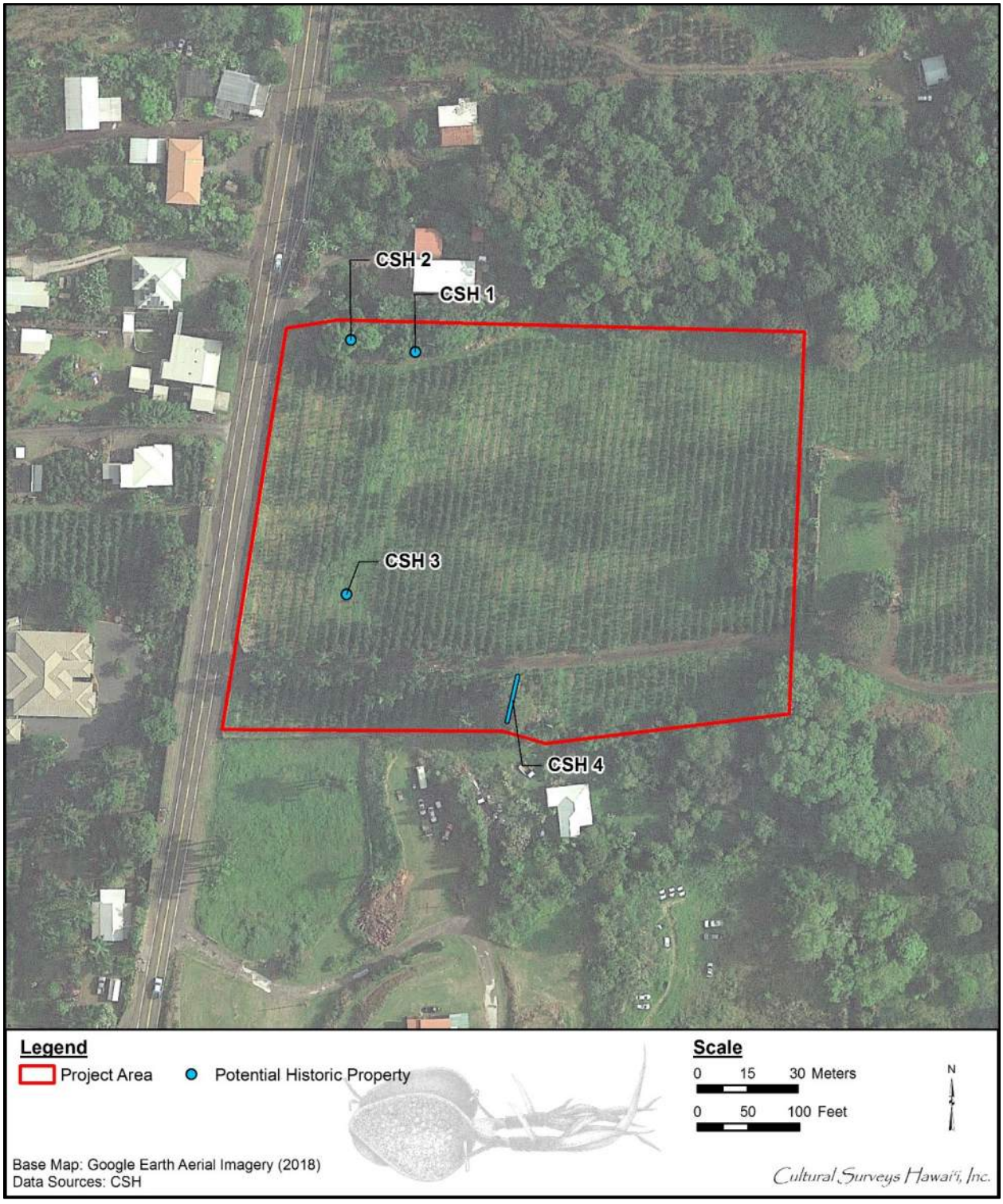

Figure 14. Aerial photograph of the project area (Google Earth 2013) showing the locations of potential historic properties (CSH 1 through 4)

Figure 15. Photo overlooking the project area from along the eastern boundary; view to west

Figure 16. Photo showing rows of mature coffee trees within the project area; view to north

Figure 17. Photo showing the asphalt driveway within the project area; view to west

Figure 18. Photo showing the western boundary of the project area along Māmalahoa Highway; view to north

Figure 19. Photo showing the interface of the modern rock wall and hog wire fence along the southern project area boundary; view to south

Figure 20. Photo taken from within heavily vegetated area showing the CSH 1 rock wall extending from the lower left corner to center of photo; view to south

Figure 21. Photo showing the location of CSH 1 rock wall within the heavy vegetation along the northern project area boundary; view to north

Figure 22. Photo showing CSH 2 rock wall under heavy vegetation near the northwestern corner of the project area; view to northeast

Figure 23. Photo taken along the northern side of the project area, showing the disturbed swath between the coffee rows and the vegetated northern boundary; view to west

Figure 24. Photo showing rock material and debris pushed up against the wall located just outside the project area to the north; view to west

Figure 25. Photo looking along the raised CSH 3 alignment (photo center) in the western portion of the project area; view to north

Figure 26. Photo showing a portion of the CSH 4 rock terrace beneath thick vegetation in the southern portion of the project area; view to southeast

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Appendix A HRHP Archaeological Cover Sheet for SIHP # -06601 (Kona Field System)

ARCHAEOLOGICAL COVER SHEET

7-7-04:20 Dillingham

HAWAII REGISTER OF HISTORIC PLACES

50 - 10 - 37 - 6601
1 2 3 4 5 6 7 8 9
SITE IDENTIFICATION NUMBER

SITE NAME/TYPE: KONA Field System
DISTRICT: North and South KONA
AREA: 1,392 square Kilometers
CATEGORY: ___Single Feature X Complex ___Places
OWNERSHIP: X Public X Private
PHOTOGRAPHS: X Yes ___No (Temp/Tech)
KNOWN PRESSURES ON SITE: URBANIZATION

2 1 PRE-1778
10 11 12 13 14 15 16 17 18 19 20
CARD No. DATE/PERIOD

PRESENT LAND USES: MULTIPLE

DESTRUCTION: ___No Known Future Danger X Possible Future Danger ___Future Danger Certain
___Present Danger ___Presently Being Destroyed

STATUS: ✓ Occupied ✓ Unoccupied
CONDITION: ___Excellent ✓ Good ___Fair ___Deteriorated
INTEGRITY: ✓ Unaltered, Orig Loc ___Unaltered, Moved ___Altered, Orig Loc ___Altered, Moved
ACCESSIBILITY: ___Unrestricted ✓ Restricted ___Inaccessible

LEGENDARY MATERIALS KNOWN: ___Yes ✓ No
WRITTEN HISTORICAL MATERIALS: ✓ Yes ___No
IMPORTANCE AS EXAMPLE OF TYPE SITE: ✓ Good ___Moderate ___Poor
SUSCEPTABILITY TO INTERPRETATION: ✓ Good ___Moderate ___Poor
RESEARCH POTENTIAL: ✓ Good ___Moderate ___Poor
LOCAL ATTITUDES ABOUT SITE: ___Valuable ___Moderate Value ___Low Value ___Ambivalent ✓ Unknown

BRIEF DESCRIPTION (Columns 21-80): MASSIVE ANCIENT HAWAIIAN FIELD System measuring 3 by 18 miles

STAFF EVALUATION: X High Value ___Valuable ___Reserve ___Marginal
SUGGESTED THEMES: Polynesian Hawaii, AGRICULTURE, SETTLEMENT PATTERNS, Habitation

DATE SUBMITTED TO REVIEW BOARD: _____

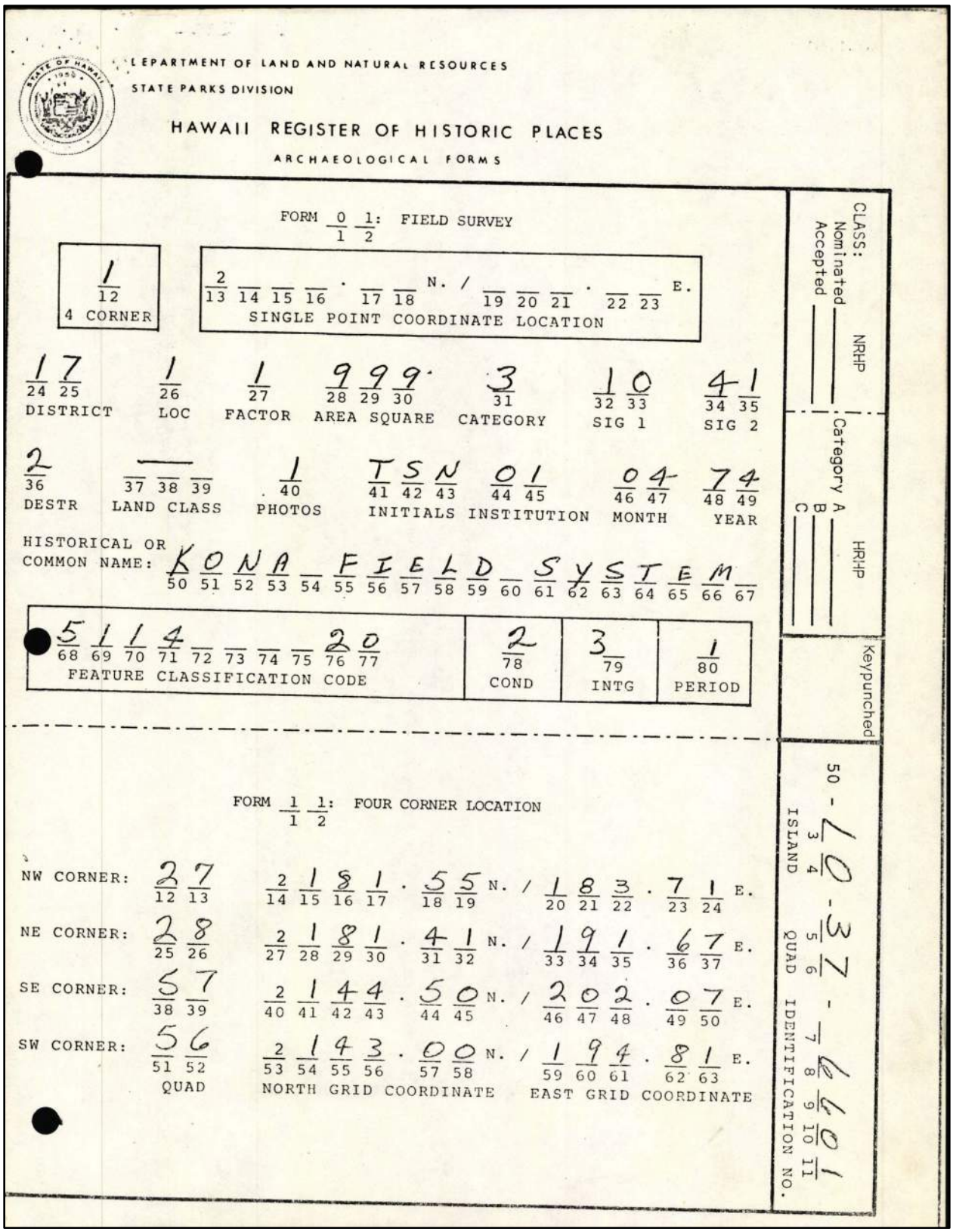
REVIEWER'S RECORD AND EVALUATION

NAME: _____ DATE REVIEWED _____
CATEGORY: ___High Value ___Valuable ___Reserve ___Marginal
SIGNIFICANCE: ___National ___State ___Local
RECOMMENDED DISPOSITION: ___Nominate National Register ___State Register ___Staff Files
RECOMMENDED THEMES: _____
REVIEWER'S COMMENTS: _____

REVIEW BOARD EVALUATION RECORD

DATE REVIEWED: _____ RECORDER: _____
OFFICIAL CATEGORY: ___High Value ___Valuable ___Reserve ___Marginal
OFFICIAL SIGNIFICANCE: ___National ___State ___Local
OFFICIAL THEMES: _____
OFFICIAL DISPOSITION: ___National Register Nomination ___State Register ___Staff Files
REVIEW BOARD COMMENTS: _____

VOTING RECORD: Daws ___ Hormann ___ Jackson ___ Kikuchi ___
Lind ___ Mark ___ Nagata ___ Paglinawan ___
Roche ___ Tuggle ___



DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE PARKS DIVISION

HAWAII REGISTER OF HISTORIC PLACES
ARCHAEOLOGICAL FORMS

FORM 01: FIELD SURVEY

1 (12) 4 CORNER

2 (13) ___ (14) ___ (15) ___ (16) . ___ (17) ___ (18) N. / ___ (19) ___ (20) ___ (21) . ___ (22) ___ (23) E.
SINGLE POINT COORDINATE LOCATION

CLASS: Nominated / Accepted — NRHP

Category A / B / C — HRHP

Keypunched

17 (24 25) DISTRICT
1 (26) LOC
1 (27) FACTOR
999 (28 29 30) AREA SQUARE
3 (31) CATEGORY
10 (32 33) SIG 1
41 (34 35) SIG 2

2 (36) DESTR
___ (37 38 39) LAND CLASS
1 (40) PHOTOS
TSN (41 42 43) INITIALS
01 (44 45) INSTITUTION
04 (46 47) MONTH
74 (48 49) YEAR

HISTORICAL OR COMMON NAME: KONA FIELD SYSTEM (50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67)

5114 ___ ___ ___ ___ 20 (68 69 70 71 72 73 74 75 76 77)
FEATURE CLASSIFICATION CODE

2 (78) COND
3 (79) INTG
1 (80) PERIOD

50 - 10 (3 4) - 37 (5 6) - 6601 (7 8 9 10 11)
ISLAND QUAD IDENTIFICATION NO.

FORM 11: FOUR CORNER LOCATION

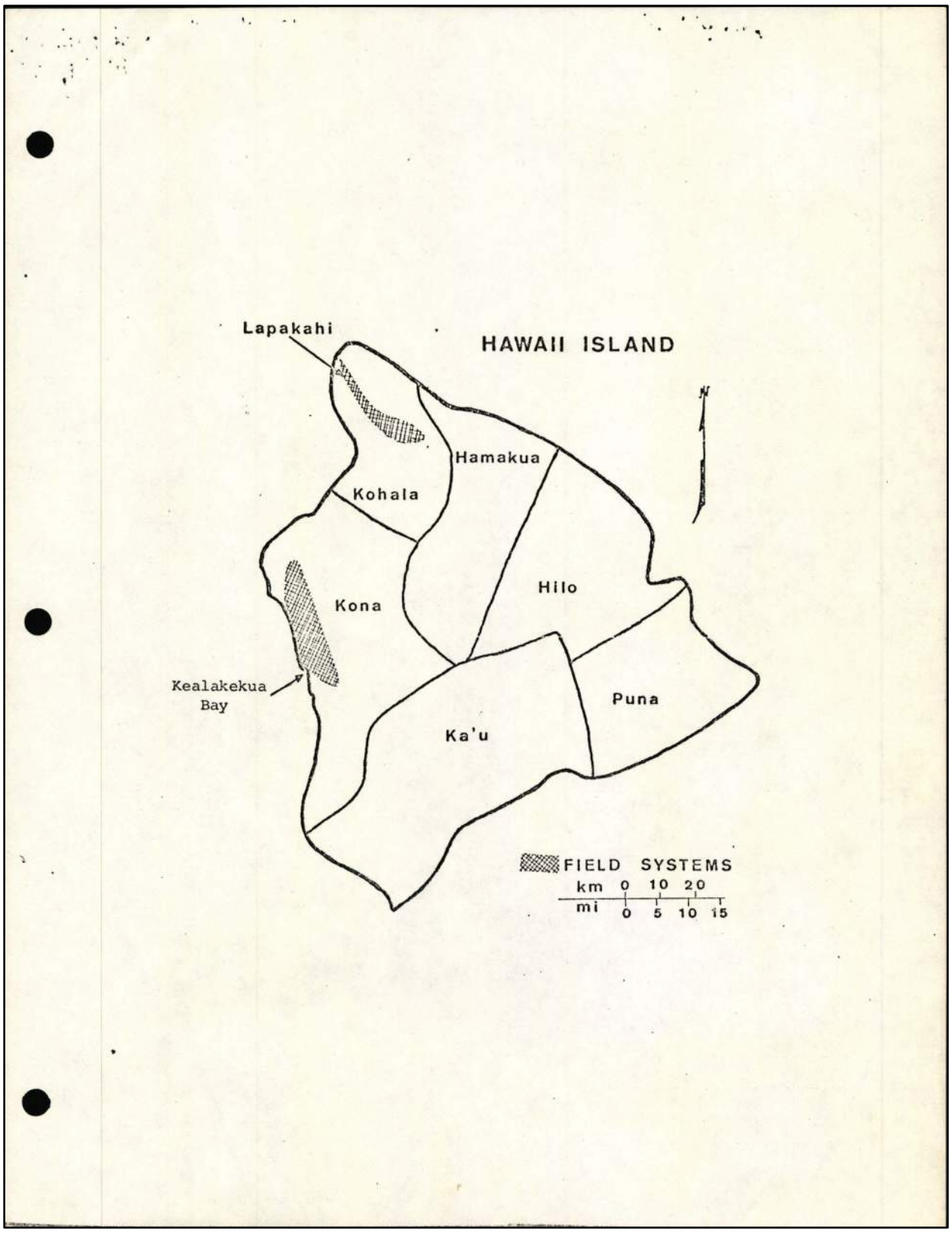
NW CORNER: 27 (12 13) — 2 (14) 18 (15 16) 1 (17) . 55 (18 19) N. / 183 (20 21 22) . 71 (23 24) E.

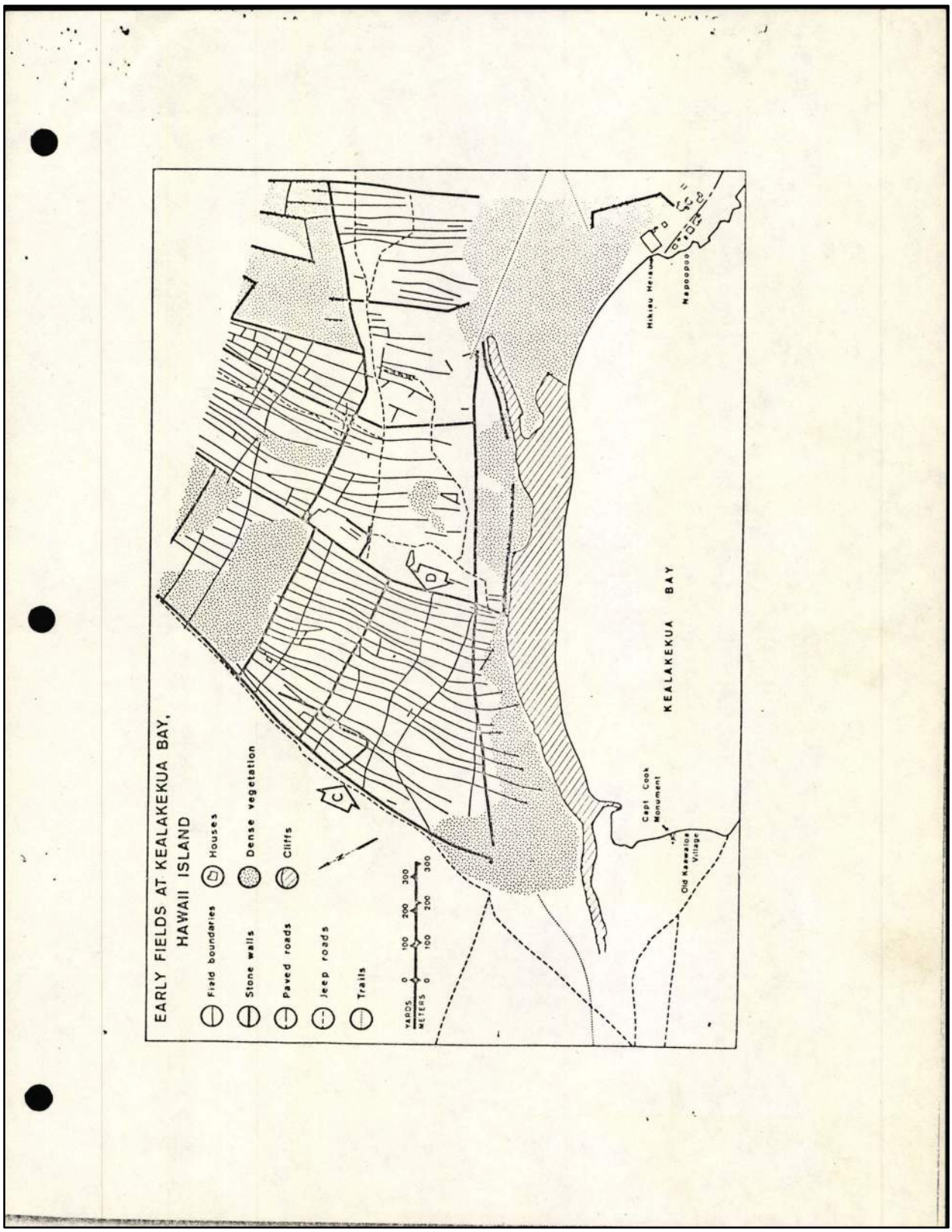
NE CORNER: 28 (25 26) — 2 (27) 18 (28 29) 1 (30) . 41 (31 32) N. / 191 (33 34 35) . 67 (36 37) E.

SE CORNER: 57 (38 39) — 2 (40) 144 (41 42 43) . 50 (44 45) N. / 202 (46 47 48) . 07 (49 50) E.

SW CORNER: 56 (51 52) — 2 (53) 143 (54 55 56) . 00 (57 58) N. / 194 (59 60 61) . 81 (62 63) E.

QUAD — NORTH GRID COORDINATE — EAST GRID COORDINATE


Lapakahi
HAWAII ISLAND
N
Hamakua
Kohala
Hilo
Kona
Kealakekua
Bay
Puna
Ka'u
FIELD SYSTEMS
km 0 10 20
mi 0 5 10 15


EARLY FIELDS AT KEALAKEKUA BAY,
HAWAII ISLAND
Field boundaries
Houses
Stone walls
Dense vegetation
Paved roads
Cliffs
Jeep roads
Trails
YARDS 0 100 200 300
METERS 0 100 200 300
KEALAKEKUA BAY
Capt Cook Monument
Old Kaawaloa Village
Napoopoo

FEATURE DESCRIPTION FORM

50 - 10 - 37 - 6601
ISLAND QUAD IDENTIFICATION NO.

VERBAL DESCRIPTION MUST INCLUDE: bearings and sources used to locate feature; size; shape; construction technique; materials used; terrain features; condition; surface artifacts; midden. SIGNIFICANCE STATEMENT MUST INCLUDE: research potential; interpretive potential; unusual or important characteristics; probable function; importance as representative of its class; recommendation of Register status.

DESCRIPTION:
The most extensive and monumental work of ancient Hawaii is the Kona Field System, lying along the western side of Hawaii Island. This field system is so extensive that it can only be appreciated from an airplane or by air photos, for it is an integrated complex of remains three by eighteen miles in size. The fields form a patterned network of elongated rectangles lying as a band parallel to the sea.

Ground inspections in the Kealakekua Bay area have shown that the patterning is caused by earthen and rock ridges which enclose rectangular field areas, generally oriented with their long axis perpendicular to the sea. This places the long sides of each rectangular field perpendicular to the topographic contours and parallel to the terrain slope. Individual fields vary in size from 9 meters (30 feet) wide by 15 meters (50 feet) long to fields measuring 50 by 300 meters (150 by 1,000 feet). The field dimensions appear related to local topography. A field may widen to take in a feature, such as an outcropping, or it may narrow to go around one, for example.

Some field boundaries are well constructed of stacked stone while others are merely piles of rock lining the field borders. These walls vary in height from about 0.5 to 1.0 meters (1.5 to 3 feet). The earthen mounds vary from about 0.5 to 1 meters (1.5 to 3 feet) in height and are quite rounded. The width of these field boundaries ranges from about 1 meter (3 feet) for well constructed stone walls to about 3 meters (9 feet) for the rounded earthen mounds.

There was no evidence of irrigation as shown by traces of water diversion or by terracing; the mounds and walls apparently were for rainfall retention, boundary markers and depositories for field rocks. In addition, the upslope orientation of the fields rules against their use for holding surface water, indicating that water was limited to rainfall.

The general symmetry of the Kealakekua fields, and of the whole Kona System, is well designed to take advantage of the western Hawaii Island environment. The orientation maximizes the available sunlight and exposure to periodic rain showers. The alignment would have made the crops susceptible to high velocity trade winds were it not for the protection of Mauna Loa. On-shore winds are generally light so physical damage or excessive plant evapo-transpiration would not have been a crucial factor in field alignment, contrary to the situation in Kohala.

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

VERBAL DESCRIPTION MUST INCLUDE PERTINENT DATA ON: bearings and sources used to locate feature; terrain and vegetation; size; shape; construction technique; materials used; condition; surface artifacts or midden visible. SIGNIFICANCE STATEMENT MUST INCLUDE: unusual or important characteristics; accessibility; interpretive and research potential; evaluation of the site's importance as a representative of its class; recommendations for register category.

(Page Two)

Excellent historical documentation exists for the Kona Field System, primarily through the journal of Archibald Menzies, the surgeon and naturalist with Captain George Vancouver, who visited periodically between A.D. 1792 and 1794. He made two trips inland through portions of the Kona Field System, from the coast to its upper elevations. In his walk through the northern portion of the Kona Field System, Menzies left Kailua to ascend Hualalai, noting:

> "We commenced our march with a slow pace, exposed to the scorching heat of the meridian sun, over a dreary barren track of a gradual ascent, consisting of little else than rugged porous lava and volcanic dregs, for about three miles, when we entered the breadfruit plantations whose spreading trees with beautiful foliage were scattered about that distance from the shore along the side of the mountain as far as we could see on both sides. Here the country began to assume a pleasant and fertile appearance, through which we continued our ascent for about two miles further, surrounded by plantations of the esculent roots and vegetables of the country, industriously cultivated, till we came to the uppermost village consisting of a few scattered huts ... (p. 154).

After reaching the summit of Hualalai, Menzies and his group angled south directly toward Kaawaloa at Kealakekua Bay instead of returning to Kailua. Descending out of the forest, he noted:

> "... we found the lower edge of it (the forest) as in other places, adorned with rich plantations of plantains and bananas (p. 167)."

The most extensive description of the Kona Field System comes from a similar trip by Menzies at Kealakekua Bay, near the southern end of the field system. After leaving Kaawaloa, Menzies observed:

> The forenoon was far spent in arranging and equipping the party before we left the village (Kaawaloa), and as our route lay directly back from it, over a dry barren rocky country, up a steep ascent, in the scorching heat of the day, the first part of our journey was rather fatiguing, before we gained the summit of the eminence over the bay, where we met a refreshing breeze, and had

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
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(Page Three)

an extensive prospect of the country and villages to the southward of us. The tract which extended along shore, if we might judge from its appearance and our knowledge of that which we had already traveled over, we were ready to pronounce a dreary naked barren waste, if we except a few groves of cocoa palms here and there near the villages. But that which stretched higher up along the verge of the woods from the manner it was industriously laid out in little fields exhibited a more pleasing and fertile appearance.

On leaving this station, we soon lost sight of the vessels, and entered their bread-fruit plantations, the trees of which were a good distance apart, so as to give room to their boughs to spread out vigorously on all sides, which was not the case in the crowded groves of Tahiti, where we found them always planted on the low plains along the sea side. But here the size of the trees, the luxuriancy of their crop and foliage, sufficiently show that they thrive equally well on an elevated situation. The space between these trees did not lay idle. It was chiefly planted with sweet potatoes and rows of cloth plant /wauke/. As we advanced beyond the bread-fruit plantations, the country became more and more fertile, being in a high state of cultivation. For several miles round us there was not a spot that would admit of it but what was with great labor and industry cleared of the loose stones and planted with esculent roots or some useful vegetables or other. In clearing the ground, the stones are heaped up in ridges between the little fields and planted on each side, either with a row of sugar cane or the sweet root of these islands (Dracena ferrea, Linn) /ti/ where they afterwards continue to grow in a wild state, so that even these stony, uncultivated banks are by this means made useful to the proprietors, as well as ornamental to the fields they intersect.

The produce of these plantations, besides the above mentioned, are the cloth plant (Morus papyriferus, Linn.) /wauke/, taro, and sweet potatoes. The latter are here planted three or four feet apart and earthed up around their stems much in the same manner as the common

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
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(Page Four)

potatoes are treated in England. When they dig up any, we remarked that, after stripping off the potatoes, they carefully put the old plant back again in the ground for the ensuing crop. But the taro, being naturally an aquatic plant, required in this dry soil a very different treatment. There were generally two or three of them planted together in a hole about nine inches below the surface of the ground. These holes were about four feet apart, and as the plants grew up, the earth is gathered round their stems in the form of a basin to retain the water, either from rain or otherwise, about their roots. The whole field is generally covered with a thick layer of hay, made from long, coarse grass or the tops of sugar cane, which continually preserves a certain degree of moisture in the soil that would otherwise be parched up by the scorching heat of the solar rays. In this way they rear up these roots to very great perfection even on a dry elevated situation.

The land here is divided into plantations, called ili, which take their rise at the sea side and proceed up the country, preserving a certain breadth without any limitations, or as far as the owner chooses to cultivate them, and without the protection either of high walls or gates. (p. 77)

After breakfast, we pursued our course onward with a fair prospect of a fine day and soon after entered the wood by a well trodden path, on both sides of which were luxuriant groves of plantains and bananas reared up with great industry in the neatest order of cultivation. These being tender vegetables, required a sheltered situation and good soil to bring them to perfection. (p. 80)

Menzies continued inland above the field sytem and returned to the coast at Honaunau, just south of Kealakekua Bay.

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - ____ - ____ - ____ ____ ____ ____ ____

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(Page Five)

The routes of Menzies and other early observers were plotted, observations matched to specific land areas, and the observations and the areas were analyzed according to modern environmental data to determine the characteristics controlling the agriculture. The following subzones for the Kona Field System were developed:

Sweet Potato/Wauke Zone

Elevation: Sea level to about 500 feet (0 to 150 meters)

Annual Rainfall: Seasonal; 30 to 50 inches (.8 to 1.2 meters)

Crops: Sweet potatoes and wauke grown in very rocky areas.

Breadfruit/Sweet Potato/Wauke Zone

Elevation: 500 to 1,000 feet (150 to 300 meters)

Annual Rainfall: 30 to 60 inches (.8 to 1.5 meters)

Crops: breadfruit trees, with sweet potatoes and wauke planted between them.

Sweet Potato/Dry Land Taro Zone

Elevation: 1,000 to 2,500 feet (300 to 750 meters)

Annual Rainfall: 60 to 80 inches (1.5 to 2.0 meters)

Crops: no breadfruit trees; sweet potatoes in the lower part, dry land taro in the upper part. Field boundaries planted with ti and sugar cane.

DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

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(Page Six)

Plantains and Banana Zone

Elevation: 2,000 to 3,000 feet (600 to 900 meters)

Annual Rainfall: 80 to 100 inches (2.0 to 2.5 meters)

Crops: bananas and plantains planted just below and within the forest.

All environmental variables are relatively constant for the sub-zones except those of elevation and rainfall, demonstrating the regulating effect of these two variables on agriculture in the Kona Field System. These divisions are not to be construed as clear-cut but rather show a gradual change from one sub-zone to the next, correlated with steady increases in elevation and rainfall.

SIGNIFICANCE

The Kona Field System is without equal in Hawaii, and probably in the nation in terms of the extensiveness of a prehistoric modification of the land. It is quite comparable in terms of complexity and size with the well known field systems of Central and South America, although differing in specific characteristics. It is a physical demonstration of the highly developed farming economy of ancient Hawaii and illustrates the complexity and advanced state of aboriginal Hawaiian culture. The system is so extensive that it cannot be seen in its entirety except from extremely high altitudes, but the physical remains are sufficiently well preserved and in such generally good condition that they may still be detected on the ground, although it is difficult to realize what is viewed is part of such a massive system. In all, it is a magnificent monument to the exhaustive labors and industry of the ancient Hawaiians.

The study of environmental and crop factors shows the ancient Hawaiians were knowledgeable and adept in molding their needs in consonance with environmental restraints. Historical records show a strong appreciation of good conservation measures, such as fallowing, and mulching. This illustrates the close partnership with nature which was so much a characteristic of ancient Hawaii.

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
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(Page Seven)

The vastness and complexity of the system show the excellent practical engineering and environmental knowledge of the ancient Hawaiians, as well as the highly evolved social organization which could coordinate the labors of a multitude of people to create and maintain such a system. Yet, within the overall system, it is possible to see the role of the 'ohana, the basic Hawaiian kinship and land-controlling grouping, for the boundaries of the traditional 'ili and ahupua'a land divisions are clear. This gives an unparallel opportunity for research into the organization and interrelationships of ancient Hawaiian society.

The innumerable habitation remains, as well as the remains of complete assemblages of other physical remains, such as burial areas, religious structures (heiau), cave shelters, refuge caves, animal enclosures, and work platforms all contribute to the research importance of this system.

Finally, the Kona Field System is a dramatic illustration of the dependence of ancient Hawaii upon the production of land foods, their primary subsistence source. Truly, this is worthy of entry into the Hawaii and National Registers of Historic Places as a district of high value.

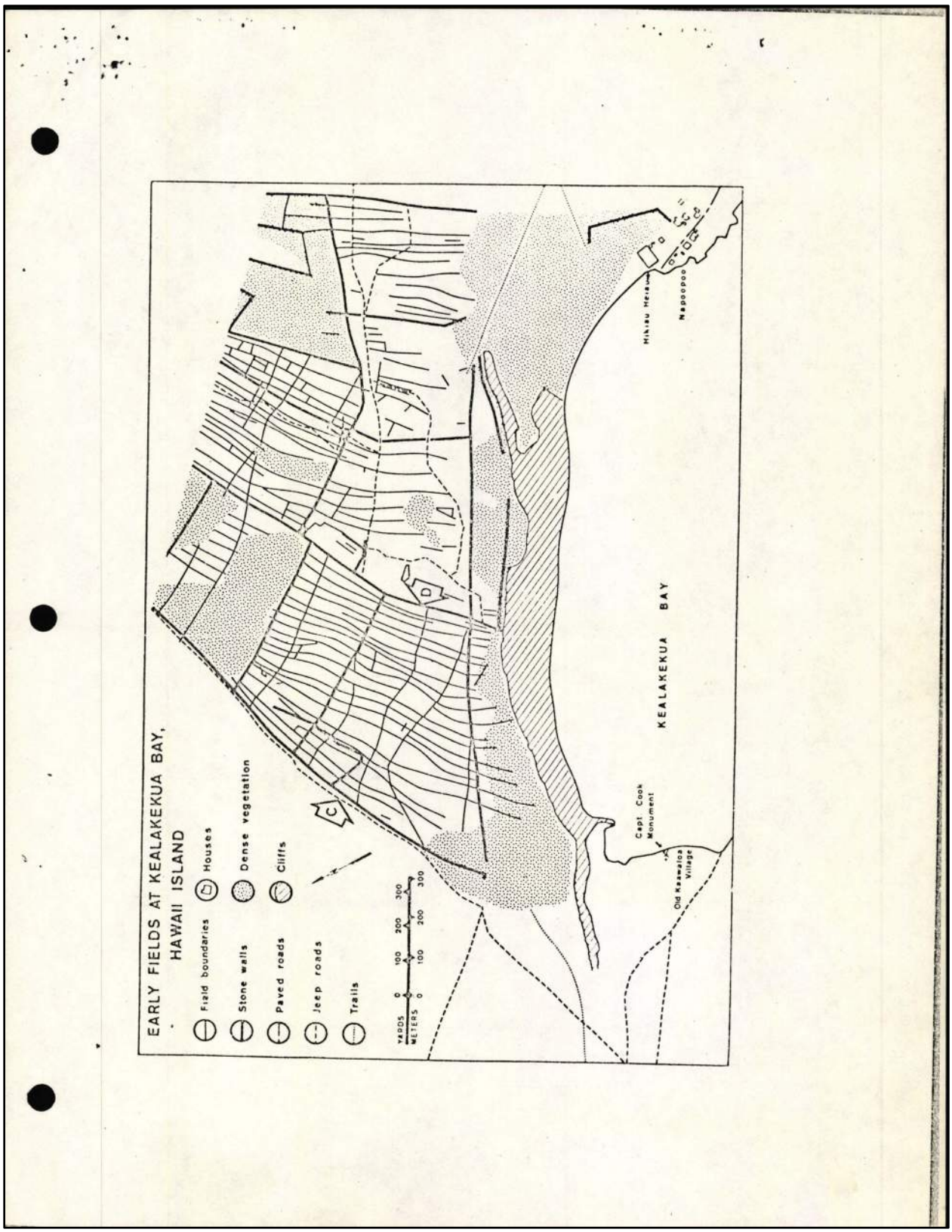
Urban development and modern agriculture has caused moderate damage to the system, but ample remains are still in existence to delimit the system and to warrant a high value evaluation.

N.B. Quotations are from:
Menzies, Archibald
1920 Hawaii Nei 128 Years Ago.... Honolulu.

N.B. The Quad number in the site identification was arbitrarily chosen since the district extends through multiple quads.

	LAT.	LONG.
NW	19°42'15"N	156°00'27"W
NE	19°42'16"N	155°56'27"W
SE	19°22'20"N	155°50'10"W
SW	19°21'32"N	155°54°18"W

SIGNED: J. Stell Mason DATE: May 15, 1979


EARLY FIELDS AT KEALAKEKUA BAY,
HAWAII ISLAND
Field boundaries
Houses
Stone walls
Dense vegetation
Paved roads
Cliffs
Jeep roads
Trails
YARDS
METERS
KEALAKEKUA BAY
Capt. Cook Monument
Old Kaawaloa Village
Napoopoo
C
D

FORM 3 1: PROPERTY OWNERSHIP

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

12 13	14 15	16	17	18	19	20	21	22 23 24	25 26 27
2 1	1 1	1	3	2	2				
USE 1	USE 2	STAT	OWNR	ATTD	ACCS	zone	sect	plat	parcel
						T A X		M A P	K E Y

PROPERTY OWNER: M U L T I P L E (28–45)

STREET ADDRESS: (46–63)

TOWN OR CITY: (64–73) STATE (74 75) ZIP CODE (76–80)

FORM 4 1: BACKGROUND DATA

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

AHUPUA'A: M U L T I P L E (12–26)

PREVIOUS SURVEYS: N O N E (27–44)

PREVIOUS SITE DESIGNATION(S): N O N E (45–62)

LAST NAME OF SURVEYOR: (63–74)

75 76	77 78	79 80
INSTITUTION	YEAR	FILED AT

APPENDIX C

Cultural Impact Assessment Report

Draft
Cultural Impact Assessment for the Department of Hawaiian Home Lands North Kona Well Construction in Pua‘a Project, Kahului Ahupua‘a, North Kona District, Hawai‘i Island TMK: [3] 7-5-014:001

Prepared for
Belt Collins Hawaii LLC

Prepared by
Chantellee Konohia Spencer, B.A.,
and
Hallet H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: PUAA 4)

July 2019

O‘ahu Office
P.O. Box 1114
Kailua, Hawai‘i 96734
Ph.: (808) 262-9972
Fax: (808) 262-4950

www.culturalsurveys.com

Maui Office
1860 Main St.
Wailuku, Hawai‘i 96793
Ph.: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Cultural Impact Assessment for the Department of Hawaiian Home Lands North Kona Well Construction in Pua‘a Project, Kahului Ahupua‘a, North Kona District, Hawai‘i Island, TMK: [3] 7-5-014:001 (Spencer and Hammatt 2019)
Date	July 2019
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: PUAA 4
Agencies	State of Hawai‘i, Department of Health – Office of Environmental Quality Control (OEQC)
Land Jurisdiction	Department of Hawaiian Home Lands (DHHL)
Project Proponent	Department of Hawaiian Home Lands (DHHL)
Project Location	The project area is located in the town of Hōlualoa on the *mauka* (upland) side of Māmalahoa Highway (Route 180) between mile markers 4 and 5. The project area is depicted on a portion of the 1996 Kailua and Kealakekua Quadrangle U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Description	The project entails drilling one or more exploratory wells, an approximate 24-inch diameter hole, for the proposed potable well. If the well(s) provide potable water, pumps will be installed in the wells. The site will be graded to accommodate a 2-million-gallon water storage tank, control building, access road, electrical lines, and other appurtenance improvements required for the operation and maintenance of the well site.
Project Acreage	5.38 acres (parcel is 128.419 acres)
Document Purpose	The purpose of this cultural impact assessment (CIA) is to comply with the State of Hawai‘i’s environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the proposed project’s potential effect on cultural beliefs, practices, and resources. Through document research and cultural consultation efforts, this report provides information compiled to date pertinent to the assessment of the proposed project’s potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control’s *Guidelines for Assessing Cultural Impacts*) which may include traditional cultural properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance Criterion e, pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “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" (HAR §13-275-6 and §13-284-6). The document will likely also support the project's historic preservation review under HRS §6E and HAR §13-275 and §13-284. The document is intended to support the project's environmental review and may also serve to support the project's historic preservation review under HRS §6E-8 and HAR §13-284.
Results of Background Research	Background research for this study yielded the following results in approximate chronological order: 1. The proposed project area is located on the leeward side of Hawai‘i Island in the *moku* (district) of North Kona. Traditionally, Hawaiian *ahupua‘a* (traditional land division) extended from the mountains to the sea so that the inhabitants had access to a wide variety of resources. This particular upland region is located within the traditional "Kona Field System" which has been described as "the most extensive and monumental work of ancient Hawaii" (Newman 1978). 2. Pua‘a, like its neighbors, is an integral part of the multi-zone cultivation area on the slope running *mauka/makai* (mountains/sea) behind Kailua and Kealakekua, known as the Kona Field System. The project area sits in the lowest zone of the Kona Field System in Pua‘a 3rd, known as the *Kula* (from sea level to 500ft above mean sea level (AMSL)) zone. 3. Four *heiau* (pre-Christian place of worship) have been recorded within the *ahupua‘a* of Pua‘a though no *heiau* has been recorded within the project area. Kalopau, Keaukukui‘ula, Mao, and Kauaikahaola were recorded by Thrum and later revaluated by Stokes and Dye (1991). 4. John Papa ‘Ī‘ī mentioned a famous surf of Pua‘a called Ko‘okā. The sport of *lele wa‘a* or canoe leaping could be seen here where this surf breaks. He also noted that Kamehameha and Ka‘ahumanu were both very skilled in canoe surfing (‘Ī‘ī 1959:133). 5. Kailua Kona gradually lost its importance as a political center as the capital of Hawai‘i was moved first to Lahaina then to Honolulu. Coupled with the general decline of the native population, Kailua Kona was depopulated and almost completely empty. Following the general decline of population and traditional subsistence farming, ranching activities increased throughout the Kona area. 6. Land Commission Awards (LCAs) were granted near the project area though no claim was made for the parcel of land that sits in the current project area. This is probably due in part to the dual ownership of Pua‘a between Lot

	Kamehameha and the Government, making it unavailable to be claimed. This does not, however, leave the *ahupua‘a* exempt from being sold by the Government to private land owners. 7. Research by Marion Kelly showed that after the Māhele, the areas most closely associated to the project area were redistributed. In addition to parcels awarded in the Māhele, between the years 1852 and 1853, the purchase of government lands in North Kona took place. An individual listed as J. Marechal purchased 198 acres in Pua‘a 3, Naipuwailuna purchased 60 acres in Pua‘a 2, and Pupule purchased 103 acres also in Pua‘a 2. Kapae 1 purchased 97 acres in Kahului 1 and Kipola purchased 78 acres also in Kahului 1 (Kelly 1983:43).
Results of Community Consultation	CSH attempted to contact Native Hawaiian organizations (NHOs), agencies, and community members. Below is a list of individuals who shared their *mana‘o* (thoughts, opinions) and *‘ike* (knowledge) about the project area and Pua‘a Ahupua‘a: 1. Craig “Bo” Kahui, Executive Director of La‘i ‘Ōpua 2020
Impacts and Recommendations	Based on information gathered from the cultural and historical background and the community consultation, potential impacts were identified and the following preliminary recommendations were made: 1. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease in that area and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (ancestral remains) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD, coroner, and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended. 2. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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Section 1 Introduction

1.1 Project Background

At the request of Belt Collins Hawaii LLC, on behalf of the State of Hawai‘i – Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH), is conducting a cultural impact assessment (CIA) for the proposed DHHL Well Construction project in Pua‘a, Kahului Ahupua‘a, North Kona District, Hawai‘i Island, Tax Map Key (TMK): [3] 7-5-014:001.

The project entails drilling one or more exploratory wells, approximately 24-inch diameter hole, for the proposed potable well. If the well(s) provide potable water, pumps will be installed in the wells. The site will be graded to accommodate a 2-million-gallon water storage tank, control building, access road, electrical lines, and other appurtenance improvements required for the operation and maintenance of the well site. The proposed project site is approximately 5.38 acres.

The project area is depicted on a portion of the 1996 Kailua and Kealakekua Quadrangle U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2018 Google Earth aerial photograph (Figure 3).

1.2 Document Purpose

The purpose of this CIA is to comply with the State of Hawai‘i’s environmental review process under Hawai‘i Revised Statutes (HRS) §343, which requires consideration of the proposed project’s potential effect on cultural beliefs, practices, and resources. Through document research and cultural consultation efforts, this report provides information compiled to date pertinent to the assessment of the proposed project’s potential impacts to cultural beliefs, practices, and resources (pursuant to the Office of Environmental Quality Control’s *Guidelines for Assessing Cultural Impacts*) which may include traditional cultural properties (TCPs). These TCPs may be significant historic properties under State of Hawai‘i significance Criterion e, pursuant to Hawai‘i Administrative Rules (HAR) §13-275-6 and §13-284-6. Significance Criterion e refers to historic properties that “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” (HAR §13-275-6 and §13-284-6). The document will likely also support the project’s historic preservation review under HRS §6E and HAR §13-275 and §13-284. The document is intended to support the project’s environmental review and may also serve to support the project’s historic preservation review under HRS §6E-8 and HAR §13-284.

1.3 Scope of Work

1. Examination of cultural and historical resources, including Land Commission documents, historic maps, and previous research reports, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal, and other resources or agricultural pursuits as may be indicated in the historic record.
2. Review of previous archaeological work at and near the subject parcel that may be relevant to reconstructions of traditional land use activities; and to the identification and description of cultural resources, practices, and beliefs associated with the parcel.

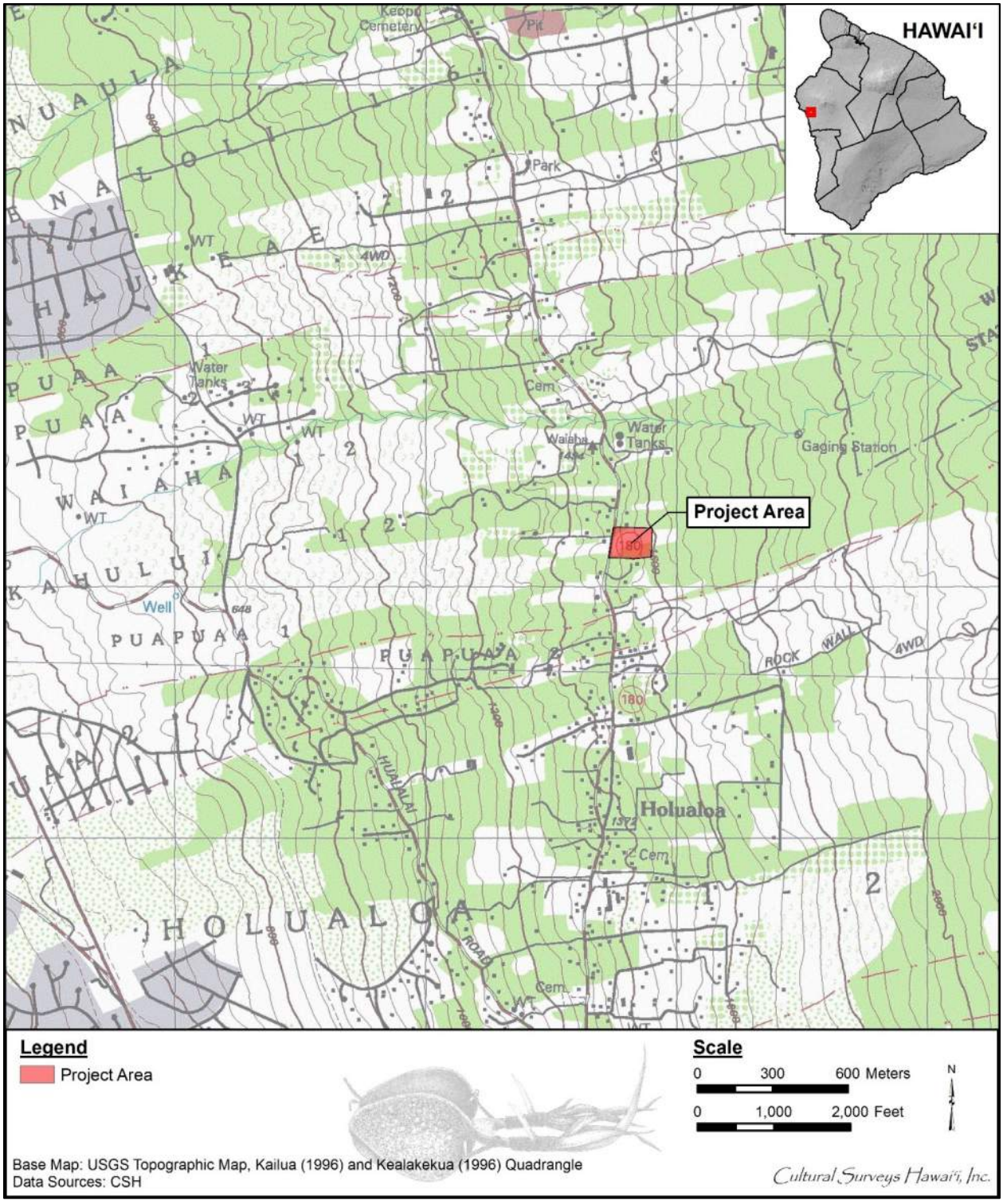

Figure 1. Portion of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangle showing the location of the project area

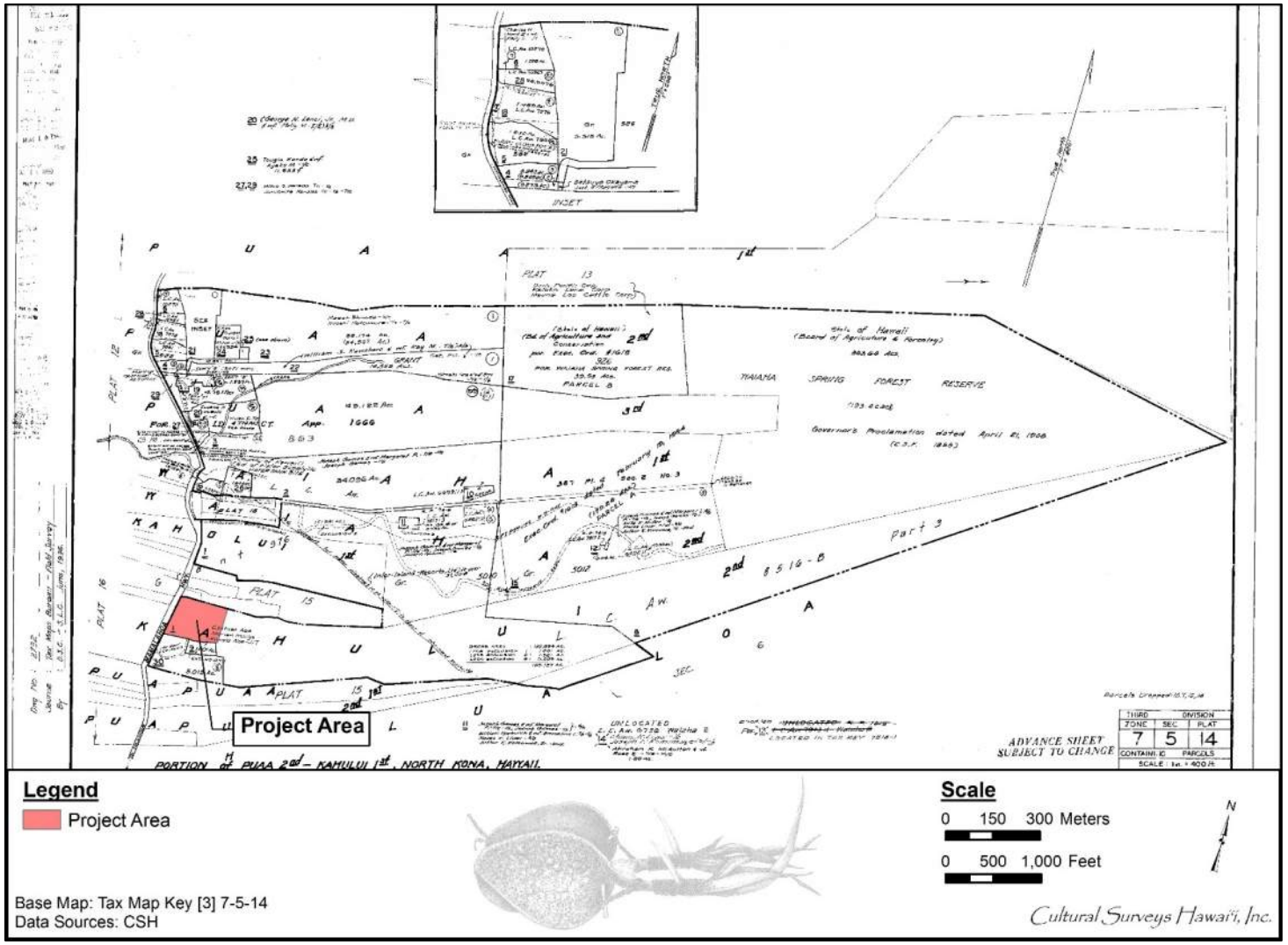

Figure 2. Tax Map Key (TMK) [3] 7-5-14 showing the project area (Hawai‘i TMK Service 2014)

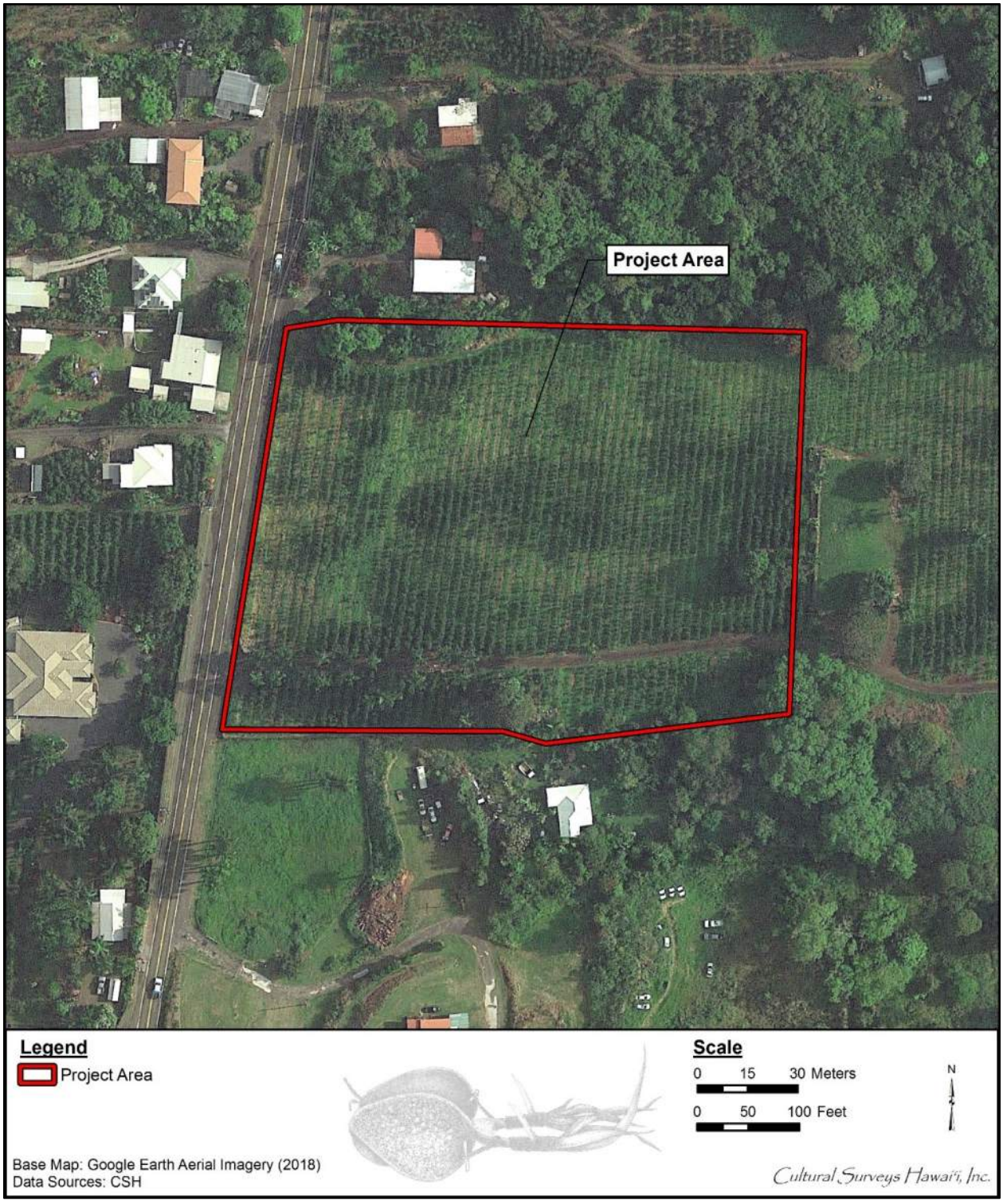

Figure 3. Aerial photograph showing the location of the project area (Google Earth 2018)

3. Consultation and interviews with knowledgeable parties regarding cultural and natural resources and practices at or near the parcel; present and past uses of the parcel; and/or other practices, uses, or traditions associated with the parcel and environs.
4. Preparation of a report that summarizes the results of these research activities and provides recommendations based on findings

1.4 Environmental Setting

1.4.1 Natural Environment

The proposed project area is located on the leeward, western slope of Hualālai Volcano, approximately 2.5 miles back from the coast at an elevation of 1,500-1,600 ft above mean sea level. Traditionally, Hawaiian *ahupua‘a* (traditional land division) extended from the mountains to the sea so that the inhabitants had access to a wide variety of resources. This particular upland region is located within the traditional "Kona Field System" which is described as:

> The most extensive and monumental work of ancient Hawaii is the Kona Field System, lying along the western side of Hawaii Island. The field system is so extensive that it can only be appreciated from an airplane or by air photos, for it is an integrated complex of remains three by eighteen miles in size. It is a physical demonstration of the highly developed farming economy. [Hawai‘i Register of Historic Places 1978]

Though modern mapping has placed this project in the *ahupua‘a* of Pua‘a, older maps and lineal descendants have placed the project in the *ahupua‘a* of Kahului. With respect to the lindeal descendants of the area, both Pua‘a and Kahului will be covered in this report.

The Kona region is characterized by a generally steep slope (about 17%), a low annual rainfall of 30 to 50 inches (Armstrong 1973), and undissected drainage systems. Nevertheless, there exists considerable variation in both micro-topography and monthly totals of precipitation resulting from the thin (4-to-5 feet [ft] thick) bedded and highly fluid late lava flows of Hualālai (Macdonald and Abbott 1970) and the subtropical cyclonic storms bring southerly and southwesterly winds and abnormally high rainfall, respectively. The mean annual temperature is from 70 to 75° F.

1.4.2 *Ka Lepo* (Soils)

According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Sato et al. (1973), the project area's soils consist primarily of Honuaulu extremely stony silty clay loam, 12 to 20% slope (HVD) and Kealakekua very stony silty clay loam, 6 to 20% slopes (KRD) (Figure 4).

Honuaulu soils are described as follows:

> The Honuaulu series consists of well-drained silty clay loams that formed in volcanic ash. These are gently sloping to moderately steep soils on uplands. They are at an elevation ranging from 1,000 to 2,500 feet and receive from 60 to 90 inches of rainfall annually, mostly during the summer months. [...] The natural vegetation consists of Christmas berry, guava, hilograss, and molassesgrass. [...] [Sato et al. 1973:19]

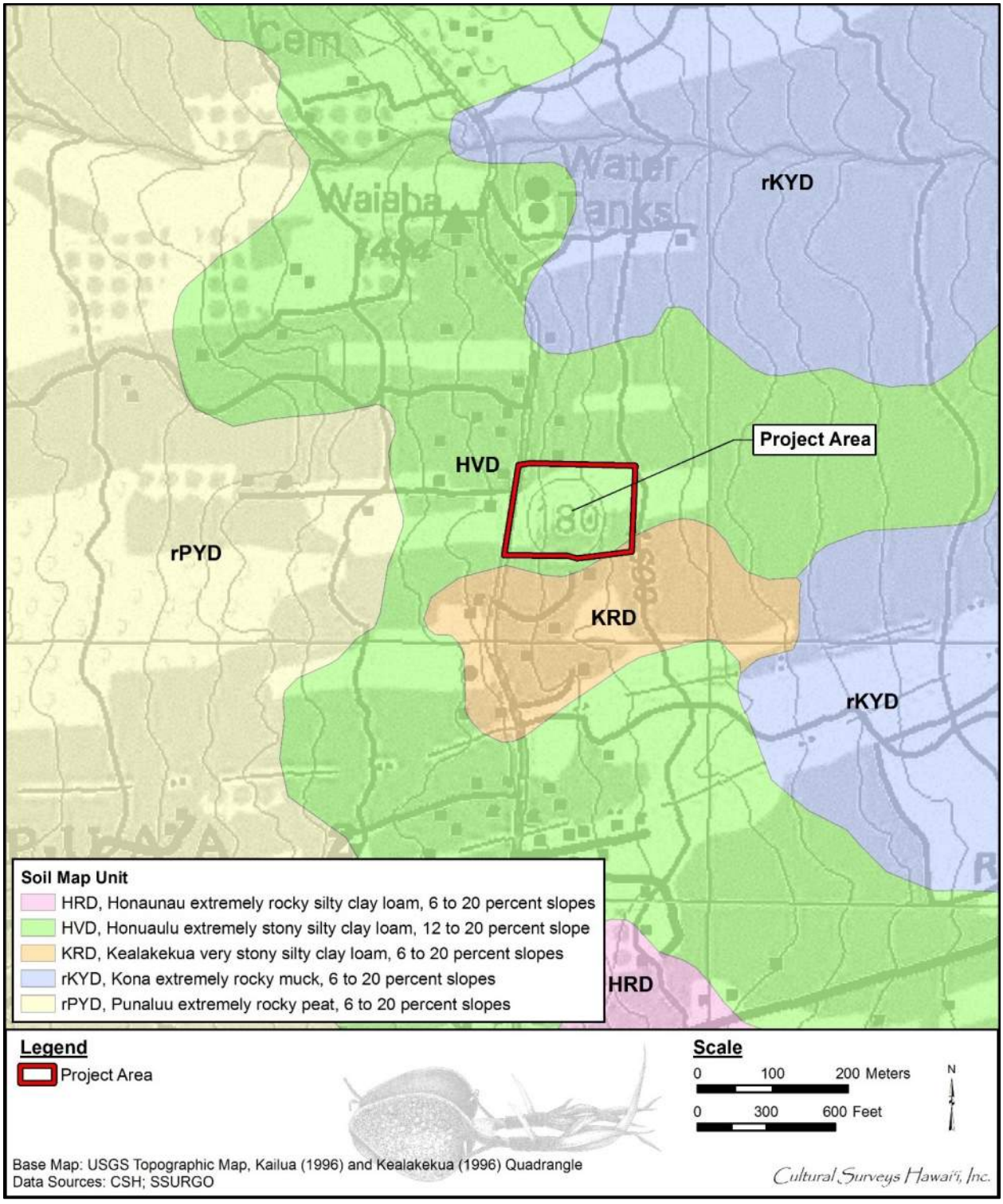

Figure 4. Overlay of *Soil Survey of the State of Hawaii* (Sato et al. 1973), indicating soil types within and surrounding the project area (USDA SSURGO 2001)

Kealakekua soils are described as follows:

> The Kealakekua series consists of well-drained silty clay loams that formed in volcanic ash. These are gently sloping to moderately steep soils on uplands at an elevation from 2,000 to 3,500 feet. The annual rainfall is 80 to 125 inches, most of which falls during the summer months. [...] The natural vegetation consists of ohia, tree fern, sedges, and kikuyugrass. [...] [Sato et al. 1973:26–27]

1.4.3 *Ka Makani* (Wind)

Each small geographic area on Hawai‘i had a Hawaiian name for its own wind, rain, and seas. The North Kona district was no exception to this naming practice. In the story, *The Wind Gourd of La‘amaomao,* Pāka‘a and his son Kuāpāka‘a are descendants of the wind goddess La‘amaomao. With their possession of her special wind gourd, they could control and call forth the winds of Hawai‘i. Pāka‘a’s chant traces the winds of and surrounding the Pua‘a Ahupua‘a. Pāka‘a’s chant is listed below:

Moa‘e ka‘u malaia ka makani	My Moa‘e, the wind that is swelling,
Apaiahaa i Kanakaloloa	Apaiahaa is at Kanakaloloa,
He Hau ko Kapalilua	Hau is of Kapalilua,
He Eka ko Kona	‘Eka is of Kona,
He Kipu ko Kahua	Kipu is of Kahuā,
He Eelekoa ko Uli [...]	‘E‘elekoa is of Uli, [...]
[...]	[...]
[...] *a ala mai Kona i ke kehau*	Kona awakens with the Kēhau breeze,
Kuu aku la ka luhi o Kona i ke kehau [...]	Kona’s burden diminishing with the Kēhau breeze, […]
[...]	[...]
He Olauniu ka makani,	‘Ōlauniu is the wind,
He Pili-a ko Kaniku,	Pili-a is of Kanikū,
He A-e ko Kalaau,	A‘e is of Kala‘au,
He Pohu, he Eka na makani o Kona,	Pohu and ‘Eka are the winds of Kona,
He Maaakualapu ko Kahaluu,	Ma‘a‘akuulapu is of Kahalu‘u
[...]	[...]

[Nakuina 1902:53–55; 1992:47–48]

1.4.4 *Ka Ua* (Rain)

Kona weather is typified by afternoon showers brought on by warm air that has been moved inland by light sea breezes. The humid air gradually condenses over higher altitudes throughout

the day. At night the land cools resulting in breezes that send warm air back out to sea. Rainfall in this general area averages 30 inches per year (Giambelluca et al. 1986).

The ability to identify rain names demonstrates the deep knowledge a person has of their homeland. As explained by Collette Akana:

> Rains are a source of pride for one's homeland. To know one's home is to know its stories and legends, its famous ali‘i, its landmarks, and its rains. […] Rain names were an important component in the traditional, largely place-based, information imparted to Hawaiian youngsters. Knowledge of local weather patterns ensured survival and proliferation, and knowledge of one's homeland was held in high esteem. [Charlot in Akana and Gonzalez 2015:xvii]

A few rains can be identified in Kona but only one is specific to the *ahupua‘a* of Pua‘a: this is the Nāulu rain. Other rains associated with Kona are the Palahī Pua‘a and Awa‘awa.

1.4.4.1 Nāulu Rain

The Nāulu rain was mentioned in a *mele kanikau* or lament for Kamehameha IV (Alexander Liholiho) by his wife ‘Emalani.

‘O Kona ia o ke kai malino a ‘Ehu ē!	Oh, Kona it is, of the tranquil sea of ‘Ehu, oh!
Ke ala a ‘Ehu, ke ala a kāua i hele ai	The pathway of ‘Ehu, the path we two traversed
I ke ao, i ka pō, pōwehiwehi i ka ua Nāulu a weli	By day, by night, made dim and threatening by the stormy Nāulu rains
He weliweli, he maluhia i ke aloha iā ‘oe	Frightful, but peaceful beacause of love for you
Iā ‘oe, iā ‘oe, e Kalopelekei i ka lā ē!	For you, for you, O Kalopelekei of the day, oh!

[Akana and Gonzalez 2015:188–189]

1.4.4.2 Palahī Pua‘a Rain

The Palahī Pua‘a rain is an intermittent rain of Kona meaning "pig diarrhea" (Akana and Gonzalez 2015:218). It is mentioned below in a *‘ōlelo no‘eau* (proverb) by Mary Kawena Pukui.

‘Mai hea mai ‘oe?’	‘Where are you from?’
‘Mai Kona mai.’	‘From Kona.’
‘Pehea ka ua o Kona?’	‘How is the rain of Kona?’
‘Palahī pua‘a ka ua o Kona.’	‘The rain of Kona pours like the watery excreta of a hog [palahī pua‘a].’
‘A pehea ke aku?’	‘How are the aku fish?’

‘Hī ka pā, hī ka malau.’	‘They run loose from the hook and the bait carrier.’

[Akana and Gonzalez 2015:218]

1.4.4.3 ‘Awa‘awa Rain

The ‘Awa‘awa rain can be found on Hualālai, which is the eastern *mauka* (inland) border of Puapua‘a. The section below is from a *mele* (song) mentioning the rain and Hualālai.

Mikihilina Hainoa i ka ‘Awa‘awa	Hainoa is dressed in the finery of the ‘Awa‘awa rain
Ka pakī mau i ka luna o Hualālai	Constantly splashing on the upper reaches of Hualālai

[Akana and Gonzalez 2015:17]

1.4.5 Built Environment

The project area is located along the *mauka* side of the old Māmalahoa Highway. Land use in this area is generally for residence and agriculture. Almost the entire project area (and overall TMK parcel 001) has been previously impacted by the development of a coffee plantation possibly overlying elements of the pre-Contact Kona Field System. A rock wall defines the western boundary of the project area along Māmalahoa Highway. The rock wall extends *mauka* a short distance along the southern boundary, where it is replaced by a hog-wire fence that continues upslope beyond the project area. The northern project area boundary is generally defined by a historic stone wall (likely a modified remnant of the former Kona Field System). The eastern project area boundary generally follows the 1600-ft elevation and is not marked. An iron gate along the highway near the southwestern corner of the property accesses an asphalt driveway extending *mauka* through and beyond the project area. The interior of the project area is characterized by linear rows of mature coffee trees. Signs of mechanical disturbance were observed along the margins of the project area.

Section 2 Methods

2.1 Archival Research

Research centers on Hawaiian activities including *ka‘ao* (legends), *wahi pana* (storied places), *‘ōlelo no‘eau*, *oli*, *mele* (songs), traditional *mo‘olelo* (stories), traditional subsistence and gathering methods, ritual and ceremonial practices, and more. Background research focuses on land transformation, development, and population changes beginning with the early post-Contact era to the present day.

Cultural documents, primary and secondary cultural and historical sources, historic maps, and photographs were reviewed for information pertaining to the study area. Research was primarily conducted at the CSH library. CSH cultural researchers also gathered information at other archives and libraries including the Hawai‘i State Archives, the Bishop Museum Archives, the University of Hawai‘i at Mānoa’s Hamilton Library, Ulukau, The Hawaiian Electronic Library (Ulukau.org 2014), the State Historic Preservation Division (SHPD) Library, the State of Hawai‘i Land Survey Division, the Hawaiian Historical Society, and the Hawaiian Mission Houses Historic Site and Archives. Information on Land Commission Awards (LCAs) were accessed via Waihona ‘Aina Corporation’s Māhele database (Waihona ‘Aina 2000), the Office of Hawaiian Affairs (OHA) Papakilo Database (Office of Hawaiian Affairs 2015), and the Ava Konohiki Ancestral Visions of ‘Āina website (Ava Konohiki 2015).

2.2 Community Consultation

2.2.1 Scoping for Participants

The cultural department commences our consultation efforts by utilizing our previous community contact list to facilitate the interview process. We then review an in-house database of *kūpuna* (elders), *kama‘āina* (native born), cultural practitioners, lineal and cultural descendants, Native Hawaiian Organizations (NHOs; includes Hawaiian Civic Clubs and those listed on the Department of Interior’s NHO list), and community groups. CSH also contacts agencies such as the SHPD, OHA, and the appropriate Island Burial Council where the proposed project is located for their response to the project and to identify lineal and cultural descendants, individuals and/or NHOs with cultural expertise and/or knowledge of the study area. CSH is also open to referrals and new contacts.

2.2.2 “Talk Story” Sessions

Prior to the interview, CSH cultural researchers explain the role of a CIA, how the consent process works, the project purpose, the intent of the study, and how their *‘ike* (knowledge) and *mana‘o* (thoughts and opinions) will be used in the report. The interviewee is given an Authorization and Release Form to read and sign.

“Talk Story” sessions range from the formal (e.g., sit down and *kūkā* [consultation, discussion] in the participant’s place of choice over set interview questions) to the informal (e.g., hiking to cultural sites near the study area and asking questions based on findings during the field outing). In some cases, interviews are recorded and transcribed later.

CSH also conducts group interviews, which range in size. Group interviews usually begin with set, formal questions. As the group interview progresses, questions are based on interviewees' answers. Group interviews are always transcribed and notes are taken. Recorded interviews assist the cultural researcher in 1) conveying accurate information for interview summaries, 2) reducing misinterpretation, and 3) adding missing details to *mo‘olelo*.

CSH seeks *kōkua* (assistance) and guidance in identifying past and current traditional cultural practices of the study area. Those aspects include general history of the *ahupua‘a*; past and present land use of the study area; knowledge of cultural sites (for example, *wahi pana*, archaeological sites, and burials); knowledge of traditional gathering practices (past and present) within the study area; cultural associations (*ka‘ao* and *mo‘olelo*); referrals; and any other cultural concerns the community might have related to Hawaiian cultural practices within or in the vicinity of the study area.

2.2.3 Interview Completion

After an interview, CSH cultural researchers transcribe and create an interview summary based on information provided by the interviewee. Cultural researchers give a copy of the transcription and interview summary to the interviewee for review and ask that they make any necessary edits. Once the interviewee has made those edits, CSH incorporates their *‘ike* and *mana‘o* into the report. When the draft report is submitted to the client, cultural researchers then prepare a finalized packet of the participant's transcription, interview summary, and any photos taken during the interview. We also include a thank you card and honoraria.

It is important that CSH cultural researchers cultivate and maintain community relationships. The CIA report may be completed, but CSH researchers continuously keep in touch with the community and interviewees throughout the year—such as checking in to say hello via email or by phone, volunteering with past interviewees on community service projects, and sending holiday cards to them and their *‘ohana* (family). CSH researchers feel this is an important component to building relationships and being part of an *‘ohana* and community.

"*I ulu no ka lālā i ke kumu*—the branches grow because of the trunk," is an *‘ōlelo no‘eau* (#1261) shared by Mary Kawena Pukui with the simple explanation: "Without our ancestors we would not be here" (Pukui 1983:137). As cultural researchers, we often lose our *kūpuna* but we do not lose their wisdom and words. We routinely check obituaries and gather information from other community contacts if we have lost our *kūpuna*. CSH makes it a point to reach out to the *‘ohana* of our *kūpuna* who have passed on and pay our respects including sending all past transcriptions, interview summaries, and photos for families to have on file for genealogical and historical reference.

Section 3 *Ka‘ao* and *Mo‘olelo*

Hawaiian storytellers of old were greatly honored; they were a major source of entertainment and their stories contained teachings while interweaving elements of Hawaiian lifestyles, genealogy, history, relationships, arts, and the natural environment (Pukui and Green 1995:IX). According to Pukui and Green (1995), storytelling is better heard rather than read for much becomes lost in the transfer from the spoken to the written word and *ka‘ao* are often full of *kaona* or double meanings.

Ka‘ao are defined by Pukui and Elbert (1986:108) as a "legend, tale […], romance, [and/or], fiction." *Ka‘ao* may be thought of as oral literature or legends, often fictional or mythic in origin, and have been "consciously composed to tickle the fancy rather than to inform the mind as to supposed events" (Beckwith 1970:1). Conversely, Pukui and Elbert (1986:254) define *mo‘olelo* as a "story, tale, myth, history, [and/or] tradition." The *mo‘olelo* are generally traditional stories about the gods, historic figures or stories which cover historic events and locate the events with known places. *Mo‘olelo* are often intimately connected to a tangible place or space.

In differentiating *ka‘ao* and *mo‘olelo* it may be useful to think of *ka‘ao* as expressly delving into the *wao akua* (realm of the gods), discussing the exploits of *akua* (gods) in a primordial time. *Mo‘olelo* on the otherhand, reference a host of characters from *ali‘i* (royalty), to *akua* and *kupua* (supernatural beings), to finally *maka‘āinana* (commoners), and discuss their varied and complex interactions within the *wao kānaka* (realm of man). Beckwith elaborates, "In reality, the distinction between *ka‘ao* as fiction and *mo‘olelo* as fact cannot be pressed too closely. It is rather in the intention than in the fact" (Beckwith 1970:1). Thus a so-called *mo‘olelo*, which may be enlivened by fantastic adventures of *kupua*, "nevertheless corresponds with the Hawaiian view of the relation between nature and man" (Beckwith 1970:1).

Both *ka‘ao* and *mo‘olelo* provide important insight into a specific geographical area, adding to a rich fabric of traditional knowledge. The preservation and passing on of these stories through oration remains a highly valued tradition. Additionally, oral traditions associated with the study area communicate the intrinsic value and meaning of a place, specifically its meaning to both *kama‘āina* as well as others who also value that place.

The following section presents traditional accounts of ancient Hawaiians living in the vicinity of the project area. Many relate an age of mythical characters whose epic adventures inadvertently lead to the Hawaiian race of *ali‘i* and *maka‘āinana*. The *ka‘ao* in and around the project area shared below are some of the oldest Hawaiian stories that have survived; they still speak to the characteristics and environment of the area and its people.

Though few recorded stories mention the Kahului or Puaʻa Ahupuaʻa, countless *mo‘olelo* speak of the neighboring *ahupua‘a* of Hōlualoa and the dormant volcano, Hualālai. The following section presents stories, proverbs, chants, and songs reflecting Hōlualoa and Hualālai where information cannot be found on Puaʻa or Kahului. The close proximity of these places to Puaʻa may give an idea to the cultural landscape of this area.

3.1.1 Legend of Kaulanapokii

In Hōlualoa, there resided a man named Kaumalumalu and his wife Lanihau (Fornander 1917a:560–569). They had five sons, named Mumu, Wawa, Ahewahewa, Lulukaina, and Kalino,

and five daughters named Mailelaulii, Maliekaluhea, Mailepakaha, Mailehaiwale, and Kaulanapookii. The names of the father and mother are the same as two *ahupua‘a* in North Kona, close to Hōlualoa. The names of the four eldest sisters are the four varieties of the fragrant *maile* vine (*Alyxia olivaeformis*).

When they were grown, the five sisters decided to travel. They left their home and family in Hōlualoa and traveled up (north) the coast of Kona to the Kohala District. When they reached Kohala, the eldest sister married Hikapoloa, the chief of the *ahupua‘a* of Puuepa and Hukiaa. One day, traders from Kohala sailed in their canoes to Hōlualoa to trade for fish. There they met Mumu and the other four brothers. These brothers were excellent fishermen and had some rare pearl fish hooks, which they used to catch the *aku* (bonito; *Katsuwonus pelamis*). When the traders returned to Hōlualoa, they gave some of the fish to the chief, Hikapoloa. He found out that it was the brothers of his wife who caught the fish, and he asked her if her brothers would give him one of their pearl fishhooks if he asked for one. She said that they would, so he sailed to Hōlualoa to get one of the fishhooks.

After returning from Hōlualoa, the chief ordered his men out to go *aku* fishing off the Kohala Coast. He held the pearl fishhook in his hand, thinking that the fish would just jump into the canoe. When the fish did not jump, Hikapoloa thought Mumu had deceived him, and he decided to kill him. In time, a drought came to Kona and there were no vegetable foods to be had. Mumu and his brothers loaded their canoe with *aku* and sailed to Kona, to trade their fish for other food. When they landed their canoe, the watchman of the coast told Mumu to go directly to his brother-in-law. As soon as Mumu entered the chief’s house, a guard cut his head off. They cooked the body in an *imu* (underground oven), and the retainers of the chief ate it. The other brothers then each entered the village one by one and met the same fate. Each brother was cooked in an *imu* with a different kind of wood, the *‘ōpiko* (*Straussia kaduana*), the *‘a‘aka*, (*Myoporum sandwicense*) the *māmane* (*Sophora chrysophylla*), the *pua* (*Pelea sandwicensis*), and the *alani* (*Pelea sandwicensis*).

The four eldest sisters were completely unaware of the murder of their brothers, but Kaulanapookii, who had supernatural powers, saw the spirits of her five headless brothers around the house. When Kaulanapookii told them that Hikapoloa had killed their brothers, the sisters plotted revenge. With her powers, Kaulanapookii caused her sister to bear her child with Hikapoloa early, so that when the child was born, they could call to the husband. When he came to see the new infant in their house, she called to the *maile* vines to completely cover the house to trap Hikapoloa, and then they set fire to the house. Kaulanapookii brought her brothers back to life.

> The sisters then first took up Mumu and after he came back to life the others were taken up. After all the brothers had been restored to life, they all returned to Kona, where they all made oath, that they would never be covered over with the same kapa [tapa cloth] with any man or woman from Kohala. This oath was even taken up and kept by their children after them. Thus did they forsake the proud land of Kohala and its favorite wind the aeloa. [Fornander 1917:568–569]

Because of her supernatural powers, Hawaiian healers would call on Kaulanapokii’s spirit to help them in their diagnosis and treatment of diseases. There is a similar character called Kaulanapokii, also with healing powers, in the legend of Keaomelemele. She is called Kaulana-iki-poki‘i, which means “beloved little one of the sunset” (Beckwith 1940:529). It is therefore possible that the youngest sister’s name in this legend means “beloved one of the sunset.” The

story emphasizes the sharing necessary between *ahupua‘a* with good fishing versus good farming, and also highlights an ancient enmity between the people of the Kohala and Kona Districts.

3.1.2 Legend of Kalaepuni and Kalaehina

Kūlanipō and Kama‘elekapu were another couple who raised their family in Hōlualoa. They had two sons, one named Kalaepuni and the other Kalaehina.

> *I ke au iā Keawenuia‘umi o Hawai‘i, e noho ana o Kūlanipō ma Holualoa, i Kona, ‘o Kama‘elekapu kāna wahine, hānau ‘elua mau keiki kāne, ‘o lāua nā keiki ‘oi kelakela o ke kolohe a me ka ikaika i ka hakakā. ‘O Kalepuni ka mua, a ‘o Kalaehina ka muli loa. i ulu a nui a‘e ‘o Kalepuni a ‘umikumāmawalu makahiki, ‘ike ‘ia a puni ka ‘āina no ka ikaika launa ‘ole ‘o Kalepuni.*
>
> In the era in which Keawenuiaumi was king of Hawai‘i, Kulanipo was living in Holualoa, Kona, Kama‘elekapu was his wife and two children were born, they had the most superior and troublemaking children who excelled in strength and fighting. Kalepuni was the eldest and Kalaehina was the youngest. When Kalepuni grew to be 18 years of age, his incomparable strength was known throughout the lands. [Halole 1861:4]

The eldest son had supernatural strength and daring; he uprooted a tree with his bare hands and dove into the water while fishing to battle hand-to-hand with the sharks. Keawenuiaumi, the high chief of Hawai‘i, became afraid that the young man would kill him, so he left and hid in the uplands near Hualālai Mountain. Kalaepuni became new chief of the island, but the old chief plotted to kill the upstart. He told his high priest to send his men to Kaho‘olawe to dig a deep well and surround the opening with rocks. He also left a couple on the island, with instructions on what to do if Kalaepuni landed on the island. One day, Kalaepuni heard of a great school of sharks off the Kohala Coast, so he went there and again dove into the water to fight the sharks. He was carried away by the current to Kaho‘olawe. He came to the house of the couple and asked them for some fresh water. They told him the only fresh water was at the bottom of the well. When he climbed down into the well, they pushed all the rocks down on him. These did not crush him, but one eventually landed on his head, killing him.

While Kalaepuni was still chief of Hawai‘i, he had sent his younger brother to Kapua in South Kona to haul six canoes down to the shore. There was one canoe for each of the six minor districts of Kona, and Kalaehina promised the people of each district that their land would be the chief’s favorite if they hauled their canoe to the shore first. All of the canoes got stuck at the point Nawaahokui in South Kona. Kalaepuni was angry that his brother had not completed his task, and demanded that he go and move the canoes himself. Kalaehina did not think he could move the canoes himself, so he ordered the people of Ka‘u to haul the canoes to the shore. They then sailed five of the canoes to the chiefly compound at Keauhou and Kalaehina carried the sixth canoe along the shore on his back. The chief was impressed with his younger brother’s strength, and urged him to sail to Maui and become the high chief of that island, just as his older brother had become high chief of Hawai‘i. Kalaehina killed the guardians of the Maui king Kamalalawalu, who fled in fear, and Kalaehina became king (Fornander 1918:198–207). Hōlualoa, therefore, was a place where two island-wide kings were born, becoming high chiefs not because of their lineage, but because of their great strength and daring.

3.1.3 Legend of Pupukea

Lonoikamakahiki was the king of Hawai‘i and his main administrator was his younger brother Pupukea. Kamalalawalu was the king of Maui and his main administrator was his younger brother Makakuikalani. There was a rivalry between both the two kings and between the two administrators. Kamalalawalu decided to invade Hawai‘i and sent another son, named Kauhiakama, to spy on the land of Hawai‘i. Kauhiakama sailed along the Kohala and Kona coasts, seeing which areas were populated and guarded.

> *Mamua ae o ka pae ana, hele aku la o Kauhiakama a hiki i Puako, a Kapalaoa, Kaniku, Kiholo, Mahaiula, Kailua, Holualoa, Kahaluu, Keauhou, Kaawaloa. A Kaawaloa, nalowale ke alanui, nokamea, ua pani ia mai i ka hulaana, a me ke ana mamua. Nolaila, huli hoi mai la o Kauhiakama a hiki i Kawaihae*.
>
> Prior to the landing, Kauhiakama voyaged and had touched at Puako, at Kapalaoa, Kaniku, Kiholo, Mahaiula, Kailua, Holualoa, Kahaluu, Keauhou and Kawaloa. At Kawaloa, the route of the travel was lost, because the slanting cliff and the crags barred them in front. Wherefore, Kauhiakama had retraced his course and arrived at Kawaihae. [Fornander 1919:440–441]

Kauhiakama sailed back to Maui and told his father there were no people on the Kona and Kohala coasts; that all of the houses were empty. But Kauhiakama was rather ignorant and did not realize that as he had passed the villages in the morning, the people of each village had left their houses to go out fishing or to go to the uplands to till their gardens. Based on the report of his son, Kamalalawalu invaded Hawai‘i, thinking there would be little resistance from the few people, but instead he had to fight the forces of Lonoikamakahiki. The war was eventually ended in Hawai‘i’s favor, when Pupukea, the Hawaiian chief, defeated Makakuikalani, the Maui chief, in single combat.

3.1.4 Hiku and Kawelu

Hiku, a demi-god, lived with his mother Hina in a cave near the summit of the mountain Hualālai (Emerson 1998:43). He had a marvelous arrow, called *Pua Ne*, which he could use to show him the way to travel. When he grew up, he decided to travel to the shore to meet new people. His mother granted his request but told him not to stay away too long. Once over the clinker lava, he shot the arrow into the air and it landed on a hill near Kailua town. He walked to the hill and shot the arrow again and it landed near the Hōlualoa shore. It landed near a waterhole called Waikalai, where the Hōlualoa villagers came to get fresh water. After Hiku’s feat, the waterhole was also called Wai o Hiku (Water of Hiku).

As he neared the village, he shot the arrow again, and it landed in the courtyard of the chief of Kona, at the feet of the chief’s daughter, Kawelu. When Hiku neared the woman, she hid the arrow as a challenge. Hiku called to the arrow “*Pua ne! Pua ne!*” and the arrow replied “*Ne.*” This act impressed Kawelu, so she decided to make Hiku her husband, and shut him up into her house. Remembering the words of his mother to return soon, Hiku escaped after several days by climbing through the roof thatch. The chief’s daughter was so bereft at his departure that she refused to eat, and after several days she died. Hiku learned of the news, and realizing his real love for Kawelu, decided to make the hazardous journey to the underworld to fetch her back to the land of the living.

He covered himself with a rancid mixture of coconut and *kukui* (candlenut; *Aleurites moluccanus*) oil so that he would smell like a corpse and took with him several feet of *kowali* (mile a minute vine*; Ipomoea cairica*) and a hollow, split coconut shell. With some friends, he paddled his canoe off shore "for a point in the sea where the sky comes down to meet the water" off the Hōlualoa shore (Emerson 1998:45). At this point was the entrance to the underworld of the dead, Lua o Milu (the pit of Milu). He sat on a swing tied to the vines, and his friends lowered him into the pit. The rancid smell of Hiku convinced the spirits at the bottom of the pit, including Milu, the god of the underworld, that Hiku had been dead for many days. He brought out the swing, which ignited much attention, especially from one spirit, his love Kawelu. She received permission from Milu to join Hiku on the vines. At each swing his friends raised the two higher and higher. At a great height, Kawelu panicked and tried to fly away, but Hiku trapped her spirit in the hollow coconut. The friends finally brought them back up to the canoe, and Hiku took the coconut back to Hōlualoa Village, where Kawelu's body was still lying in her house. He forced the spirit of Kawelu back into her body from her big toe, massaging the spirit up into the rest of her body, until she was fully revived (Emerson 1998:43–48).

3.2 *Wahi Pana* (Storied Places)

Wahi pana are legendary or storied places of an area. These legendary or storied places may include a variety of natural or human-made structures. Oftentimes dating to the pre-Contact period, most *wahi pana* are in some way connected to a particular *mo‘olelo*, however, a *wahi pana* may exist without a connection to any particular story. Davianna McGregor outlines the types of natural and human-made structures that may constitute *wahi pana*:

> Natural places have mana, and are sacred because of the presence of the gods, the akua, and the ancestral guardian spirits, the ‘aumakua. Human-made structures for the Hawaiian religion and family religious practices are also sacred. These structures and places include temples, and shrines, or heiau, for war, peace, agriculture, fishing, healing, and the like; pu‘uhonua, places of refuge and sanctuaries for healing and rebirth; agricultural sites and sites of food production such as the lo‘i pond fields and terraces slopes, ‘auwai irrigation ditches, and the fishponds; and special function sites such as trails, salt pans, holua slides, quarries, petroglyphs, gaming sites, and canoe landings. [McGregor 1996:22]

As McGregor makes clear, *wahi pana* can refer to natural geographic locations such as streams, peaks, rock formations, ridges, offshore islands and reefs, or they can refer to Hawaiian land divisions such as *ahupua‘a* or *‘ili*, and man-made structures such as fishponds. It is common for places and lanscape features to have multiple names, some of which may only be known to certain *‘ohana* or even certain individuals within an *‘ohana*, and many have been lost, forgotten, or kept secret through time. Place names also convey *kaona* and *huna* (secret) information that may even have political or subversive undertones. Before the introduction of writing to the Hawaiian Islands, cultural information was exclusively preserved and perpetuated orally. Hawaiians gave names to literally everything in their environment, including points of interest that may have gone unnoticed by persons of other cultural backgrounds. Hawaiians have named taro patches, rocks and trees that represented deities and ancestors, sites of houses and *heiau*, canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place (Pukui et al. 1974:x).

The primary compliation source is the online database of Lloyd Soehren's (2010), *Hawaiian Place Names*. Soehren has compiled all names from mid-nineteenth century land documents, such as Land Commission Awards (LCAs) and Boundary Commission Testimony (BCT) report. The Soehren database includes place name meanings from the definitive book on Hawaiian place names, *Place Names of Hawai‘i* (Pukui et al. 1974). In cases where Pukui et al. (1974) did not provide a meaning, Soehren often suggests a meaning for simple names from the *Hawaiian Dictionary* (Pukui and Elbert 1986). Thomas Thrum also compiled a list of place names in the 1922 edition of Lorrin Andrews' *A Dictionary of the Hawaiian Language*, although these meanings are considered less reliable than those in the definitive *Place Names of Hawai‘i* (Pukui et al. 1974). Using Lloyd Soehren's database (Soehren 2010), the tables below present place names of Pua‘a and Kahului nearest the project area.

Table 1. Place names of Kahului 2

The following table lists place names in Kahului 2, an area close to the project area and the neighboring *ahupua‘a* to Pua‘a.

Place Name	Type	Description
Ka‘aipaka	Boundary Point, *Kūlana kauhale* [Village, town, city]	"a kulana kauhale ahua hulipali" above Govt. road, between Waiakekea & Pohakuhano on south boundary Kahului 2
Kahuki	*‘Ili ‘āina* [land area]; usually a smaller land divsion in an *ahupua‘a*	Claim no. 7336 by Kuapuu is "i ka ili aina o Kahuki ahupuaa o Kahului 2." Also claim no. 7690 by Kulou. Claim no. 7073:7 by Kapa in Kahuki 1 is bounded on the south by Kahuki 2.
Kealaehu	Boundary Point	"Mauka corner of [RPG 976] is at Kealaehu sometimes called Alau, a koele [small land unit farmed for the chief]" along north boundary Kahului 2 between Mamalahoa Hwy and Papalanui. Elev. about 1900 ft.
Kealakōwa‘a	*‘Ili ‘āina*	Claim no. 7336:4 by Kuapuu is "i Kealakowaa. Mauka konohiki, Ma Kau Kikiaiole. Makai konohiki. Ma Kohala o Kahuki aina." Claim no. 10252:4 by Maliu "i ka ili i Halewaawaa" is bounded makai by Kealakowaa.
Kekawahi	Point	*Makai* of Kahelo and *hōlua* [sled] track
Kikiaiole	*‘Ili ‘āina*	Claim no. 7335 by Kaanaana is "i ka ili aina o Kikiaiole 1, ahupuaa Kahului 2. 3 apana aina." Apana 1 is bounded on the south by Kikiaiole 2.
Lapalua	*‘Ili ‘āina*	Claim no. 7496B by Keaweehu is "i ka ili aina Lapalua ahupuaa Kahului 1, 3 apana aina."
Ohia	*‘Ili ‘āina*	Claim no. 7336:6 by Kuapuu in the ‘ili of Kikiaiole is bounded on the south by "Ohia aina." Claim no. 7086:1 by Kalawa in Puki is bounded on the north by "Ohia ili."
Papiha	*‘Ili ‘āina*	Claims no. 7086:1, 2 by Kalawa in the *‘ili* of Puki are bounded on the south by the *‘ili* of Papiha.

Place Name	Type	Description
Pōhakuhano	Boundary Point	“the mauka corner of Puapuaa. This is in fern [ama‘u] below the edge of the woods, a few rocks a sort of ahua” (p.337) Also called Pohakuokahano. On boundary between Kahului 2 and Holualoa 1. Elev. about 2080 ft.
Puki	*‘Ili ‘āina*	Claim no. 7086 by Kalawa: “aia i ka ili aina i Puki ahupuaa Kahului 2. 3 apana.”
Pu‘u Kīhoe	*Pu‘u* [Hill, Peak]	“a high hill outside of the woods, now overgrown with koa” (p.327) Elev. 2281. Spelt Kehoe on USGS and TM, Kehoi in BCT 1:328, Koheo in BCT 1:327. Claim no. 10252:3 by Maliu “i Kamuku ahupuaa Kahului 1.... Makai o Puukehoe [*sic*] he puu.”
Waiakalaho	*Pūnāwai* [Water spring]	“above Governor Adams' wall” (p.327) on south boundary Kahului 2, “about 3 kihapai to north of the boundary of Puapuaa” (p.328).
Waiakekea	Boundary Point	“A trifle inland from Ka-‘ili-ki‘i Point was the now covered spring...on the upper side of which are a few stones of a house foundation on the place where Queen Emma was born.” Above Govt. road and below Kaaipaka on south boundary Kahului 2, near the *iwi aina.*
Waiapūkō	*‘Ili ‘āina*	Claim no. 7914 by Kekipi is “i ke ahupuaa o Kahului 2, he pauku aina. [Bounded] Mauka o Waiapuko he ili aina.”
Waihuna	Boundary Point, Water hole	“a waterhole on the boundary between Kahului 1 & 2” *makai* of Puu Kehoi.
Waike‘e	Boundary Point, Gulch	“where the gulch turns west” between Pohakuhano and Puu o Kaloa, on south boundary Kahului 2. Elev. 2440 ft

Table 2. Place names of Pua‘a 2 and Pua‘a 3

The following table lists place names associated with Pua‘a 2 and Pua‘a 3. These place names were taken from Māhele testimonies presented to the Boundary Commission.

Place Name	Type	Description
Ka‘a‘awa	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 10270 by Mailou and claim no. 3479 by Kalama
‘Ohiki	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 7076 by Kupihe and claim no. 10267 by Malowale
Kamuku	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 6181 by Iwaiwa
Opulehelehe	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 10266 by Makai

Place Name	Type	Description
Kanakaloa	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 6240 by Kanakamakua
Ulumoe	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 10270 by Mailou
Moonuiohua 1	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 7077 by Kahuakailoa
Kamuku	*‘Ili ‘Āina*	Mentioned in Māhele testimony for claim no. 6181 by Iwaiwa

3.2.1 *Heiau*

The following section lists *heiau* recorded by Thomas G. Thrum and a secondary list of *heiau* recorded by John F.G. Stokes and Thomas Dye. When Stokes traveled to Hawai‘i Island to begin his survey of *heiau,* he discovered a far greater number of *heiau* existed than was never previously recorded by Thrum (Stokes and Dye 1991:10). It should be noted that for some records by Stokes and Dye where no details exist, this information was likely gathered and transmitted by locals of the visited area. In most cases, only the name of the *heiau* was known and the function and dimensions have been completely lost.

Table 3 lists *heiau* recorded nearest the project area. This is the area of Pua‘a, Puapua‘a, Waiaha, and Kahului. Where information is given on the *heiau*, it is presented and cited in the table.

Table 3. *Heiau* nearest the project area

Name	Description
Kalopau	At Puaa 1; but little remains of this heiau; no facts learned. [Thrum 1938:43] Originally it was probably a walled *heiau* of three divisions, but the foundations was so disturbed that it was impossible to pick out the lines of the walls. […] In the interior of the place, there were orange, *kukui,* and *‘ohe* trees of large size. It is said to have been built by Alapa‘i. [Stokes and Dye 1991:50]
Keaukukui‘ula	*Heiau* of Keaukukui‘ula, at Puapua‘a 1, North Kona, was not seen. [Stokes and Dye 1991:52]
Mao	Waiaha; a small heiau now in a tumbled down condition, the road—which has cut into it—runs along its mauka side. The inner division shows a series of holes in its platform, said to have been where rain was cooked. [Thrum 1938:43] This is a platform *heiau* of peculiar construction built mainly of waterworn stones. The surface of the platform, 3 feet abov the sand, is irregularly pitted, and in some of the holes *kī* was growing. […] Later information was to the effect that the name of this *heiau* was Nalupo‘o. Said to have been built by Kiwala‘o. [Stokes and Dye 1991:52]

Name	Description
Kauaikahaola	Puapua 1 [*sic*]; an early heiau, rebuilt by Kamehameha; about 170x75 ft. in size of two divisions. Its walls yet in fair condition; entry way on seaward side. [Thrum 1938:43] Spelled Kauakaiakaola in Stokes and Dye (1991). This *heiau* was found on the northern point of Puapua‘a Bay, 80 feet from the sea and 10 feet above mean tide. [Stokes and Dye 1991:52] This *heiau* is believed to be the the structure recorded by the missionary William Ellis during his tour of Hawai‘i: At Ruapua we examined an interesting heiau, called Kauaikaharoa, built of immense blocks of lava, and found its dimensions to be 150 feet by 70. […] The places where the idols formerly stood were apparent, though the idols had been removed. The spot where the altar had been erected could be distinctly traced; it was a mound of earth, paved with smooth stones, and surrounded by a firm curb of lava. The adjacent ground was strewn with bones of the ancient offerings. The natives informed us that four principal idols were formerly worshipped there, one of stone, two of wood, and one covered with red feathers. One of them, they said, was brought from a foreign country. Their names were Kanenuiakea, (great and wide spreading Kane,) who was brought from Tauai, Kaneruruhonua, (earth-shaking Kane,) Roramakaeha, and Kekuaaimanu. [Ellis in Stokes and Dye 1979:73]

3.2.2 Famous Surf of Pua‘a

Hawaiian scholar and historian John ‘Ī‘ī mentions a famous surf of Pua‘a called Ko‘okā. It was here the sport of *lele wa‘a* or canoe leaping was often seen. He also notes that Kamehameha and Ka‘ahumanu were both very skillful in canoe surfing (‘Ī‘ī 1959):

> In Puaa, North Kona, is a famous surf called Kooka, where a coral head stands just outside a point of lava rocks. When the surf dashed over the coral head, the people swam out with their surfboards and floated with them. If a person owned a long narrow canoe, he performed what was called *lele wa‘a*, or canoe leaping, in which the surfer leaped off the canoe with his board and rode the crest of a wave ashore. The canoe slid back of the wave because of the force of the shove given it with the feet. When the surfer drew close to the place where the surf rose, a wave would pull itself up high and roll in. […] The opening through which the surfer entered was like a sea pool, with a rocky hill above and rows of lava rocks on both sides, and deep in the center. This was a difficult feat and one not often seen, but for Kaahumanu and the king it was easy. [‘Ī‘ī 1959:133]

3.3 *‘Ōlelo No‘eau* (Proverbs)

Hawaiian knowledge was shared by way of oral histories. Indeed, one’s *leo* (voice) is oftentimes presented as *ho‘okupu* (“to cause growth,” a gift given to convey appreciation, to strengthen bonds); the high valuation of the spoken word underscores the importance of the oral tradition (in

this case, Hawaiian sayings or expressions), and its ability to impart traditional Hawaiian "aesthetic, historic, and educational values" (Pukui 1983:vii). Thus, in many ways these expressions may be understood as inspiring growth within the reader or between speaker and listener:

> They reveal with each new reading ever deeper layers of meaning, giving understanding not only of Hawai‘i and its people but of all humanity. Since the sayings carry the immediacy of the spoken word, considered to be the highest form of cultural expression in old Hawai‘i, they bring us closer to the everyday thoughts and lives of the Hawaiians who created them. Taken together, the sayings offer a basis for an understanding of the essence and origins of traditional Hawaiian values. The sayings may be categorized, in Western terms, as proverbs, aphorisms, didactic adages, jokes, riddles, epithets, lines from chants, etc., and they present a variety of literary techniques such as metaphor, analogy, allegory, personification, irony, pun, and repetition. It is worth noting, however, that the sayings were spoken, and that their meanings and purposes should not be assessed by the Western concepts of literary types and techniques. [Pukui 1983:vii]

Simply, *‘ōlelo no‘eau* may be understood as proverbs. The Webster dictionary notes it as "a phrase which is often repeated; especially, a sentence which briefly and forcibly expresses some practical truth, or the result of experience and observation." It is a pithy or short form of folk wisdom. Pukui equates proverbs to a treasury of Hawaiian expressions (Pukui 1995:xii). Oftentimes within these Hawaiian expressions or proverbs are references to places. This section draws from the collection of author and historian Mary Kawena Pukui and her knowledge of Hawaiian proverbs describing *‘āina* (land), chiefs, plants, and places. The following proverbs are from Mary Kawena Pukui's *‘Ōlelo No‘eau* (Pukui 1983) and describe the broader region of Kona.

3.3.1 *‘Ōlelo No‘eau* #55

The following *‘ōlelo no‘eau* describes the clouds that bring rain to Kona.

> *Aia ka wai i ka maka o ka ‘ōpua.*
>
> Water is in the face of the ‘ōpua clouds.
>
> In Kona, when the *‘ōpua* clouds appear in the morning, it's a sign that rain is to be expected. [Pukui 1983:9]

3.3.2 *‘Ōlelo No‘eau* #232

Similar to the *‘ōlelo no‘eau* mentioned above, the following proverb also mention a certain cloud as a sign of rain.

> *Ao ‘ōpiopio.*
>
> Young cloud.
>
> A cloud that rises from sea level or close to the cloud banks and is as white as steam. When seen in Kona, Hawai‘i, this is a sign of rain. [Pukui 1983:27]

3.3.3 *‘Ōlelo No‘eau* #1072

The following *‘ōlelo no‘eau* mentions the priest Hāwa‘e of Kona. Ironically, the *heiau* mentioned nearest the project area make no mention of him which means they could have been erected before his time or functioned as agricultural *heiau.*

Ho‘okāhi no Hāwa‘e, lauhue Kona.

Only one Hāwa‘e, and poisonous gourds grow all over Kona.

In Kona, Hawai‘i, a priest named Hāwa‘e lived during the reign of Ehukaipo. In every important *heiau* in that district, an image named for this priest was kept. Many people were sacrificed to these evil namesakes of Hāwa‘e. [Pukui 1983:114]

3.3.4 *‘Ōlelo No‘eau* #1467

The following *‘ōlelo no‘eau* mentions the ‘Eka wind of Kona.

Ka makani kūkulu pe‘a nui, he ‘Eka.

The ‘Eka, the wind that sets up the big sails.

When the ‘Eka wind blew in Kona, Hawai‘i, the fishermen sailed out to the fishing grounds. [Pukui 1983:159]

3.3.5 *‘Ōlelo No‘eau* #1690

The following *‘ōlelo no‘eau* also mentions the ‘Eka wind.

Ke ‘Eka, makani ho‘olale wa‘a o na Kona.

The ‘Eka breeze of Kona that calls to the canoemen to sally forth to fish.

Refers to Kona, Hawai‘i. [Pukui 1983:182]

3.3.6 *‘Ōlelo No‘eau* #1731

The following *‘ōlelo no‘eau* mentions the calm sea of Kona.

Ke kai malino o Kona.

The calm sea of Kona.

Refers to Kona, Hawai‘i. [Pukui 1983:186]

3.3.7 *‘Ōlelo No‘eau* #1755

The following *‘ōleo no‘eau* is perhaps a modern saying that speaks of the coffee of Kona, a post-Contact, introduced crop.

Ke kope ho‘ohia‘ā maka o Kona.

The coffee of Kona that keeps the eyes from sleeping.

This saying applies not only to coffee, but also to love. To be in love with a person of Kona is to lose much sleep. [Pukui 1983:188]

3.3.8 *‘Ōlelo No‘eau* #1839

The following *‘ōlelo no‘eau* states the borders of North Kona.

Kona ‘ākau, mai Keahualono a Pu‘uohau.

North Kona, from Keahualona to Pu‘uohau.

The boundary of North Kona, Hawai‘i. [Pukui 1983:198]

3.3.9 *‘Ōlelo No‘eau* #1842

The following *‘ōlelo no‘eau* mentions the calm sea of Kona.

Kona i ke kai mā‘oki‘oki.

Kona of the sea that is cut up.

From a distance one can see the smooth surface of the sea at Kona, Hawai‘i, cut by innumerable streaks of color. [Pukui 1983:199]

3.3.10 *‘Ōlelo No‘eau* #1843

The following *‘ōlelo no‘eau* mentions the chief Ehunuikaimalino.

Kona, kai malino a Ehu.

Kona, land of the calm sea of Ehu.

Ehunuikaimalino was a chief of Kona, Hawai‘i, under the ruler Liloa. [Pukui 1983:199].

3.3.11 *‘Ōlelo No‘eau* #1846

The following *‘ōlelo no‘eau* describes North and South Kona.

Kona, mauna uliuli; Kona mauna ulupō.

Kona of the green mountains; Kona of the dense forest.

North and South Kona, Hawai‘i. [Pukui 1983:199]

3.3.12 *‘Ōlelo No‘eau* #1847

The following *‘ōlelo no‘eau* describes the farmers of Kona.

Kona po‘o ku‘i.

Kona of the added head.

Said of farmers of Kona, Hawai‘i, returning from the fields with a load on the shoulders and a child sitting atop the load. [Pukui 1983:199]

3.4 *Oli* (Chants)

Chants have been used throughout history to retain and retell stories and historic events. Genealogical chants, for example, are composed for *ali‘i* to confirm their rank and godliness. Other chants retell natural events. Possibly the most famous *oli* is the Kumulipo, a Hawaiian cosmogonic and genealogical chant (Beckwith 1951:ix) over 2,100 lines in length. The chant starts with the birth of the coral pollup and ends with the chief Lono-i-ka-makahiki. The following chant below is actually used in a game amongst children of Kona.

3.4.1 Kona Nui ‘Āina Lā

The *oli* below appears in *The Legend of Kaipalaoa, the Hoopapa Youngster*. Fornander explains that *ho‘opāpā* is a profession wherein “the interpretation of and play on words afford occasions of witticisms in contests for entertainment, or on wager; sometimes of serious moment” (Fornander 1916:574). In this story, the youngster, Kaipalaoa, challenges the king of Kaua‘i and his court to avenge his father’s death. The chant below is part of a game where the person who holds out the last note of the last line the longest, wins:

O Kona nui aina la,	Kona, the big sunny land
Ua wela i ka la e!	It is made hot by the sun.
Ua keekeehia e ka ua,	Trodden down by the rain
Ka muo o ka wauke a!	Is the bud of the wauke plant.
Pili nakeke i ka la o Kona,	It clings together and is made to rattle by the head of the sun of Kona,
O ka haawe pili i ke kua,	For the load will cling to the back when carried,
O ke kamaa pili i ka wawae nei la e.	And the shoe will cling to the foot when worn,
Na-u-u-u-u	*Na-u-u-u-u*
[Fornander 1917b:590–591]	

3.5 *Mele* (Songs)

The following section presents songs that speak of the Kona district. The scarcity of *oli* and *mele* associated with Kahului and Pua‘a suggests a lowly populated area.

3.5.1 Kona Kai Opua

Kona kai opua i ka la‘i;	The cloud-piles o’er Kona’s sea whet my joy,
Opua hinano ua i ka malie;	Clouds that drop rain in fair weather.
Hiolo no wai naoa a ke kehau,	The clustered dew-pearls shake to the ground;
Ke na-ū la na kamalii,	The boys drone out the na-ū to the West,
Ke kaohi la i ke kukuna o ka la;	Eager for Sol to sink to his rest.
Ku‘u la koili i ke kai—	This is my day for a plunge in the sea—
Pumehana wale ia aina!	The Sun will be warming other shores—
Aloha wale ke kini o Hoolulu,	Happy the tribes of that land of calm
Aoha lua ia oe ke aloha,	Fathomless, deep is my love
O ku‘u puni, o ka me‘ owā.	To thee, my passion, my mate.

[Emerson 1909:117–118]

3.5.2 I Kona

This *mele,* composed by George Kelepolo, praises Kona and its hospitable people.

Aia i Kona kai ‘ōpua i ka la‘i	There at Kona is where the calm sea reflects clouds
‘A‘ohe lua e like ai me ‘oe	There is no other to compare with you
Malihini mākou iā ‘oe i Kona	We are strangers to you in Kona
I ke kon oa ke aloha no mākou	At the invitation of so much love for us
Ha‘ina ‘ia mai ana ka puana	Tell the story in the refrain
‘A‘ohe lua e like ai me ‘oe	For there is no other to compare with you

[Wilcox et al. 2003:81]

3.5.3 Kona Kai ‘Ōpua

This *mele* was composed by Henry Waia‘u for his son’s graduation from Kamehameha School.

Hanohano ‘o Kona kai ‘ōpua i ka la‘i	Grand is Kona of the clouds mirrored in the sea
‘Ōpua hīnano kau i ka mālie	Puffy white clouds nestled in the calm
Pua‘i nā wai i ka ma o ka ‘ōpua	Waters psill forth from the cloud banks
‘A‘ole nō ‘elua a‘e like aku ai	Theres no other that can compare
Me Kona kai ‘ōpua (Kona kai ‘ōpua)	With Kona of the mirrored seas
Ke kai mā‘oki‘oki (kai mā‘oki‘oki)	A sea of mingling hues
Ke kai malino a‘o Kona	The calm seas of Kona
Ha‘aheo i ka mālie	Proud indeed in the tranquility
‘O Kona kai ‘ōpua i ka la‘i	Kona of mirrored seas in the calm
Kilakila ‘o Hualālai	Majestic is Hualālai
I ke kai malino a‘o Kona	The calm seas of Kona
Ha‘aheo Hawai‘i i nā Kona	Hawai‘i island is proud of the Kona district
Ka wai kau i ka maka o ka ‘ōpua	The water in the face of the clouds
Hualālai kau mai i luna	Hualālai stands there above
Ka heke ia o nā Kona	The finest of the Kona district

He ‘āina wela ‘i‘o nō nā Kona	Kona is truly a sweltering land
He ‘Eka ka makani a‘e ‘olu ai	The ‘Eka breeze brings sweet relief
‘O ka pā kolonohe a ke Kēhau	The gentle touch of the Kēhau breeze
I ka ‘ili o ka malihini	Cooling on the visitor’s skin

[Wilcox et al. 2003:131]

3.5.4 Ku‘u Lei Poina ‘Ole

The *mele* below was written by Matthew H. Kāne and music put to it by Charles E. King. It mentions the ‘Eka breeze of Kona and its famous chief ‘Ehunuikaimalino.

Ku‘u ipo, ku‘u lei	My sweetheart, my dear garland
I ka la‘i a Ehu	In peaceful Kona of chief ‘Ehu
Hi‘ipoi ‘ia iho	Held near in fond embrace
Ke aloha makamae	Is the precious love
Nou nō nā hā‘upu ‘ana	For you are the fond recollections
A ka mana‘o e nū nei	That stir here in the mind
Ho‘i mai kāua e pili	Let us come back together
E lei ku‘u lei poina ‘ole	To share my unforgettable lei
‘O ka pā kolonahe a ka ‘Eka	The soft caress of the ‘Eka breeze
Makani kupa o ka ‘āina	Familiar wind of the land
Lawe mai an ai ke aloha	Bringing with it the affection
A hā‘ale i ku‘u maka	And my eyes brim with tears
A he makamaka ke aloha	Love is a dear friend
Hoa pili no ia uka	A close companion of that upland
Ua kama ‘ia a pa‘a	Bound together securely
A pa‘a mai ko‘u pu‘uwai	Held fast here in my heart

[Wilcox et al. 2003:142]

3.5.5 Kona (Pā Mai Ana Ka Makani)

The following *mele* was composed by Lydia Nāwahine Kekuewa and translated by Kīhei de Silva. As mentioned in the previous *mele* of Kona, this song also speaks of the streaked sea of Kona.

Pā mai ana ka makani	The wind blows
Hele uluulu a‘o Kona	The inspiration-bringing wind of Kona blows
Ku‘u ‘āina hānau	Over the land of my birth

I ka poli a‘o ka Makua	A place cherished in the bosom of my parents
Hāli‘ali‘a mai ana	It stirs fond memories
Ka ‘ano‘i o ka ‘āina	Of the desired-one of the land
Ku‘u home ku‘u lā ‘ōpio	Of my home and my youth
He nani maoli nō a‘o Kona	Kona is truly beautiful
I ke kau mai a‘o ka ‘ōpua	With cloud-banks resting on the horizon
Ka malino o ke kai	The serenity of the sea
Ke kai mā‘oki‘oki	The streaked sea of Kona
Hāli‘ali‘a mai ana	Stirs fond memories
Ha ‘ano‘i o ka ‘āina	Of the desired-one of the land
Ku‘u home ku‘u lā ‘ōpio	Of my home and my youth

[de Silva 1997:29]

Section 4 Background Research

4.1 Traditional and Historical Background

4.1.1 Traditional Accounts

Historic accounts and Hawaiian tradition consistently refer to the Kona District as the residence of chiefs and the center of political consolidations in the late pre-Contact and early post-Contact times (‘Ī‘ī 1959; Kamakau 1961). The focus of activity stretched from Kailua to Keauhou and to a varying extent included all the *ahupua‘a* in between. The importance of this region is archaeologically expressed in the large number of major *heiau* located in the area. Hawaiian tradition and literature associate many great Hawaiian chiefs with the Kona District.

Pua‘a is commonly translated to mean pig (Pukui and Elbert 1986). Pukui and Elbert also define *pua‘a* as “banks of fog or clouds, often as gathered over a mountain summit, a sign of rain and believed to be the cloud forms of Kama-pua‘a” (Pukui and Elbert 1986:344).

Pua‘a, like its neighbors, is an integral part of the multi-zone cultivation area on the slope running *mauka/makai* (mountains/sea) behind Kailua and Kealakekua, known as the Kona Field System. The project area sits in the lowest zone of the Kona Field System in Pua‘a 3rd, known as the *kula* zone. The *kula* zone was characterized in traditional Hawaiian times by open pasture lands, planted with thatching grasses, sweet potatoes, sugarcane, breadfruit, and *wauke* (paper mulberry; *Broussonetia papyrifera*) (Newman 1970).

4.2 Early Historic Period

Following Western Contact, change occurred rapidly in the Kona area. Prior to the Māhele of 1848, Queen Ka‘ahumanu granted permission to Reverend Thurston and Reverend Bishop to build missions and schools in Wai‘aha in 1823 and 1824 (Rechtman 2002). A Royal Patent was issued to Asa Thurston in 1855 for all of Wai‘aha 1, the *ahupua‘a* abutting the south side of the present project area (Waihona ‘Aina 2000). Land in Wai‘aha was also awarded to the American Board of Commissioners for Foreign Missions during the Māhele, no doubt to provide rental income to the mission schools (Soehren 1981). Kauikeaouli (Kamehameha III) claimed the whole of Wai‘aha 2nd Ahupua‘a (Land Commission Award 387). Kahaunaele was awarded Pua‘a 2 through Land Grant 1744 in 1855. The grant consisted of 120 acres (Waihona ‘Aina 2000). A large portion of Pua‘a 3, 198 acres, was awarded to Joaquim Marechal, a French missionary (Forbes 2000) on 21 July 1852 as Land Grant 863:

> Kamehameha III, By the Grace of God, King of the Hawaiian Islands, by this his Royal Patent, makes known, unto all men, that he has for himself and his successors in office, this day granted and given, absolutely, in Fee Simple unto Joaquim Marechal for the consideration of Ninety nine dollars, paid into the Royal Exchequer, all that certain piece of Land, situated at Puaa 3 rd. in the District of Kona, in the Island of Hawaii. [Waihona ‘Aina 2000]

Pua‘a 3, abutting the west, *makai* end of Grant 863, was awarded as Land Grant 2120 to J. Marechell on 12 November 1856 (Waihona ‘Aina 2000). Despite the slight variation in spelling of the grantee name in Land Grant documents and on Emerson’s 1880 map, both Grants 863 and 2120 are believed to have been awarded to the same individual.

Early foreign accounts by missionary Asa Thurston give detail to the environment in the early days of Western Contact.

4.2.1 Kona as a Political Center

Kailua Kona gradually lost its importance as a political center as the capital of Hawai‘i was moved first to Lahaina then to Honolulu. Coupled with the general decline of native population, Kailua Kona was depopulated and almost completely empty. Following the general decline of population and traditional subsistence farming was an increase in ranching activities throughout the Kona area. Cattle had been brought to Hawai‘i by Vancouver and they increased rapidly under protection from being killed. However, the increased demand for meat by whalers encouraged the first operating ranches in Hawai‘i.

The following entry was taken from the journal of George Vancouver, dated January 1794, and lists the introduced livestock gifted to the king:

> After the large canoes had delivered their acceptable cargoes, they received and took to shore the live cattle, which I had been more successful in bringing from New Albion than on the former occasion. These consisted of a young bull nearly full grown, two fine cows, and two very fine bull calves, all in high condition; as likewise five rams, and five ewe sheep. Two of each of these, with most of the black cattle, were given to the king; and as those I had brought last year had thrived exceedingly well; the sheep having bred, and one of the cows having brought forth a cow calf; I had little doubt, by this second importation, of having at length effected the very desirable object of establishing in this island a breed of those valuable animals. [Vancouver 1798:11]

Furthermore, the entry below explains the *kapu* (taboo) put on these animals by Vancouver which was supported by the king:

> […] namely, that of establishing a breed of sheep, cattle, and other European animals in these islands, which with so much difficulty, trouble, and concern, I had at length succeeded so far as to import in good health and in a thriving condition; I demanded that they should be *tabooed* for ten years, with a discretionary power in the king alone to appropriate a certain number of the males of species, in case that sex became predominant, to the use of his own table; but that in so doing the women should not be precluded partaking of them, as the intention of their being brought to the island was for he general use and benefit of every inhabitant of both sexes, as soon as their number should be sufficiently increased to allow of a general distribution amongst the people. This was unanimously approved of, and faithfully promised to be observed […] [Vancouver 1798:53]

4.2.2 The Kona Field System

The current project area sits within the historic Kona Field System. The Kona Field System spans the slopes of Hualālai and Mauna Loa and is characterized by the vast expanse of its agricultural and elevational planting. There are different names to distinguish different elevations of the field system. For example, *Kula* refers to land from sea level to 500 ft, *Kalulu* refers to land from 500 to 1,000 ft, *‘Āpa‘a* refers to land from 1,000 to 2,500 ft, and *‘Ama‘u* are lands from 2,500 to 4,000 ft (Schilt 1984:21). Each section received different amounts of rainfall, therefore

determining the crop best suited for that area in addition to soil distribution and temperature (Horrocks and Rechtman 2009:1116).

Newman describes the following:

> . . . the whole Kona System, is well designed to take advantage of the western Hawaii Island environment. The orientation maximizes the available sunlight and exposure to periodic rain showers. The alignment would have made the crops susceptible to high velocity trade winds were it not for the protection of Mauna Loa. Onshore winds are generally light so physical damage or excessive plant evapotranspiration would not have been a crucial factor in field alignment . . . [Newman in Kelly 1983:71]

4.2.3 Foreign Accounts of the Kona Field System

Additional foreign accounts mention Kona's extensive field system. The chronology of these accounts suggests continuous use of this field system and successful production of food. The accounts below paint a picture of what the landscape was like then, starting in the year 1779.

John Ledyard describes his experience of the Field System on his trip into the uplands:

> . . . about two miles without the town the land was level, and continued of one plain of little enclosures separated from each other by low broad walls: Whether this circumstance denoted separate property, or was done solely to dispense with the lava that overspread the face of the country, and of which the walls are composed, I cannot say, but probably it denotes a distinct possession. Some of these fields were planted, and others by their appearance were left fallow: In some we saw the natives collecting the coarse grass that had grown upon it during the time it had lain unimproved, and burning it in detached heaps. Their sweet potatoes were mostly raised here, and indeed are the principal object of their agriculture, but it requires an infinite deal of toil on account of the quantity of lava that remains on the land notwithstanding what is used about the walls to come at the soil, and besides they have no implements of husbandry that we could make use of had the ground been free from the lava. If any thing can recompence their labor it must be an exuberant soil, and a beneficent climate. We saw a few patches of sugar cane interspersed in moist places, which were but small: But the cane was the largest and as sweet as any we had ever seen, we also passed several groups of plantain-trees.
>
> These enclosed plantations extended about 3 miles from the town near the back of which they commence, and were succeeded by what we called the open plantations. Here the land began to rise with a gentle ascent that continued about one mile when it became abruptly steep. These were the plantations that contain the bread-fruit-trees. [Ledyard 1779 in Kelly 1983:71-72]

Archibald Menzies traversed the different sub-zones of the Field System and described the change in vegetation of each area:

> We commenced our march with a slow pace, exposed to the scorching heat of the meridian sun, over a dreary barren track of a gradual ascent, consisting of little else than rugged porous lava and volcanic dregs, for about three miles, when we entered

> the bread fruit plantations whose spreading trees with beautiful foliage were scattered about that distance from the shore along the side of the mountain as far as we could see on both sides. Here the country began to assume a pleasant and fertile appearance through which we continued our ascent for about two miles further, surrounded by plantations of the esculent roots and vegetables of the country, industriously cultivated, till we came to the uppermost village consisting of a few scattered huts […]
>
> […] Next morning after going on about two miles by a narrow path through an uncultivated track, overgrown with ferns and small bushes, we entered the forest, the verge of which was adorned with rich and fruitful plantations of bananas and plantains, from which we supplied ourselves with a good stock for our journey. [Menzies, January 1794 in Schilt 1984:4]

De Freycinet noted,

> In order to reach the mountain that lies to the southeast of the village . . . we first went across dry fields, where hardly any young growth was visible; but, after reaching a certain elevation, we found much richer terrain where the paper mulberry, breadfruit tree, the mountain apple, tobacco, cabbage, sweet potatoes and yams were cultivated. We were given water of a delicious coolness [de Freycinet, August 1819 in Schilt 1984:6]

In the Summer of 1823, Reverend William Ellis provided this secondhand account:

> . . . enjoyed a fine view of the town and adjacent country. The houses, which are neat, are generally built on the sea-shore, shaded with cocoa-nut and kou trees, which greatly enliven the scene.
>
> The environs were cultivated to a considerable extent; small gardens were seen among the barren rocks on which the houses are built, wherever soil could be found sufficient to nourish the sweet potato, the water-melon, or even a few plants of tobacco, and in many places these seemed to be growing literally in the fragments of lava, collected in small heaps around their roots.
>
> After travelling over the lava for about a miles, the hollows in the rocks began to be filled with a light brown soil; and about half a mile further, the surface was entirely covered with a rich mould, formed by decayed vegetable matter and decomposed lava.
>
> Here they enjoyed the agreeable shade of bread-fruit and ohia trees; the latter is a deciduous plant, a variety of eugenia, resembling the *eugenia malaccensis*, bearing a beautifully red pulpy fruit, of the size and consistence of an apple, juicy, but rather insipid to taste. The trees are elegant in form, and grow to a height of twenty or thirty feet; the leaf is oblong and pointed, and the flowers are attached to the branches on a short stem. The fruit is abundant, and is generally ripe, either on different places in the same island, or on different islands, during all the summer months. [Ellis 1823 in Schilt 1984:6–7]

In 1845, Captain Charles Wilkes commented,

> Cultivation is carried on in many places where it would be deemed almost impracticable in any other country . . . . The natives, during the rainy season, also plant, in excavations among the lava rocks, sweet potatoes, melons, and pine-apples, all of which produce a crop.
>
> The only staple commodities are sweet-potatoes, upland taro, and yams. The latter are almost entirely raised for ships. Sugar-cane, bananas, pine-apples, bread-fruit, cocoa-nuts, and melons, are also cultivated. The Irish potato, Indian corn, beans, coffee, cotton, figs, oranges, guavas, and grapes, have been introduced, and might be successfully cultivated, if there was any demand for them.
>
> From May to September is the wet or rainy season, when they experience a good deal of rain; and this is also the growing season.
>
> In December, January, and February, they have usually very dry weather, and the winds prevail from the north, from which quarter it sometimes blows fresh. [Wilkes 1845 in Schilt 1984:7–8]

4.3 The Māhele and the Kuleana Act

To try to maintain sovereignty of the land, the *mō‘ī* (king) Kauikeaouli (Kamehameha III) in 1846–1848 supervised the Māhele—the division of Hawaiian lands—that transformed the land system in Hawai‘i from collective to private ownership. Modeled after western concepts, Crown Lands were to be reserved for the king and the royal house, Konohiki Lands were claimed by *ali‘i* and their *konohiki* (land steward of an *ahupua‘a*), and Government Lands were set aside to generate revenue for the government. In 1850, these three categories of land were subject to the rights of the *maka‘āinana* and other tenants (naturalized foreigners, non-Hawaiians born in the islands, or long-term resident foreigners), who could make claims for their habitation and agricultural plots, known as *kuleana* (Native land rights) parcels (Chinen 1958:8–15).

Under the Kuleana Act of 1850, the *maka‘āinana* were required to file their claims with the Board of Commissioners to Quiet Land Titles (Land Commission) within a specified time period in order to apply for fee-simple title to their lands. The claim could only be filed after the claimant arranged and paid for a survey and two witnesses testified that they knew the claimant and the boundaries of the land, knew that the claimant had lived on the land since 1839, and knew that no one had challenged the claim. Then, the *maka‘āinana* could present their claims to the Land Commission to receive their Land Commission Award (Kame‘eleihiwa 1992).

Not everyone who was eligible to apply for *kuleana* lands did so and not all claims filed were awarded. Some claimants failed to follow through and come before the Land Commission, some did not produce two witnesses, and some did not get their land surveyed. In addition, some *maka‘āinana* may have been reluctant to claim *‘āina* that had been traditionally controlled by their *ali‘i*, some may have not been familiar with the concept of private land ownership, and some may have not known about the Māhele, the process of making claims (which required a survey) or the strict deadline for making claims. Further, the Land Commission was comprised largely of foreign missionaries, so the small number of claimants and awards may reflect only those *maka‘āinana* who were in good standing with the church (Kame‘eleihiwa 1992:296–297). Significantly, the surveying of the land was not standardized.

Figure 5 shows LCAs near the project area though no claim was made for the parcel of land that sits in the current project area. This is probably due in part to the dual ownership of Pua‘a between Lot Kamehameha and the Government, making it unavailable to be claimed. This does not, however, leave the *ahupua‘a* exempt from being sold by the Government to private land owners.

Research by Marion Kelly showed that after the Māhele, the areas most closely associated to the project area were redistributed (Table 4). In addition to parcels awarded in the Māhele, between the years 1852 and 1853, the purchase of government lands in North Kona took place. An individual listed as J. Marechal purchased 198 acres in Pua‘a 3, Naipuwailuna purchased 60 acres in Pua‘a 2, and Pupule purchased 103 acres also in Pua‘a 2. Kapae 1 purchased 97 acres in Kahului 1 and Kipola purchased 78 acres also in Kahului 1 (Kelly 1983:43).

Table 4. Redistribution of land after the Māhele

Ahupua‘a	**Awardee**	**Land Commission Award**
Kahului 1	Government	–
Kahului 2	Emma Kama‘iku‘i Rooke	8516-B [See Appendix A]
Pua‘a 1	Lot Kamehameha	7715:13
Pua‘a 2	Government	–
Pua‘a 3	Government	–
Waiaha 1	American Protestant Mission	387
Waiaha 2	Crown Land	–

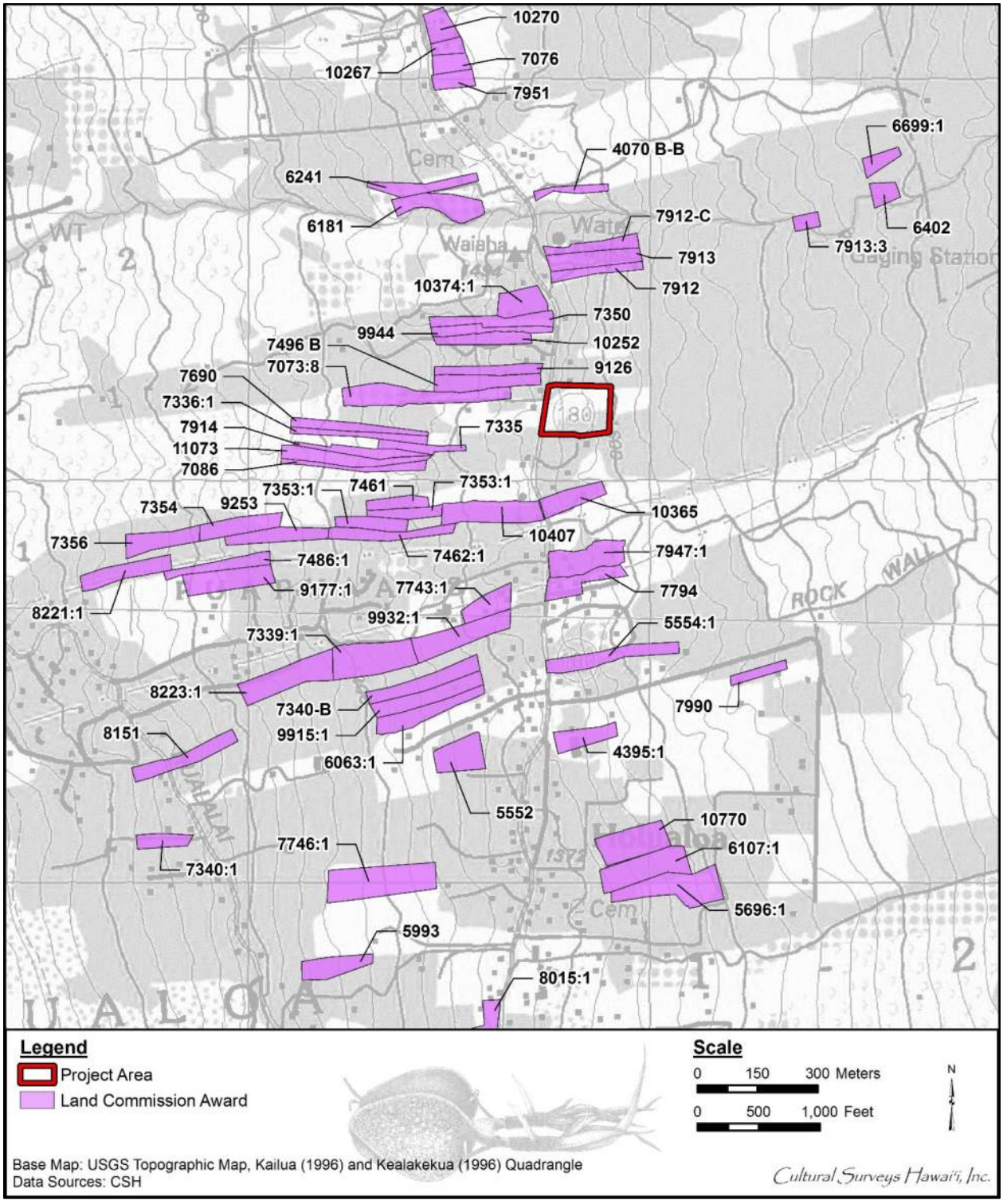

Figure 5. Land Commission Awards in Pua‘a and the neighboring *ahupua‘a*

4.4 Hawaiian Language Newspapers

Hawaiians lived in an advanced, oral society in which genealogies, stories, and chants—nearly their entire history—was learned and passed down through memorization and oration. In January 1822, printing was introduced to the Islands (Dibble 1843:192) and the first item printed was an instructional book produced for and by the Lahainaluna Seminary. The preface of this book reads as follows:

> Perhaps the Sandwich Island's Mission owes an apology to the literary world for having reduced to writing a language of such variety and extent as the Hawaiian, and published so many books in it, without having given any account either of the genius structure or peculiarities of the language. [Andrews 1836]

By September 1823, several hundred Hawaiians were making progress in learning to read (Dibble 1843:197). More instructional material for Lahainaluna was printed as well as Bibles and hymn books to assist missionaries in their teachings. Nearly ten years after printing's introduction to the Islands, the first Hawaiian language newspaper, *Ka Lama Hawai‘i,* was produced by the Lahainaluna Seminary (Dibble 1843:331). This newspaper could be compared to a school newsletter that published school announcements and featured "miscellaneous instruction for the school" (Dibble 1843:331).

It should be noted that all the materials printed at this time were written without any Hawaiian diacritics such as the *‘okina* (glottal stop) and *kahakō* (macron). Though this was probably for ease of production, this also helped Hawaiians in learning to read. Dibble explains,

> The missionaries adopted also the simple method of avoiding all arbitrary spelling. Every word is spelled precisely as it is pronounced, so that to teach spelling is scarcely an object. Every one who can combine two letters in a syllable and put two syllables together can both read and spell with readiness. The art of reading, therefore, is very easily acquired. I think I am safe in saying that the children of Hawaii learn to read their language in a much shorter time than our children do in English. [Dibble 1843:193]

The success of printing at Lahainaluna and the speed with which Hawaiians learned to read brought more printing presses to the Islands and birthed new newspapers. The Hawaiian electronic library, Ulukau, has a database of old Hawaiian newspapers. Forty-eight newspapers are available on this site, though one paper, *The Liberal*, published only in 1893, is in English. The articles printed in these papers were far more detailed and unfiltered than what we read today. Horrific accidents, causes of death, and personal advertisements are just a few examples of what they contained. A great deal can be learned about a place or time through these newspapers. They are utilized in this report to understand the daily realities of *kama‘āina* living in the *ahupua‘a.*

CSH utilizes Ulukau's Hawaiian Language Newspaper database in order to find articles that mention the *ahupua‘a* or *moku* of the proposed project area. Information can be found by entering keywords, like place names. To narrow down searches, as many *wahi pana* throughout Hawai‘i share the same name, newspapers are categorized by name and the date published. The following section presents newspaper articles in Hawaiian and their translation completed by CSH.

4.4.1 A Public Announcement

OLELO HOOLAHA.

KE hoakaka ia nei ma keia Olelo Hoolaha ka inoa o na IA kapu a na Konnhiki i hoouna mai iloko o keia Keena Kalaiaina, e like me ke Kanawai.
Konohoiki. Ili Aina Ia Kapu.
Kanaina, Kalemaohe, Maui, Opelu,
J. H. Kaawa, Kapuna, " Opihi,
" " " Kalua, Wailuku, " Akule,
L. Kamehameha, Puaa, Hawaii, Hee,
" " Kaloko, " Opelu.
6-2t*

[*Ka Hae Hawaii*, 6 May 1857]

Translation:

Ka Hae Hawaii. 6 May 1857.

A Public Announcement.

The prohibited fish that the land managers have sent to this office are being clarified upon this public announcement, in accordance with the law.

Land Manager. Land Division. Prohibited Fish.

Kanaina. Kalemaohe, Maui. ‘*Ōpelu* [the mackerel scad],

J.H. Kaawa, Kapuna, [Maui,] *‘Opihi* [limpets],

[J.H. Kaawa,] Kalua, Wailuku, [Maui,] *Akule* [big-eyed scad fish],

L. Kamehameha, Pua‘a, Hawai‘i, the *he‘e* [the octopus],

[L. Kamehameha,] Kaloko, [Hawai‘i,] *‘Ōpelu*.

4.4.2 The Heavy Rains Here at Kona Akau

Nui ka ua ma Kona Akau nei.

I ka la 13 o Dekemaba nei, ia po iho hiki mai ka ua nui me ka makani pu; i ka ua no a ao, i ke ao anae aole nui ka ua, he ua no nae aole like me ka po; a ia po iho no la 14 hiki hou mai no ka ua nui, aole okana mai e like no me ka po mamua.

Ua hoolana ia kekahi mau hale e ka wai, nui ka wai kahe i keia mau po, he mau kahawai ma kai o Kona A. ma Puaa, Waiaha, Kahului, Holualoa, a pela aku, inoino ke ala aupuni o kahakai i na pohaku i ke kaheia e ka wai.

Aole nae he wai nui mauka, ma kaika nui o ka ua me ka wai, a ma kula hoi mai ka nui o ka ua me ka wai.

A ke ua nei no i keia mau po aolo nae e like me ka mea i hoikeia maluna ae: a nau e hai ae oe i ka poe i noho iho nei ma Kailua nei me makou. Aloha ia oe e ka Hae Hawaii;

Kailua Kona A. Hawaii Dek. 18, 1858.

[*Ka Hae Hawaii*, 29 December 1858]

Translation:

The Heavy Rains Here at Kona Akau.

On the 13th of this December, on that night, heavy rains arrived as well as the winds. It rained until day, but during the day, it did not rain heavily. The rain was not like that at night. On that night of the 14th, the heavy rains arrived, but nothing exceeded the likeness of the rains upon the first night.

Several houses were floating because of the water. The water was flowing heavily during these nights. Several rivers toward the ocean of Kona ‘Akau, in Pua‘a, Wai‘aha, Kahului, Holualoa, and so on, caused damaged to the kingdom road at the seacoast due to rocks flowing because of the waters.

However, the waters were not strong in the uplands. The rain and the water was heavy on wetlands, and the majority of the rain and the water was on the plain.

And it is raining now during these nights, however, it is not like what was described above. You should inform the people who are residing in Kailua here with us. Regards to you, O *Ka Hae Hawaii.*

Kailua, Kona ‘Akau, Hawai‘i. 18 December 1858.

4.4.3 Large Breadfruit

Ulu nui.

E ka hae Hawaii e:

ALOHA OE:— O kela huaolelo a ka poe kahiko, "pupuhi ka ulu o Keei."

Eia ka makou ulu nui i ike iho nei; O kona anapuni 24 iniha. o kona loa 12 iniha; akahi no o loia ka ulu nui ma kona A, nei, Ua iawe ia mai e keia mau keiki pii ulu Tatiio, a me Kaopuo, A ua lawe ia a haawi ia i ka Moi haanou no ke 'Lii nui io no ka! aia mauka o Puaa kahi i loaa mai ai o keia ulu.

Oia kahi nu, nau ia e eku hele aku i ka maka o ka poe lawe i kou kina, a me ka poe e hana hanai mai ana.

E aloha auanei ku ukana a ke aloha, hoolahaia'ku.

J W. MAKANOANOA.

Kailua Kona A. H. Okatoba 19, M. H. 1858.

[*Ka Hae Hawaii*, 27 October 1858]

Translation:

Large Breadfruit.

O *Ka Hae Hawaii*:

Greetings to you: Concerning that expression of the traditional people, “*pupuhi ka ulu o Ke‘ei*,” the breadfruit of Ke‘ei have disappeared.

Here is our large breadfruit that has been seen here: Its circumference is 24 inches, it’s length is 12 inches. This is the first time a large breadfruit has been obtained here in Kona ‘Akau. It was brought by the children Tatiio and Kaopuo who were climbing breadfruit [trees.] They brought it and gave it to the high chief

who was enthusiastic and surprised. This breadfruit was obtained in the uplands of Pua‘a.

That is some news . . .

JW. Makanoanoa.

Kailua, Kona ‘Akau, Hawai‘i. 19 October 1858.

4.4.4 An Old Man

KANAKA KAHIKO.— Aia ma Puaa 3, Kona Akau, Hawaii, kekahi kanaka kahiko, o Kaiwihui kona inoa, ua hanau ola mamua aku o ka make ana o Lono ma Kaawaloa, he kanaiwa kona mau makahiki mai la manawa a hiki ia nei, a ke ola nei no la.

[*Ka Hae Hawaii*, 18 May 1859]

Translation:

An Old Man.

In Pua‘a 3, Kona ‘Akau, Hawai‘i is an old man named Kaiwihui who was born and lived before the death of Lono in Ka‘awaloa. He has 90 years since that time up until now, and he is indeed still living now.

4.4.5 A House Destroyed by Fire

Hale pau i ke ahi.

E ka Hae Hawaii e:

ALOHA OE:- Ua pau i ke ahi kekahi hale ma Puaa 1, Kona Akau, Hawaii. Penei ka pau ana, i ka po a ao ae ola ka Ia 31 o Maraki, aole kanaka oloko o ua hale nei, o Kaumu ka inoa o ka mea nona ka hale, ua hele ia ma Oahu. Nui na waiwai maloko o keia hale, o Pupule a me G. L, Kapeau, ka mea nona ka hale; ua manaoia elua haneri dala no ia waiwai ke hui pu me ka hale. Ua manaoia na kekahi kanaka kolohe i puhi, aole nae i loaa ka mea nana i puhi keia hale.

[*Ka Hae Hawaii*, 25 May 1859]

Translation:

A House Destroyed by Fire.

O *Ka Hae Hawaii*:

Greetings to you: A house in Pua‘a 1, Kona ‘Akau, Hawai‘i, has been destroyed by fire. This is how it was destroyed. In the night and during the day 31 of March, there was no one inside the house. Kaumu is the name of the person who the house belongs to and he/she went to O‘ahu. There were many valuables within this house. Pupule and G.L Kapeau are the names of the people the house belongs to. It is thought that the value, when combined with the house, is 200 dollars. It is thought that a crazy person burned the house, but it is not known who set fire to this house.

4.5 Boundary Commission Testimonies

Shortly after the establishment of the Māhele, the Hawaiian Legislature created the Boundary Commission. Each island had their own Boundary Commissioner whose job was to settle and delineate boundaries of larger lands, particularly *ahupua‘a*, that were awarded in the Māhele without proper surveying. Specifically speaking of Hawai‘i Island, the Boundary Commission records contain the most detailed information due to the meticulous record keeping of Hawai‘i Island Commissioner, Rufus Lyman (Waihona ‘Aina 2000). Where information is known, recorded *kama‘āina* testimony revealed names of all the land and ocean features, springs, caves, plants, rocks, peaks; all which was told to them by previous generations (Waihona ‘Aina 2000).

The following accounts below are Boundary Commission testimonies for areas nearest the project area (Kahului and Pua‘a). The wealth of knowledge included in these testimonies are invaluable and, in some cases, are the only records where a place name was mentioned. No detailed account is given but testimony was submitted by the Catholic Priest Charles Pouzot in 1873 confirming ownership of Pua‘a for the Catholic Mission (Boundary Commission 1873).

4.5.1 Niniha, from Kahului

> Niniha, kane, sworn, I was born at Kahului, North Kona, Hawaii at the time of Kaoku and have always lived there. My parents (now dead) pointed out the boundaries to me. Boundary at the seashore between Kahului 2 and Puuapuaaike is at the right hand side of Kakapa, a rocky point in the sea; thence mauka along an iwi aina to Governor Adam’s wall; thence to Waiakalaho, a water hole; thence mauka to Waiakekea, a water hole near the iwi aina and a little above the Government road; thence to Kaaipaka, a kulana kauhale, ahua hulipali; thence mauka a short distance to where Puapuaaike ends; thence to Puuokoheo, a high hill outside of the woods; now overgrown with koa; there Holualoa corner at Pohakuhano; thence along Holualoa to Waikee, a [page 328] kahawai; thence across said gulch and follow the gulch up to Puuokaloa, a pali in the woods on the North side of the gulch; thence to Palule where Holualoa and Puaa cut off Kahului; said place is a puu pahoehoe and kahawai; thence makai along the boundary of Puaa to Popoulu, mauka corner of Kahului 1st near the lower edge of the woods; thence along Government portion of Kahului to Papalanui, a kihapai koele, below Puukohia; thence along iwi aina, makai to Alau in the fern above the Government road. There is a pile of stones set up there. I pointed out the boundaries of Kahului 1st when it was surveyed; thence along the land sold, to Kalalii, a pulu lepo a seashore. Ancient fishing rights extending out to sea. [Boundary Commission 1864-1935]

4.5.2 Makuakane, born at Hāmākua

> Makuakane, kane, sworn (rather a young man), I was born at Hamakua, Hawaii; came to Kahului when I was young and have resided there ever since; know the boundaries of said land; Kapee (now dead) former konohiki of the land with whom I lived four years told me the boundaries, and also pointed them out to me. Commencing at seashore between Kahului and Puapuaa at a rocky point called Kakapa; thence mauka along an iwi aina to Governor Adam’s wall; thence mauka,

the boundary still following the iwi aina to Waiakalaho, a water spring; said spring being about three kihapai to North of the boundary to Puapuaa; thence to Waiakekea, spring mauka of the road; said spring is on Kahului near the iwi aina; thence to Kaaipaka, an Ahuapuu, kauhale kahiko, boundary at the South side of it; thence to Waikee (I do not know where Puapuaaike ends; Holualoa joins Kahului at Waikee; thence to Popoula, a kahawai with koa growing in it; thence to Puuokaloa, a pali; thence to Palule where Puaa and Holualoa cut Kahului off; thence makai along Puaa to Puuakaloa; thence to Popoula, the land is very narrow here; thence makai to Puukehoi, a hill in fern, thence makai along the iwi aina to Waihuna a water hole on the boundary between Kahului 1st [page 329] and Kahului 2nd. Kahului 1st reaches to Puuokaloa at the foot of the pali; makai of the Government road you come to Waiahuna which is the boundary of Kapai's land. The mauka corner of Kapai's land is at Kealaehu, sometimes called Alau a koele. Thence the boundary runs along land sold, to the sea, and the land has ancient fishing rights extending out to sea. [Boundary Commission 1864-1935]

4.5.3 Kauwa, from Pua‘a

Kauwa, wahine, sworn I was born at Puaa, North Kona, Hawaii, at the time of Keoua, and have always lived there, and am acquainted with the boundaries of the land. Kahio, my father (now dead), who was a kamaaina, and bird catcher told me the boundaries.

Puaa is bounded makai by the sea and the land has ancient fishing rights near the shore, but not extending out to sea. Thence commencing at a punawai by the seashore called Holoke, between the lands of Puaa and Auhaukeae and running mauka to Poholua, a huli pali near the shore and just above a housel thence along iwi aina, the boundary runs mauka to Kuinakihei, an oioina way above pa aina; or Governor Adam's wall; thence to Puukole, a breadfruit tree; thence to Nuanulapalapa, a kualapa; thence mauka to Keahupuaa, the [page 377] the [*sic*] boundary follows the iwi aina, along all these places; thence to a kihapai by the mauka Government roads; thence to an Ahupohaku; thence along the iwi aiana to Kanoweana, an old kauhale, a rose[?] bushes and a Puuhala tree are at this place from thence to Kanakehipahoa, a banana grove at the edge of the woods, said grove is the mauka end of Ahuhaukeae; Thence the boundary runs towards Kohala; first cutting off the land of Hianaloli 1, 2, 3, 4, 5 & 6 and then Auhaukeae 1 & 2 to Luaike, junction with Honuaula. I have not seen this place. I have only heard about it being on the edge of the woods. Thence Puaa runs along the land of Honuaula to Mamahana wai olona.

(I have only heard of the boundaries in the woods, have never seen them[)]; Thence mauka to Kainakelekele, wai olona, and where olona grows; thence the boundary runs mauka to the side of a gulch called Honuaula (said gulch comes out of woods on Hianaloli); thence mauka along the South side of the gulch to Kapapai, a place where two old roads used to meet on a pali above the woods, from thence the boundary turns toward Kau. Along Honuaula to Pulalalaau, a hill; Keauhou 2d is

> mauka of the hill and Honualua [*sic*] is on the North side; <strike>as well as </strike> Puaa and Holualoa corner there.
>
> Thence makai along Holualoa to kahawai 0 Holualoa, the boundary line passing to the North side of it; thence makai along the gulch to Paule, a pahihi and Wai aoao, thence makai leaving the gulch and running to a place called Punokaloa; passing along Kahului 2nd, through a lae mana (sharp ferns like uluhi [uluhe]); thence cutting across Kahului 1st, Kahului 2nd, Waiaha 1st and Waiaha 2d and Puaa 2d and Puaa 3d and running mauka to a punawai at the mauka corner of Puaa 2d called Honu; at the makai edge of the forest. Thence makai to Kaneuehu, an old kauhale; thence makai along the iwi aina and through the fern to Pahuaukii, a kihapai at the Government road; and in the middle of the land; This is a mistake; I should have said to Palihoohoolowaa, a small pali on the road and thence to Pahuaukii; Thene to a huli pali on the North side of some houses, and thence to banana trees growing on the huli pali; thence makai to Kawi, and thence to Pailima; thence makai to Hiilia, a punawai; thence to Kekawa, at the seashore. Hiilia is mauka of [page 378] Governor Adam's wall, and Kekawa is the awaawa kai, with points each side. The boundary is between the two. Puaa has ancient fishing rights extending to the squid grounds. [Boundary Commission 1864-1935]

4.6 Development in Pua‘a

An 1888 map by Emerson (Figure 6) show a few clusters of LCA parcels *makai* of the project area though no LCAs overlap the project area and at this time no sign of development is depicted within or in the vicinity of the project area. A second map by Emerson dated 1891 (Figure 7) shows the project area, again with no real depiction of development. However, note the location of Queen Emma’s house and the American Protestant Mission. Both maps by Emerson and a 1906 Territory Survey Map (Figure 8) place the project area in Kahului. The 1906 map also places the project area along the southern boundary of sugar plantation lands and marks the location of nearby schools and post offices. Figure 9 shows the current development of the area in 1924. Note the Hawaii Railroad and Kona Mill *makai* of the project area and the Japanese School and Holualoa School south of the project area. Structures, possibly residences, are depicted within the project area at this time. Figure 10, a 1977 aerial photograph, shows the continued use of the surrounding area for agriculture and ranching; note the change in vegetation, and the development of the project area into discrete agricultural plots.

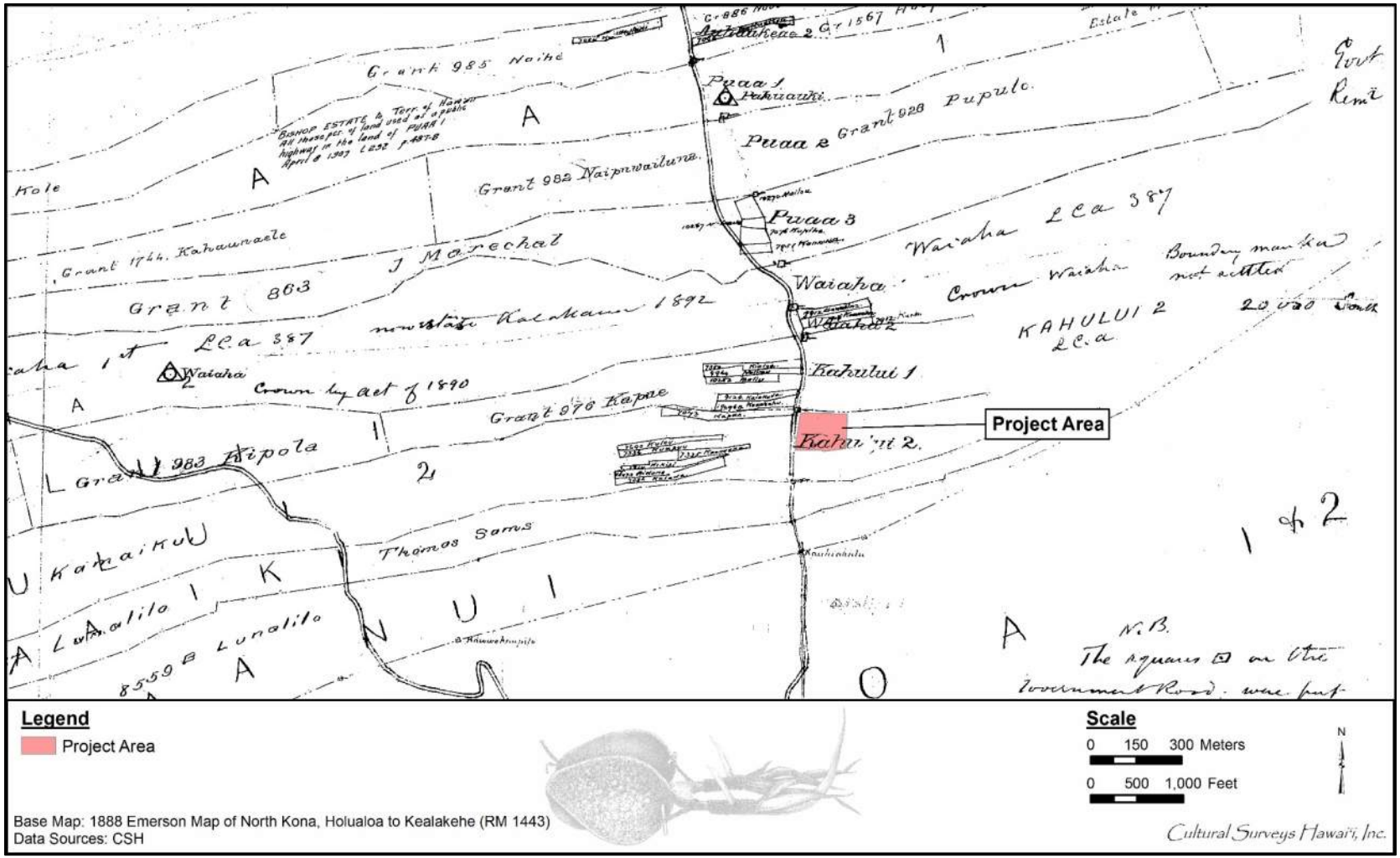

Figure 6. Portion of 1888 Emerson map of North Kona showing the project area

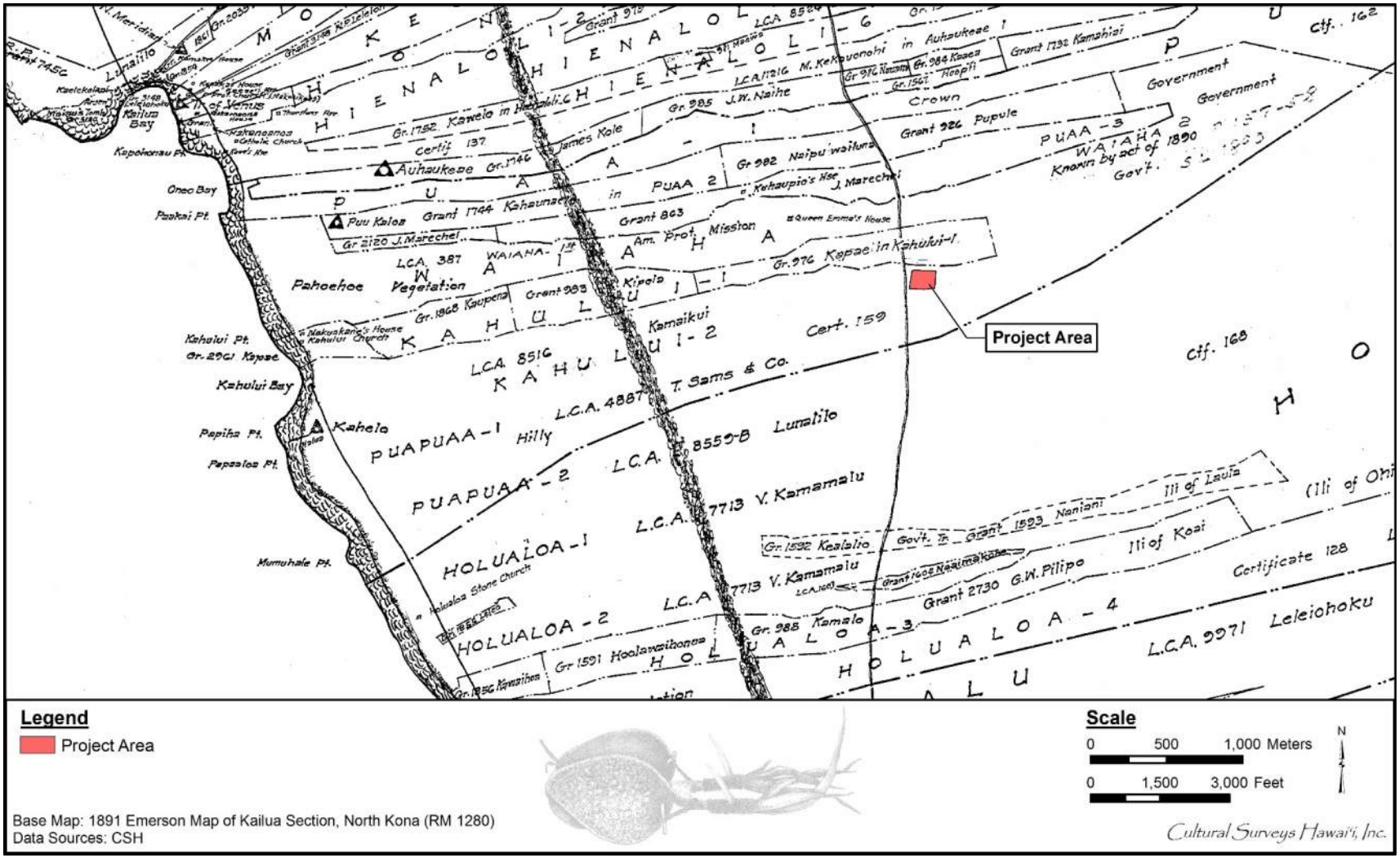

Figure 7. Portion of 1891 Emerson map of North Kona showing the project area within Kahului

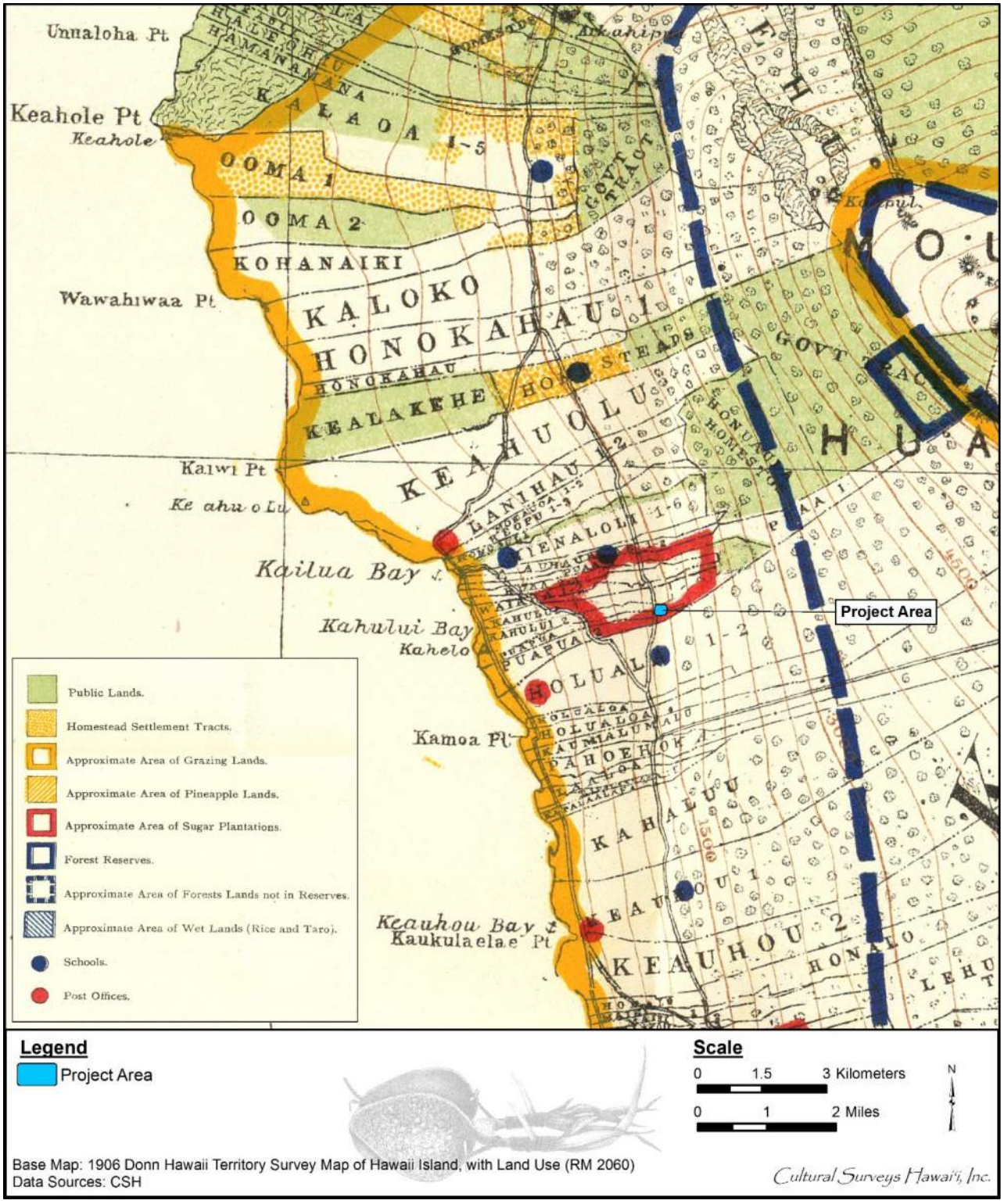

Figure 8. Portion of 1906 Donn Hawaii Territory Survey map of Hawaii Island showing location of project area along the southern bounds of sugar plantation lands

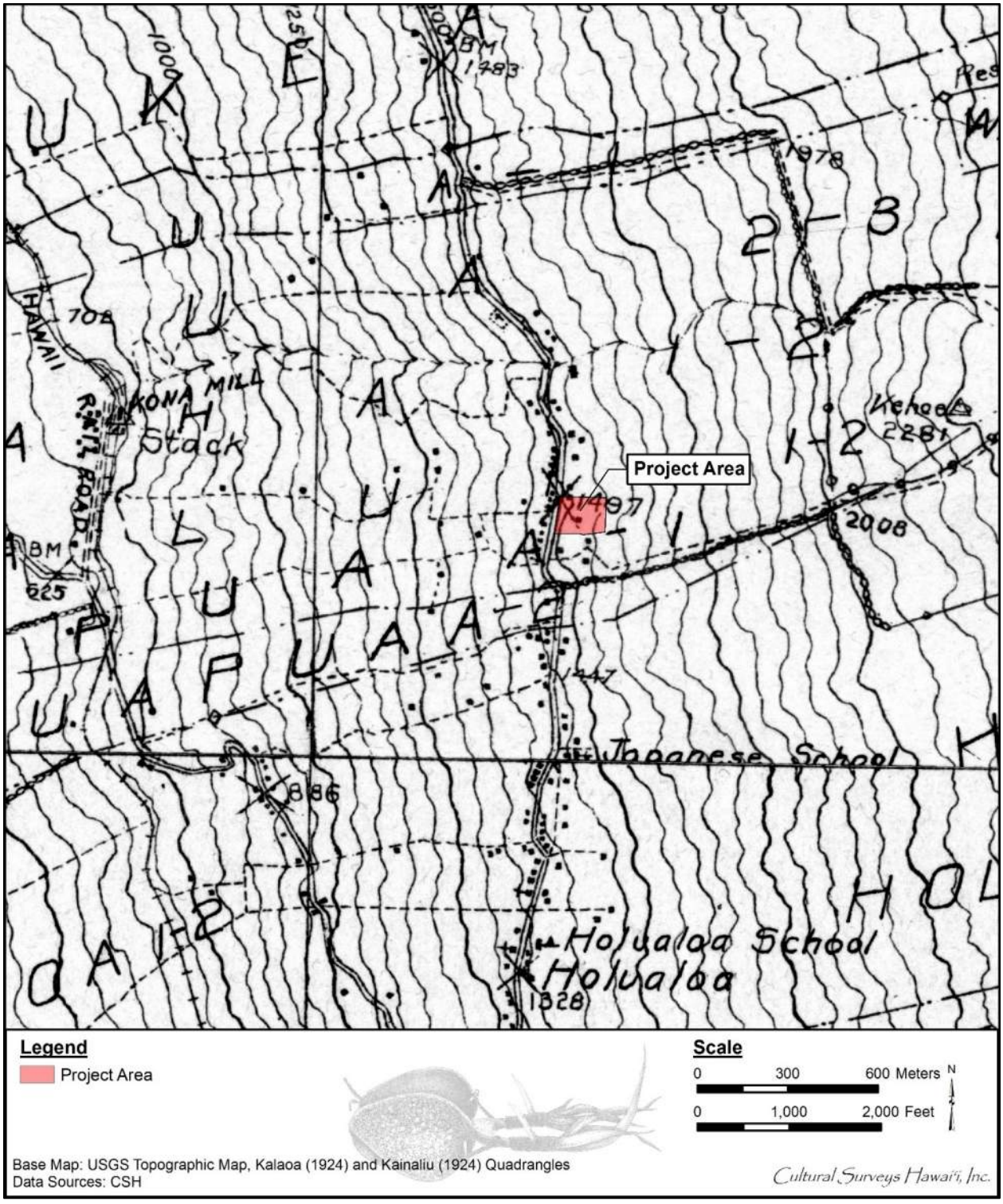

Figure 9. Portions of the 1924 Kalaoa and Kainaliu USGS 7.5-minute topographic quadrangles showing the location of the project area

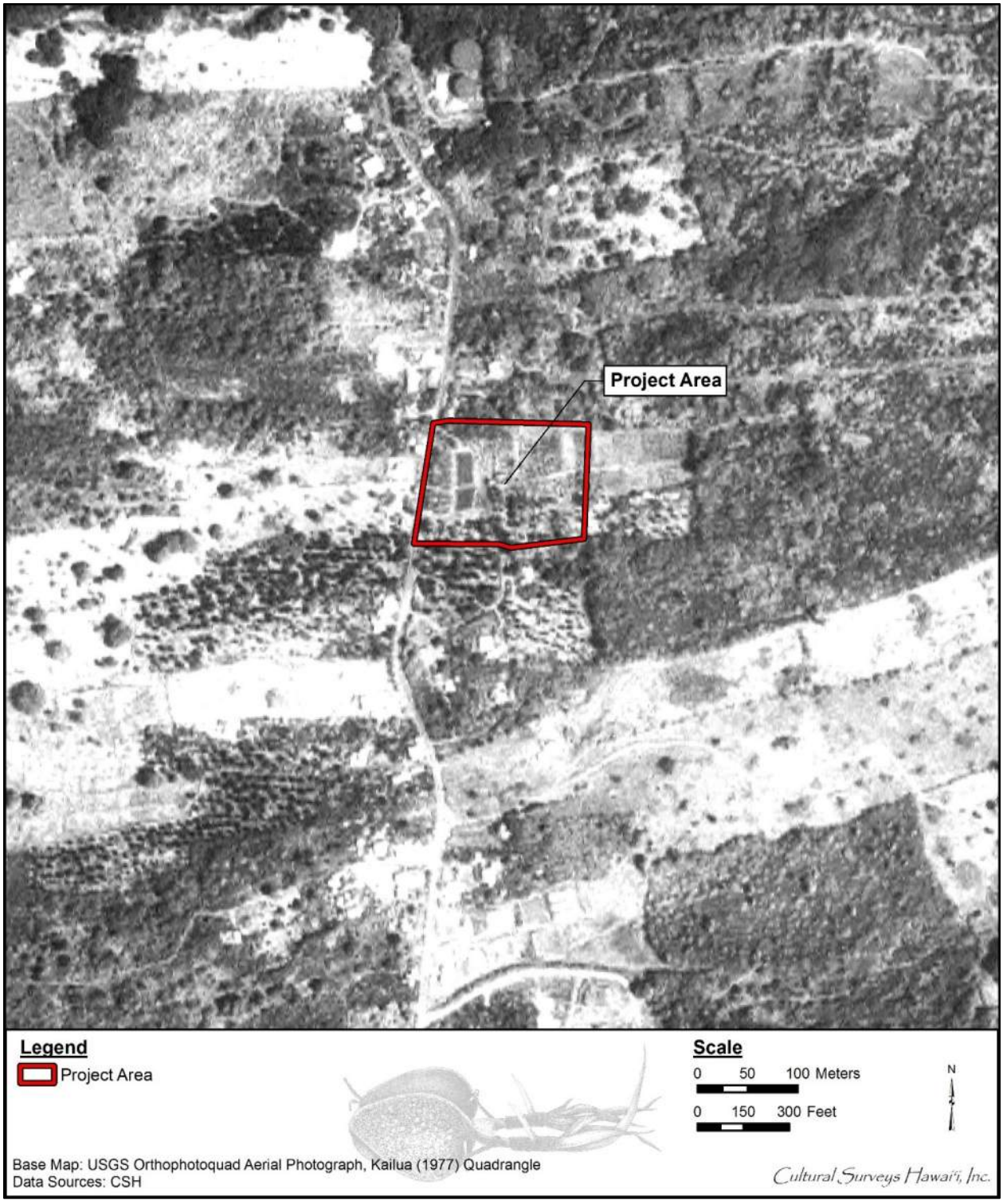

Figure 10. 1977 USGS Orthophoto showing the continued use of the surrounding area for agriculture and ranching and the development of the project area into discrete agricultural plots

Section 5 Previous Archaeological Studies

Previous archaeological studies in the vicinity of the project area are summarized in Table 5 and depicted in Figure 11. Of these, five studies are located within 0.8 km (0.5 miles) of the current project area: Allen (1984), Walsh and Hammatt (1995), Haun and Henry (2001), Moore and Kennedy (2002), and Haun et al. (2003).

5.1.1 Allen (1984)

In 1984, Paul H. Rosendahl, Inc. (PHRI) undertook a reconnaissance survey of over 600 acres south and upslope of the current project area (Allen 1984; see Figure 11). The survey documented 19 archaeological sites and site complexes (not assigned State Inventory of Historic Properties [SIHP] numbers). Documented feature types included walls, terraces, mounds, small platforms, modified outcrops, enclosures, an artifact scatter, a cave, and a water tank foundation. These features were attributed to the pre-Contact Kona Field System and historic ranching activity. Three sites were recommended for testing, and the remainder were recommended for no further work.

5.1.2 Walsh and Hammatt (1995)

In 1994 CSH recorded six sites in a 5.9-acre project area on the Puapua‘a/Hōlualoa border southwest of the current project area (Walsh and Hammatt 1995; see Figure 11). Two agricultural complexes (SIHP #s 50-10-37-19666 and -19667) comprising 91 features were identified as remnants of the Kona Field System. Four sites (SIHP #s -19662 through -19665) comprising 11 features were associated with historic habitation, agriculture, ranching, and transportation. All of the six documented sites were recommended for data recovery.

5.1.3 Haun and Henry (2001)

In 2001, Haun and Associates conducted an archaeological inventory survey (AIS) of an 87-acre parcel located in Kahalui 1 and 2 just *makai* of the current project area (Haun and Henry in 2001; see Figure 11). The survey identified “12 historic ranching walls or enclosures, an historic railroad trestle [SIHP # -07214], an historic road with a retaining wall, two agricultural enclosures, two agricultural terraces, a modified outcrop, an agricultural wall, a small agricultural complex with 11 features, two permanent habitation platforms [SIHP #s -22762 and -22764], a temporary habitation modified outcrop [SIHP # -22763], two permanent habitation platforms [SIHP #s -22762 and -22764], a complex of 33 features interpreted as remnants of the Kona Field System, a complex of 181 historic clearing features related with sugarcane cultivation, and a complex of 101 features that roughly correspond to six Land Commission Awards in the *mauka* portion of the project area [SIHP # -22780]” (Haun et al. 2003:1).

5.1.4 Moore and Kennedy (2002)

In 2002, Archaeological Consultants of the Pacific, Inc. undertook data recovery at SIHP # -19677 located within the northeastern portion of the Walsh and Hammatt (1995) project area (Moore and Kennedy 2002; see Figure 11). The results indicated many features previously thought to have been remnants of the Kona Field System were actually historic constructions associated with coffee cultivation. Furthermore, it was determined that many Kona Field System features existing within the site had been heavily modified for use in coffee cultivation after 1930.

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

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Allen 1984	Archaeological reconnaissance survey	600+ acres in Puapua‘a and Hōlualoa, TMKs: [3] 7-5-015:002 and 102 and 7-6-002:001 and 014	Documented 19 sites and site complexes associated with Kona Field System and cattle ranching (no SIHP numbers assigned); majority recommended for no further work
Walsh and Hammatt 1995	Archaeological inventory survey	5.9 acres in Hōlualoa 1 and 2, TMKs: [3] 7-6-009:014, 016, and 023	Documented six previously unidentified sites (SIHP #s -19662 through 19667) associated with Kona Field System and historic habitation, agriculture, ranching, and transportation; all sites recommended for data recovery
Haun and Henry 2001	Archaeological inventory survey	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Documented 27 sites comprised of 349 features, representing a wide variety of feature types associated with pre-Contact to historic agriculture, habitation, ranching, and transportation
Moore and Kennedy 2002	Archaeological data recovery	Hōlualoa 1 and 2, TMK: [3] 7-6-009:014	Data recovery conducted within a portion of SIHP # -19667 indicated historic-era construction and modification of most features within site previously described as remnants of Kona Field System
Haun et al. 2003	Archaeological data recovery	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Data recovery indicated SIHP # -22764 (platform) constructed between AD 1440-1650; excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use
Desilets and Rechtman 2004	Archaeological inventory survey	800-m-long corridor in Holualoa 1 and 2, TMK: [3] 7-6-008:005 por.	Survey identified one new historic property, SIHP # -24211, a rock wall-lined road that encompasses entire project area; background research indicates road constructed in late 1890s, presumably to provide grant recipients access to their parcels
Hammatt and Shideler 2006	Archaeological literature review and field check	Cesspool Improvement project at Nine DOE Schools, Kona School District	Study noted for Hōlualoa vicinity that many surface features found in inland areas first constructed, heavily modified, or destroyed by historic use of land for cattle pasture and coffee cultivation

Reference	Type of Study	Location	Results (SIHP # 50-10-37**** unless otherwise noted)
Wilkinson and Hammatt 2009	Archaeological monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Rechtman 2013	Archaeological inventory survey	29 acres in Hōlualoa 1-2, TMKs: [3] 7-6-008:005, 008, and 030	Identified 24 historic properties, including previously documented SIHP # -24211 (historic road) and newly documented SIHP #s -29700 through -29722 associated with late pre-Contact through late historic agriculture, habitation, and ranching; data recovery and/or preservation recommended for four sites
Bautista et al. 2014	Archaeological monitoring report	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Haun and Henry 2014	Archaeological inventory survey	2.313 acres in Hōlualoa 1-2, TMK: [3] 7-6-010:005	Documented 14 newly identified sites (SIHP #s -30050 through -30063) comprising 145 features associated with pre-Contact through historic agriculture, habitation, ranching burial, rock art, and transportation; preservation recommended for burial (SIHP # -30060) and petroglyph (SIHP # -30061), and data recovery recommended for SIHP # -30063 (pre-Contact/historic agricultural complex); monitoring of ground disturbance also recommended
Wilkinson et al. 2014	Archaeological monitoring report	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002 and 7-6-005:015	Identified SIHP # -29888, a modified lava tube located beneath the school

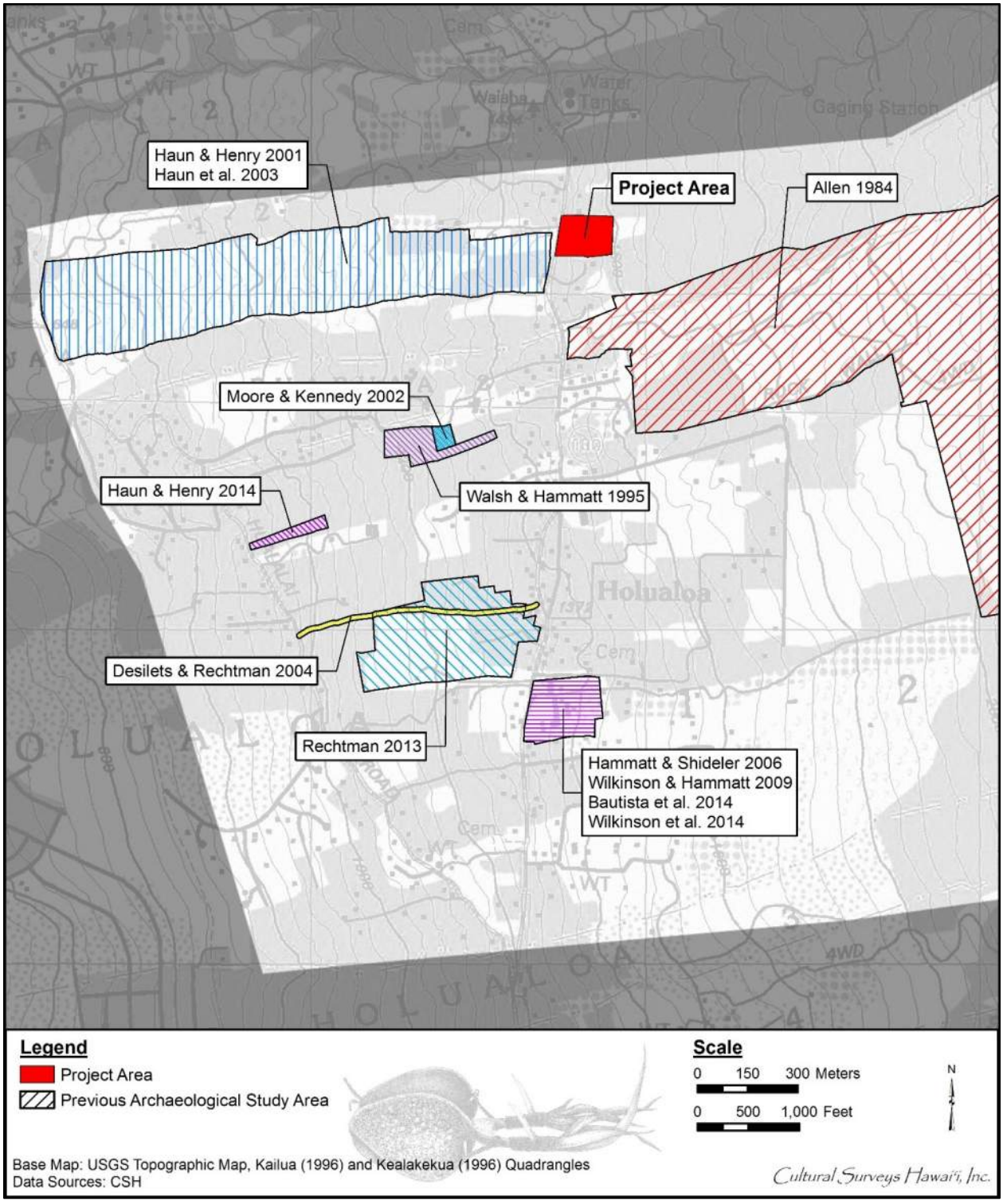

Figure 11. Portions of the 1996 Kailua and Kealakekua USGS 7.5-minute topograpjoc quadrangles, showing the location of previous archaeological studies in the vicinity of the project area

5.1.5 Haun et al. (2003)

In 2003, Haun and Associates conducted data recovery at SIHP #s -22764 (rectangular platform) and -22780 (habitation and agriculture complex) within the Haun and Henry (2001) study area (Haun et al. 2003; see Figure 11). SIHP # -22764 was shown to have been constructed between AD 1440-1650. Excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use throughout the site, including repurposing of pre-Contact features in historic times.

Section 6 Community Consultation

6.1 Introduction

Throughout the course of this assessment, an effort was made to contact and consult with Native Hawaiian Organizations (NHOs), agencies, and community members including descendants of the area, in order to identify individuals with cultural expertise/and or knowledge of the *ahupua‘a* where the project area is located. CHS initiated its outreach effort in December 2018 through letters, email, telephone calls, and in-person contact. CSH completed the community consultation in June 2019.

6.2 Community Contact Letter

Letters (Figure 12 and Figure 13) along with a map and aerial photograph of the project area were mailed with the following text:

> At the request of Belt Collins Hawaii LLC, on behalf of the State of Hawai‘i – Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH), is conducting a cultural impact assessment (CIA) for the proposed DHHL Well Construction Project in Pua‘a, Pua‘a 2-3 Ahupua‘a, North Kona District, Hawai‘i Island, Tax Map Key (TMK): [3] 7-5-014:001.
>
> The project entails drilling one or more exploratory wells, approximately 24-inch diameter hole for the proposed potable well. If the well(s) provide potable water, pumps will be installed in the wells. The site will be graded to accommodate a two-million-gallon water storage tank, control building, access road, electrical lines and other appurtenance improvements required for the operation and maintenance of the well site. The proposed project site is approximately 5.38 acres.
>
> The purpose of the CIA is to gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about this area. The research and interviews assist us when assessing potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the planned project. We are seeking your *kōkua* (assistance) and guidance regarding the following aspects of our study:
>
> - **General history and present and past land use of the project area.**
> - **Knowledge of cultural sites –for example, historic sites, archaeological sites, and burials.**
> - **Knowledge of traditional gathering practices in the project area, both past and ongoing.**
> - **Cultural associations of the project area, such as legends and traditional uses.**
> - **Referrals of *kūpuna* or elders and *kama‘āina* (Native-born) who might be willing to share their cultural knowledge of the project area and the surrounding**

Cultural Surveys Hawai‘i, Inc.
Archaeological and Cultural Impact Studies
Hallett H. Hammatt, Ph.D., President

399 Hualani Street, Suite 124 Hilo, Hawai‘i 96720 Ph: (808) 965-6478 Fax: (808) 965-6582

Job code: PUAA 4 nishihara@culturalsurveys.com www.culturalsurveys.com

December 2018

Aloha,

At the request of Belt Collins Hawaii LLC, on behalf of the State of Hawai‘i – Department of Hawaiian Home Lands (DHHL), Cultural Surveys Hawai‘i, Inc. (CSH), is conducting a cultural impact assessment (CIA) for the proposed DHHL Well Construction Project in Pua‘a, Pua‘a 2-3 Ahupua‘a, North Kona District, Hawai‘i Island, Tax Map Key (TMK): [3] 7-5-014:001.

The project entails drilling one or more exploratory wells, approximately 24-inch diameter hole for the proposed potable well. If the well(s) provide potable water, pumps will be installed in the wells. The site will be graded to accommodate a two-million-gallon water storage tank, control building, access road, electrical lines and other appurtenance improvements required for the operation and maintenance of the well site. The proposed project site is approximately 5.38 acres.

The purpose of the CIA is to gather information about the project area and its surroundings through research and interviews with individuals that are knowledgeable about this area. The research and interviews assist us when assessing potential impacts to the cultural resources, cultural practices, and beliefs identified as a result of the planned project. We are seeking your *kōkua* (assistance) and guidance regarding the following aspects of our study:

- **General history and present and past land use of the project area.**
- **Knowledge of cultural sites –for example, historic sites, archaeological sites, and burials.**
- **Knowledge of traditional gathering practices in the project area, both past and ongoing.**
- **Cultural associations of the project area, such as legends and traditional uses.**
- **Referrals of *kūpuna* or elders and *kama‘āina* (Native-born) who might be willing to share their cultural knowledge of the project area and the surrounding *ahupua‘a* (traditional land division extending from the mountains to the sea) lands.**
- **Any other cultural concerns the community might have related to cultural practices within or in the vicinity of the project area.**

Please contact Nicole Ishihara, at (808) 965-6478, or send me an e-mail at nishihara@culturalsurveys.com if you have any information you would like to share.

Me ka ha‘aha‘a,

Figure 12. Page one of the community consultation letter

Nicole Ann Nāhōkūlaniahiahi Ishihara
Project Director & Cultural Researcher
Cultural Surveys Hawai‘i

Figure 13. Page two of the community consultation letter

- ***ahupua‘a*** **(traditional land division extending from the mountains to the sea) lands.**

- **Any other cultural concerns the community might have related to cultural practices within or in the vicinity of the project area.**

In most cases, two or three attempts were made to contact individuals, organizations, and agencies.

6.3 Community Contact Table

Table 6 contains names, affiliations, dates of contact, and comments from NHOs, individuals, organizations, and agencies contacted for this project. Results are presented below in alphabetical order.

Table 6. Community contact table

Name	Affiliation	Notes
Calpito, Jordan	SHPD, Hawai‘i Island Burial Sites Specialist	Letter and figures sent via email 26 December 2018 Mr. Calpito called CSH on Tuesday 5 February 2019 with possible contacts for the project. He will reply later via email with information.
Carlson, Carl	Former General Manager of Huehue Ranch	Letter and figures sent via USPS 26 December 2018 Returned to sender 31 December 2018
County of Hawai‘i Planning Department, Cultural Resources Commission (West Hawai‘i)		Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Crabbe, Kamana‘opono	Ka Pouhana (CEO), OHA	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Fergerstrom, Hanalei	Spokesperson, Nā Kūpuna Moku O Keawe	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019

Name	Affiliation	Notes
Fitzgerald, Robert	Director, Dept. of Parks Rec (Old Airport)	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Flores, Kalani	UH Professor of Hawaiian Lifestyles: Hawai‘i Community College, UH Center at West Hawai‘i	Letter and figures sent via USPS 26 December 2018 Returned to sender 11 January 2019
Gmirkin, Rick	Archaeologist, Ala Kahakai National Historic Trail	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Gomes, Stanley	*Kama‘āina*	Letter and figures sent via USPS 26 December 2018 Returned to sender 31 December 2018
Greenwell, Kelly	Palani Ranch Family/Farmer	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Halemau, Karin	Paniolo at Huehue Ranch, Lineal descendant, fisherman	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Hind, Mehanaokalā	Community Engagement Director, OHA	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Hiraishi, Michelle Malia	Hui Mālama Ola Nā ‘Ōiwi	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019 Returned to sender 24 February 2019

Name	Affiliation	Notes
Kahaulelio, Aunty Maxine	Kona Rep., HIBC	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kahui, Craig V.	Executive Director, La‘i ‘Ōpua 2020	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019 Received email from Diana Akao, Executive Assistant of La‘i ‘Ōpua 2020, on 18 March 2019 saying Mr. Kahui would like to participate in the consultation process. CSH reached out to Mr. Kahui via email on 20 March 2019 to work out details. Mr. Kahui replied 21 March 2019 with his personal contact info to schedule a time. CSH met with Mr. Kahui on 25 April 2019 for an interview. CSH emailed Mr. Kahui his interview summary for review on 3 May 2019. Mr. Kahui replied 8 May 2019 with corrections to his summary. CSH replied 9 May 2019 acknowledging receipt of email and verifying edits will be made. Mr. Kahui replied same day with thanks. CSH emailed Mr. Kahui on 10 June 2019 advising that two copies of authorization forms are being mailed over for him to sign and send back to CSH CSH did a status check with Mr. Kahui on 18 June 2019 asking if he reviewed his latest interview summary. Mr. Kahui replied same day: *“No, I haven’t yet.* *But Its ok to send.”*

Name	Affiliation	Notes
		See Section 7.1 for Mr. Kahui's interview summary
Kaimuloa, Norman	HIBC	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kailiwai, John H.	*Kama‘āina* of Maka‘eo	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Keanaaina, Rev. Norman	Mauna Ziona Church	Letter and figures sent via USPS 26 December 2018 Received reply via email on 2 january 2019: *I am not quite familiar with the land title, could I have more information on the Land Title original ownership? So I could best inform you of some Historical knowledge? If any.* CSH replied 3 January 2019 informing Mr. Keanaaina that when traditional and historical background information become available, we will reach out to him.
Kimitete, Richard	*Kama‘āina*	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kona Hawaiian Civic Club	Community Organization	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kossow, Barbara	Ka Ulu Lauhala O Kona	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019

Name	Affiliation	Notes
Kuali‘i, Melvyn Kaleo	*Kama‘āina*	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kunewa, Iris	*Kama‘āina*	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Kunitake, Walter	*Kupuna,* Coffee Farmer	Letter and figures sent via email 26 December 2018 Second round letter and figures sent via email 15 February 2019
Lamont, Joan	Community Organizer/ Vice President of Beautification, Kona Outdoor Circle	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Lee, Reggie	Lineal descendant with DLNR/ Government Agency	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Lindsey Jr., Robert K.	Hawai‘i Island OHA Trustee	Letter and figures sent via email 26 December 2018
Lui, Nicole Keaka	*Kupuna*	Letter and figures sent via email 26 December 2018 Ms. Lui replied to CSH via email on 27 December 2018 expressing concern over the traditional boundaries of Pua‘a and if the project area is in fact in Pua‘a or Kahului or Puapua‘a. CSH replied same day confirming that the project area is in fact in Kahului. Ms. Lui replied same day wanting an explanation for the project area being placed under Pua‘a rather than Kahului. CSH responded 7 January 2019:

Name	Affiliation	Notes
		Confirming that the project area is indeed in Kahului. The Pua‘a labeling is an internal CSH job code and we have used USGS maps for determination. USGS has grouped Pua‘a, Wai‘aha, Kahului, and Puapua‘a into one ahupua‘a (instead of each having its own respectful boundaries). We are making internal changes to reflect your concerns and will make it known in the report that the project is in Kahului. CSH contacted Ms. Lui on 15 February 2019 to ask if she was still interested in participating in an interview. Ms. Lui responded 18 February saying she will call and set a date for a telephone interview.
Marks, Jerome	‘Aha Moku Rep, Kohala to South Kona	Letter and figures sent via email 26 December 2018 Second round letter and figures sent via email 15 February 2019
Marquez, David	Kealakehe Ahupua‘a 2020	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019 Both letters returned to sender 22 May 2019
Medeiros Jr., Clarence	Lineal descendant	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Nakahashi, Ikaika	SHPD, Hawai‘i Island Cultural Historian	Letter and figures sent via email 26 December 2018 Mr. Nakahashi replied via email 27 December 2018 with recommendations on who to contact and what outlets to utilize to receive information on the project area.

Name	Affiliation	Notes
Naleimaile, Sean	SHPD, Hawai‘i Island Archaeologist	Letter and figures sent via email 26 December 2018 Second round letter and figures sent via email 15 February 2019
Nazara, Cynthia	Cultural Research Consultant	Letter and figures sent via USPS 26 December 2018
Pai, Mahealani	Cultural Specialist/Kamehameha Investment Corp	Letter and figures sent via USPS 26 December 2018 Returned to sender 3 January 2019
Reeves, Hannah	*Kupuna*/Community Organizer	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Tam Sing, Tracy	DLNR, Division of State Parks	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019 Mr. Tam Sing responded via email on 27 Feburary 2019 with the following reply: *I have looked over your request for consultation for a CIA for the proposed DHHL Well Construction Project in Pua‘a, Pua‘a2-3 Ahupua‘a, North Kona District, Hawai‘i Island, TMK (3) 7-5-014:001.* *We have no State Parks near the proposed project area, and I am not familiar with any archaeological sites within or around the project area. At the time the Division of State Parks has no comment on the proposed project.* *We thank you for reaching out to us for comments. If you need further information from us at State Parks, please let me know.*
Trask, Mililani B.	Convenor, Nā Koa Ikaika Ka Lāhui Hawai‘i	Letter and figures sent via USPS 26 December 2018

Name	Affiliation	Notes
		Second round letter and figures sent via USPS 15 February 2019
Tyler, Curtis	Resident/Council Member	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Yent, Martha	Interpretive Program Supervisor, State Parks	Letter and figures sent via USPS 26 December 2018 Second round letter and figures sent via USPS 15 February 2019
Young, Charles	‘Aha Moku Rep, Ho‘okena	Letter and figures sent via email 26 December 2018 Second round letter and figures sent via email 15 February 2019

Section 7 *Kama‘āina* Interviews

The authors and researchers of this report extend our deep appreciation to everyone who took time to speak and share their *mana‘o* and *‘ike* with CSH whether in interviews or brief consultations. We request that if these interviews are used in future documents, the words of contributors are reproduced accurately and in no way altered, and that if large excerpts from interviews are used, report preparers obtain the express written consent of the interviewee/s.

7.1 Summary of Craig Kahui Interview

Mr. Craig Kahui is the Executive Director of La‘i ‘Ōpua 2020, a 501(c)3 community organization whose mission is to ”identify community needs, foster the creation of community facilities, and coordinate planning with service providers and partners for a variety of programs for residents of the Villages of La‘i‘Opua and the broader Kealakehe area.” It should be noted that this organization serves as the charitable arm of the Kaniohale Community Association (KCA), the Hawaiian homeowners association for the Kaniohale subdivision built by DHHL.

Mr. Kahui is originally from Kalihi, O‘ahu but has been living in Kealakehe since 1998.

On 26 April 2019, CSH met with Craig “Bo” Kahui, Executive Director of La‘i ‘Ōpua 2020, a non-profit organization initially established to provide funding to the Kaniohale Community Association (KCA), a Department of Hawaiian Home Lands (DHHL) Hawaiian Homeowners Association for the Kaniohale subdivision in Kealakehe. Mr. Kahui served as the president of the KCA, which at the time was its own separate entity. His vision for creating a *pu‘uhonua,* traditionally a place of refuge—ultimately propelled the establishment of La‘i ‘Ōpua 2020 and its federal and state designation as a 501(c)(3) nonprofit organization.

In one of its earliest community newsletters in 2005, the KCA introduced La‘i ‘Ōpua 2020 whose overall mission was to “protect and preserve the Kealakehe ahupua‘a’s cultural and archaeological sites and recreational programs” and additionally “actively participate in the overall development of the Kealakehe ahupua‘a from mauka to makai” (Kaniohale Community Association 2005). In 2012, the KCA was incorporated and merged with the Villages of La‘i ‘Ōpua (Figure 14); this joining allowed for one unified voice that could present community issues and concerns and a single unified vision for the future of the Kealakehe Ahupua‘a..

Mr. Kahui’s journey to La‘i ‘Ōpua 2020 began with his humble beginnings in Kalihi, O‘ahu. Being one of eight children and living in urban Honolulu, Mr. Kahui experienced the negative effects of a community overwhelmed by poverty and by the absence of positive community resources. Eager to achieve a better future for himself than what he witnessed on the streets of Kalihi, Mr. Kahui joined the military service after graduating from Farrington High School in 1972 (Figure 15).

When Mr. Kahui returned home, he enrolled at Honolulu Community College (HCC) and later at the University of Hawai‘i (UH) Mānoa where he studied pre-law and business administration. At around this same time, the birth of the Hawaiian Renaissance, a series of cultural movements that sparked a rejuvenation of self-identity for Hawaiians, was taking place. As a student, Mr. Kahui participated in school-sponsored activities and graduated as the student body president. Relative to the Hawaiian Renaissance, Mr. Kahui served as the Honolulu District Representative

for the Protect Kaho‘olawe ‘Ohana (PKO) (Figure 16). PKO was established and spearheaded by George Helm, Jr. to raise awareness of the continued desecration of the sacred island of Kaho‘olawe. Ultimately, the presence of PKO and their tireless efforts to promote *aloha ‘āina* (love of one’s country) forced all bombing to stop and prompted the final end of military use of the island. The PKO also paved the way to allowing future access for Native Hawaiians and other groups and continued protection of the island. In addition to his work with PKO, Mr. Kahui was part of a team whose inadvertent discoveries lead to archeological mapping and surveying of cultural sites on Kaho‘olawe.

Figure 14. Overall view of the Villages of La‘i ‘Ōpua (La‘i ‘Ōpua n.d.)

Figure 15. Mr. Kahui after enlisting in the Navy (Greco 2013)

Figure 16. Mr. Kahui and other members of PKO at the Kaho‘olawe adze quarry (Greco 2013)

In 1979, Mr. Kahui received his Bachelor of Arts degree from UH Mānoa. This same year he and several others discovered an abandoned *‘auwai* (water channel) alongside UH Mānoa. The group worked at their leisure to clear the *‘auwai* which revealed a fresh water *kahawai* (stream; Greco 2013) that would eventually become the life source for Ka Papa Lo‘i ‘o Kānewai, one of the educational components of Hawai‘inuiākea School of Hawaiian Knowledge at UH Mānoa. Alongside the teachings and guidance of *kupuna* Harry Mitchell and the multitudes of *kūpuna* who came before, Ka Papa Lo‘i ‘o Kānewai served as the first cultivation curriculum primarily focused on *kalo* (taro). This school also functioned like a *pu‘uhonua* that housed the supportive environment for students and faculty to interact, engage, and have access to resources that would assist in a positive progression.

In addition to his work with clearing the *‘auwai* , Mr. Kahui also worked with the Fukumitsu and Reppun *‘ohana* at their *lo‘i* in Hakipu‘u and at Waiāhole and Waikāne.

Mr. Kahui’s upbringing in Kalihi and the absence of the community aspect there contributed to the disconnect between Mr. Kahui’s family and their sense of culture, identity, and purpose. This is too often seen among Hawaiian families who fall victim to urbanized environments and economic pressure. This paired with his connection to Native Hawaiian groups would later lay the foundation that sparked his vision for La‘i ‘Ōpua 2020.

In 1998, Mr. Kahui was awarded property through DHHL in Kaniohale, one of the community hubs that make up the Villages of La‘i ‘Ōpua. Though proud of his accomplishment of homeownership, Mr. Kahui realized that a stable community infrastructure would allow the community to flourish; by providing community resources and public facilities, the true meaning of the word community could be upheld—a concept completely removed from his life in Kalihi. This became the foundation of La‘i ‘Ōpua.

The following description is provided by Mr. Kahui:

> La‘i ‘Ōpua was founded by the homesteaders of the Kaniohale Community Association (KCA), a Native Hawaiian homeowners association in the Villages of La‘i ‘Ōpua, to ensure the existence of adequate health care, social service and recreational infrastructure to compliment and support the Native Hawaiian homesteaders and surrounding communities residing in the greater Kealekehe community. […] La‘i ‘Ōpua Community Center will be on a 26.5-acre parcel […] and serve as a primary regional resource for the Hawaiian people […] offering an array of programs and services to meet most every health, social, educational, and recreational needs of our people and surrounding communities. [Mr. Craig Kahui, Executive Director, laiopua.org]

Mr. Kahui’s connection to the project is his affiliation with La‘i ‘Ōpua 2020. He has petitioned for a water source to support the Villages of La‘i ‘Ōpua but after years of agency stalling and no forward progression, Mr. Kahui took it upon himself to seek the proper parties to make it happen; thus, the proposal of this project. Mr. Kahui does not know of any cultural sites within the project area and if any were once erected, these structures would have been almost completely destroyed by years of agricultural or ungulate disruption.

Section 8 Traditional Cultural Practices

Timothy R. Pauketat succinctly describes the importance of traditions, especially in regards to the active manifestation of one's culture or aspects thereof. According to Pauketat,

> People have always had traditions, practiced traditions, resisted traditions, or created traditions . . . Power, plurality, and human agency are all a part of how traditions come about. Traditions do not simply exist without people and their struggles involved every step of the way. [Pauketat 2001:1]

It is understood that traditional practices are developed within the group, in this case, within the Hawaiian culture. These traditions are meant to mark or represent aspects of Hawaiian culture that have been practiced since ancient times. As with most human constructs, traditions are evolving and prone to change, resulting from multiple influences including modernization as well as other cultures. It is well known that within Hawai‘i, a "broader 'local' multicultural perspective exists" (Kawelu 2015:3). While this "local" multicultural culture is deservedly celebrated, it must be noted that it often comes into contact with "traditional Hawaiian culture." This contact between cultures and traditions has undoubtedly resulted in numerous cultural entanglements. These cultural entanglements have prompted questions regarding the legitimacy of newly evolved traditional practices. The influences of "local" culture are well noted throughout this section, and understood to represent survival or "the active sense of presence, the continuance of native stories, not a mere reaction, or a survivable name. Native survivance stories are renunciations of dominance, tragedy and victimry" (Vizenor 1999:vii). Acknowledgement of these "local" influences helps to inform nuanced understandings of entanglement and of a "living [Hawaiian] contemporary culture" (Kawelu 2015:3). This section strives to articulate traditional Hawaiian cultural practices followed within the *ahupua‘a* in ancient times, and the aspects of these traditional practices that continue to be practiced today; however, this section also challenges "tropes of authenticity" (Cipolla 2013) and acknowledges the multicultural influences and entanglements that may "change" or "create" a tradition.

This section integrates information from Sections 3–5 in examining cultural resources and practices identified within or in proximity of the project area in the broader context of the encompassing Kahului and Pua‘a landscape.

8.1 Agriculture

Perhaps the most well known feature of the project area is the historic and extensive Kona Field System. Spanning the slopes of Mauna Kea and Hualālai, the success of the Kona Field System was due in large part to the use of elevational planting. The different zones—*Kula, Kalulu, ‘Āpa‘a,* and *‘Ama‘u*—allowed for a variety of plants and trees to be cultivated. The project area sits in the *Kula* zone, characterized by open pasture lands planted with thatching grasses, sweet potatoes, sugarcane, breadfruit and *wauke* (Newman 1970). In addition to the food crops that provided sustenance, the cultivation of thatching grass and *wauke* would have likely provided shelter coverings and clothing for the surrounding communities and possibly for allied communities from afar.

The establishment of the Kona Field System suggests a picture of ancient life. First, it implies a flourishing population able to maintain a wide expanse of agricultural area. Second, it points to

allied communities in need of food; this field system could have acted as a bartering center between coastal and non-coastal communities or even across districts and possibly as a supplemental resource for *ali‘i.*

Foreign accounts of the Kona Field System would suggest that elevational planting was a technique not normally seen in other parts of Hawai‘i and possibly the Pacific. Explorers visiting this part of Kona would make note of this extensive agricultural system. One such account by John Ledyard describes a mid-*mauka*, rather rocky terrain with habitation enclosures where the primary cultivation was sweet potato. As he ascended, in places where soil was moist, sugar cane was planted and further along were plaintain trees. In the highest elevation of the field system were breadfruit trees (Ledyard cited in Kelly 1983:71-72). Another account by Archibald Menzies nearly 20 years laters mentioned “bread fruit plantations whose spreading trees with beautiful foliage were scattered about that distance from the shore along the side of the moutain as far as we could see” (Menzies cited in Schilt 1984:4). A journal entry by Reverend William Ellis in 1823 mentions coconut and *kou* (*Cordia subcordata*) trees near the shore. Sweet potato, watermelon, and some tobacco plants were cultivated in close proximity to house structures. Further from the house sites Ellis began to see what looked like natural composting in the crevices of lava where “decayed vegetable matter and decomposed lava” collected. This is where he noted the bread fruit and mountain apple trees. In another 20 years, An account by Captain Charles Wilkes describes new crops such as pineapples, sugar cane, the “Irish potato, Indian corn,” beans, coffee, cotton, figs, oranges, guavas, and grapes; a number of new additions than what was noted 40 years prior.

8.2 Religious Practices

Though the function of *heiau* found in Pua‘a and its neighboring *ahupua‘a* are unknown, the presence of *heiau* would still suggest some kind of unity and order in regards to employing able bodies for construction. Kalopau was said to have been built by Alapa‘i (Stokes and Dye 1991:50), Mao is believed to have been built by Kīwala‘ō (Stokes and Dye 1991:52), and the description of Kauaikahaola emphasizes its importance and function to the *ali‘i* at that time.

The arrival of missionaries and their presence in Kailua Kona, and especially their affiliation with Hawaiian royalty, had significant influence on Hawaiian religious practices and structures. Their presence is likely the reason *heiau* have been dismantled as Hawaiian religion became second to Western religion.

8.3 Kona Weather

Kona’s weather pattern has been noted in both historical and traditional accounts. Overall, Kona was a very pleasant area with rain, wind, calm seas, and fruitful land. *‘Ōlelo No‘eau* by Mary Kawena Pukui mention the *‘ōpua* clouds which, when seen in the morning, was a sign that it would rain (Pukui 1983:9). The ‘Eka wind belonged to Kona and when it blew, fishermen would sail out to their fishing grounds (Pukui 1983:159). The sea of Kona is often reffered to as *ke kai malino*, the calm sea or *ke kai mā‘oki‘oki*, the sea that is cut up, referring to the streaks of color that “cut up” the smooth surface (Pukui 1983:199). The *‘ōlelo no‘eau*, *Kona, mauna uliuli, Kona mauna ulupō* meaning Kona of the green mountain; Kona of the dense forest (Pukui 1983:199) briefly describe the lush, green land of Kona.

A newspaper article published in 1858 mentions heavy rains the swept houses away and caused rivers to overflow damaging roadways. The extent of the damage was mostly *makai* and the writer mentions that it rained heavily at night into the morning and it seized during the day.

Kona's weather patterns were also briefly mentioned in foreign accounts. Archibald Menzies describes being exposed to the scorching heat of the sun while traversing the Kona Field System. Captain Charles Wilkes observed that even during the rainy seaon, planting continues; perhaps implying the success of elevational planting where large, heavy rooted trees like breadfruit could act as breakwalls for the shallow rooted plants like sweet potatoes planted below. He goes on to say that the rainy season is from the months of May to September, which is also called the growing season. December, January, and February is typically the dry season (Wilkes cited in Schilt 1984:7-8).

Section 9 Summary and Recommendations

CSH undertook this CIA at the request of Belt Collins Hawai‘i LLC. The research broadly covered the *ahupua‘a* of Kahului and Pua‘a and emphasized parts particularly close to the location of the project area.

9.1 Results of Background Research

Background research for this study yielded the following results in approximate chronological order:

1. The proposed project area is located on the leeward side of Hawai‘i Island in the *moku* of North Kona. Traditionally, Hawaiian *ahupua‘a* extended from the mountains to the sea so that the inhabitants had access to a wide variety of resources. This particular upland region is located within the traditional "Kona Field System" which has been described as "the most extensive and monumental work of ancient Hawaii" (Newman 1978).
2. Pua‘a, like its neighbors, is an integral part of the multi-zone cultivation area on the slope running *mauka/makai* behind Kailua and Kealakekua, known as the Kona Field System. The project area sits in the lowest zone of the Kona Field System in Pua‘a 3rd, known as the *Kula* zone.
3. Four *heiau* have been recorded within the *ahupua‘a* of Pua‘a though no *heiau* has been recorded within the project area. Kalopau, Keaukukui‘ula, Mao, and Kauaikahaola were recorded by Thrum and late revaluated by Stokes and Dye (1991).
4. John Papa ‘Ī‘ī mentioned a famous surf of Pua‘a called Ko‘okā. The sport of *lele wa‘a* or canoe leaping could be seen here where this surf breaks. He also noted that Kamehameha and Ka‘ahumanu were both very skilled in canoe surfing (‘Ī‘ī 1959:133).
5. Kailua Kona gradually lost its importance as a political center as the capital of Hawai‘i was moved first to Lahaina then to Honolulu. Coupled with the general decline of the native population, Kailua Kona was depopulated and almost completely empty. Following the general decline of population and traditional subsistence farming, ranching activities increased throughout the Kona area.
6. Land Commission Awards (LCAs) were granted near the project area though no claim was made for the parcel of land that sits the current project area. This is probably due in part to the dual ownership of Pua‘a between Lot Kamehameha and the Government, making it unavailable to be claimed. This does not, however, leave the *ahupua‘a* exempt from being sold by the Government to private land owners.
7. Research by Marion Kelly showed that after the Māhele, the areas most closely associated with the project area were redistributed.. In addition to parcels awarded in the Māhele, between the years 1852 and 1853 the purchase of government lands in North Kona took place. An individual listed as J. Marechal purchased 198 acres in Pua‘a 3, Naipuwailuna purchased 60 acres in Pua‘a 2, and Pupule purchased 103 acres also in Pua‘a 2. Kapae 1 purchased 97 acres in Kahului 1 and Kipola purchased 78 acres also in Kahului 1 (Kelly 1983:43).

9.2 Impacts and Recommendations

Based on information gathered from the cultural and historical background and the community consultation, potential impacts were identified, and the following preliminary recommendations were made:

1. Project construction workers and all other personnel involved in the construction and related activities of the project should be informed of the possibility of inadvertent cultural finds, including human remains. In the event that any potential historic properties are identified during construction activities, all activities will cease in that area and the SHPD will be notified pursuant to HAR §13-280-3. In the event that *iwi kūpuna* (ancestral remains) are identified, all earth moving activities in the area will stop, the area will be cordoned off, and the SHPD, coroner, and Police Department will be notified pursuant to HAR §13-300-40. In addition, in the event of an inadvertent discovery of human remains, the completion of a burial treatment plan, in compliance with HAR §13-300 and HRS §6E-43, is recommended.
2. In the event that *iwi kūpuna* and/or cultural finds are encountered during construction, project proponents should consult with cultural and lineal descendants of the area to develop a reinterment plan and cultural preservation plan for proper cultural protocol, curation, and long-term maintenance.

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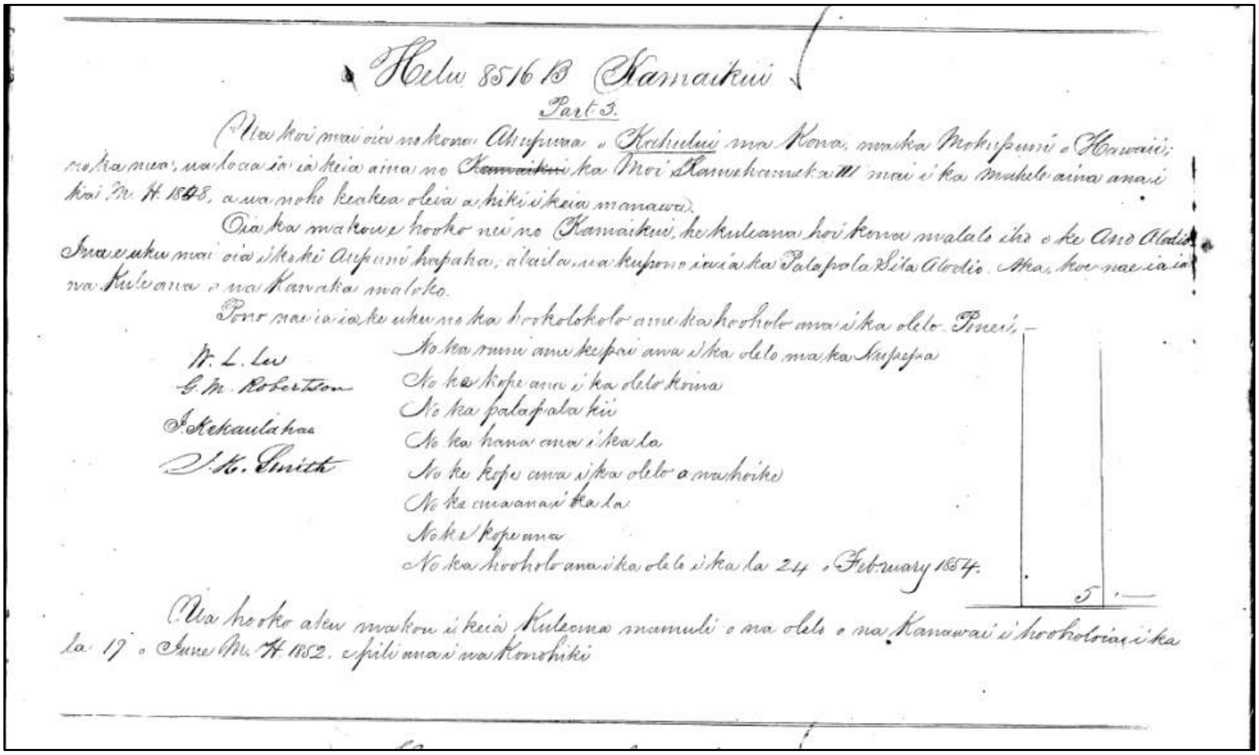
Appendix A Emma Kamaikui Rooke's Property in Kahului

A.1 Emma Kamaikui Rooke's Māhele Testimony



Helu 8516 B Kamaikui

Part 3.

Ua koi mai oia no kona Ahupuaa o Kahului ma Kona, ma ka Mokupuni o Hawaii; no ka mea, ua loaa ia ia keia aina no Kamaikui ka Moi Kamehameha III mai i ka mahele aina ana i kai M. H. 1848, a ua noho kaakea oleia a hiki i keia manawa.

Oia ka makou e hooko nei no Kamaikui, he kuleana hoi kona malalo iho o ke Ano Alodio. Ina e uku mai oia i ke kei Aupuni hapaha, alaila, ua kupono ia ia ka Palapala Sila Alodio. Aka, koe nae ia ia na Kuleana o na Kanaka maloko.

Pono nae ia ia ke uku no ka hookolokolo ame ka hooholo ana i ka olelo. Penei, –

	No ka mau ame kepai ana i ka olelo ma ka Nupepa
W. L. Lee	No ka kope ana i ka olelo koina
G. M. Robertson	No ka palapala kii
J. Kekaulahao	No ka hana ana i ka la
J. H. Smith	No ke kope ana i ka olelo a na hoike
	No ke ninaninau ka la
	No ke kope ana
	No ka hooholo ana i ka olelo i ka la 24 o February 1854.

5

Ua hooko aku makou i keia Kuleana mamuli o na olelo o na Kanawai i hooholoia i ka la 17 o June M. H. 1852. e pili ana i na Konohiki

A.2 Translation of Māhele Testimony

Number 8516 B Kamaikui
Section 3.

They have made a claim for their land division [named] Kahului in Kona, on the island of Hawaiʻi because they obtained this land from King Kamehameha III from the Māhele lands in the year 1848. No one has disputed this claim up until this time.

We are agreeing now [with the claim of] Kamaikui, and it is their responsibility under an allodial title. If they pay the government's portion, then they are qualified for the alloidal title document. However, the interest/taxes/responsibility remains with the person within [the claim].

They will also pay for the court and delegation proceedings, like so:

	For the space and printing in the newspaper
	For the copy of the claim
W.L. Lee	For the document picture
G.M. Robertson	For the work days

J. Kekaulahao	For the copy of the agreement and the announcement
J.H. Smith	For the surveying days
	For the copying
	For the proceeding of the agreement on 24 February 1854
	$5.-

We have agreed with this claim based on the terms of the law that was established on 19 June 1852 and in connection with the land agent.

APPENDIX D

Archaeological Inventory Survey

Draft
Archaeological Inventory Survey for the North Kona Well Construction Project, Kahului 2 Ahupua‘a, North Kona District, Hawai‘i Island TMK: [3] 7-5-014:001 por.

Prepared for
Belt Collins Hawaii LLC
and the
Department of Hawaiian Home Lands

Prepared by
Olivier M. Bautista, B.A.,
Samantha Sund, B.A.,
Sarah Wilkinson, B.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: PUAA 5)

August 2020

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Management Summary

Reference	Archaeological Inventory Survey for the North Kona Well Construction Project, Kahului 2 Ahupua‘a, North Kona District, Hawai‘i Island, TMK: [3] 7-5-014:001 por. (Bautista et al. 2020)
Date	August 2020
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: PUAA 5
Investigation Permit Number	CSH completed the archaeological inventory survey (AIS) fieldwork under archaeological fieldwork permit numbers 19-07 and 20-07, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-13-282.
Agencies	United States Department of Agriculture (USDA); Department of Hawaiian Home Lands (DHHL); Hawai‘i County Water Department; SHPD
Land Jurisdiction	Private
Project Proponent	DHHL Andrew H. Choy Acting Planning Program Manager Department of Hawaiian Home Lands 91-5420 Kapolei Parkway, Kapolei, HI 96707 P.O. Box 1879, Honolulu, HI 96805 Phone: (808) 620-9279 Fax: (808) 620-9559 Email: Andrew.H.Choy@hawaii.gov
Project Funding	USDA
Project Location	The project area is located in the town of Hōlualoa in North Kona District, on the *mauka* (upland) side of Māmalahoa Highway (Route 180) between mile markers 4 and 5. It is depicted on a portion of the 1996 Kailua and Kealakekua U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles.
Project Description	The project involves the construction of a 2.0-million-gallon reservoir with wells, pumps, underground utilities, a control building, and an access road linking the project area to the Māmalahoa Highway. The reservoir will be approximately 200 feet (ft) square with a maximum depth of 25–30 ft. The access road will be approximately 500 ft long and 30 ft wide.
Project Area Acreage	The project area comprises a 5.38-acre portion of the overall 128.419-acre parcel at TMK: [3] 7-5-014:001. This portion of the parcel comprises the southwest corner of the parcel fronting Māmalahoa Highway. The proposed well site would occupy a smaller acreage within the 5.38-acre project area.

Historic Preservation Regulatory Context	As a state (DHHL) project within private lands, this project is subject to Hawai‘i State environmental and historic preservation review legislation (Hawai‘i Revised Statutes [HRS] §343 and HRS §6E-8/HAR §13-275, respectively). While this project involves federal (USDA) funding, at the time of this writing it is unknown if the USDA has determined whether this project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act (NHPA). In consultation with the SHPD, this AIS investigation fulfills the requirements of HAR §13-276 and the *Secretary of the Interior's Standards for Archaeology and Historic Preservation*. It was conducted to identify, document, and assess any historic properties for integrity and site significance in accordance with HAR §13-275-6. CSH in November 2018 conducted a literature review and field inspection (LRFI) of the 5.38-acre project area and reported the findings in a February 2019 report to Belt Collins Hawaii LLC and DHHL (Bautista et al. 2019). The literature review confirmed the project area is within the bounds of the traditional agricultural Kona Field System (State Inventory of Historic Places [SIHP] # 50-10-32-06601), and within an area of North Kona historically used widely for commercial coffee farming. The field inspection identified within the project area three potential historic properties (CSH 1, wall; CSH 2, wall; and CSH 4, retaining wall) and an additional feature described as a berm-like undulation (CSH 3). Consultation with SHPD was recommended regarding the need to conduct an AIS. The Bautista et al. (2019) field inspection report was attached as supportive information to an April 2019 letter from DHHL to SHPD initiating project consultation under HRS §6E-8 and HAR §13-275-5(b). SHPD responded in a letter dated 14 May 2019 (Log No.: 2019.00795; Doc. No.: 1905SN19; Appendix A) stating that an AIS should be conducted in order to identify and document any historic properties within the project area and to provide any necessary mitigation measures.
Fieldwork Effort	CSH Project Director Olivier M. Bautista, B.A., Samantha Purdy, B.A., and Timothy Scheffler, Ph.D., conducted fieldwork intermittently between 12 November 2019 and 12 February 2020 under the general supervision of Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 29 person-days to complete.
Consultation	A cultural impact assessment (CIA) (Spencer and Hammatt 2019) was completed for the project in accordance with HRS §343, and involved consultation with community members, agencies, and NHOs. The CIA recommended that all project personnel should be informed of the

	possibility of inadvertent cultural finds, including human remains, and of the proper protocols in the event of any cultural finds.
Historic Properties Identified	This AIS documented three newly identified historic properties in the project area: • SIHP # 50-10-28-31124 is a site complex representing an intact portion of the pre-Contact Kona Field system that was modified for historic use. The site retains integrity of location, design, setting, materials, workmanship, and feeling. Pursuant to HAR §13-275-6 it is assessed as significant under Criterion d for the important information it has yielded about pre-Contact and historic land use. • SIHP # 50-10-28-31125 is a historic causeway used as a travel way to access a homesite and/or agricultural work area. The site retains integrity of location, design, setting, materials, and workmanship. Pursuant to HAR §13-275-6 it is assessed as significant under Criterion d for the important information it has yielded about historic land use. • SIHP # 50-10-28-31126 is an isolated pre-Contact agricultural terrace that has been subject to historic modification and use. The site retains integrity of location, design, setting, materials, and workmanship. Pursuant to HAR §13-275-6 it is assessed as significant under Criterion d for the important information it has yielded about pre-Contact agricultural land use.
Effect Recommendation	In accordance with HAR §13-275-7, the DHHL has determined the project effect is “effect, with proposed mitigation commitments.”
Mitigation Recommendations	The three archaeological historic properties documented within the project area (SIHP #s 50-10-28-31124, -31125, and -31126) have been assessed as significant under Criterion d pursuant to HAR §13-275-6(b) for the information they have yielded about pre-Contact and historic land use within the project area. These historic properties have been adequately documented and, thus, no further archaeological documentation or any mitigation is recommended. Archaeological monitoring of project-related ground disturbance is proposed to facilitate identification for information purposes of any subsurface remnants of historic properties beneath the coffee fields that may be encountered, including but not limited to culturally modified lava tubes, although such findings are unexpected.

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Section 1 Introduction

1.1 Project Background

At the request of Belt Collins Hawaii LLC and on behalf of the Department of Hawaiian Home Lands, Cultural Surveys Hawai‘i, Inc. (CSH) has prepared this archaeological inventory survey report (AISR) for the North Kona Well Construction Project, Kahului Ahupua‘a, North Kona District, Hawai‘i Island, TMK: [3] 7-5-014:001 por. The project area is located along the Māmalahoa Highway in the town of Hōlualoa. It is depicted on a portion of the 1996 Kailua and Kealakekua U.S. Geological Survey (USGS) 7.5-minute topographic quadrangles (Figure 1) tax map plats (Figure 2), and a 2013 aerial photograph (Figure 3).

The project involves the construction of a 2.0-million-gallon reservoir with wells, pumps, underground utilities, a control building, and an access road linking the project area to the Māmalahoa Highway (Figure 4). The reservoir will be approximately 200 feet (ft) square with a maximum depth of 25–30 ft. The access road will be approximately 500 ft long and 30 ft wide.

The project area comprises a 5.38-acre portion of the overall 128.419-acre parcel at TMK: [3] 7-5-014:001. This portion of the parcel comprises the southwest corner of the parcel fronting Māmalahoa Highway. The proposed well site would occupy a smaller acreage within the 5.38-acre project area.

1.2 Historic Preservation Regulatory Context and Document Purpose

As a state (DHHL) project within private lands, this project is subject to Hawai‘i State environmental and historic preservation review legislation (Hawai‘i Revised Statutes [HRS] §343 and HRS §6E-8/Hawai‘i Administrative Rules [HAR] §13-275, respectively).

While this project involves federal (USDA) funding, at the time of this writing it is unknown if the USDA has determined whether this project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act (NHPA).

In consultation with the State Historic Preservation Division (SHPD), this archaeological inventory survey (AIS) investigation fulfills the requirements of HAR §13-276 and the *Secretary of the Interior's Standards for Archaeology and Historic Preservation*. It was conducted to identify, document, and assess any historic properties for integrity and site significance in accordance with HAR §13-275-6. This report is also intended to support any project-related historic preservation consultation with stakeholders such as state and county agencies and interested Native Hawaiian Organizations (NHOs) and community groups, if applicable.

CSH in November 2018 conducted a literature review and field inspection (LRFI) investigation of the 5.38-acre project area and reported the findings in a February 2019 report to Belt Collins Hawaii LLC and DHHL (Bautista et al. 2019). The literature review confirmed the project area is within the bounds of the traditional agricultural Kona Field System (State Inventory of Historic Places [SIHP] # 50-10-32-06601) and within an area of North Kona historically used widely for commercial coffee farming. The field inspection identified within the project area three potential historic properties (CSH 1, wall; CSH 2, wall; and CSH 4, retaining wall) and an additional feature described as a berm-like undulation (CSH 3). Consultation with SHPD was recommended

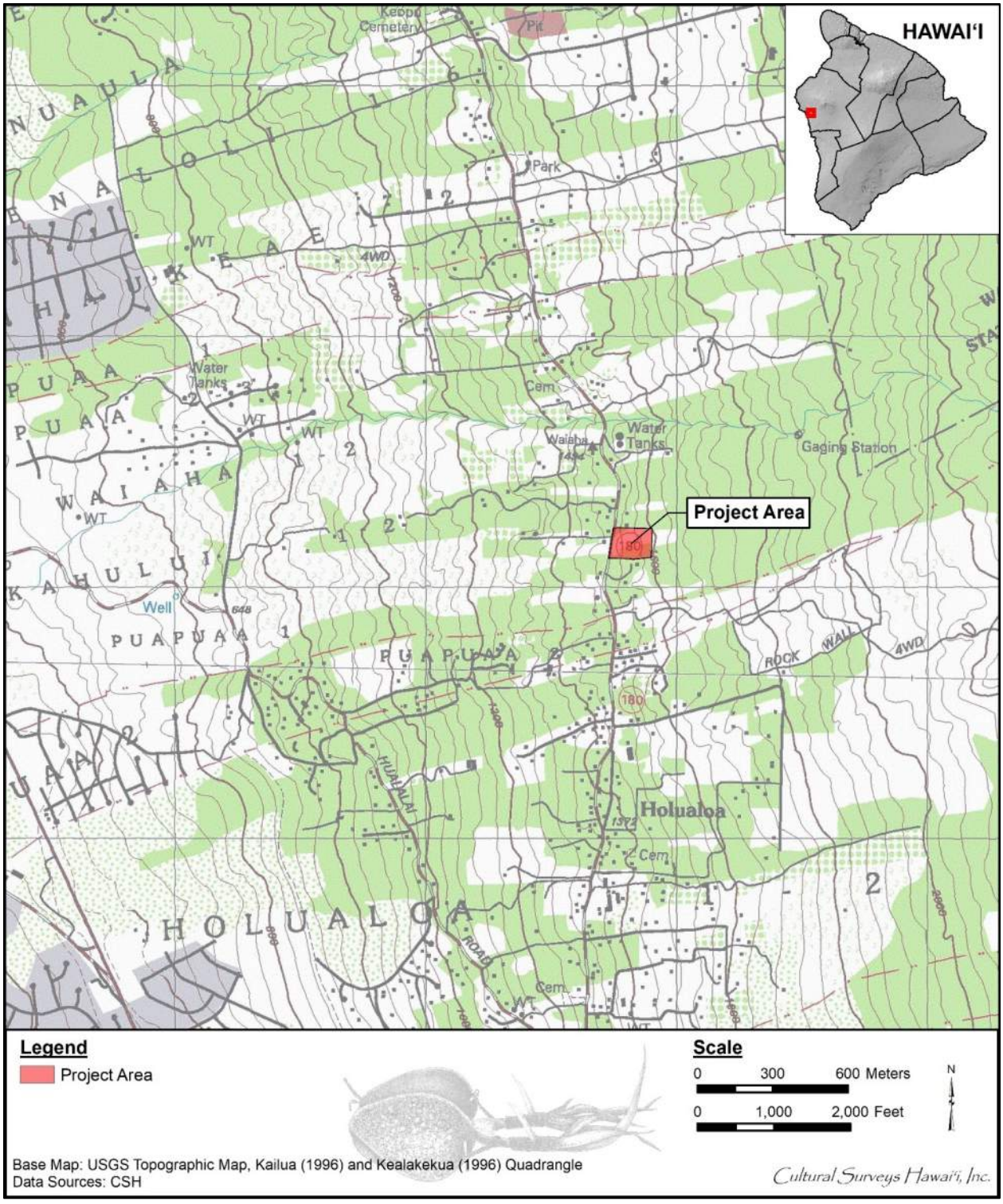

Figure 1. Portion of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles showing the location of the project area in Hōlualoa

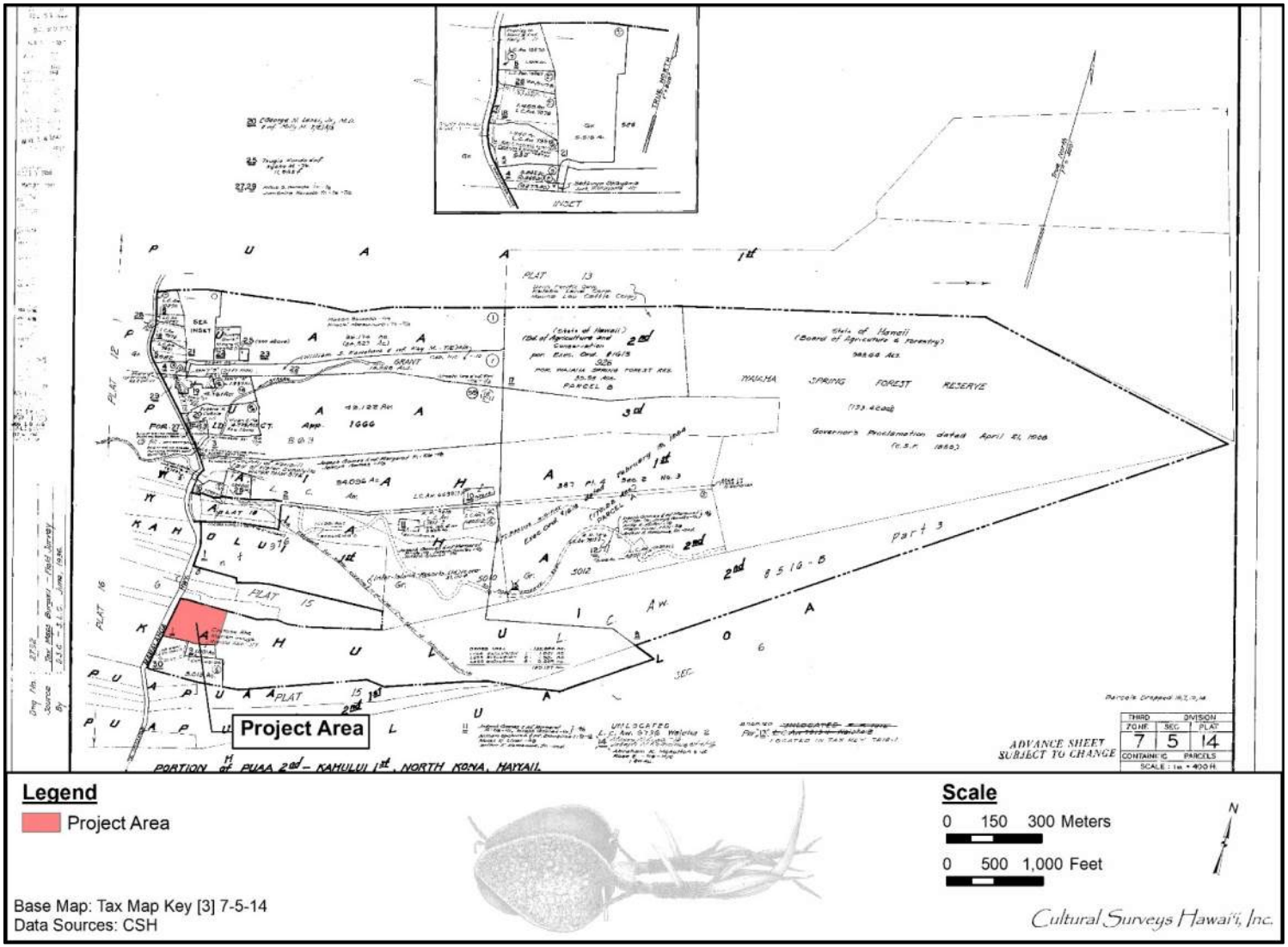

Figure 2. Tax Map Key (TMK) [3] 7-5-14 showing the project area in Kahului 2 Ahupua‘a (Hawai‘i TMK Service 2019)

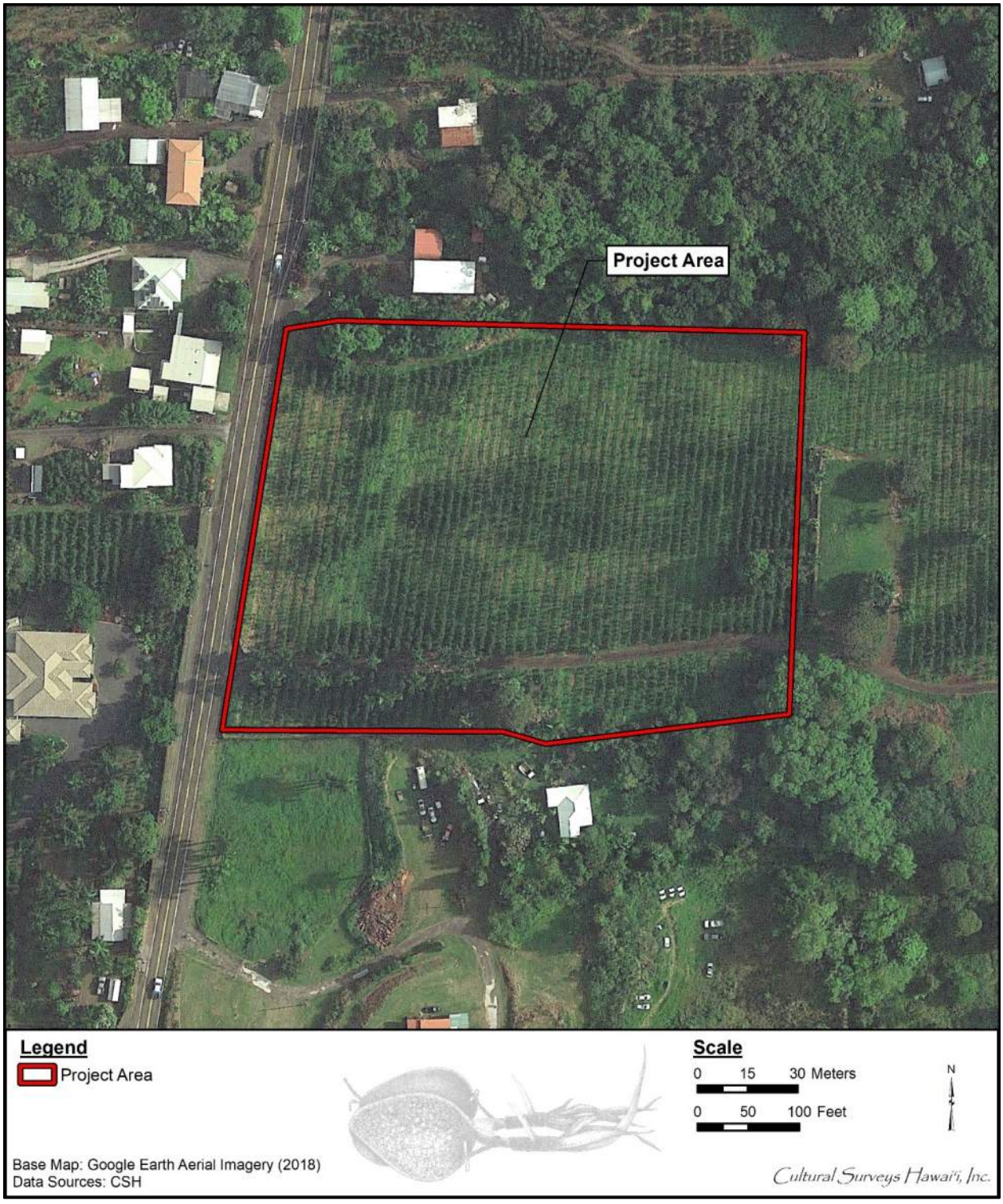

Figure 3. Aerial photograph of the project area (Google Earth 2018)

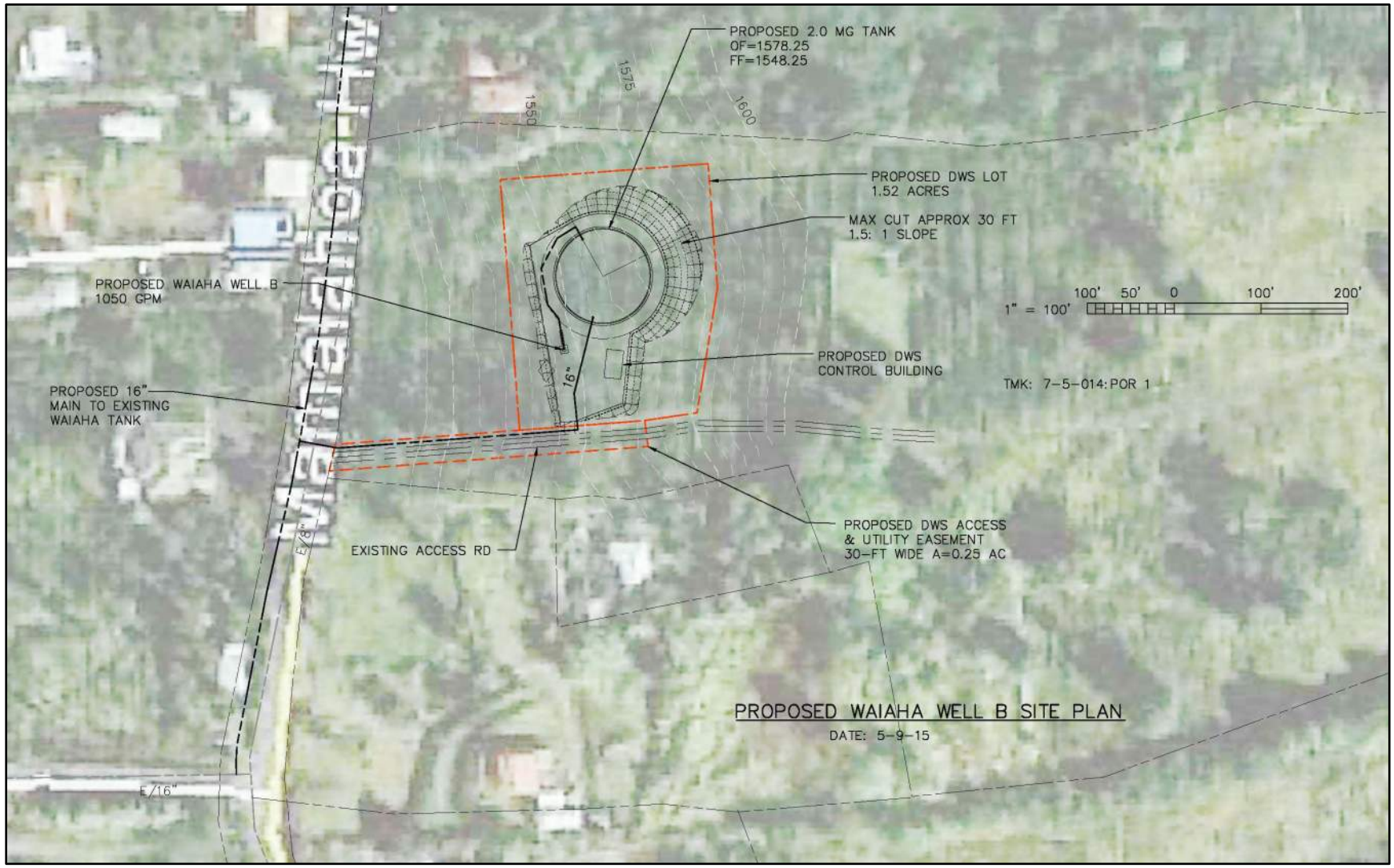

Figure 4. Preliminary site plan showing the 5.38-acre project area with planned improvements in TMK: [3] 7-5-14 (courtesy of client)

regarding the need to conduct an AIS. The Bautista et al. (2019) field inspection report was attached as supportive information to an April 2019 letter from DHHL to SHPD initiating project consultation under HRS §6E-8 and HAR §13-275-5(b). SHPD responded in a letter dated 14 May 2019 (Log No.: 2019.00795; Doc. No.: 1905SN19; Appendix A) stating that an AIS should be conducted in order to identify and document any historic properties within the project area and to provide any necessary mitigation measures.

1.3 Environmental Setting

1.3.1 Natural Environment

The project area is situated approximately 4.0 km (2.5 miles) back from the coast along the lower western slope of Hualālai Volcano on leeward Hawai‘i Island. The natural topography in the vicinity of the study area is moderately sloping to the west. Elevations within the study area range from approximately 457 m (1,500 ft) to 490 m (1,610 ft) AMSL (above mean sea level). Waiaha Stream, an intermittent waterway, is located 0.4 km (0.25 miles) north of the project area.

Average annual rainfall in the project area is approximately 2,386 mm (60-90 inches) (Giambelluca et al. 2013). The project area is within an active coffee plantation. It contains rows of coffee (*Coffea arabica*) throughout, except for along the fringes of the property where other plant species are present. The northwest corner of the project area, in particular, is heavily vegetated and generally consists of a canopy of mature Christmas berry (*Schinus terebinthifolius)*, various avocado (*Persea* spp.), and guava (*Psidium guajava*) with moderately dense undergrowth of Guinea grass (*megathyrsus maximus*). Additional observed species include *‘ōhi‘a* (*Metrosideros polymorpha*), ti plant (*Cordyline terminalis*), African tulip (*Spathodea campanulata*), and various ferns, vines, and grasses. Rows of palm trees line the lower portion of the asphalt driveway through the project area.

Soil series maps indicate most of the project area is covered with Honuaulu extremely rocky silty clay loam, 12 to 20% slope (HVD) (Figure 5). According to Sato et al. (1973:19), “the Honuaulu series consists of well-drained silty clay loams that formed in volcanic ash. These are gently sloping to moderately steep soils on uplands. […] Honuaulu soils are used mostly for coffee and pasture. Small areas are used for macadamia nuts, bananas, citrus fruits, avocados, and truck crops.” A small area at the southeastern corner of the project area overlaps Kealakekua very stony silty clay loam, 6 to 20% slopes (KRD) (see Figure 5). The Kealakekua series soils also consist “of well-drained silty clay loams that were formed in volcanic ash. These are gently sloping to moderately steep soils on the uplands” (Sato et al. 1973:26–27).

1.3.2 Built Environment

The project area is located along the old Māmalahoa Highway in Hōlualoa. Land use in this area is generally for residence and agriculture (see Figure 3). The project area is bound to the west by Māmalahoa Highway, to the north and south by adjacent parcels, and to the east by a continuation of the coffee plantation on subject parcel TMK: [3] 7-5-014:001. The project area has been heavily altered by commercial agricultural development. Almost the entire project area (and overall TMK parcel 001) has been previously impacted by the development of a coffee plantation possibly overlying elements of the pre-Contact Kona field system (SIHP # 50-10-32-06601).

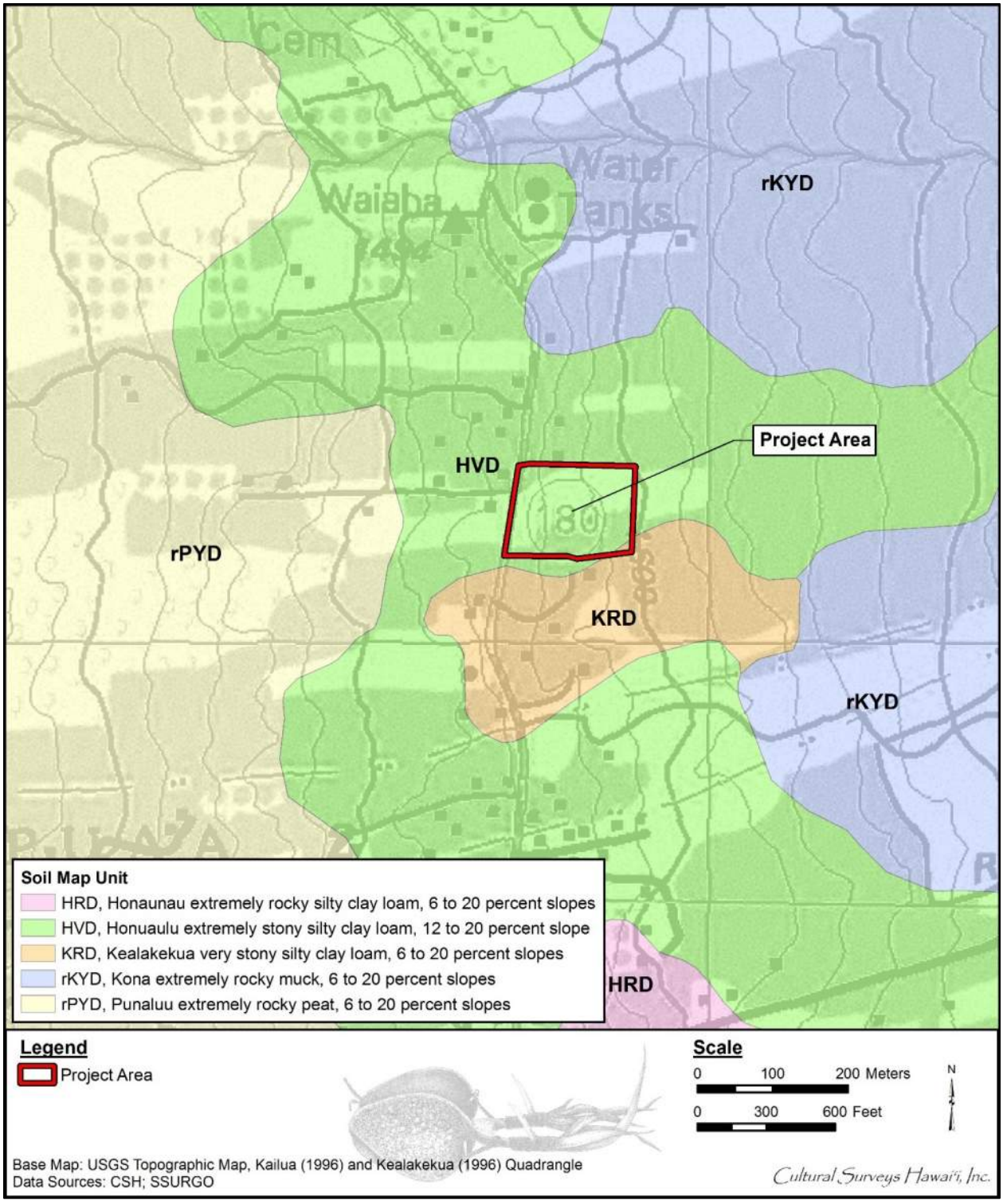

Figure 5. Overlay of *Soil Survey of the State of Hawaii* (Sato et al. 1972), indicating soil types within and surrounding the project area (USDA SSURGO 2001)

A modern rock wall defines the western boundary of the project area along Māmalahoa Highway. This rock wall extends *mauka* (inland) a short distance along the southern boundary, where it is replaced by a hog-wire fence that continues upslope beyond the project area. The northern project area boundary is generally defined by a historic stone wall. The eastern project area boundary generally follows the 1,600-ft elevation contour and is not marked. An iron gate along the highway near the southwestern corner of the property accesses an asphalt driveway extending *mauka* through and beyond the project area. The interior of the project area is characterized by linear rows of mature coffee trees. Signs of mechanical disturbance were observed along the northern margins of the project area.

Section 2 Methods

2.1 Field Methods

CSH completed the fieldwork component of this archaeological inventory survey under archaeological fieldwork permit number 18-15, issued by the SHPD pursuant to HAR §13-282. Fieldwork was conducted intermittently between 12 November 2019 and 12 February 2020 by CSH Field Supervisor Olivier Bautista, B.A., Samantha Sund, B.A., and Timothy Scheffler, Ph.D., under the general supervision of CSH Principal Investigator Hallett H. Hammatt, Ph.D. This work required approximately 29 person-days to complete. In general, fieldwork included 100% pedestrian inspection of the project area, GPS data collection, and subsurface testing.

2.1.1 Pedestrian Survey

A 100%-coverage pedestrian inspection of the project area was undertaken for the purpose of historic property identification and documentation. The pedestrian survey was accomplished through systematic sweeps spaced 2-5 m apart depending on ground visibility.

Where a new historic property was encountered, vegetation was cleared in order to expose and fully document the site. The determination of historic property boundaries was based on factors including apparent age, architectural style, and the spatial and functional interrelationships of both natural and man-made features. Historic properties were documented with scaled plan view maps, digital photographs, and written descriptions. Historic property locations were recorded using a Trimble ProXR GPS unit (sub-meter horizontal accuracy).

2.1.2 Subsurface Testing

A program of subsurface testing was undertaken for the AIS to assess the potential for subsurface archaeological features, including but not limited to buried cultural deposits and/or culturally modified lava tubes. The number and locations of the test excavations were chosen based on consultation with SHPD and were amended as appropriate as the fieldwork progressed.

The subsurface testing program consisted of the manual excavation of 13 test units (TUs) within the project area. Twelve of these test units (TU-02 though TU-13) measured 50 cm by 50 cm (0.25 square [sq] m), and the remaining unit (TU-01) measured 2.0 m by 1.0 m (2.0 sq m). TU-02 through TU-13 were excavated at seven features of CSH1; test unit locations were selected based on the presence of cultural materials on the ground surface, relative depth of excavatable sediment, and to avoid major obstructions such as bedrock outcrops or other large rocks or roots. TU-1 was placed in an area of maximum sediment that allowed for cross-sectioning of the downslope terrace wall and avoidance of major tree root obstructions. Test unit locations were recorded using a Trimble ProXR GPS unit (sub-meter horizontal accuracy). All the test units were excavated one level (or stratum) at a time to bedrock. All excavated material was screened through 1/8-inch mesh. Screened sediment was deposited on a tarp adjacent to the pit; upon completion of excavation and documentation the units were backfilled with the excavated material.

A stratigraphic profile of each test excavation was drawn and photographed. The observed sediments were described using standard USDA soil description observations/terminology. Sediment descriptions included Munsell color; texture; consistence; structure; plasticity; cementation; origin of sediments; descriptions of any inclusions, such as cultural material and/or

roots; lower boundary distinctiveness and topography; and other general observations. Where stratigraphic anomalies or potential cultural deposits exposed, these were carefully represented on test excavation profile maps.

2.2 Laboratory Methods

Materials collected during AIS fieldwork were identified and catalogued at CSH's laboratory facilities in Hilo on Hawai‘i Island. Analysis of collected materials was undertaken using standard archaeological laboratory techniques. Materials were washed, sorted, measured, weighed, described, and/or photographed. No human remains or grave goods were encountered during site documentation or subsurface testing.

2.2.1 Artifact Analysis

In general, artifact analysis focused on establishing, to the greatest extent possible, material type, function, cultural affiliation, and age of manufacture. As applicable, artifacts were washed, sorted, measured, weighed, described, photographed, and catalogued. Diagnostic (dateable or identifiable) attributes of artifacts were researched. A catalogue of all collected artefactual material was prepared and is presented in Section 5.

2.2.2 Faunal Analysis

Faunal analysis generally focused on species identification and evidence of food consumption. No invertebrate remains were collected. Collected non-human vertebrate skeletal material was identified to the lowest possible taxa and analyzed using an in-house comparative collection and reference texts (e.g., Adams and Crabtree 2011; Olsen 1964; Schmid 1972; Sisson 1953). A catalogue of all collected material was prepared and is presented in Section 4.5.

2.2.3 Energy-Dispersive X-ray Fluorescence (EDXRF) Analysis

The use of energy-dispersive X-ray fluorescence (EDXRF) may make it possible to determine if lithic artifacts from within the project area are from similar sources, different sources, or from sources consistent with another island. Using an EDXRF spectrometer, Dr. Peter Mills of the University of Hawai‘i at Hilo is working to establish geochemical "fingerprints" of stone tools that Native Hawaiians quarried from various sites and track the extent to which that material was circulated on each island or throughout the island chain. The EDXRF analyzer allows archaeologists to conduct rapid and non-destructive analyses of stone artifacts to determine the extent and distance stone tools moved from the quarries. Attempts are made to match the lithic artifact samples with geochemical data collected on known prehistoric quarry areas. Samples that do not match known quarry sites may lead to the discovery of currently unknown quarry sites, or possibly to the identification of stone tools derived from other island groups such as Tahiti and the Marquesas. By examining the extent to which stone tools in various *ahupua‘a* were derived from non-local sources, archaeologists will be able to quantify Native Hawaiian movement of lithic artifacts through time and space, and possibly identify some tools that were carried over long distances of open ocean.

2.2.4 Wood Taxa Analysis

Collected charcoal samples were analyzed for species identification. Samples were sent to the Wood Identification Laboratory at International Archaeological Research Institute, Inc. (IARII) on O‘ahu for taxa identification. The samples were viewed under magnification of a dissecting

microscope and then compared with anatomical characteristics of known woods in the Pacific Islands Wood Collection at the Department of Botany, University of Hawai‘i, as well as in published descriptions. Taxa identification of wood samples provides useful information for interpreting the environmental and cultural history of the project area and helps determine a general time frame of land use. Analysis by IARII also identified short-lived plant species, which are useful for radiocarbon dating (see Section 2.2.5). Following analysis, samples were returned to the CSH laboratory in Hilo.

2.2.5 Radiocarbon Analysis

Charcoal samples identified as short-lived plant species during wood taxa analysis (see Section 2.2.4) were sent to Beta Analytic, Inc. of Miami, Florida for radiocarbon dating analysis using the Accelerator Mass Spectrometer (AMS) method. The conventional radiocarbon age determined by Beta Analytic, Inc. was calibrated to calendar ages using the INTCAL13 High Probability Density Range Method (HPD) and OxCal calibration program, Version 4.3, developed by the University of Oxford Radiocarbon Accelerator Unit (ORAU).

2.2.6 Disposition of Materials

Materials collected during the current AIS will remain temporarily curated at the CSH office in Hilo, Hawai‘i. CSH will arrange with the landowner regarding the long-term disposition of this material. Should the landowner request different archiving of material, an archive location will be determined in consultation with the SHPD. All data generated during the course of the AIS are stored at the CSH offices on O‘ahu and Hawai‘i Island.

2.3 Research Methods

Background research included a review of previous archaeological studies on file at the SHPD; review of documents at Hamilton Library of the University of Hawai‘i, the Hawai‘i State Archives, the Mission Houses Museum Library, the Hawai‘i Public Library, and the Bishop Museum Archives; study of historic photographs at the Hawai‘i State Archives and the Bishop Museum Archives; and study of historic maps at the Survey Office of the Department of Land and Natural Resources. Historic maps and photographs from the CSH library were also consulted. In addition, Māhele records were examined from the Waihona ‘Aina database (Waihona ‘Aina 2020).

This research provided the environmental, cultural, historic, and archaeological background for the project area. The sources studied were used to formulate a predictive model regarding the expected types and locations of cultural resources in the project area.

2.4 Consultation Methods

A cultural impact assessment (CIA) (Spencer and Hammatt 2019) was completed for the project in accordance with HRS §343, and involved consultation with community members, agencies, and NHOs. The CIA recommended that all project personnel should be informed of the possibility of inadvertent cultural finds, including human remains, and of the proper protocols in the event of any cultural finds.

Section 3 Background Research

3.1 Traditional and Historical Background

The project area is located in the *ahupua‘a* (traditional land division) of Kahului 2, approximately 300 m north of its boundary with Hōlualoa Ahupua‘a, within the extensive Kona Field System agricultural and settlement complex (SIHP # 50-10-32-06601). Traditional and historical contexts focused on Kahului 2, but including Hōlualoa Ahupua‘a when appropriate, are therefore relevant to understanding trajectories of human settlement, land use, and development in the project area.

3.1.1 Traditional Accounts and Archaeological Evidence

Kahului, which translates to “the winning” (Pukui et al. 1976:67), does not feature in Hawaiian *ka‘ao* (legends), or ethnohistoric accounts. Broader ethnohistoric understandings of Hōlualoa, a short distance south of the project area, as well as the Kona Field System, and Kona Moku (District) help to characterize the project area in Kahului 2 during the traditional era.

Hōlualoa literally translates to “long sled course” (Pukui et al. 1976:48), likely named for the traditional sport of *hōlua* (sledding down grassy slopes or constructed sled courses) and famed *hōlua* courses (Pukui and Elbert 1986:78). Early historic accounts by Ellis (1969), ‘Ī‘ī (1959), and Kamakau (1992) describe Hōlualoa as a populous *ahupua‘a* with good surf and abundant food resources that served as a chiefly center for generations.

Clues to the prominence of Hōlualoa Ahupua‘a are contained in nineteenth century Hawaiian histories. Kamakau mentions Hōlualoa three times in his *Ruling Chiefs of Hawai‘i*. The first occurs in an account of an extraordinary day’s reconnaissance of the west coast of Hawai‘i Island by the spy Kauhi-o-ka-lani who had been sent to the island by Kama-lala-walu, chief of Maui. Having reached Kawaihae by canoe at night, Ka-uhi-o-ka-lani “ran about that same evening [reaching as far south as Ka‘awaloa] and returned before the canoes were dismantled […]” (Kamakau 1961:56). Kauhi-o-ka-lani recounts his journey and the landmarks he observed. After his “fellow spies and hosts” announce to him that he had gone past the “walled-in ponds [of] Kaloko and Honokohau,” the areas he describes are identified by them: “The point that juts out is Hi‘iaka-noho-lae and the sandy beach inside of that is Kaiakeakua. Next is Kailua. The coconut groves are Holualoa and Kahalu‘u” (Kamakau 1961:56).

Kamakau names these *ahupua‘a* when recounting the life of Ka-lani-opu‘u, ruling chief of Hawai‘i Island: “After the death of Captain Cook and the departure of his ship, Ka-lani-‘opu‘u moved to Kainaliu near Honua‘ino and, after some months to Keauhou where he could surf in the waves of Kahalu‘u and Holualoa […]” (Kamakau 1961:105).

Finally, Hōlualoa figures centrally in a striking prophecy made to Kamehameha:

> Ka-pihe the seer prophesied in the presence of Kamehameha and said, ‘There shall be a long malo [loincloth] reaching from Kuamo‘o to Holualoa. The islands shall come together, the tabus shall fall. The high shall be brought low, and the low shall rise to heave.’ The prophecy was fulfilled when the battle was fought at Kuamo‘o

> for the downfall of the ancient tabus. Holualoa was the long malo uniting the kingdom from Kahiki to Hawai‘i. [Kamakau 1961:223]

Kamakau's accounts suggest "Hōlualoa" was a well-known, powerful place. The preeminence of Hōlualoa Kamakau suggests is asserted unequivocally by John Papa ‘Ī‘ī:

> It was in the Holualoa lands of Kona that the chiefs dwelt in olden times, from the time of Keakamahana, the great kapu chiefess of Hawai‘i, and earlier. Where the large stone wall is located above Keolonahihi was Keakealaniwahine's dwelling place, for her parents, Keakamahana and Iwikauikaua, resided there. These lands were occupied by the chiefs because the surfing there was good, and the food abundant in ancient times. There Kamehameha learned to surf and to glide with a canoe over the waves, guarded by the kaikunane [female's brother or male cousin] of Keaka, in accordance with her commands. Because he was well trained, Kamehameha excelled in these arts and in sailing canoes. [‘Ī‘ī 1959:6]

Ethnohistoric accounts of Hōlualoa confirm the project area in Kahului 2 was very close to a populous center of chiefly power.

Archaeological evidence indicates windward Hawai‘i Island, and the project area in Kahului 2, were probably settled in the thirteenth century CE after the discovery and settlement of the archipelago by Polynesian seafarers sometime between the eleventh and thirteenth centuries CE (Athens et al. 2014:144; Bayman and Dye 2013; La Croix 2019:19; Rieth et al. 2011:2740). Initially, settlement likely occurred on the windward coasts of O‘ahu and Maui in water-rich lowlands with deep soil deposits conducive to wet taro agriculture (Kanahele 1995:12; Kirch 2012:66; Ladefoged et al. 2009:2374).

In the context of traditional Hawai‘i Island settlement patterns and land use observed in Kona and elsewhere (Cordy 2000:248; Kelly 1983), at 1,500-1,610 ft AMSL the project area, proximal to the chiefly center of Hōlualoa and later Kona, occupies a prime inland habitation and agricultural zone. The Kula (Coastal) Zone was a relatively narrow strip of oceanfront land hosting the highest concentrations of habitation and religious sites. *Mauka* of the Kula Zone, agriculture, temporary to permanent habitation sites constituted the Kalu‘ulu (Intermediate) Zone. The project area is located in the ‘Āpa‘a (Upland) Zone. Like the Kalu‘ulu Zone, the ‘Āpa‘a Zone hosted agriculture (sweet potatoes, dry land taro, ti, and sugarcane would have been dominant crops) and temporary and permanent habitations with a *mauka* periphery fringed by the *wao* (upland forest). Beyond the *wao* was the ‘Ama‘u (Saddle) Region, where mostly temporary habitation concentrated in lava tubes and bird hunting was the main human activity. An 1840 etching of Kailua *mauka* illustrates settlement, land use, and defining characteristics of the distinct zones (Kapohoni in Kelly 1983:61; Figure 6).

3.1.2 The Kona Field System

Covering approximately 139 sq km on the western slopes of Mauna Loa and Hualālai, the Kona Field System is understood as the largest traditional Hawaiian agricultural system in the archipelago (Newman 1978); similar, concurrently unique agricultural complexes also existed on Hawai‘i Island at Kohala, Waimea, and Kā‘u (Cordy 2000:248). Kuaīwi, defined as long, low, linear mounds forming field boundaries extending *mauka* to *makai* (mountains to sea), are a defining feature of the extensive non-irrigated field system. Interior fields were used to plant crops

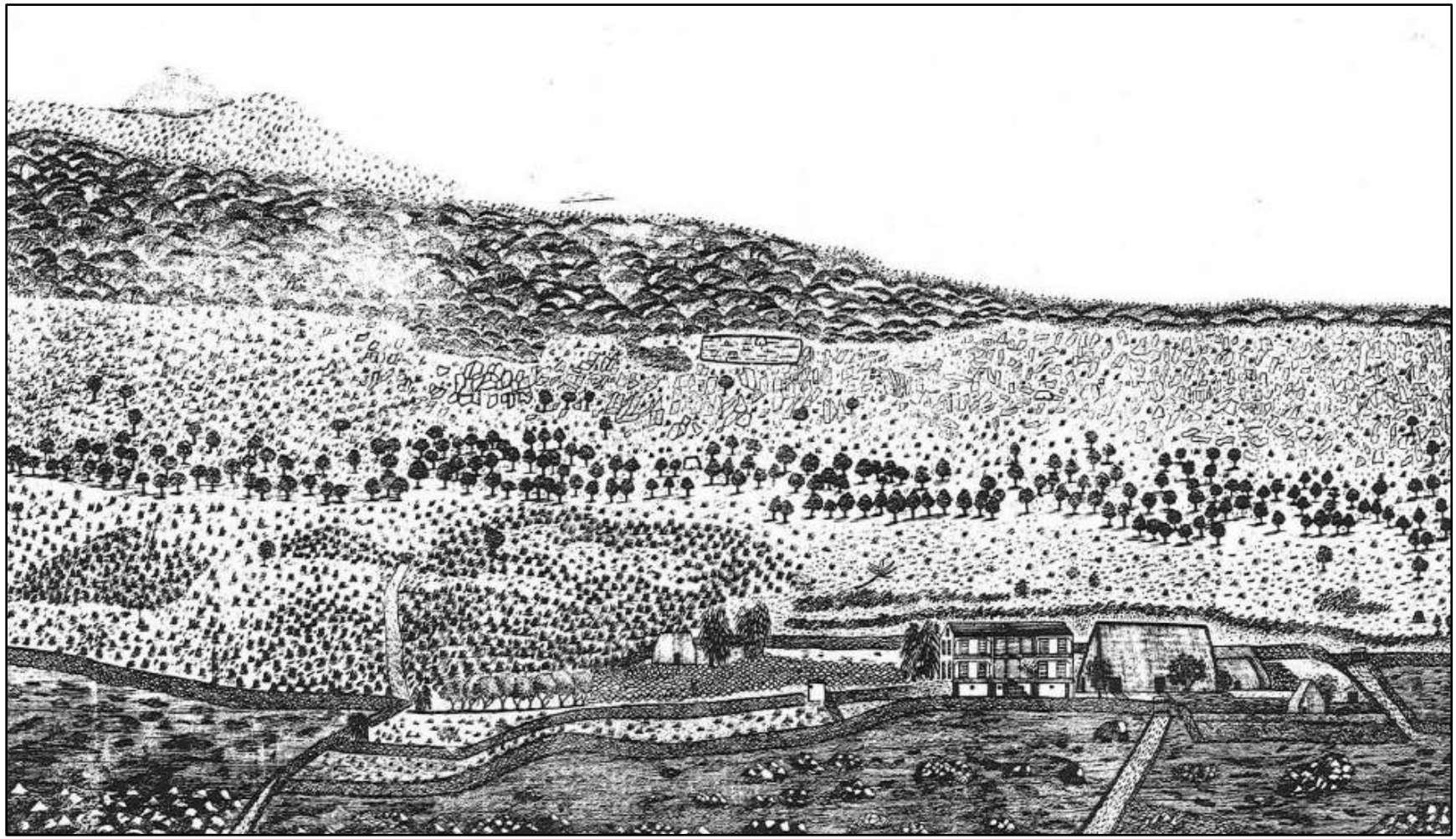

Figure 6. Engraving entitled “View of the Country Back of Kailua” from an 1840 drawing of Kailua *mauka* illustrating resources, land use, and settlement patterns distinctive to select areas on Hawai‘i Island (Kapohoni in Kelly 1983:61)

such as *kalo* (taro), while other crops such as sugarcane were planted atop the *kuaīwi* forming windbreaks. Gardens, habitation and ceremonial complexes were interspersed throughout the field system, which was linked by trails to coastal settlements (Kelly 1983; Newman 1978; Tomonari-Tuggle 1985).

Cultivation of upland areas in Kona likely led to the establishment of the Kona Field System by 1300 CE, if not before (McCoy et al. 2017). The system was improved and agricultural practices intensified between the fourteenth and sixteenth centuries. Permanent settlements were established as populations and the number of chiefdoms throughout Hawai‘i Island increased (Tomonari-Tuggle 1985:15–24; McCoy et al. 2017). From the sixteenth or seventeenth through the eighteenth centuries, the Kona Field System became a densely developed agricultural and settlement complex, proximal to the important political center of Kona (Tomonari-Tuggle 1985:15–24).

The traditional features of the Kona Field System were commonly altered and/or repurposed during historic-era agricultural practices such as sugarcane and coffee cultivation and cattle ranching.

The Kona Field System was designated SIHP # 50-10-32-06601 in the 1970s. Hawai‘i Register of Historic Places documentation (Newman 1978: Appendix A) does not indicate submission to the Review Board or nomination to the National Register of Historic Places (NRHP).

3.1.3 Early Historic Period

European incursion into the Hawaiian Islands began with the 1778 arrival of Captain James Cook. Successive waves of incursion and colonization resulted in centuries of frequently dramatic change to virtually every facet of traditional Native Hawaiian life (Archer 2018; ‘Ī‘ī 1959; La Croix 2019).

Confirmation of Hōlualoa—very near the project area—as a prominent population and agricultural center that hosted a large settlement and religious structures is furnished by the missionary William Ellis in his account of a journey down the Kona coast in 1823:

> At two P.M. we reached Horuaroa [Hōlualoa], a large and populous district. Here we found Keoua, the governor’s wife, and her attendants, who had come from Kairua [Kailua] for wauti [wauke, or paper mulberry; Broussonetia papyrifera], with which to make cloth. Shortly after, we reached a village called Karuaokalani, (the second heaven,) where was a fine heiau [pre-Christian place of worship], in good preservation. It is called Pakiha; its dimensions were two hundred and seventy feet by two hundred and ten. We could not learn the idol to which it was dedicated, but were informed it was built in the time of Keakealani, who, according to tradition, was queen of Hawai‘i about eleven generations back. The walls were solid, thick, and nearly entire; and the singular manner in which the stones were piled upon the top, like so many small spires, gave it an unusually interesting appearance. Before we left Karuaokalani the inhabitants pointed out to us a spot called Maukareoreo, the place of a celebrated giant of that name, who was one of the attendants of Umi, king of Hawai‘i, about twelve generations since, and who, they told us, was so tall that he could pluck the cocoa-nuts from the trees as he walked along; and when the king was playing in the surf where it was five or six

> fathoms deep, would walk out to him without being wet above his loins; and when he was in a canoe, if he saw any fish lying among the coral at the same depth, would just put his hand down and take them. They also told us he was a great warrior, and that, to his prowess principally, Umi was indebted for many of his victories. [Ellis 1969:117–188]

Ellis's characterization of Hōlualoa as a "large and populous district" with a "village called Karuaokalani" suggests the *ahupua‘a,* at least up to the first quarter of the nineteenth century, continued to provide the *maka‘āinana* (commoners, populace) who cultivated its resources food that, according to John Papa ‘Ī‘ī, had been "abundant in ancient times."

However, a marked decline in the native population had occurred by the mid-1800s, a result of contact with western diseases and considerable migration to town centers such as Kailua and Honolulu (Archer 2018; La Croix 2019:68, 95). A missionary census of North Kona, published in 1836, indicates "populous" Hōlualoa may have been much diminished during the decade following Ellis's trip. Out of a total population of 5,957 for the North Kona District, only 731 persons are recorded between Puaa and Holualoa-4 (called "Palauweka" in the census) (Schmitt 1973:31). An impassioned outcry accompanied the population figures, bemoaning the decline throughout the district:

> In these past four years, the people of North Kona have diminished 692 less than those previously counted [...] A tenth of the adults have died in the four years. If perhaps the people who come after are diminished at the same rate, the people of Hawai‘i will be finished and the land will be empty!! [Schmitt 1973:31]

Natural and post-Contact societal disruptions imposed upon the Hawaiian people—evidenced by the sharp reduction of the native population (Archer 2018; LaCroix 2019:170)—make inferences about former settlement patterns from records documenting nineteenth century Hawaiian life difficult. Mid-nineteenth century land award records generated after private land ownership was introduced to the Hawaiian Islands evince settlement patterns that could have persisted from traditional times, and hint at *maka‘āinana* lifeways beyond the coastal compounds of the *ali‘i* (chiefly class).

3.1.4 The Māhele and the Kuleana Act

Impacts from sweeping mid-nineteenth century land reforms reverberated throughout the Hawaiian Islands, including the *ahupua‘a* of Kahului 2 and the project area. Kauikeaouli (King Kamehameha III) transformed the Hawaiian Kingdom into a constitutional monarchy through documents drafted in 1840 and 1852 establishing systems of governance, representation, and law throughout the archipelago. Much legislation focused on securing Hawaiian rights to land and pathways to power. The intent was to provide a degree of landed security and political autonomy against a constellation of looming threats such as disease, increasing foreign incursion, social, political and religious tumult, and the island nation conquest by Europeans and Americans occurring elsewhere in the Pacific (Gonschor 2019:41, 42; Van Dyke 2008:31).

The Māhele (literally, "division") was a series of land acts and reforms enacted between 1840 and 1856. The legislation upended traditional Hawaiian systems of collective land utilization and complex social hierarchies and introduced concepts of land commodification and ownership (Van Dyke 2008:1, 11). In 1846, a Land Commission was formed to review and grant Native Hawaiian

land claims based on proof of residency and utilization until its dissolution in 1855 (Van Dyke 2008:33, 34). In 1848, the crown, the Hawaiian government, and the *ali‘i* received their titles to choice tracts of land. In 1850, the Alien Land Ownership Act granted private land ownership rights to foreigners. Concurrently, the Kuleana Act encouraged *maka‘āinana* to file claims with the Land Commission for the land they were presently using plus 0.25 additional acres for a house lot. However, both the concept of land ownership and western bureaucratic systems were unknown/unclear to *maka‘āinana*, the majority of whom did not file claims (Van Dyke 2008:46). Claimant *maka‘āinana* received their *kuleana* awards (individual land parcels) beginning in 1850.

The records for the Land Commission Awards (LCAs) generated during the Māhele document mid-nineteenth century land use and settlement in Kahului 2 and the project area. Kahului 2 was awarded to and retained by the *ali‘i* (chief) Kamaikui under LCA 8516-B:3. A cluster of *kuleana* or commoner awards were granted within Kahului 2 just downslope of Māmalahoa Highway and the project area (Figure 7) and the records for these awards indicate land uses such as habitation, agriculture, and cattle ranching. No *kuleana* awards are located within the project area. A portion of an 1888 map of North Kona (Figure 8) depicts clusters of LCA parcels along the government road in the project area, but none overlap it and there are no signs of any development within the project area. A portion of an 1891 map of North Kona shows the project area within Kahului and identifies Land Grants in the vicinity; no grants or developments are indicated within the project area (Figure 9).

3.1.5 Mid- to Late 1800s

By the end of the nineteenth century in Kona the traditional subsistence settlement pattern was eclipsed by new patterns focused around commercial agriculture (especially coffee) and ranching. Coffee farming expanded greatly across leeward Hawai‘i; the project area is within what remains of the Kona coffee belt today. This transition was greatly facilitated by an influx of immigrants into the area who established communities of small farmers (Nakano 1990) clustered along the belt road or Māmalahoa Highway.

Thomas Thrum, writing in the 1870s, records that coffee was first introduced in Hilo and Kona on Hawai‘i Island around 1828 (Thrum 1876:46–47). Thrum notes that the coffee industry in Kona—the “center of [coffee] cultivation [on Hawai‘i Island which] […] both from soil and climate produces the choicest article”—subsequently expanded despite a scarcity of labor, fluctuating prices, occasional drought, and blight. Thrum also relates that in Kona, into the 1870s, the expanding industry was not consolidated by large plantation-type operations:

> Mr. H.N. Greenwell of Kona, trader, takes great pains in his selections for the market, and any bearing his mark is a sufficient guarantee in Honolulu market of fully ripe, well dried and clean aromatic coffee. There is an idea prevalent that Mr. G. is a grower of this article [i.e., coffee], but that is erroneous. The coffee is almost wholly in the hands of the natives with little patches here and there throughout the district, who gather it in its season and dispose of the same to the stores located near them. [Thrum 1876:51]

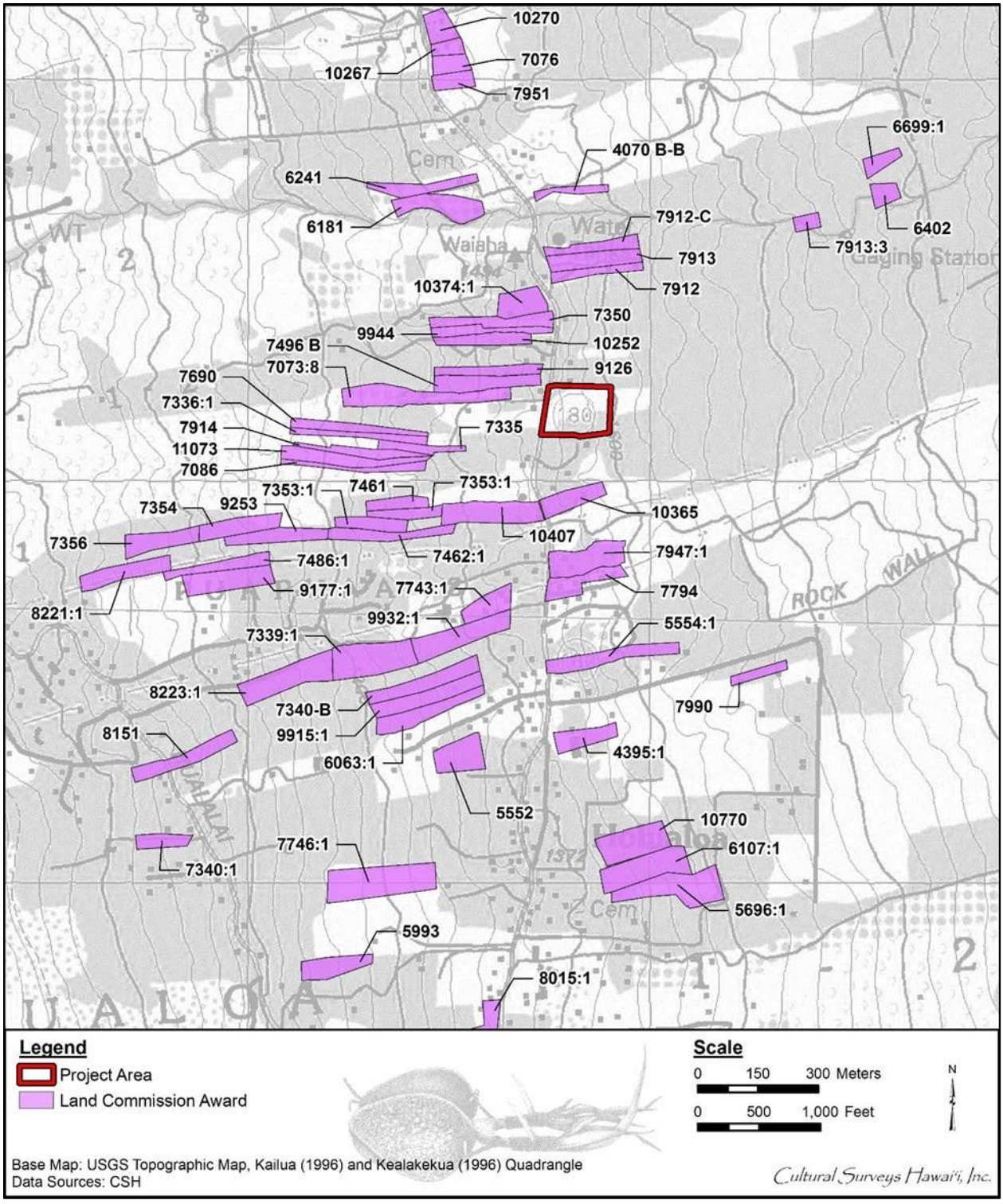

Figure 7. Portions of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles, showing the location of the project area and nearby LCA parcels

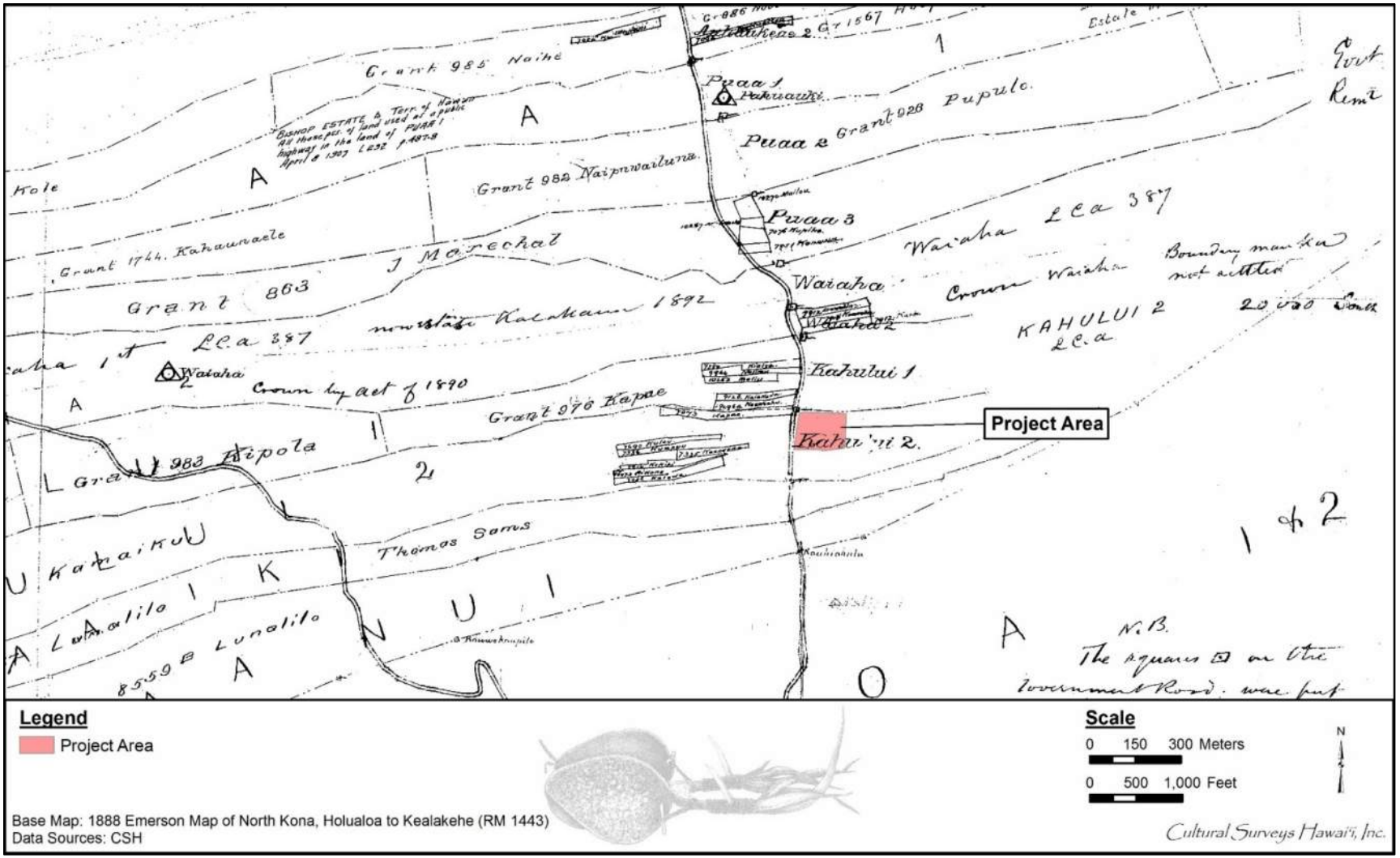

Figure 8. Portion of 1888 Emerson map of North Kona showing the project area; while clusters of LCAs are depicted in the vicinity along the road, none overlap the project area and there are no signs of any development within the project area

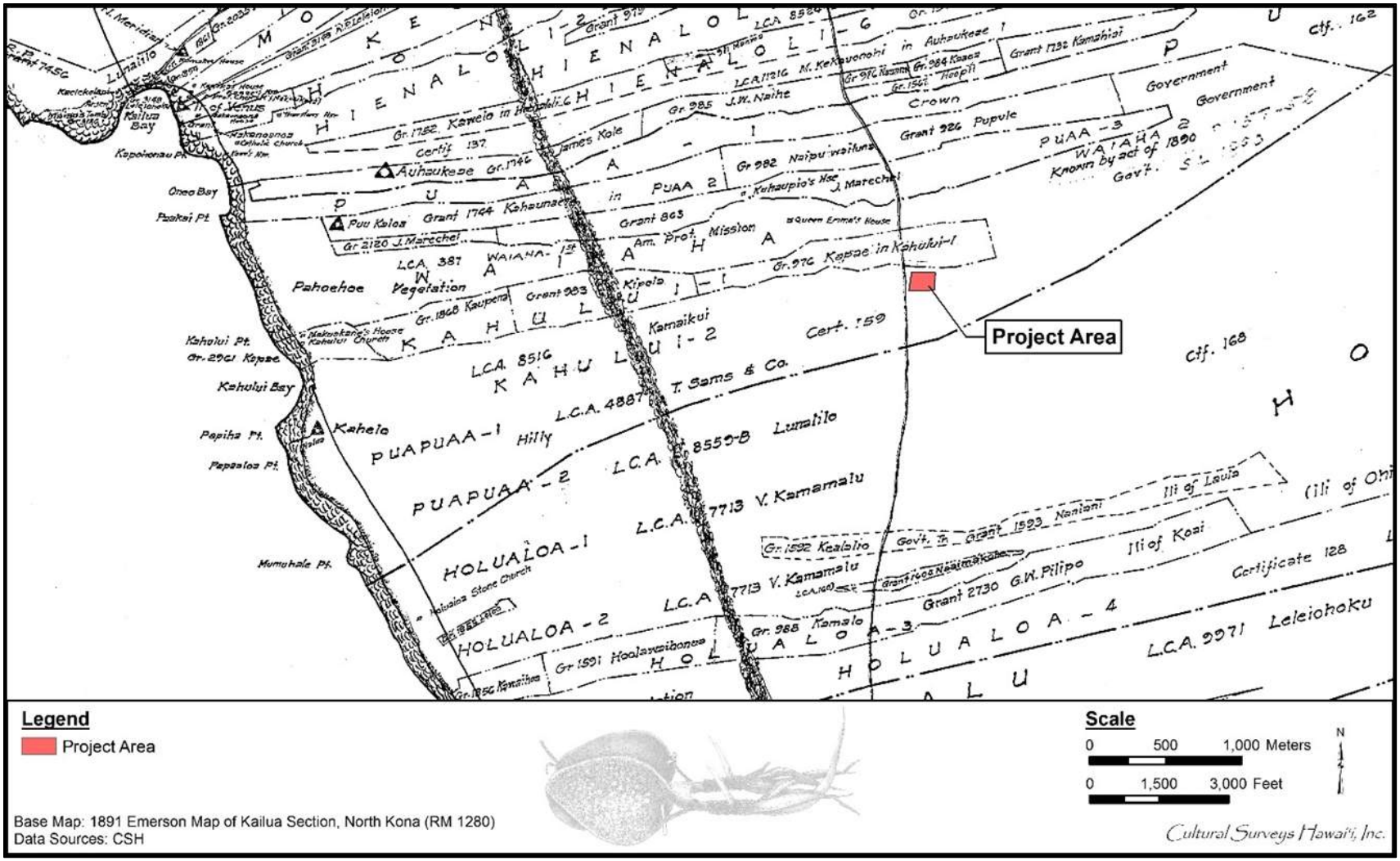

Figure 9. Portion of 1891 Emerson map of North Kona showing the project area within Kahului (awarded to Kamaikui); while there are numerous land grants depicted throughout the area, none overlap the project area and there are no signs of any development within the project area

With the influx of Asian immigrants to the Hawaiian Islands during the second half of the nineteenth century, the cultivation of coffee would no longer be "almost wholly in the hands of the natives," though planting likely continued to be concentrated upon "little patches here and there throughout the district." Hōlualoa became one center of the immigrant Japanese population of Kona:

> Most Japanese immigrants in Kona came from three prefectures of Japan: Kumamoto-ken, Hiroshima-ken, and Yamaguchi-ken. They were mostly sugarcane laborers and coffee farmers, and lived in Kailua, Holualoa, Kainaliu, Kealakekua, Honaunau, Captain Cook, and Napoopoo. The majority of these immigrants came directly from Japan during periods of government contract or liberal immigration from 1885 to 1923. [Nakano 1990:45]

An article in Thrum's *Hawaiian Annual* for 1899 based on extracts from a "carefully prepared paper on 'Coffee and Diversified Industries in Hawai‘i,' more particularly the district of Kona, by Chas. D. Miller" reported that the

> […] leading industry at present [in the district of Kona], and in fact for a number of years past, has been the cultivation of coffee, with some little attention to dairy farming, cattle raising, fruit culture (limited to oranges and pine-apples) and lately sugar cane. Little else has been attempted. [Miller in Thrum 1899:127]

The article also noted "the best coffee tracts in North Kona are mostly settled" and, quoting F.W. Bartels describing North Kona in general and Lanihau Coffee Plantation in particular, interestingly revealed the constraint placed upon the current coffee planting by the formerly intensive traditional Hawaiian agriculture:

> 'Last year we never stopped picking till the new crop came in. There is no fear of coffee not doing well, if the fertility of the land is kept up by manuring. The better lands in Kona have suffered the most, by the incessant cultivation of taro for a former large native population, and the soil has lost many vital constituents during that time. The sooner the coffee planter awakes to the manure question, the better. Rocky lands, that could not be used for taro, have preserved more of their natural conditions.' [Miller in Thrum 1899:130]

3.1.6 Twentieth Century Land Use

Historic maps and aerial photographs provide a cultural context and chronology of the changing landscape of the project area and its surroundings during the twentieth century.

A 1906 map of Hawai‘i Island (Figure 10) depicts the project area located at the interface of sugar plantation and cattle grazing lands. The Kona Sugar Company operated in the vicinity from 1881–1904 and utilized a railroad; in 1908 the Kona Development Company attempted to resurrect the plantation and railroad, but the venture only lasted until 1926 (Dorrance and Morgan 2000:112).

Portions of the 1924 USGS quadrangles (Figure 11) indicate the growth of the surrounding area, depicting the railroad and Kona Mill downslope, schools to the south, and numerous trails throughout the area and structures clustered along the highway. This map depicts a structure,

Figure 10. Portion of J.M. Donn’s 1906 map of Hawai‘i Island, showing the project area in relation to areas of different land use

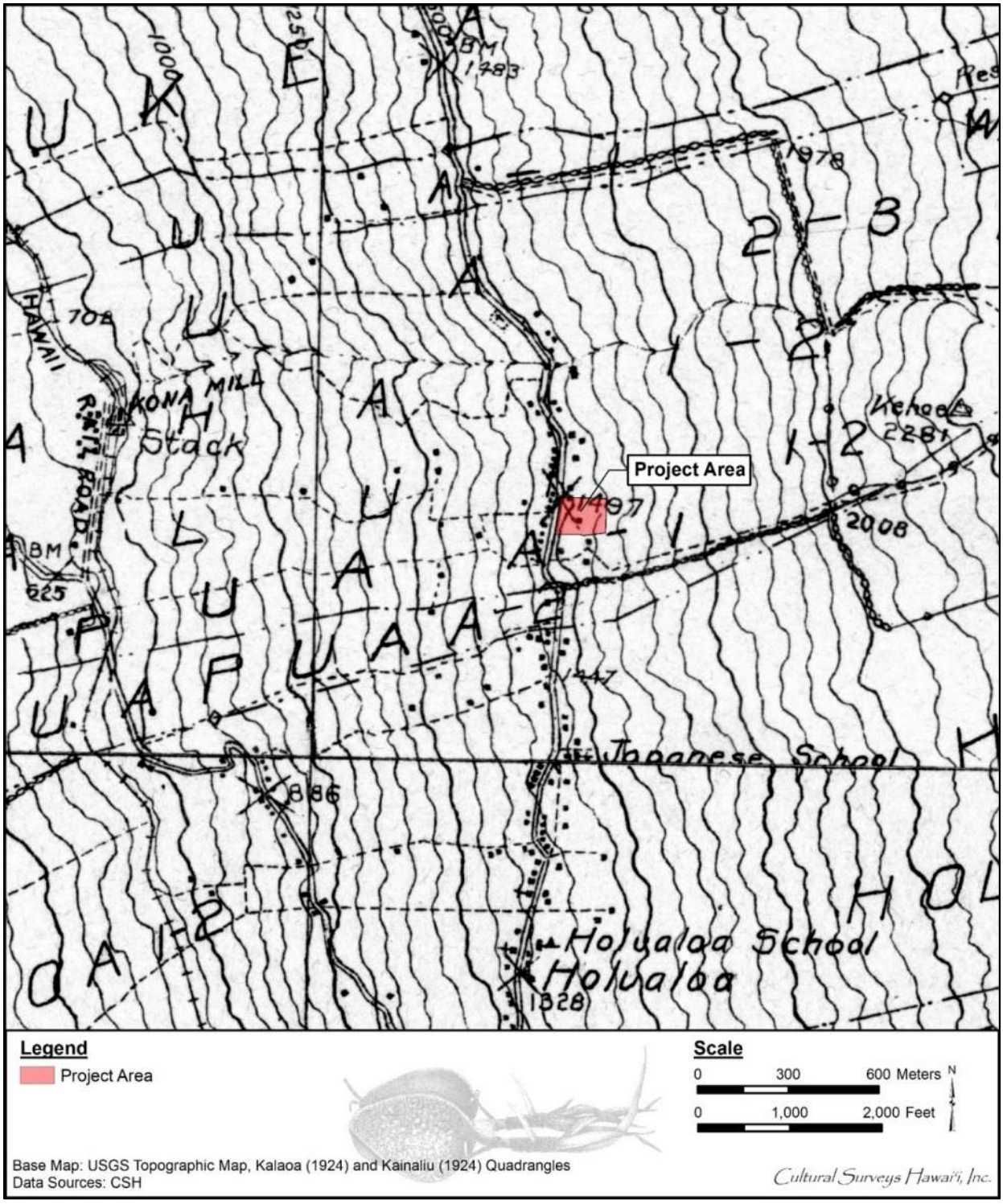

Figure 11. Portion of the 1924 Kalaoa and Kainaliu USGS 7.5-minute topographic quadrangles showing the project area in relation to the school, roads, and residences in the Hōlualoa vicinity

possibly a dwelling, within the project area and another along the northwestern project area boundary.

Portions of the 1959 USGS quadrangle maps (Figure 12) illustrate little change in the vicinity of the project area; most notable is the lack of the structure previously depicted near the center of the project area (see Figure 10); the structure adjacent to the north still appears to be present.

A 1977 orthophoto (Figure 13) indicates the continued use of the area for agricultural (and perhaps ranching) pursuits. Discrete agricultural fields are visible within the project area. It is unclear in this image if the dwelling adjacent to the north is still present.

3.2 Previous Archaeological Research

3.2.1 Previous Archaeological Studies

Previous archaeological studies in the vicinity of the project area are summarized in Table 1 and depicted in Figure 14. Of these, five studies are located within 0.8 km (0.5 miles) of the current project area: Allen (1984), Walsh and Hammatt (1995), Haun and Henry (2001), Moore and Kennedy (2002), and Haun et al. (2003). An LRFI was also conducted for the current project (Bautista et al. 2019).

In 1984, Paul H. Rosendahl, Inc. (PHRI) undertook a reconnaissance survey of over 600 acres south and upslope of the current project area (Allen 1984; see Figure 14). The survey documented 19 archaeological sites and site complexes (not assigned SIHP numbers). Documented feature types included walls, terraces, mounds, small platforms, modified outcrops, enclosures, an artifact scatter, a cave, and a water tank foundation. These features were attributed to the pre-Contact Kona Field System and historic ranching activity. Three sites were recommended for testing and the remainder were recommended for no further work.

In 1994, CSH recorded six sites in a 5.9-acre project area on the Puapua‘a/Hōlualoa border southwest of the current project area (Walsh and Hammatt 1995; see Figure 14). Two agricultural complexes (SIHP #s 50-10-37-19666 and -19667) comprising 91 features were identified as remnants of the Kona Field System. Four sites (SIHP #s -19662 through -19665) comprising 11 features were associated with historic habitation, agriculture, ranching, and transportation. All six documented sites were recommended for data recovery.

In 2001, Haun and Associates conducted an AIS of an 87-acre parcel located in Kahalui 1 and 2 just *makai* (seaward) of the current project area (Haun and Henry 2001; see Figure 14). The survey identified

> 12 historic ranching walls or enclosures, an historic railroad trestle [SIHP # -07214], an historic road with a retaining wall, two agricultural enclosures, two agricultural terraces, a modified outcrop, an agricultural wall, a small agricultural complex with 11 features, two permanent habitation platforms [SIHP #s -22762 and -22764], a temporary habitation modified outcrop [SIHP # -22763], two permanent habitation platforms [SIHP #s -22762 and -22764], a complex of 33 features interpreted as remnants of the Kona Field System, a complex of 181 historic clearing features related with sugarcane cultivation, and a complex of 101 features that roughly correspond to six Land Commission Awards in the mauka portion of the project area [SIHP # -22780]. [Haun et al. 2003:1]

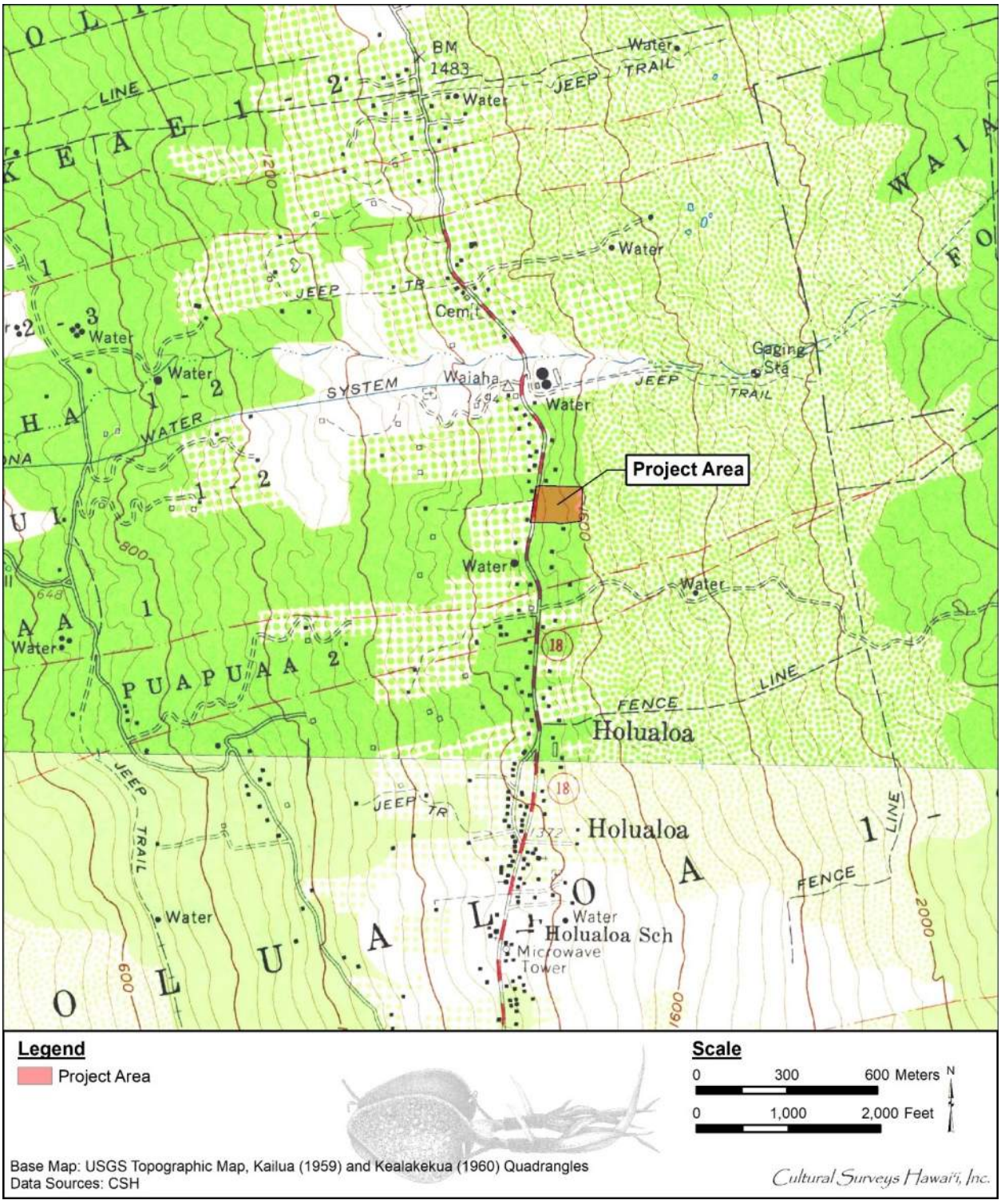

Figure 12. Portion of the 1959 Kailua and 1960 Kealakekua USGS 7.5-minute topographic quadrangles showing the project area and development

Figure 13. Portion of the 1977 USGS orthophotoquad aerial photo, Kailua Quadrangle, showing the project area and continued agricultural development in the vicinity of the project area

Table 1. Previous archaeological studies in the vicinity of the project area

Reference	Type of Study	Location	Results (SIHP # 50-10-28**** unless otherwise noted)
Allen 1984	Archaeological reconnaissance survey	600+ acres in Puapua‘a and Hōlualoa, TMKs: [3] 7-5-015:002 and 102 and 7-6-002:001 and 014	Documented 19 sites and site complexes associated with Kona Field System and cattle ranching (no SIHP numbers assigned); majority recommended for no further work
Walsh and Hammatt 1995	Archaeological inventory survey	5.9 acres in Hōlualoa 1 and 2, TMKs: [3] 7-6-009:014, 016, and 023	Documented six previously unidentified sites (SIHP #s -19662 through 19667) associated with Kona Field System and historic habitation, agriculture, ranching, and transportation; all sites recommended for data recovery
Haun and Henry 2001	Archaeological inventory survey	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Documented 27 sites comprised of 349 features, representing wide variety of feature types associated with pre-Contact to historic agriculture, habitation, ranching, and transportation
Moore and Kennedy 2002	Archaeological data recovery	Hōlualoa 1 and 2, TMK: [3] 7-6-009:014	Data recovery conducted within portion of SIHP # -19667 indicated historic-era construction and modification of most features within site previously described as remnants of Kona Field System
Haun et al. 2003	Archaeological data recovery	87 acres in Kahalui 1 and 2, TMKs: [3] 7-5-016:015, 016, 017, and 029	Data recovery indicated SIHP # -22764 (platform) constructed between AD 1440-1650; excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use
Desilets and Rechtman 2004	Archaeological inventory survey	800-m-long corridor in Holualoa 1 and 2, TMK: [3] 7-6-008:005 por.	Survey identified one new historic property, SIHP # -24211, a rock wall-lined road that encompasses entire project area; background research indicates road constructed in late 1890s, presumably to provide grant recipients access to their parcels
Hammatt and Shideler 2006	Archaeological literature review and field check	Cesspool Improvement project at nine DOE Schools, Kona School District	Study noted for Hōlualoa vicinity that many surface features found in inland areas were first constructed, heavily modified, or destroyed by historic use of land for cattle pasture and coffee cultivation

Reference	Type of Study	Location	Results (SIHP # 50-10-28**** unless otherwise noted)
Wilkinson and Hammatt 2009	Archaeological monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Rechtman 2013	Archaeological inventory survey	29 acres in Hōlualoa 1-2, TMKs: [3] 7-6-008:005, 008, and 030	Identified 24 historic properties, including previously documented SIHP # -24211 (historic road) and newly documented SIHP #s -29700 through -29722 associated with late pre-Contact through late historic agriculture, habitation, and ranching; data recovery and/or preservation recommended for four sites
Bautista et al. 2014	Archaeological monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002, 037; 7-6-005:015	No historic properties identified
Haun and Henry 2014	Archaeological inventory survey	2.313 acres in Hōlualoa 1-2, TMK: [3] 7-6-010:005	Documented 14 newly identified sites (SIHP #s -30050 through -30063) comprising 145 features associated with pre-Contact through historic agriculture, habitation, ranching, burial, rock art, and transportation; preservation recommended for burial (SIHP # -30060) and petroglyph (SIHP # -30061); data recovery recommended for SIHP # -30063 (pre-Contact/historic agricultural complex); monitoring of ground disturbance also recommended
Wilkinson et al. 2014	Archaeological monitoring	Hōlualoa Elementary School, Hōlualoa, TMKs: [3] 7-6-004:002 and 7-6-005:015	Identified SIHP # -29888, a modified lava tube located beneath the school

Reference	Type of Study	Location	Results (SIHP # 50-10-28**** unless otherwise noted)
Bautista et al. 2019	Archaeological literature review and field inspection	5.38 acres in Hōlualoa, Kahului 2, TMK: [3] 7-5-014:001 por.	Documented four potential historic properties, not assigned SIHP numbers: CSH 1 (wall), CSH 2 (wall), CSH 3 (possible berm), and CSH 4 (retaining wall)

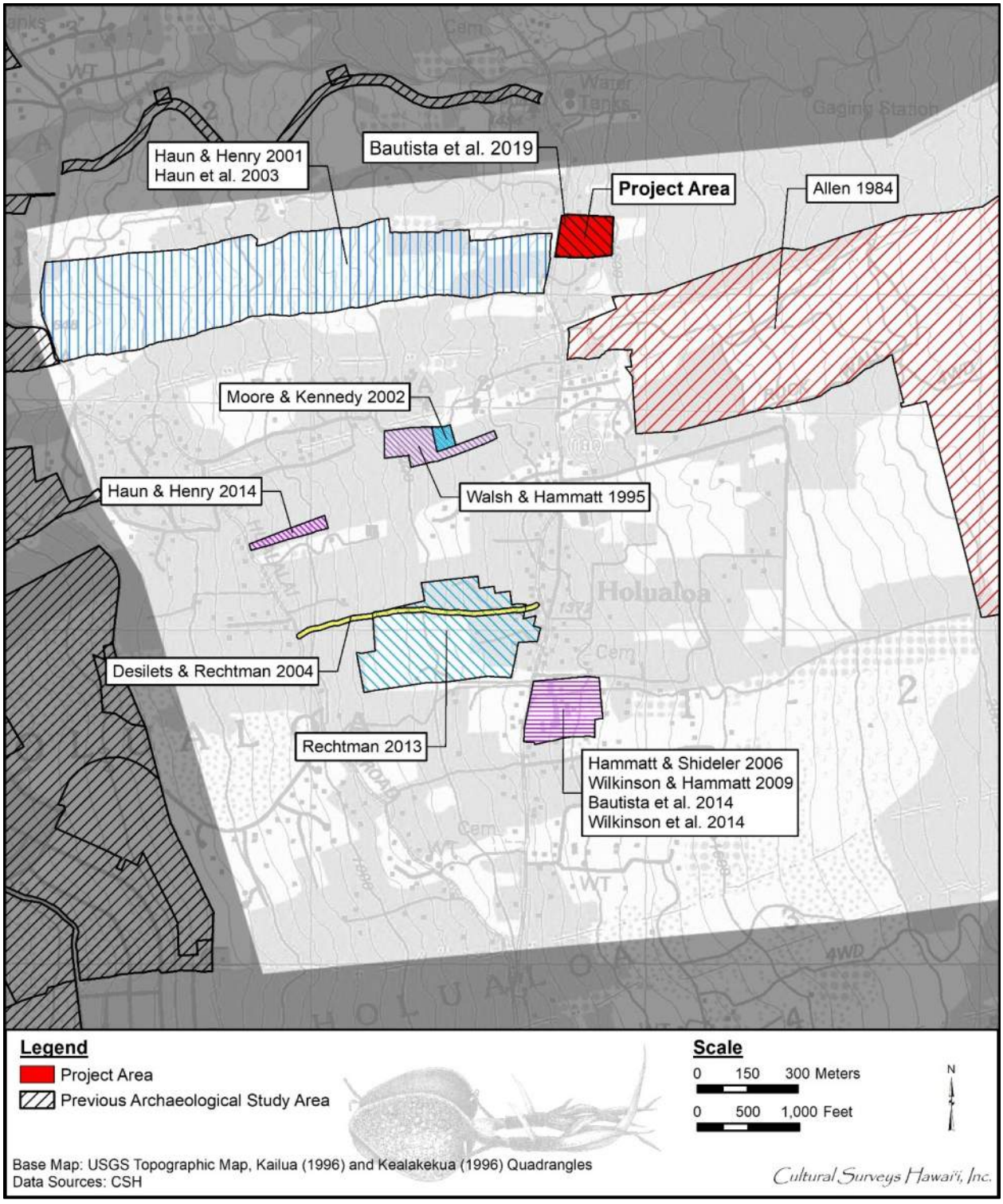

Figure 14. Portion of the 1996 Kailua and Kealakekua USGS 7.5-minute topographic quadrangles showing previous archaeological studies in the vicinity of the project area

In 2002, Archaeological Consultants of the Pacific, Inc., undertook data recovery at SIHP # -19677 located within the northeastern portion of the Walsh and Hammatt (1995) project area (Moore and Kennedy 2002; see Figure 14). The results indicated many features previously thought to have been remnants of the Kona Field System were actually historic constructions associated with coffee cultivation. Furthermore, it was determined that many Kona Field System features existing within the site had been heavily modified for use in coffee cultivation after 1930.

In 2003, Haun and Associates conducted data recovery at SIHP #s -22764 (rectangular platform) and -22780 (habitation and agriculture complex) within the Haun and Henry (2001) study area (Haun et al. 2003; see Figure 14). SIHP # -22764 was shown to have been constructed between AD 1440-1650. Excavations at SIHP # -22780 yielded evidence of pre-Contact to modern use throughout the site, including repurposing of pre-Contact features in historic times.

In 2019, CSH conducted an LRFI for the current project (Bautista et al. 2019; see Figure 14). The field inspection confirmed the project area has been heavily altered by the development of the existing coffee plantation and associated driveway. A wall extending along but just outside the eastern half of the northern property boundary was identified as a potential remnant of the pre-Contact Kona Field System. An area of thick vegetation was observed along the western half of the northern property boundary; within this area two features were encountered within the project area (Figure 15): CSH 1 (cross-slope, dry-stacked rock wall) and CSH 2 (*mauka-makai*-oriented dry-stacked rock wall). The vegetation in this area was too thick to determine whether these walls interface. Signs of bulldozing inside and along the northern boundary were also noted, and scattered fragments of historic glass, ceramics, and scrap metal were observed. Topographical undulations within the lower interior portion of the project area (CSH 3; see Figure 15) were described as berm-like. Near the mid-point of the southern project area boundary a north-south-oriented rock retaining wall (CSH 4) was observed along the downslope edge of a pocket of dense vegetation (see Figure 15). Consultation with SHPD was recommended regarding project historic preservation requirements.

3.3 **Background Summary and Predictive Model**

Early in the traditional settlement trajectory of Hawai‘i Island, permanent settlements were constricted to coastal locations away from the project area. The project area environs were used intensively for agriculture as part of the Kona Field System, and would have included associated short-term habitation, transportation routes, and use of lava tubes for activities such as burial and water collection. The project area is specifically within the portion of the Kona Field System referred to as the *‘apa‘a* zone, in which sweet potatoes, dry land taro, ti, and sugarcane would have been dominant crops. In the historic period, settlement became centralized around major ports at the coast and upslope along the *mauka* Government Road. For a short time, sugar was grown commercially in the area, but the enduring markets were cattle ranching and coffee cultivation. These enterprises transformed the traditional landscape, disturbing large swaths of the pre-Contact agricultural field system and leading to the development of towns like Hōlualoa along the Māmalahoa Highway.

Previous archaeological investigations in the vicinity of the project area confirm the known history of land use. Scattered and disturbed remnants of the Kona Field System have been identified amongst historic-era habitation and agricultural sites. In some cases, pre-Contact features have been shown to have been adapted for historic use.

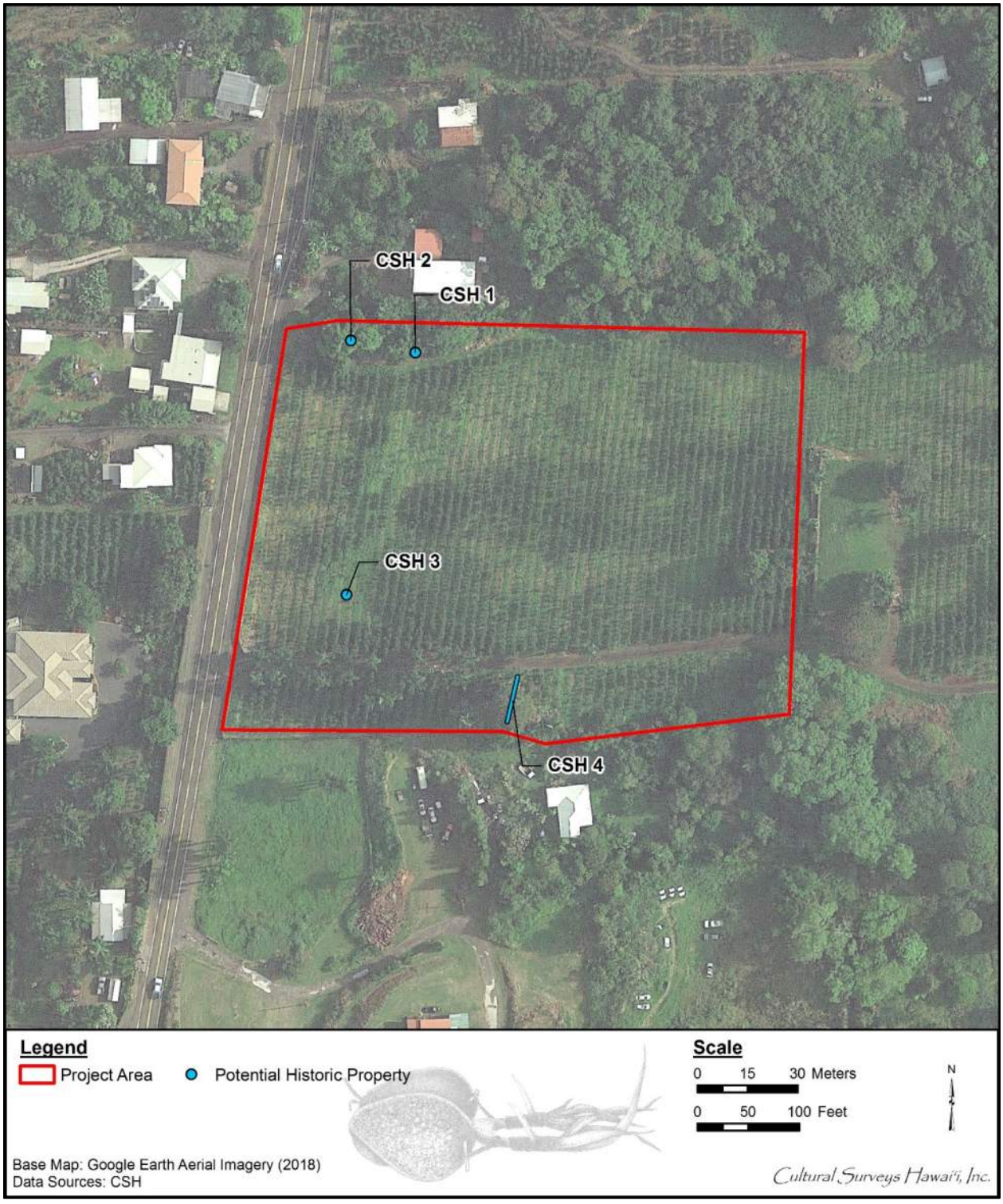

Figure 15. Aerial photograph of the project area (Google Earth 2018) showing the locations of potential historic properties (CSH 1 through 4) identified during the LRFI (Bautista et al. 2019)

While the project area has been heavily impacted by coffee development, the LRFI conducted for this project (Bautista et al. 2019) identified four surface features representing potential historic properties (CSH 1 through CSH 4). These features (walls, retaining wall, and possible berm) may represent historic and/or historically modified pre-Contact agricultural, habitation, or animal husbandry sites. The distribution of CSH 1 through CSH 4 suggests a higher potential for archaeological sites around the less-disturbed perimeter of the project area, though CSH 3 is located within the project area interior.

Due to the characterization of soil deposition and prior disturbance in the area, significant, intact subsurface deposits of cultural materials not associated with surface features are not expected. Any burials present would most likely be located in formal platforms, mounds, or lava tubes, the latter of which may also contain pre- or post-Contact modifications including water collection or shelter features.

Section 4 Results of Fieldwork

CSH completed the fieldwork component of this archaeological inventory survey intermittently between 12 November 2019 and 12 February 2020. This work required approximately 29 person-days to complete. The fieldwork comprised a 100% pedestrian inspection of the project area, a program of subsurface testing, and associated GPS data collection. The results of the pedestrian inspection are provided in Section 4.1 and the subsurface testing results are provided in Section 4.2.

4.1 Pedestrian Inspection Results

A 100% pedestrian inspection was undertaken with the field crew spaced 3-5 m apart depending upon the density of the vegetation. Ground visibility was very good throughout most of the inspection area.

Three newly discovered historic properties were documented within the project area and have been designated SHIP #s 50-10-28-31124, -31125, and -31126 (Table 2). Their locations within the project area are depicted on a USGS topographic map (Figure 16) and aerial map (Figure 17). Full site descriptions are provided in Section 6.

As discussed in Section 1.3.2, most of the project area has been altered by coffee farm development. The project area is actively planted in coffee and the grass between the coffee plants is regularly mowed (Figure 18 and Figure 19). A palm-lined driveway accessing the property through a gate along Māmalahoa Highway bisects the project area (Figure 20, Figure 21, and Figure 22). The western boundary of the property along the Māmalahoa Highway is defined by a modern rock wall with concrete; a low extension of this modern wall continues *mauka* from the southwestern corner of the property (Figure 23 through Figure 26).

The northern and southern project area boundaries are defined by the parcel boundaries. A maintained dozer swath is present between the northern project area boundary and the planted coffee rows (Figure 27). This dozer swath runs parallel to and just inside the eastern half of the northern project area boundary. A heavily vegetated area is present along the western half of the northern project area boundary; the dozer swath bends southward in this area around the vegetation and away from the parcel boundary. There is considerable leaf litter on the ground throughout this undeveloped portion of the project area, and ground visibility ranges from poor to fair. The AIS fieldwork included large-scale clearing of this area to further expose features CSH 1 and 2 identified there during the LRFI (Bautista et al. 2019; see Section 3.2.1). This clearing effort exposed a pre-Contact through historic site complex designated as SIHP # -31124 (see Table 2, Figure 17 and Section 6.1). This site is characterized as a remnant portion of the Kona Field System that was subsequently modified for use into the twentieth century. Twelve test units (TUs 2 through 13) were excavated various features of SIHP # -31124 (see Section 4.2). Artifacts and other cultural materials collected from both the surface and within 11 of the 12 test units conducted at the site support the interpretation that the site was used from the late pre-Contact to historic eras (see Section 5). Charcoal samples procured from TU-12 at SIHP # -31124 yielded radiocarbon dates ranging from the latter 1600s through the 1930s (see Section 5.3.2).

The notable undulation identified as CSH 3 by Bautista et al. (2019) in the western portion of the project area was subjected to further investigation. This undulation is interpreted as a historic causeway crossing a natural depression, used as a driveway or cart road to access agricultural fields, structures, and/or work areas in or around the project area. It has been designated as SIHP # 50-10-28-31125 (see Table 2, Figure 17, and Section 6.2).

A level, heavily vegetated area is present near the mid-point of the southern project area boundary. The downslope side of this level area is defined by a rock retaining wall. A test unit (TU-1) was excavated across this wall and into the adjacent terrace; this excavation yielded volcanic glass, cow bone, and a variety of historic artifacts (see Section 5). The terrace has been designated as SIHP # 50-10-28-31126 (see Table 2, Figure 17, and Section 6.3).

Table 2. Historic properties newly identified within the project area

SIHP # (50-10-28)	CSH Site #	Formal Type	Number of Features	Function	Age
-31124	CSH 1	Complex	13	Agriculture, habitation	Pre-Contact through historic
-31125	CSH 3	Causeway	1	Transportation	Historic
-31126	CSH 4	Terrace	1	Agriculture	Pre-Contact through historic

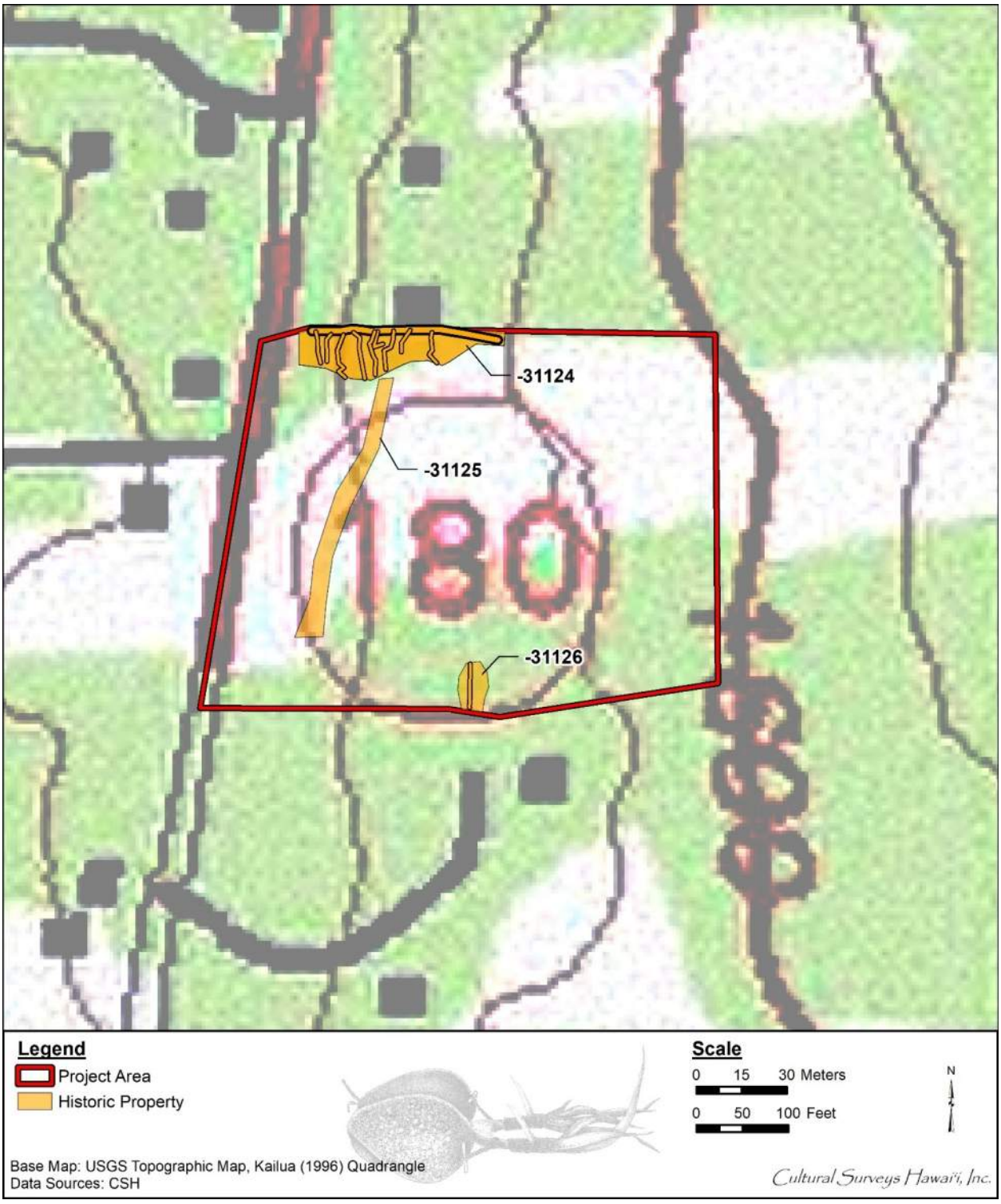

Figure 16. Portion of the 1996 Kailua USGS 7.5-minute topographic quadrangle showing historic properties documented within the project area

Figure 17. Aerial photo of the project area (Google Earth 2018) showing the approximate locations of newly documented historic properties

Figure 18. Photo overlooking the northern portion of the project area, with the densely vegetated portion visible in background; view to west

Figure 19. Photo showing rows of coffee trees in the project area; view to southwest

Figure 20. Photo showing the asphalt driveway contemporaneous with the modern coffee farm, bisecting the project area; view to west

Figure 21. Photo looking down the modern asphalt driveway in the project area to its entry gate at Māmalahoa Highway; view to west

Figure 22. Photo looking up the modern asphalt driveway in the project area through the gate that accesses the property from Māmalahoa Highway; view to east

Figure 23. Photo showing the northern portion of the modern stone wall fronting the project area along Māmalahoa Highway; note PVC drainpipes along the base of the wall; view to north

Figure 24. Photo showing the southern portion of the modern stone wall fronting the project area along Māmalahoa Highway; note PVC drainpipes along the base of the wall; view to southeast

Figure 25. Photo looking *makai* along the low, modern stone wall extension bounding the property to the south; view to west

Figure 26. Photo looking *mauka* along the low, modern stone wall extension bounding the property to the south; view to east

Figure 27. Photo showing the coffee trees near the northwestern boundary of the project area, with the bulldozer swath and dense vegetation containing SIHP # -31124 visible to the right; view to west

4.2 **Subsurface Testing Results**

Subsurface testing was conducted at two of the three historic properties in the project area (SIHP #s 50-10-28-31124 and -31126). These excavations were conducted in an effort to procure additional information about feature age and function. The subsurface testing program involved manual excavation of 13 test units (TU). Twelve of these units (TU-2 though TU-13) were excavated at seven selected features of SIHP # -31124; these units measured 50 cm sq or 0.25 sq m. The remaining test unit (TU-1) was excavated at SIHP # -31126 and measured 2 m by 1 m or 2.0 sq m. All 13 units terminated at bedrock. The locations of the test units are depicted on Figure 28. Descriptions of observed stratigraphy, profile drawings, and photographs for each individual unit follow.

The subsurface testing program consistently revealed one to two distinct layers of natural brown to dark grayish brown silty clay loam, located beneath a surface layer of organic leaf litter and atop a consolidated basalt bedrock substrate. Sediments ranged in depth from 32–75 cm below surface (cmbs). The exposed natural silty clay loam layers comprise type A and transitional AB soil horizons. The observed sediments are consistent with the Honuaulu series soils expected within the project area (see Section 1.3.1), and with past and present agricultural use. No obvious fill layers were encountered.

Numerous pre-Contact through historic cultural materials were encountered during excavations, including faunal bone, lithic artifacts, charcoal, glass bottles, porcelain, ceramic, earthenware, horseshoes, metal nails, a glass button, and other post-Contact materials. No human remains were encountered during the test unit excavations. Where historic materials were encountered, they were generally located on the surface and/or within the upper 10–20 cm of the test unit. Charcoal and lithic materials were found both mixed in with these historic material concentrations, and in the sediments below them.

4.2.1 Test Unit 1 (TU-1)

Test Unit 1 (TU-1) was located at SIHP # -31126 in the southern-central portion of the project area (see Figure 28). The unit bisected the central portion of the terrace wall at a right angle. Figure 29 shows the 2.0-sq-m TU-1 marked out with pink string prior to excavation (left frame) and post-excavation (right frame). TU-1 was excavated to a depth of up to 75 cm below surface (cmbs) through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (see Figure 29 through Figure 31 and Table 3). Excavation at TU-1 indicated the base of the terrace wall does not extend below the current ground surface. Numerous artifacts were collected from TU-1 and cataloged, including a small horseshoe (possibly for a donkey), marble, bottle stopper, and fragmental glass, porcelain, metal, stoneware, and volcanic glass (see Section 5). Except for a single ceramic fragment collected from the unit surface along the terrace wall, these artifacts were recovered from the screen and concentrated in the *makai* portion of the unit west of the terrace wall. The materials were evenly distributed throughout Stratum I in this portion of the unit, indicating a likely secondary deposition. These materials may have washed down from above in storm run-off and collected below the terrace wall, and/or may have been pushed into the area downslope of the terrace wall during bulldozing of the coffee field.

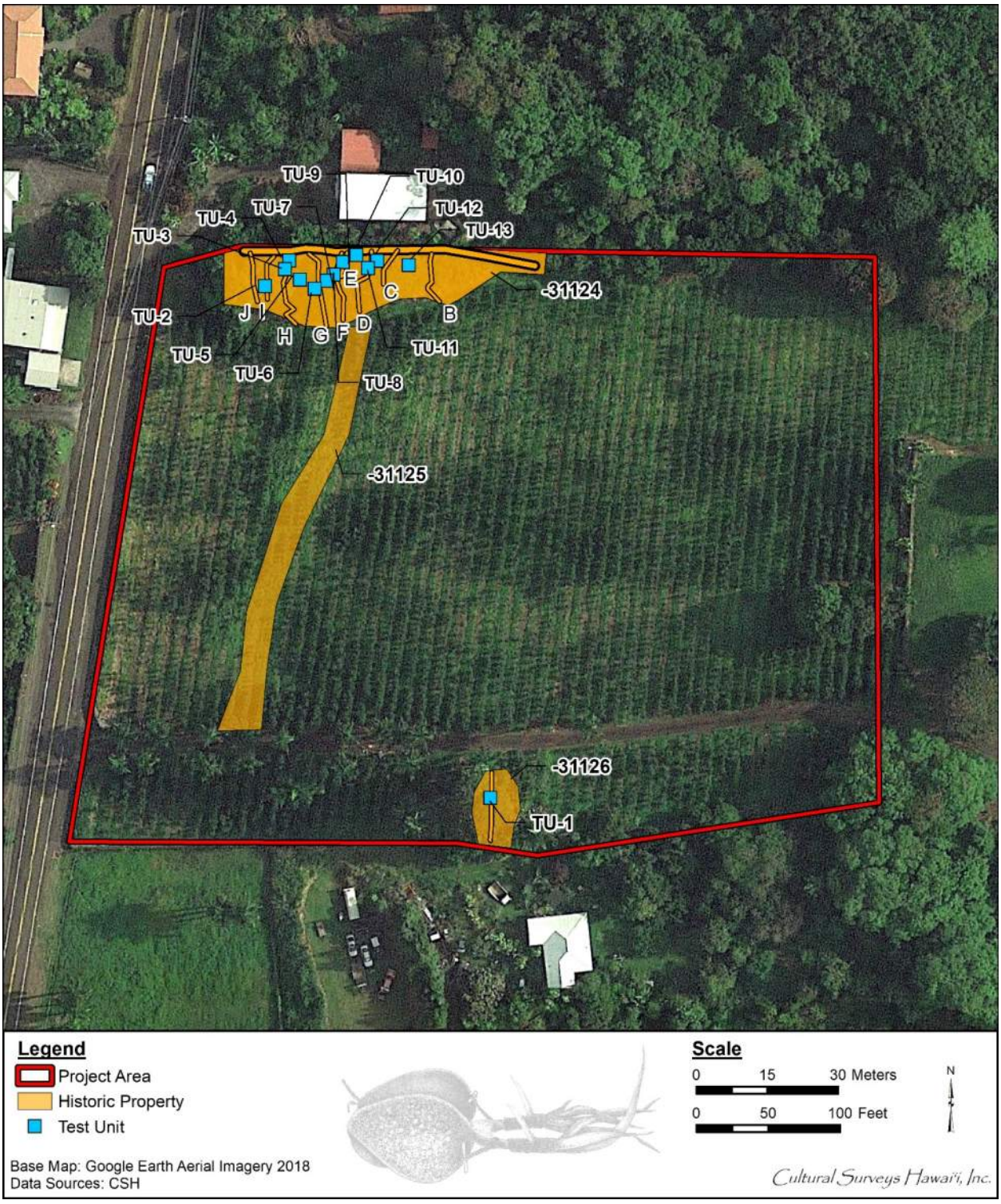

Figure 28. Aerial photograph showing the locations of the 13 test units (TUs) within the project area (TU-1 through TU-13) (Google Earth 2018)

Figure 29. Photo of TU-1 prior to excavation (left) and post-excavation (right); view to east

Figure 30. Photo of TU-1 north sidewall; view to north

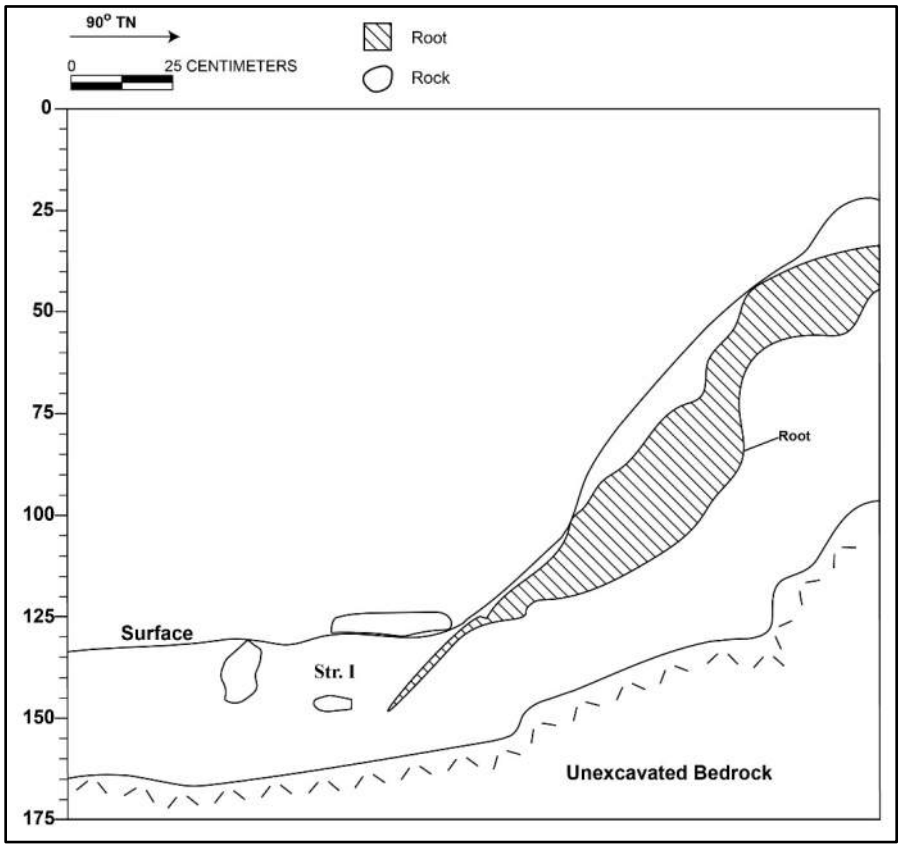

Figure 31. Profile of TU-1 north sidewall

Table 3. TU-1 stratigraphic description

Stratum	Depth (cmbd*)	Description
I	11–165	A horizon; 10YR 2/2, very dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, wavy lower boundary, terminated at bedrock; roots common; cultural materials present, including a horseshoe, marble, bottle stopper, and fragmental glass, porcelain, metal, stoneware, and volcanic glass; natural Honuaulu series sediment

*cmbd = centimeters below datum

4.2.2 Test Unit 2 (TU-2)

Test Unit 2 (TU-2) was located at SIHP # -31124 within the central-upper portion of the Feature J terrace (see Figure 28). Figure 32 shows the 0.25-sq-m TU-2 marked out with pink string prior to excavation. TU-2 was excavated to a depth of up to 37 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 33, Figure 34, and Table 4). Faunal remains (cow bone) and artifacts including fragmental glass and metal were recovered from the screen during excavation at TU-2, from sediments excavated from within the first 10–20 cmbs. These materials were collected and cataloged (see Section 5).

4.2.3 Test Unit 3 (TU-3)

Test Unit 3 (TU-3) was located at SIHP # -31124 within the central-*mauka* portion of the Feature I terrace (see Figure 28). Figure 35 shows the 0.25-sq-m TU-3 marked out with pink string prior to excavation. TU-3 was excavated to a depth of up to 37 cmbs through two layers of natural Honuaulu series sediment (Strata Ia and Ib), and terminated at basalt bedrock (Figure 36, Figure 37, and Table 5). Artifacts including fragmental glass and metal were encountered during excavation at TU-3. Apart from one glass fragment collected from the unit surface, these artifacts were recovered from the screen from sediments excavated from within the first 10–15 cmbs in Stratum Ia. These materials were collected from TU-3 and cataloged (see Section 5.1).

4.2.4 Test Unit 4 (TU-4)

Test Unit 4 (TU-4) was located approximately 1.5 m north of TU-3 at SIHP # -31124 Feature I, abutting the western side of the Feature L foundation (see Figure 28). The unit was placed against the Feature L foundation in an attempt to expose the subsurface pre-construction profile. Figure 38 shows the 0.25-sq-m TU-4 marked out with pink string prior to excavation. TU-4 was excavated to a depth of up to 32 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 38, Figure 39, Figure 40, and Table 6). Modern trash (rubber pieces), faunal remains (bird bone, cut cow bone), and concrete fragments were encountered during excavation at TU-4. These materials were recovered from the screen; the modern and historic materials were encountered in sediments excavated from within the first 10–15 cmbs. The faunal remains were collected and cataloged (see Section 5). Excavation at TU-4 indicated the Feature L foundation does not extend below the current ground surface.

Figure 32. Photo of TU-2 marked out with pink string prior to excavation; view to north

Figure 33. Photo of TU-2 west sidewall and base of excavation; view to west

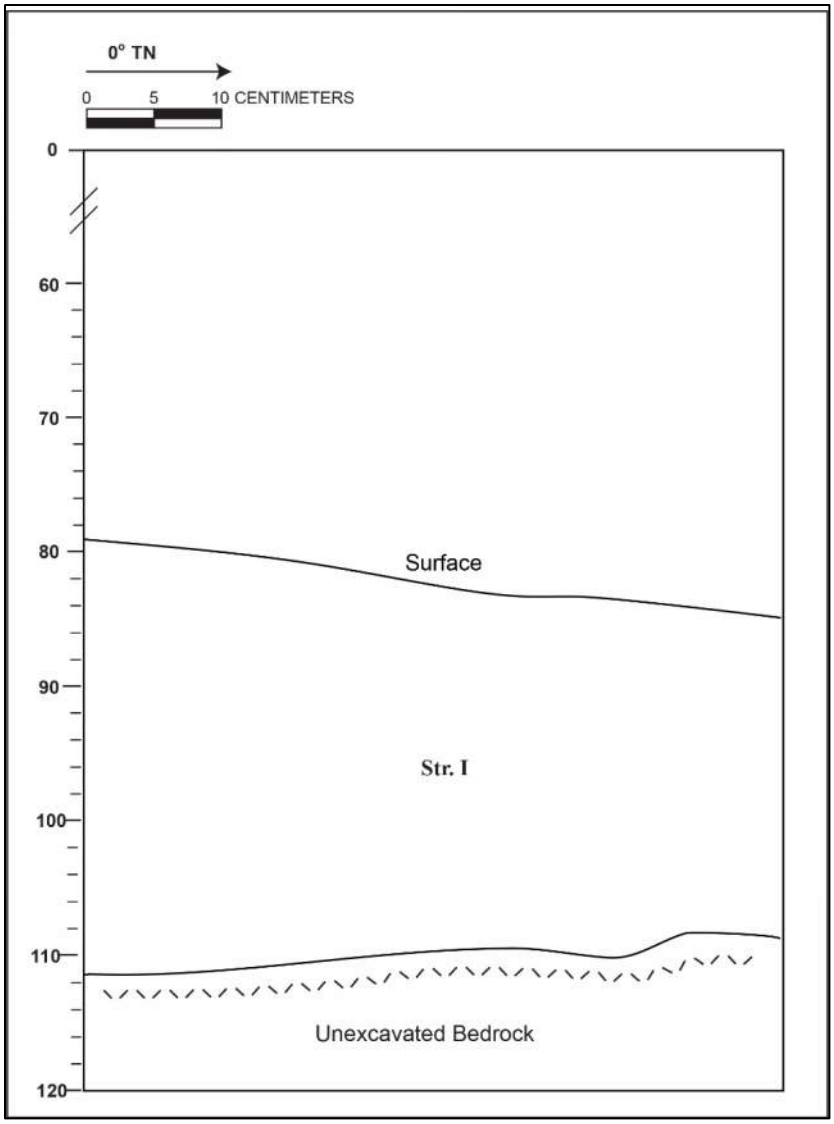

Figure 34. Profile of TU-2 west sidewall

Table 4. TU-2 stratigraphic description

Stratum	Depth (cmbd)	Description
I	78–115	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, medium and fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origins; very abrupt, smooth lower boundary, terminated at bedrock; roots common; cultural material present, including cow bone and fragmental glass and metal; natural Honuaulu series sediment

Figure 35. Photo of TU-3 marked out with pink string prior to excavation; view to southeast

Figure 36. Photo of TU-3 southeast sidewall and base of excavation; view to southeast

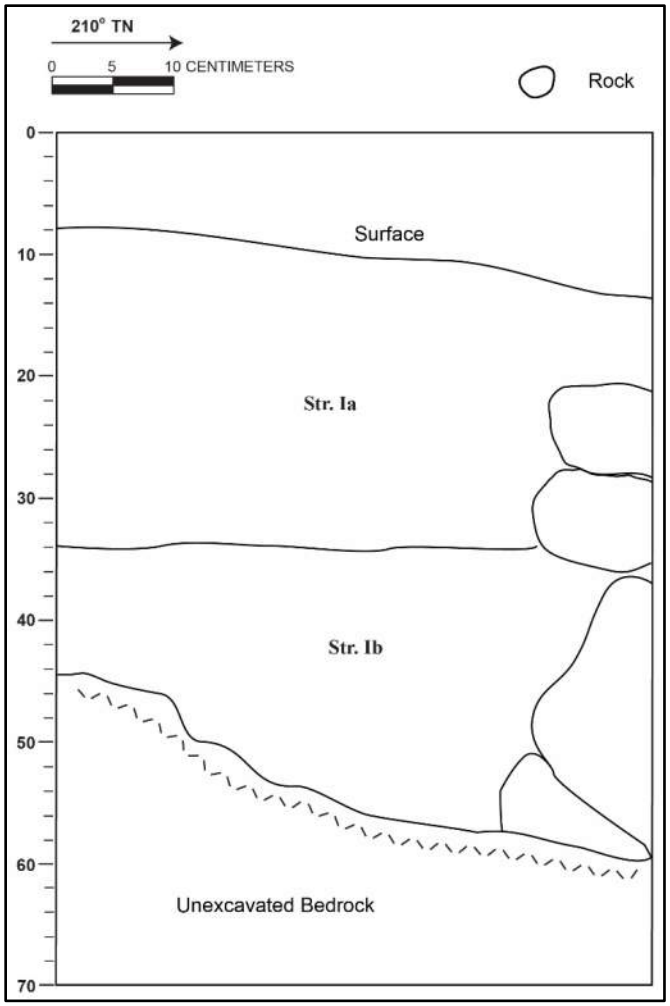

Figure 37. Profile of TU-3 east sidewall

Table 5. TU-3 stratigraphic description

Stratum	Depth (cmbd)	Description
Ia	8–34	A horizon; 10YR 3/2, very dark grayish brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; clear, smooth lower boundary; roots common; cultural material present, including fragmental glass and metal; natural Honuaulu series sediment
Ib	31–61	AB horizon; 10YR 4/3, brown; sandy silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; few roots; no cultural material present; natural Honuaulu series sediment

Figure 38. Photo of TU-4 marked out with pink string prior to excavation; view to northwest

Figure 39. Photo of TU-4 east sidewall profile and base of excavation; view to east

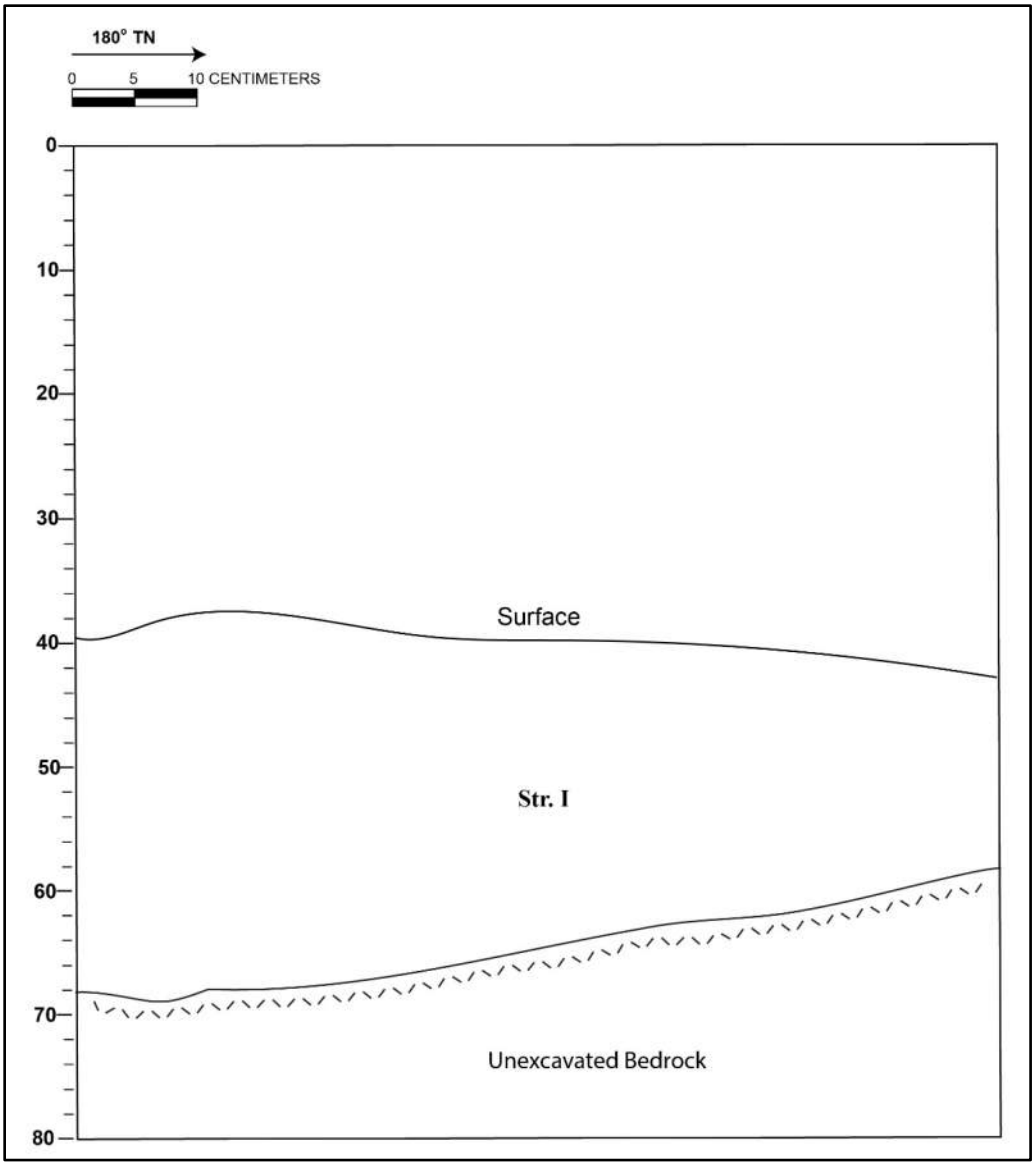

Figure 40. Profile of TU-4 east sidewall

Table 6. TU-4 stratigraphic description

Stratum	Depth (cmbd)	Description
I	38–70	A/B horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; roots common; cultural material present, including cow and avian bone, modern rubber pieces, and concrete fragments; natural Honuaulu series sediment

4.2.5 Test Unit 5 (TU-5)

Test Unit 5 (TU-5) was located at SIHP # -31124 within the central portion of the Feature H terrace (see Figure 28). Figure 41 shows the 0.25-sq-m TU-5 marked out with pink string prior to excavation. TU-5 was excavated to a depth of up to 58 cmbs through two layers of natural Honuaulu series sediment (Strata Ia an Ib), and terminated at basalt bedrock (Figure 42, Figure 43, and Table 7). No cultural materials were encountered.

4.2.6 Test Unit 6 (TU-6)

Test Unit 6 (TU-6) was located approximately 4 m south of TU-5 at SIHP # -31124 Feature H (see Figure 28). Figure 44 shows the 0.25-sq-m TU-6 marked out with pink string prior to excavation. TU-6 was excavated to a depth of up to 36 cmbs through two layers of natural Honuaulu series sediment (Strata Ia and Ib), and terminated at basalt bedrock (Figure 45, Figure 46, and Table 8). Artifacts including fragmental glass and ceramics were recovered from the screen during excavation at TU-6, from sediments excavated from within upper Stratum Ia. These materials were collected and cataloged (see Section 5).

4.2.7 Test Unit 7 (TU-7)

Test Unit 7 (TU-7) was located at SIHP # -31124 within the central portion of the Feature G terrace (see Figure 28). Figure 47 shows the 0.25-sq-m TU-7 marked out with pink string prior to excavation. TU-7 was excavated to a depth of up to 37 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 48, Figure 49, and Table 9). Two glass fragments and one stoneware lip fragment were present on the unit surface. Fragmental glass, ceramic, porcelain, and earthenware and a glass button were recovered from the screen during excavation of TU-7. While some of the ceramic shards were observed in situ just above bedrock, most of the artifacts were recovered from sediments excavated from within the first 10–15 cmbs. All of these artifacts were collected and cataloged (see Section 5).

4.2.8 Test Unit 8 (TU-8)

Test Unit 8 (TU-8) was located approximately 1.5 m east of TU-7 at SIHP # -31124 Feature G (see Figure 28). The unit was placed against the Feature F terrace wall in an attempt to expose the subsurface pre-construction profile. Figure 50 shows the 0.25-sq-m TU-8 marked out with pink string prior to excavation. TU-8 was excavated to a depth of up to 33 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 51, Figure 52, and Table 10). Artifacts including fragmental glass and porcelain were recovered from the screen during excavation at TU-8, from sediments from within the first 10–15 cmbs. These materials were collected and cataloged (see Section 5). Excavation at TU-8 indicated the base of the Feature F terrace wall extends at least partially below the current ground surface, but that the terrace was not constructed directly atop bedrock.

Figure 41. Photo of TU-5 marked out with pink string prior to excavation; view to north

Figure 42. Photograph of TU-5 south sidewall and base of excavation; view to south

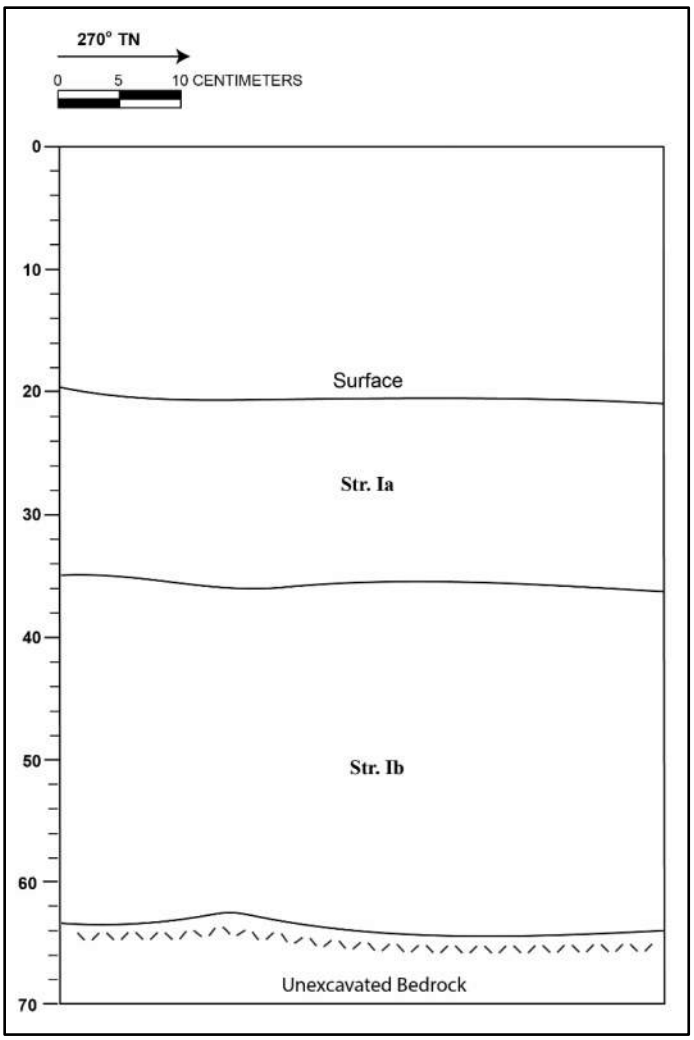

Figure 43. Profile of TU-5 south sidewall

Table 7. TU-5 stratigraphic description

Stratum	Depth (cmbd)	Description
Ia	19–35	A horizon; 10YR 3/2, very dark grayish brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; clear, smooth lower boundary; roots common; no cultural material present; natural Honuaulu series sediment
Ib	35–74	AB horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, wavy lower boundary, terminated at bedrock; few roots; no cultural material present; natural Honuaulu series sediment

Figure 44. Photo of TU-6 marked out with pink string prior to excavation; view to north

Figure 45. Photo of TU-6 south sidewall and base of excavation; view to south

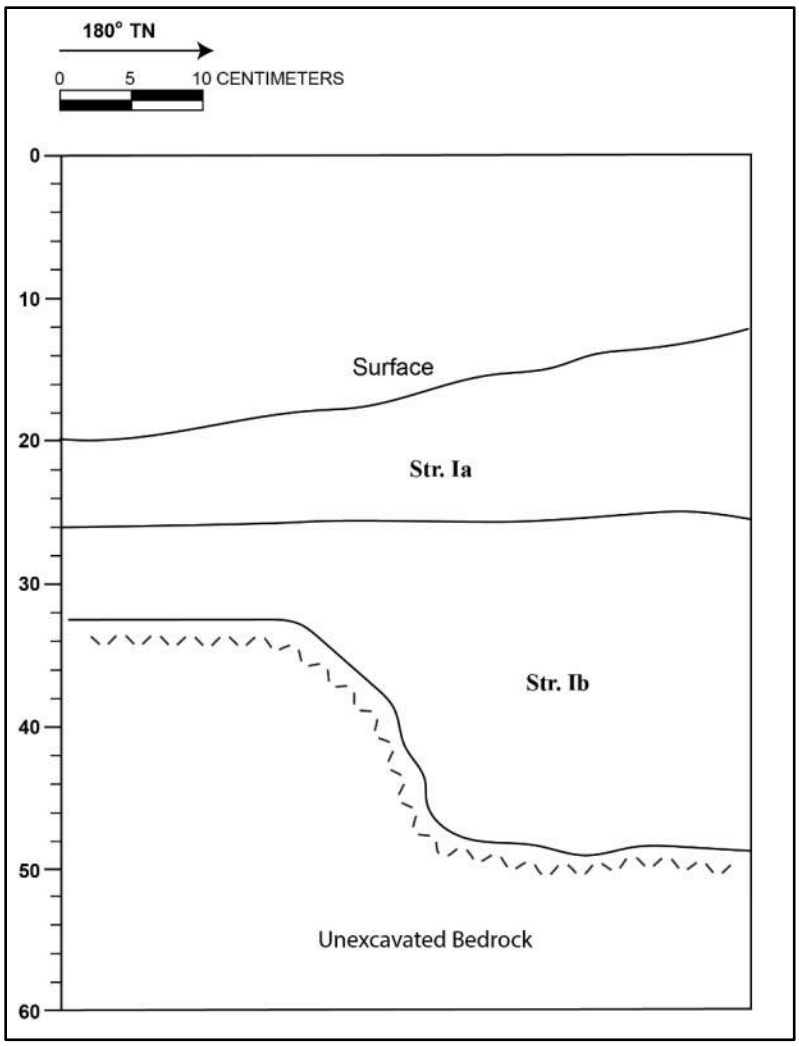

Figure 46. Profile of TU-6 east sidewall

Table 8. TU-6 stratigraphic description

Stratum	Depth (cmbd)	Description
Ia	12–28	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; roots common; cultural material present including glass and ceramic fragments; natural Honuaulu series sediment
Ib	26–48	AB horizon; 10YR 4/3, brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, wavy lower boundary, terminated at bedrock; few roots; no cultural materials present; natural Honuaulu series sediment

Figure 47. Photo of TU-7 marked out with pink string prior to excavation; view to north

Figure 48. Photo of TU-7 east sidewall and base of excavation; view to east

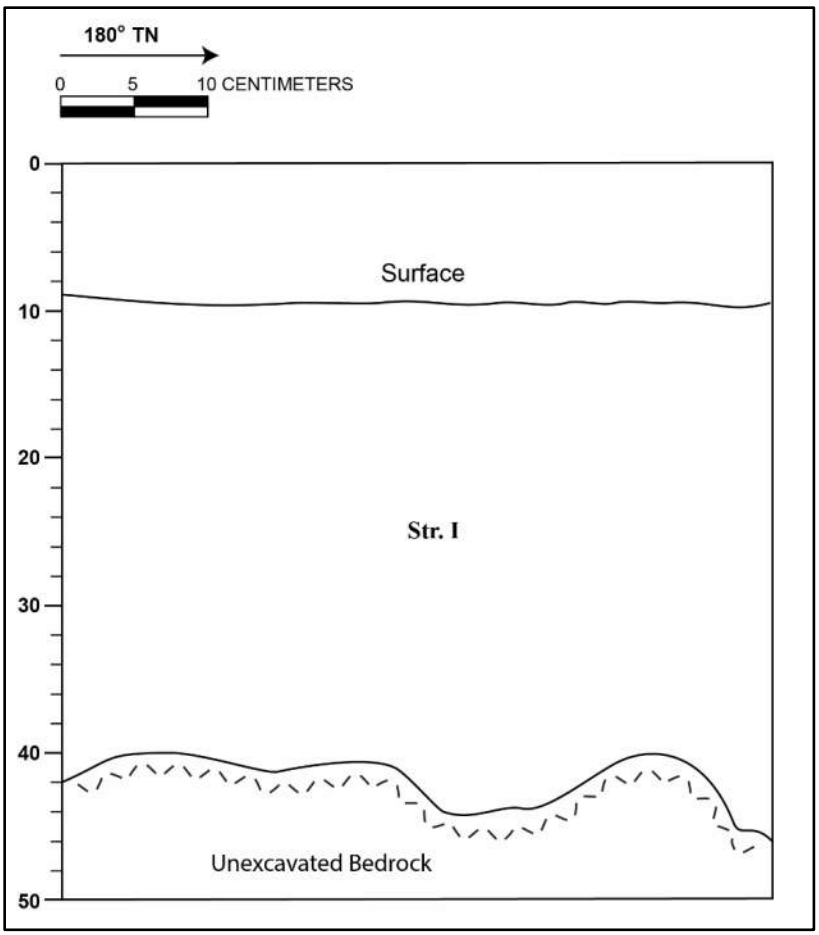

Figure 49. Profile of TU-7 east sidewall

Table 9. TU-7 stratigraphic description

Stratum	Depth (cmbd)	Description
I	9–46	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, wavy lower boundary, terminated at bedrock; roots common; cultural material present, including glass, ceramic, porcelain, and earthenware fragments and a glass button; natural Honuaulu series sediment

Figure 50. Photo of TU-8 marked out with pink string prior to excavation; view to northeast

Figure 51. Photograph of TU-8 northeast sidewall and base of excavation; view to northeast

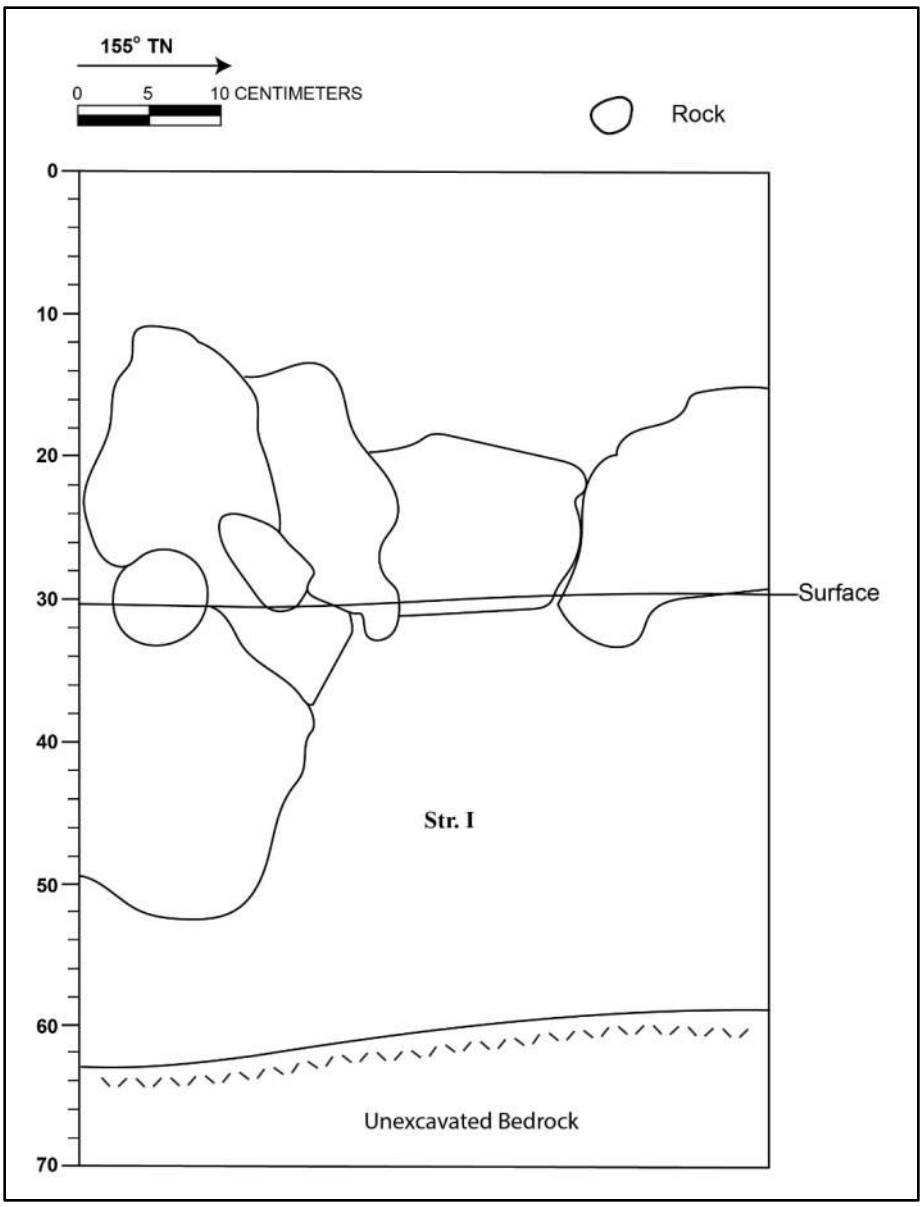

Figure 52. Profile of TU-8 northeast sidewall

Table 10. TU-8 stratigraphic description

Stratum	Depth (cmbd)	Description
I	30–63	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; roots common; cultural material present, including glass and porcelain fragments; natural Honuaulu series sediment

4.2.9 Test Unit 9 (TU-9)

Test Unit 9 (TU-9) was located at SIHP # -31124 within the central-northern portion of the Feature E terrace (see Figure 28). Figure 53 shows the 0.25-sq-m TU-9 marked out with pink string prior to excavation. TU-9 was excavated to a depth of up to 57 cmbs through two layers of natural Honuaulu series sediment (Strata Ia and Ib), and terminated at basalt bedrock (Figure 54, Figure 55, and Table 11). Cultural materials including cow bone, charcoal, and fragmental glass, metal, and volcanic glass were recovered from the screen during excavation at TU-9. These materials were collected and cataloged (see Section 5). All the historic artifacts, cow bone, and one bulk sample of charcoal was collected from the upper 50 cm of the unit, while another charcoal sample was collected from near the base of the unit in association with the volcanic glass flakes.

4.2.10 Test Unit 10 (TU-10)

Test Unit 10 (TU-10) was located approximately 3 m southwest of TU-9 at SIHP # -31124 Feature E. Figure 56 shows the 0.25-sq-m TU-10 marked out with pink string prior to excavation. TU-10 was excavated to a depth of up to 51 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 57, Figure 58, and Table 12). Cultural materials including charcoal, one basalt flake, and fragmental glass, porcelain, metal (nail), and volcanic glass were recovered from the screen during excavation at TU-10; the historic materials were concentrated in sediments excavated from within the first 10–20 cmbs. These materials were collected and cataloged (see Section 5).

4.2.11 Test Unit 11 (TU-11)

Test Unit 11 (TU-11) was located at SIHP # -31124 within the Feature E terrace along the *makai* edge of the Feature D terrace wall (see Figure 28). Figure 59 shows the 0.25-sq-m TU-11 marked out with pink string prior to excavation. TU-11 was excavated to a depth of up to 52 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 60, Figure 61, and Table 13). Cultural materials including charcoal, a metal nail, and fragmental glass, ceramic, and volcanic glass were recovered from the screen during excavation at TU-11; the historic materials were concentrated in sediments excavated from within the first 10–20 cmbs. These materials were collected and cataloged (see Section 5). Excavation at TU-11 indicated the base of the Feature D terrace wall does not extend below the current ground surface.

4.2.12 Test Unit 12 (TU-12)

Test Unit 12 (TU-12) was located at SIHP # -31124 within the central-northern portion of the Feature D terrace. Figure 62 shows the 0.25-sq-m TU-12 marked out with pink string prior to excavation. TU-12 was excavated to a depth of up to 47 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 63, Figure 64, and Table 14). Cultural materials including charcoal, a basalt adze fragment, and fragmental glass and porcelain were recovered from the screen during excavation at TU-12; the historic materials were concentrated in sediments excavated from within the first 10–15 cmbs. These materials were collected and cataloged (see Section 5).

Figure 53. Photo of TU-9 marked out with pink string prior to excavation; view to north

Figure 54. Photo of TU-9 south sidewall and base of excavation; view to south

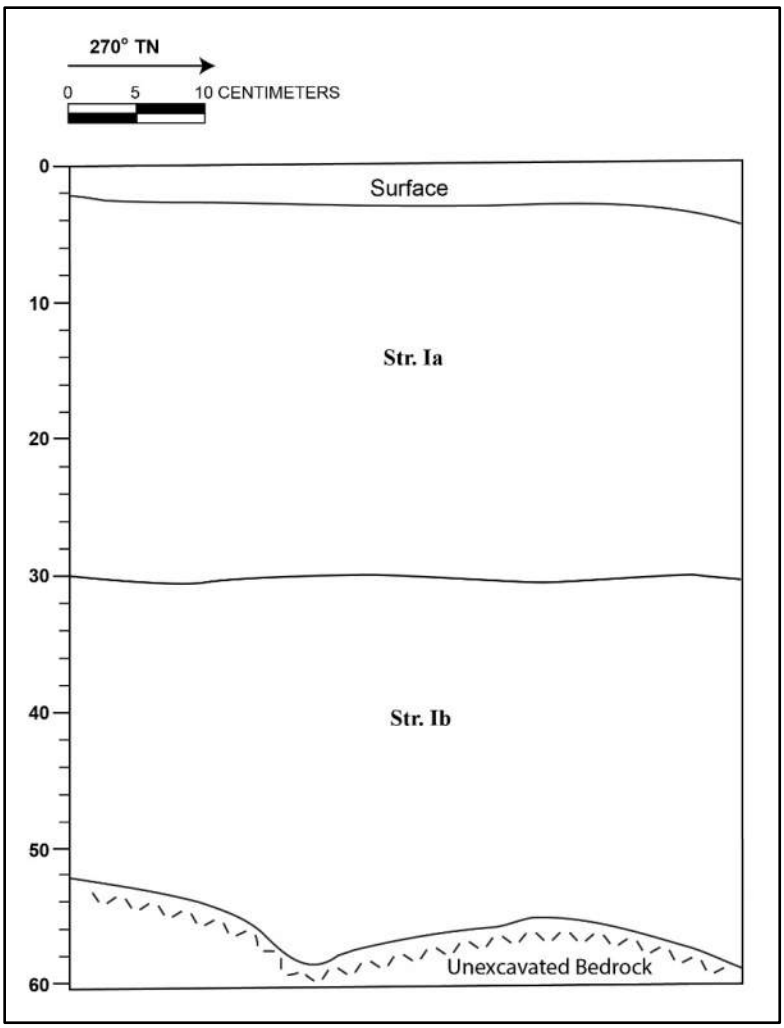

Figure 55. Profile of TU-9 south sidewall

Table 11. TU-9 stratigraphic description

Stratum	Depth (cmbd)	Description
Ia	2–30	A horizon; 10YR 3/2, very dark grayish brown; silty loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; diffuse, smooth lower boundary; roots common; cultural material present, including cow bone, charcoal, and fragmental glass, and metal; natural Honuaulu series sediment
Ib	30–59	AB horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, wavy lower boundary, terminated at bedrock; few roots; cultural material present, including charcoal and fragmental volcanic glass; natural Honuaulu series sediment

Figure 56. Photo of TU-10 marked out with pink string prior to excavation; view to north

Figure 57. Photo of TU-10 north sidewall and base of excavation; view to north

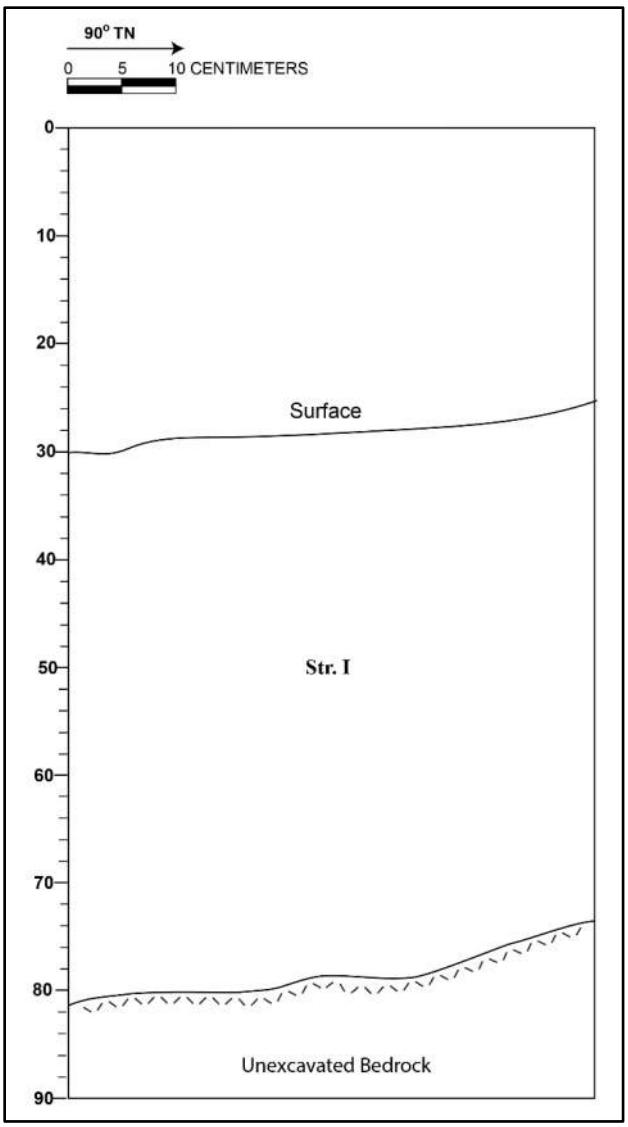

Figure 58. Profile of TU-10 north sidewall

Table 12. TU-10 stratigraphic description

Stratum	Depth (cmbd)	Description
I	26–83	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; few roots; cultural material present, including charcoal, one basalt flake, and fragmental glass, porcelain, metal, and volcanic glass; natural Honuaulu series sediment

Figure 59. Photo of TU-11 marked out with pink string prior to excavation; view to east

Figure 60. Photo of TU-11 east sidewall and base of excavation; view to east

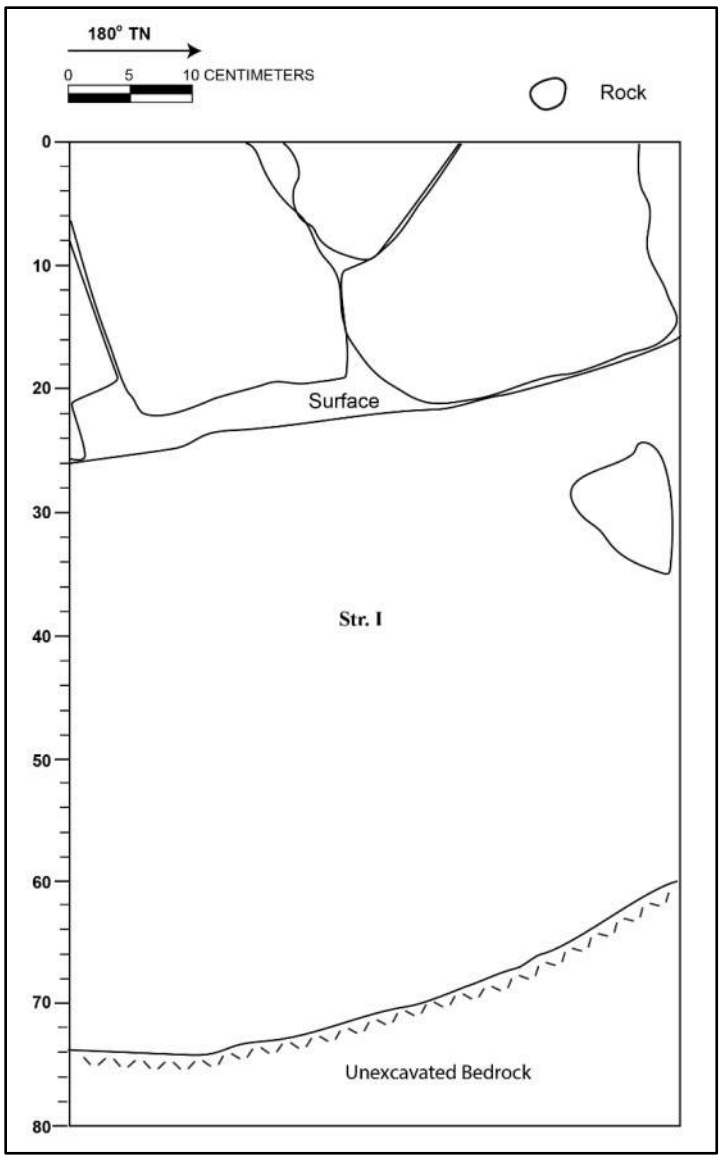

Figure 61. Profile of TU-11 east sidewall

Table 13. TU-11 stratigraphic description

Stratum	Depth (cmbd)	Description
I	15–81	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; roots common; cultural material present, including charcoal, a metal nail, and fragmental glass, ceramic, and volcanic glass; natural Honuaulu series sediment

Figure 62. Photo of TU-12 marked out with pink string prior to excavation; view to north

Figure 63. Photo of TU-12 east sidewall and base of excavation; view to east

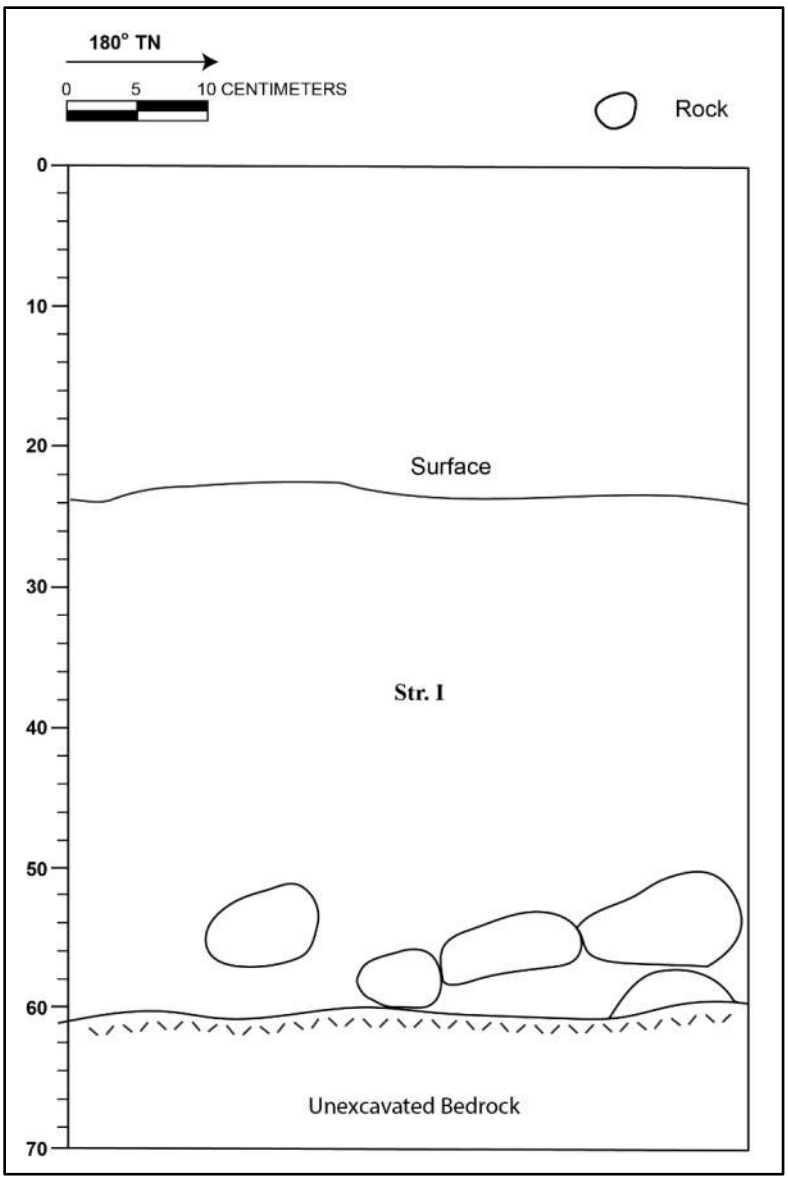

Figure 64. Profile of TU-12 east sidewall

Table 14. TU-12 stratigraphic description

Stratum	Depth (cmbd)	Description
I	24–61	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; clear, smooth lower boundary, terminated at bedrock; roots common; cultural material present including charcoal, a basalt adze fragment, and fragmental glass and porcelain; natural Honuaulu series sediment

4.2.13 Test Unit 13 (TU-13)

Test Unit 13 (TU-13) was located at SIHP # -31124 within the central-northern portion of the Feature C terrace (see Figure 28). Figure 65 shows 0.25-sq-m TU-13 marked out with pink sting prior to excavation. TU-13 was excavated to a depth of up to 50 cmbs through one layer of natural Honuaulu series sediment (Stratum I), and terminated at basalt bedrock (Figure 66, Figure 67, and Table 15). Artifacts including fragmental earthenware and volcanic glass were recovered from the screen during excavation at TU-13, from sediments excavated from within the first 10–15 cmbs. These materials were collected and cataloged (see Section 5).

Figure 65. Photo of TU-13 marked out with pink string prior to excavation; view to north

Figure 66. Photo of TU-13 east sidewall and base of excavation; view to east

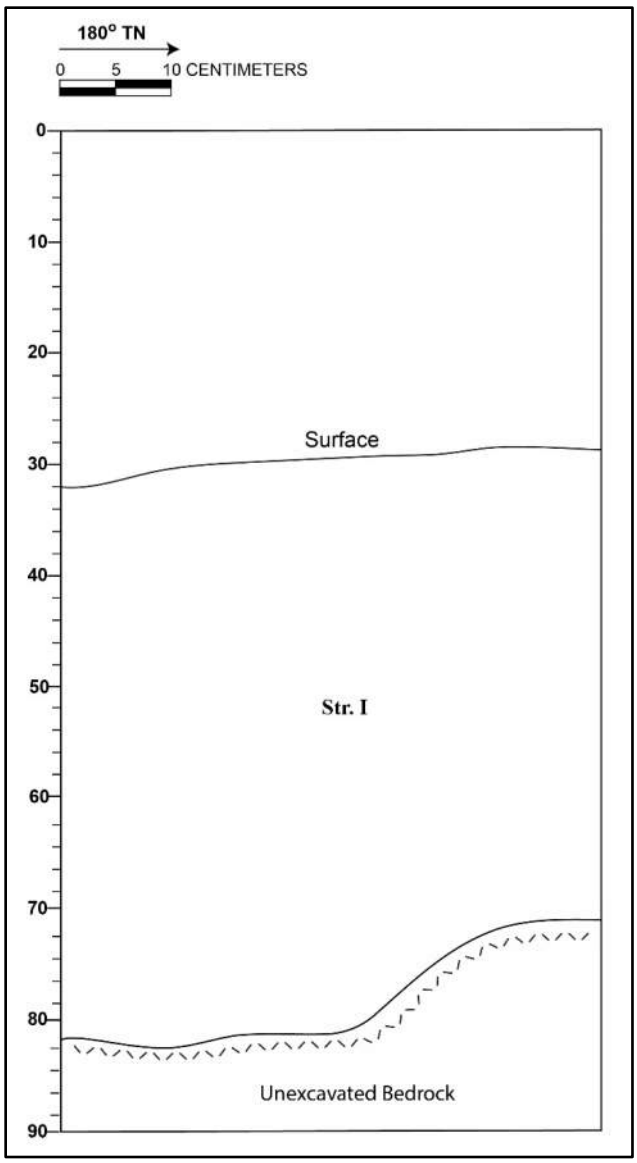

Figure 67. Profile of TU-13 east sidewall

Table 15. TU-13 stratigraphic description

Stratum	Depth (cmbd)	Description
I	29–84	A horizon; 10YR 3/3, dark brown; silty clay loam; weak, fine, granular structure; dry, loose, weak cementation consistence; slightly plastic; terrigenous sediment origin; very abrupt, smooth lower boundary, terminated at bedrock; roots common; cultural material present, including fragmental earthenware and volcanic glass; natural Honuaulu series sediment

Section 5 Results of Laboratory Analysis

Collection of artifacts and cultural materials for laboratory analysis was undertaken as part of the archaeological inventory survey investigation. All materials collected from the project area for laboratory analysis were recovered from the ground surface within SIHP # 50-10-28-31124 or from the screen (1/8-inch mesh) during test unit excavations at SIHP #s 50-10-28-31124 and -31126. The artifacts and cultural materials encountered during screening were noted on historic property description and/or excavation forms and assessed in the field for datable and/or representative characteristics. The materials selected for laboratory analysis were washed and sorted in the laboratory as applicable.

This section describes the findings of the laboratory analysis. Section 5.1 addresses the artifacts collected for analysis. Some faunal bone was collected from the project area; these findings are discussed in Section 5.2. Finally, Section 5.3 provides wood taxa and radiocarbon analysis results for select charcoal samples collected during test excavations.

5.1 Artifact Analysis

Sixty-five artifacts were collected from the context of 12 of the 13 test units within the project area (the remaining unit, TU-5, was culturally sterile). These artifacts are presented in Table 20. In several cases, numerous fragments of similar materials have been collectively cataloged as a single artifact. Highly fragmented items were weighed but typically not measured; these materials included glass of various colors, ceramics, metal scraps, and small pieces of volcanic glass. Artifacts encountered during the testing program and collected for analysis included a basalt adze fragment, basalt flake, glass button, glass marble, rubber bottle stopper, metal nails, two horseshoes, and nine intact or partially intact glass bottles. Traditional-type artifacts are described in more detail in Section 5.1.1; this section includes the results of EDXRF analysis on select lithic materials. Representative historic artifacts are described in Section 5.1.2.

Eleven (17%) of the 65 collected artifacts were from TU-1 at SIHP # -31126. The remaining 54 artifacts (83%) came from SIHP # -31124, from the context of either the ground surface or within ten of the 12 test units. The number of surface-collected artifacts at SIHP # -31124 was nine, representing 17% of the items collected from that site and 14% of the overall project assemblage. It should be noted that these nine collected items are a very small representative sample of surface artifacts throughout the site. At SIHP # -31124, the test unit containing the most collected artifacts was TU-7 at Feature G (number = 9, or 17% of SIHP # -31124 assemblage). TU-11 at Feature E contained seven artifacts (13% of SIHP # -31124 assemblage); TU-10 (Feature E) and TU-12 (Feature D) each contained six artifacts (11% each); TU-6 at Feature H contained five artifacts (9%); TU-8 (Feature G) and TU-9 (Feature E) each contained three artifacts (6% each); and TU-2 (Feature J), TU-3 (Feature I), and TU-13 (Feature C) each contained two artifacts (<4% each). No artifacts were collected from TU-4 or TU-5; TU-4 did contain modern trash and faunal bone, while TU-5 was sterile.

The collected artifacts are attributed to the pre-Contact and historic periods. The artifacts commonly associated with traditional or pre-Contact usage include fragments of volcanic glass and basalt, and a piece of a polished basalt adze. The wide variety of historic materials present are associated with habitation and work-related activity. While the historic materials were typically

Table 16. Artifact catalog

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Description	# of Pieces	Material Type	Dimensions (cm unless otherwise noted)	Weight (grams)
001	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Ornate porcelain fragments	4	Ceramic	Not measured	62.7
002	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Clear glass fragments	58	Glass	Not measured	176.8
003	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Blue glass fragment	1	Glass	Not measured	0.4
004	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Brown glass fragment	8	Glass	Not measured	43.8
005	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Metal fragment	2	Metal	Not measured	0.3
006	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Porcelain fragments	3	Ceramic	Not measured	27.9
007	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Stoneware fragment	1	Ceramic	Not measured	11.1
008	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Horseshoe	1	Metal	12.50 long x 10.45 wide x 1.0 thick	209.8
009	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Marble	1	Glass	1.7 long x 1.4 wide (one side chipped)	6.4
010	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Volcanic glass flake	1	Lithic	1.4 long x 1.2 wide x 0.5 thick	1.3
011	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	Bottle stopper	1	Rubber	3.4 long x 2.5 wide	15.2
012	-31124	TU-2	Str. I; 0–20 cmbs	Clear glass fragment	1	Glass	Not measured	3.1

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Description	# of Pieces	Material Type	Dimensions (cm unless otherwise noted)	Weight (grams)
013	-31124	TU-2	Str. I; 0–20 cmbs	Metal fragment	1	Metal	Not measured	5.7
015	-31124	TU-3	Str. Ia; 0–15 cmbs	Brown glass fragment	1	Glass	Not measured	4.9
016	-31124	TU-3	Str. Ia; 0–15 cmbs	Metal fragment	2	Metal	Not measured	3.0
019	-31124	TU-6	Str. Ia; 0–16 cmbs	Olive glass fragment	1	Glass	Not measured	15.7
020	-31124	TU-6	Str. Ia; 0–16 cmbs	Brown glass fragment	1	Glass	Not measured	2.1
021	-31124	TU-6	Str. Ia; 0–16 cmbs	Light blue glass fragments	3	Glass	Not measured	56.4
022	-31124	TU-6	Str. Ia; 0–16 cmbs	Clear glass fragments	1	Glass	Not measured	0.4
023	-31124	TU-6	Str. Ia; 0–16 cmbs	Ceramic fragment	1	Ceramic	Not measured	11.2
024	-31124	TU-7	Str. I; 0–15 cmbs	Light blue glass fragments	13	Glass	Not measured	47.8
025	-31124	TU-7	Str. I; 0–15 cmbs	Glass bottle fragment	1	Glass	Not measured	45.6
026	-31124	TU-7	Str. I; 0–15 cmbs	Light green glass fragments	5	Glass	Not measured	10.3
027	-31124	TU-7	Str. I; 0–15 cmbs	Clear glass fragments	8	Glass	Not measured	15.6
028	-31124	TU-7	Str. I; 0–15 cmbs	Brown glass fragments	6	Glass	Not measured	19.5
029	-31124	TU-7	Str. I; 0–15 cmbs	Button with 4 holes	1	Glass	1.15 long x 1.15 wide x 0.29 thick	0.4
030	-31124	TU-7	Str. I; 0–15 cmbs	Porcelain fragments	2	Ceramic	Not measured	4.0

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Description	# of Pieces	Material Type	Dimensions (cm unless otherwise noted)	Weight (grams)
031	-31124	TU-7	Str. I; 0–15 cmbs	Ceramic fragments	2	Ceramic	Not measured	9.4
032	-31124	TU-7	Str. I; 0–15 cmbs	Earthenware fragments	9	Ceramic	Not measured	29.0
033	-31124	TU-8	Str. I; 0–15 cmbs	Green glass fragments	1	Glass	Not measured	0.8
034	-31124	TU-8	Str. I; 0–15 cmbs	Light blue glass fragments	2	Glass	Not measured	1.7
035	-31124	TU-8	Str. I; 0–15 cmbs	Porcelain fragments	1	Ceramic	Not measured	3.9
036	-31124	TU-9	Str. I; 0–50 cmbs	Olive glass fragments	1	Glass	Not measured	0.9
037	-31124	TU-9	Str. I; 0–50 cmbs	Metal fragment	1	Metal	Not measured	5.8
038	-31124	TU-9	Str. I; 50–57 cmbs	Volcanic glass fragments	3	Lithic	Not measured	1.0
040	-31124	TU-10	Str. I; 0–20 cmbs	Porcelain fragment	1	Ceramic	Not measured	0.4
041	-31124	TU-10	Str. I; 0–20 cmbs	Light blue glass fragment	1	Glass	Not measured	1.0
042	-31124	TU-10	Str. I; 0–20 cmbs	Earthenware fragment	1	Ceramic	Not measured	1.6
043	-31124	TU-10	Str. I; 0–51 cmbs	Basalt flake	1	Lithic	Not measured	1.0
044	-31124	TU-10	Str. I; 0–51 cmbs	Volcanic glass fragments	6	Lithic	Not measured	2.4
046	-31124	TU-10	Str. I; 0–20 cmbs	Nail fragments	2	Metal	Not measured	7.3
047	-31124	TU-11	Str. I; 0–20 cmbs	Nail	1	Metal	6.0 long x 1.3 wide x 0.5 thick	7.4

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Description	# of Pieces	Material Type	Dimensions (cm unless otherwise noted)	Weight (grams)
048	-31124	TU-11	Str. I; 0–20 cmbs	Purple glass fragment	1	Glass	Not Measured	28.2
049	-31124	TU-11	Str. I; 0–52 cmbs	Volcanic glass fragment	1	Lithic	Not measured	0.6
050	-31124	TU-11	Str. I; 0–20 cmbs	Ceramic fragments	3	Ceramic	Not measured	9.5
051	-31124	TU-11	Str. I; 0–20 cmbs	Clear glass fragments	5	Glass	Not measured	1.8
052	-31124	TU-11	Str. I; 0–20 cmbs	Aqua glass fragment	1	Glass	Not measured	0.1
053	-31124	TU-11	Str. I; 0–20 cmbs	Aqua glass fragments	10	Glass	Not measured	42.2
055	-31124	TU-12	Str. I; 0–15 cmbs	Brown glass fragments	3	Glass	Not measured	1.0
056	-31124	TU-12	Str. I; 0–15 cmbs	Purple glass fragment	1	Glass	Not measured	0.9
057	-31124	TU-12	Str. I; 0–15 cmbs	Olive glass fragment	1	Glass	Not measured	2.0
058	-31124	TU-12	Str. I; 0–15 cmbs	Porcelain/light blue glaze fragment	1	Ceramic	Not measured	4.2
059	-31124	TU-12	Str. I; 0–47 cmbs	Basalt adze fragment	1	Lithic	2.75 long x 2.0 wide x 1.6 thick	12.8
061	-31124	TU-13	Str. I; 0–15 cmbs	Earthen ware fragments	2	Ceramic	Not measured	3.6
062	-31124	TU-13	Str. I; 0–15 cmbs	Volcanic glass fragments	1	Lithic	Not measured	0.7
063	-31124	TU-12	Str. I; 0–15 cmbs	Clear glass fragments	3	Glass	Not measured	3.2

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Description	# of Pieces	Material Type	Dimensions (cm unless otherwise noted)	Weight (grams)
064	-31124	N/A	Surface, Feature B	Brown bottle	1	Glass	28.7 long x 8.0 wide x 5.53 mm thick	703.1
065	-31124	N/A	Surface, Feature D	Blue bottle	1	Glass	7.6 long x 7.5 wide x 8.09 mm thick	196.1
066	-31124	N/A	Surface, Feature H	Green bottle	1	Glass	18.8 long x 5.8 wide x 5.53 mm thick	378.7
067	-31124	N/A	Surface, Feature I	Clear bottle	1	Glass	13.6 long x 7.3 wide x 3.23 mm thick	260.0
068	-31124	N/A	Surface, Feature I	Clear bottle	1	Glass	13.2 long x 5.4 wide x 3.20 mm thick	126.5
069	-31124	N/A	Surface, Feature J	Purple bottle	1	Glass	13.5 long x 4.5 wide x 4.0 mm thick	160.2
070	-31124	N/A	Surface, Feature J	Brown bottle	1	Glass	14.9 long x 16.4 wide x 3.7 mm thick	194.0
071	-31124	N/A	Surface, *makai* of Feature J	Clear bottle	1	Glass	30.3 long x 4.5 wide x 4.4 mm thick	1,606.7
072	-31124	N/A	Surface, *makai* of Feature J	Brown bottle	1	Glass	29.5 long x 15.5 wide x 4.2 mm thick	1,429.4

encountered within the upper 10–20 cm of the test units, these and the traditional type materials were diffuse within the sediment layer. The historic artifacts encountered on the surface of SIHP # -31124 were also evenly distributed throughout the site. None of the materials were found in concentrations sufficient to indicate a delineated trash pit. It is possible some of the historic artifacts at SIHP # -31124 originated from the property to the north and were tossed over the wall during clearing or other land improvements at that property. However, this hypothesis seems unlikely to account for all the historic materials present at SIHP # -31124.

5.1.1 Traditional Artifacts

Artifacts encountered within the project area that could be associated with traditional or pre-Contact land use include lithic materials (Table 17). A combined total of 6.0 grams of raw (unworked) volcanic glass fragments was collected from TU-1 at SIHP # -31126 and TU-9, TU-10, TU-11 and TU-12 at SIHP # -31124. A single basalt flake weighing 1.0 gram was found at TU-10, and a polished basalt adze fragment weighing 12.8 grams was recovered at TU-12. Lithic materials from all but TU-9 were sent to the University of Hawai‘i at Hilo geoarchaeology lab for EDXRF analysis in an attempt to source the lithic material found in the project area. Table 17 indicates which samples were submitted for EDXRF analysis and notates where only a portion of the collectively accessioned materials were submitted (i.e., at Catalog # 038).

Table 17. Catalog of lithic artifacts

Catalog #	SIHP # (50-10-28)	Unit	Context (stratum; depth)	Weight (grams)	Description	Photo Reference	EDXRF Analysis (yes/no)
Volcanic glass; total weight = 6.0 grams							
010	-31126	TU-1	Str. I, *makai* of terrace wall; 0–30 cmbs	1.3	Volcanic glass (1 pc)	Figure 68	Yes
038	-31124 Feature E	TU-9	Str. I; 50–57 cmbs	1.0	Volcanic glass (3 pcs)	Figure 68	No
044	-31124 Feature E	TU-10	Str. I; 0–51 cmbs	2.4	Volcanic glass (6 pcs)	Figure 69	Yes; 1.5 of 2.4 g submitted
049	-31124 Feature E	TU-11	Str. I; 0–52 cmbs	0.6	Volcanic glass (1 pc)	Figure 69	Yes
062	-31124 Feature C	TU-13	Str. I; 0–15 cmbs	0.7	Volcanic glass (1 pc)	Figure 70	Yes
Basalt object; number items = 2							
043	-31124 Feature E	TU-10	Str. I; 0–51 cmbs	1.0	Basalt flake (1 pc)	Figure 71	Yes
059	-31124 Feature D	TU-12	Str. I; 0–47 cmbs	12.8	Basalt adze fragment (1 pc)	Figure 72	Yes

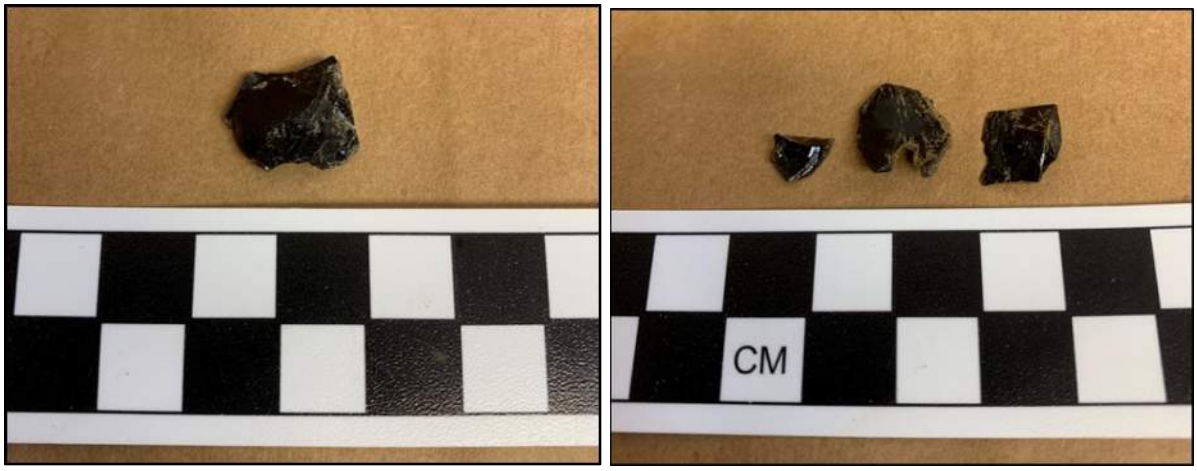

Figure 68. Photos of Catalog # 010 volcanic glass (left), and Catalog # 038 volcanic glass (right)

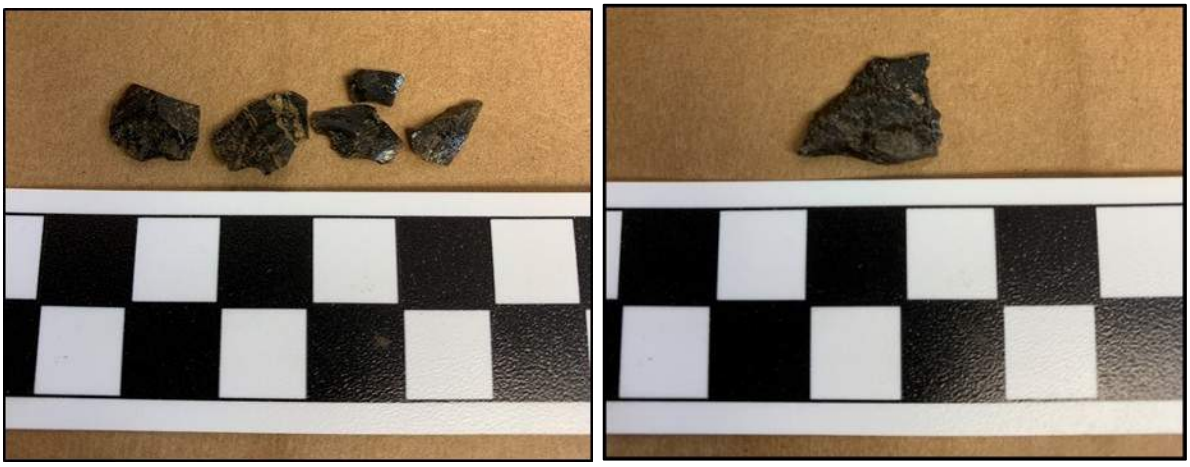

Figure 69. Photos of Catalog # 044 volcanic glass (left), and Catalog # 049 (right)

Figure 70. Photo of Catalog # 062 volcanic glass

Figure 71. Photo of Catalog # 043 basalt flake

Figure 72. Photo of Catalog # 059 basalt adze fragment

5.1.1.1 Energy-Dispersive X-ray Fluorescence (EDXRF) Background

The use of energy-dispersive X-ray fluorescence (EDXRF) may make it possible to determine if lithic artifacts from within the project area are from similar sources, different sources, or from sources consistent with another island. Using an EDXRF spectrometer, Dr. Peter Mills of the University of Hawai‘i at Hilo is working to establish geochemical “fingerprints” of stone tools that Native Hawaiians quarried from various sites and track the extent to which that material was circulated on each island or throughout the island chain. The EDXRF analyzer allows archaeologists to conduct rapid and non-destructive analyses of stone artifacts to determine the extent and distance to which stone tools moved from the quarries. Attempts are made to match the lithic artifact samples with geochemical data collected on known prehistoric quarry areas. Samples that do not match known quarry sites may lead to the discovery of currently unknown quarry sites, or possibly to the identification of stone tools derived from other island groups such as Tahiti and the Marquesas. By examining the extent to which stone tools in various *ahupua‘a* were derived from non-local sources, archaeologists will be able to quantify Native Hawaiian movement of lithic artifacts through time and space, and possibly identify some tools that were carried over long distances of open ocean.

5.1.1.2 Volcanic Glass and Basalt Samples Analysis

The EDXRF focuses a high energy beam of X-rays onto a sample and uses atomic excitation to create X-ray emissions that are then measured by an energy-dispersive spectrometer. The spectrometer converts the X-ray energy into voltage signals that are digitally analyzed and plotted. The trace elements strontium and zirconium were used as main discriminators for this study and were plotted on Sr to Zr bivariate plots. The work of Peter Mills and Steve Lundblad has shown that Sr and Zr percentages in Hawaiian volcanic basalt have a wide variance and when plotted against each other can create concentrated clusters that can be used as a visual comparison to samples in the UHH EDXRF database. The team of Peter Mills and Steven Lundblad have used this technique to match Hawaiian lithic artifacts to well-known adze quarries, such as on Mauna Kea, and sources of volcanic glass, such as Pu‘u Wa‘awa‘a located on the north slope of Hualālai volcano on Hawai‘i Island (McCoy et al. 2011). As the UHH EDXRF database has expanded over time, more information has become known about specific sources for stone and volcanic glass across the Hawaiian Islands.

As noted in Table 17, four samples of volcanic glass and two basalt artifacts recovered during project excavations were sent to the University of Hawai‘i at Hilo for EDXRF analysis (see Table 17). The Sr to Zr measurements for these lithic samples were plotted against 12 geochemical groups (Groups A through L) and outliers defined in an analysis of basalt artifacts from the Kahalu‘u Habitation Cave in Kona (Mills et al. 2011) (Figure 73). The full EDXRF analysis including measurements of other chemical elements is included in Appendix C (courtesy UHH EDXRF Lab)

Table 18. Table 18 lists the UHH EDXRF Sample ID with its corresponding sample description, CSH catalog number and test unit, strontium and zirconium readings, and the interpretation of these readings as expressed by Dr. Peter Mill in email correspondence to CSH dated 6 March 2020.

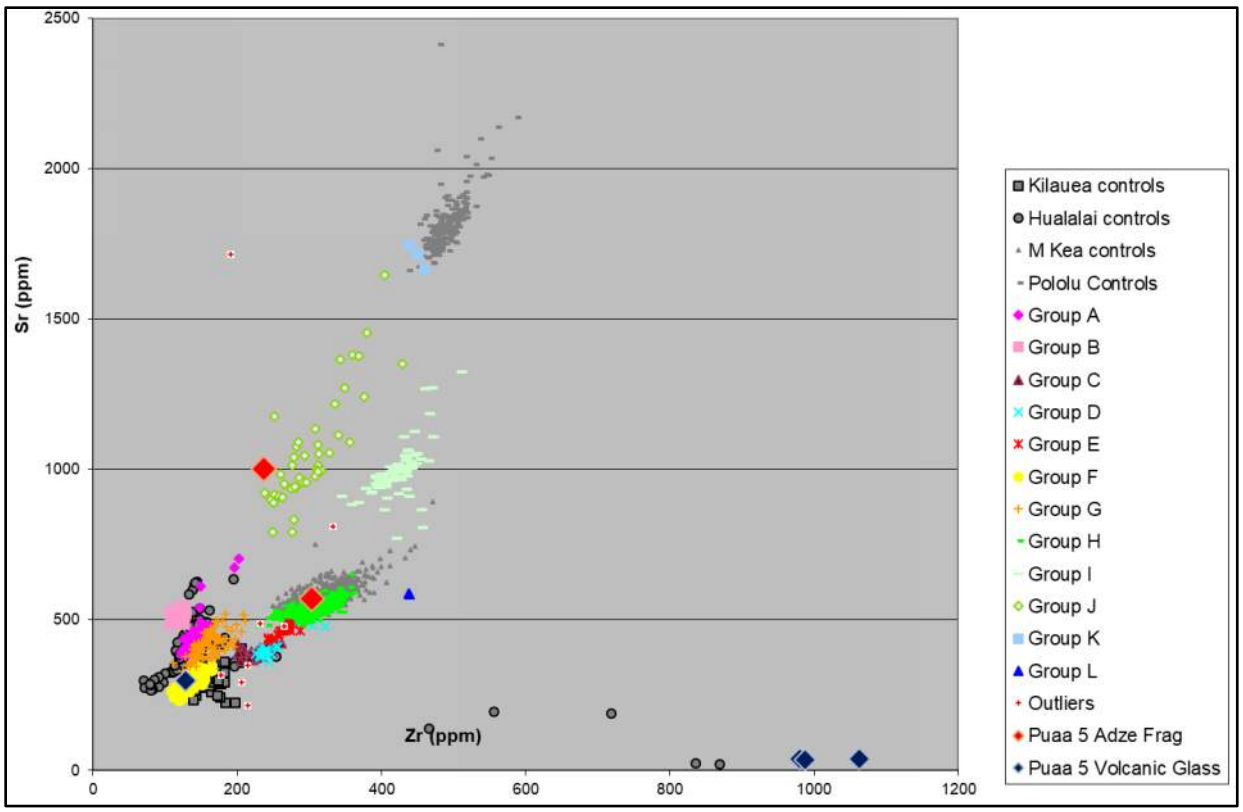

Figure 73. Bivariate plot showing Strontium (Sr) vs. Zirconium (Zr) ratios of “Puaa 5 Adze Frag” and “Puaa 5 Volcanic Glass” samples in comparison to various known petrographic groups (courtesy UHH EDXRF Lab)

Table 18. Strontium and Zirconium concentrations for volcanic glass and basalt samples and petrographic interpretation

EDXRF Sample ID	Description	CSH Catalog #	Unit	Sr (ppm)	Zr (ppm)	Source Interpretation
Puaa 5-10 basalt flake 1.0g	Basalt flake	043	TU-10	572	304	Group H (Mauna Kea)
Puaa 5-59 adze frag 12.4g	Basalt adze fragment	059	TU-12	1003	237	Group J (no match on Hawai‘i Island)
Puaa 5-10 vg 1.3g	Volcanic glass	010	TU-1	38	1063	Group 1 (Pu‘u Wa‘awa‘a)
Puaa 5-44 vg 1.5g	Volcanic glass	044	TU-10	298	128	Group 2 (Mauna Loa)
Puaa 5-62 vg 0.7g	Volcanic glass	062	TU-13	38	980	Group 1 (Pu‘u Wa‘awa‘a)
Puaa 5-49 vg 0.6g	Volcanic glass	049	TU-11	34	987	Group 1 (Pu‘u Wa‘awa‘a)

The basalt flake (Catalog # 043) from TU-10 at SIHP # -31124 Feature E plots within the Group H cluster (see Figure 73). Mills et al. (2011:88) note that Group H in Kona is consistent with geochemical signatures from the Mauna Kea adze quarry. The adze fragment (Catalog # 059) from TU-12 at SIHP # -31124 Feature D plots within the Group J cluster (see Figure 73). Dr. Mills (3 March 2020 email correspondence) states that Group J "does not match anything we have seen in Big Island sources" and notes that research is ongoing to identify a potential Group J source on a different island.

Lundblad et al. (2013) identify three volcanic glass geochemical groups in leeward Hawai‘i Island: Groups 1, 2, and 3. Three of the four volcanic glass samples (Catalog #s 010, 062, and 049 from TU-1, TU-13, and TU-11 at SIHP #s -31126 and -31124, respectively) show a clear geochemical match to Group 1, which comprises volcanic glasses consistent with Pu‘u Wa‘awa‘a. According to Dr. Mills (3 March 2020 email correspondence), "The Zr concentrations around 1000 ppm are unique [to Pu‘u Wa‘awa‘a] within Hawaiian volcanic glass sources." The remaining volcanic glass sample, Catalog # 044 from TU-10 at SIHP # -31124 Feature E correlates with Group 2, "another common geochemical group in Kona that matches best with a broad range of chilled glass collected from the surfaces of Mauna Loa flows" (Dr. Mills, 3 March 2020 email correspondence).

5.1.2 Historic Artifacts

Artifacts encountered within the project area associated with historic land use include numerous glass, ceramic, metal, and rubber objects (Table 20). Many of these items were highly fragmented. Nine wholly or partially complete bottles were collected for their datable and representative characteristic; these bottles are described in Section 5.1.2.1. Other historic artifacts including two horseshoes, a rubber stopper, a metal nail, a marble, and a glass button were collected as representative items. These non-bottle artifacts, described in Section 5.1.2.2, are typically lacking in specific datable characteristics but are considered to indicate a range of historic occupation extending from at least the early 1900s through the mid-twentieth century.

5.1.2.1 Bottles

Nine glass bottles collected from the surface of SIHP # -31124 were selected for analysis based on their representative and apparent datable characteristics (see Table 16 and Table 19). All but two of the collected bottles are completely intact. Research indicates manufacture dates ranging from the turn of the twentieth century through the 1970s.

Catalog # 64 is an intact, brown glass Dai Nippon Beer Company beer bottle collected from the surface of SIHP # -31124 Feature B (see Table 19, Figure 75, and Figure 76). The bottle is machine-made, with a crown finish. The bottle is embossed the sun symbol and "Trademark" around the neck of the bottle and "Dainippon Brewery Co. LTD" near the heel. The base of the bottle is embossed with a star containing a dot. The Dai Nippon Brewery operated from 1909 to 1949, and the company introduced semi-automatic and automatic bottle making machines in 1911 (Ross 2009:8–10). An identical Dai Nippon bottle listed on a collectibles website (Worth Point 2020) indicates this bottle was manufactured between 1946-1949.

Catalog # 65 is the base of a broken, blue glass Massilon Bottle & Glass Co. beverage bottle collected from the surface of SIHP # -31124 Feature D (see Table 19, Figure 77, and Figure 78).

Table 19. Bottle artifacts

Catalog #	SIHP # (50-10-28)	Color	% Complete	Length (cm)/ Width (cm)/ Thickness (mm)	Weight (g)	Maker's mark present	Description	Probable Manu-facture Date	Photo Reference
064	-31124 Feature B	Brown	100	28.7/8.0/5.53	703.1	Yes	Dai Nippon Beer Company, beer bottle; embossed with sun symbol and "Trademark" on neck, "Dainippon Brewery Co. LTD" at bottom, star with dot on base	1946-49	Figure 74, Figure 75
065	-31124 Feature D	Blue	10	7.6/7.5/8.09	196.1	Yes	Massilon Bottle & Glass Co., beverage bottle; embossed with "M.B. & G. Co." on base	1900-1904	Figure 76, Figure 77
066	-31124 Feature H	Green	90	18.8/5.8/5.53	378.7	Yes	Kona Soda Works, soda bottle; embossed with "Property of Kona Soda Works" "Hawaii" Net Contents 6 ½ fld ozs" on side, and "K.B." on base	1920s-30s	Figure 78, Figure 79
067	-31124 Feature I	Clear	100	13.6/7.3/3.23	260.0	Yes	Owens Illinois Glass Co., food jar; embossed with "Duraglass" twice along the bottom; plant code (20) for Oakland, CA, and "49" for manufacture date	1949	Figure 80, Figure 81
068	-31124 Feature I	Clear	100	13.2/5.4/3.20	126.5	Yes	Brockway Glass Co., condiment bottle Plant code (16) for Pomona, CA	1979	Figure 82
069	-31124 Feature J	Purple	100	13.5/4.5/4.0	160.2	Possibly	Unknown manufacturer, medicine bottle; embossed with "H98" on base	Early 1900s	Figure 83
070	-31124 Feature J	Brown	100	14.9/6.4/3.7	194.0	Yes	Owens Illinois Glass Co., beverage bottle; plant location (20) Oakland, CA, and "70" for manufacture date; embossed with "Not to be refilled" and "20372-58" on heel	1970	Figure 84, Figure 85

Catalog #	SIHP # (50-10-28)	Color	% Complete	Length (cm)/ Width (cm)/ Thickness (mm)	Weight (g)	Maker's mark present	Description	Probable Manu-facture Date	Photo Reference
071	-31124 *makai* of Feature J	Clear	100	30.3/16.4/4.4	1,606.7	Yes	Owens-Illinois Glass Co., one-gallon jug; plant location (23) Los Angeles, CA	Post-1934	Figure 86, Figure 87
072	-31124 *makai* of Feature J	Brown	100	29.5/15.5/4.2	1,429.4	Yes	Clorox Chemical Company, one-gallon jug; embossed with "Clorox" on shoulder, "Pat Design 187113" on base	1959-1962	Figure 88, Figure 89

Figure 74. Photo showing Catalog # 064 in situ at SIHP # -31124 Feature B; view to west

Figure 75. Photos of Catalog # 064, Dai Nippon glass beer bottle (1940s)

Figure 76. Photo showing Catalog # 065 in situ at SIHP # -31124 Feature D; view to east

Figure 77. Photos of Catalog # 065, Massillon Bottle & Glass Co. beverage bottle (1900-1904)

Figure 78. Photo showing Catalog # 066 in situ at SIHP # -31124 Feature H; view to northeast

Figure 79. Photos of Catalog # 066, Kona Soda Works glass soda bottle (1920s-1930s)

Figure 80. Photo showing Catalog # 067 in situ with other artifacts at SIHP # -31124 Feature I; view to south

Figure 81. Photos of Catalog # 067, Owen Illinois Glass Company food jar (1949)

Figure 82. Photos of Catalog # 068 SIHP # -31124 Feature I, Brockway Glass Company condiment bottle (1979)

Figure 83. Photos of Catalog # 069, collected from SIHP # -31124 Feature J, medicine bottle embossed with “H98” (early 1900s)

Figure 84. Photo showing Catalog # 070 in situ with other artifacts at SIHP # -31124 Feature J; view to northeast

Figure 85. Photos of Catalog # 070, Owens Illinois Glass Company beverage bottle (1970)

Figure 86. Photo showing Catalog # 071 in situ with other artifacts at SIHP # -31124 *makai* of Feature J; view to north

Figure 87. Photos of Catalog #71, Owens Illinois Glass Company one-gallon jug (post-1934)

Figure 88. Photo showing Catalog # 072 in situ at SIHP # -31124 *makai* of Feature J; view to northeast

Figure 89. Photos of Catalog # 072, Clorox glass one-gallon jug (1959-1962)

The bottle is mold blown and the base is embossed with “M.B. & G. Co.” This bottle dates to 1900-1904 (Schultz et al. 2011:93–95).

Catalog # 066 is a 90% intact, green glass Kona Soda Works soda bottle collected from the surface of SIHP # -31124 Feature H (see Table 19, Figure 78, and Figure 79). The bottle is machine-made; the finish and part of the neck are broken off. “Property of Kona Soda Works Hawaii” is embossed on the body of the bottle with “Net Contents 6 ½ fld ozs” embossed across the heel. The company makers’ mark “K.B.” is embossed on the base of the bottle. This bottle dates to the 1920s-1930s (personal communication, David Ackerman at Glass from the Past in Honomū, Hawai‘i).

Catalog # 067 is an intact, clear glass Owens Illinois Glass Company food jar collected from the surface of SIHP # -31124 Feature I (see Table 19, Figure 80, and Figure 81). The machine-made jar is oval in shape with decorative side panels and a wide-mouth continuous threaded finish. The heel is embossed twice with “Duraglass” and the base bears the maker’s mark of an oval superimposed by a diamond with an “I”. Around the maker’s mark are a series of embossed numbers: “20” on the left, “3116-6 IA” below the maker’s mark, and “49” on the right. This indicates the bottle was manufactured by the Owens Illinois Glass Company in Oakland, California in 1949 (Lockhart and Hoening 2016:301–308).

Catalog # 068 is an intact, clear glass Brockway Glass Company condiment bottle collected from the surface of SIHP # -31124 Feature I (see Table 19 and Figure 82). The machine-made bottle has a continuous threaded finish and fluted shoulder. The base bears a maker’s mark of a “B” surrounded by a circle; to the left is the plant location code “16” and to the right the date code “79”. These marks indicate the bottle was manufactured by the Brockway Glass Company in Brockway, Pennsylvania in 1979 (Lockhart et al. 2013:310–330).

Catalog # 069 is an intact, purple (or amethyst) glass medicine bottle collected from the surface of SIHP # -31124 Feature J (see Table 19 and Figure 83). This blown-in-mold bottle is square in shape with flattened panel “corners” and continuous thread finish. Bubbles are visible in the glass. The base of the bottle is embossed with “H98”; no information was found about this maker’s mark. Based on the manufacture type and use of manganese decolorant producing the eventual purple tint, this bottle likely dates to the early 1900s (Lockhart 2006:54).

Catalog # 070 is an intact, brown glass Owens Illinois Glass Company beverage bottle collected from the surface of SIHP # -31124 Feature J (see Table 19, Figure 84, and Figure 85). The machine-made bottle exhibits stippling on the heel, shoulder, and base and an interrupted thread finish. The base bears the maker’s mark of a circle with an “I” in it; to the left is the plant location code “20” and to the right the date code “70”. Additionally, “Not To Be Refilled” and “20372-58” are embossed around the base of the bottle. These marks indicate the bottle was manufactured by the Owens Illinois Glass Company in Oakland, California in 1970 (Lockhart and Hoening 2016:301–308).

Catalog # 071 is an intact, clear glass Owens Illinois Glass Company one-gallon jug collected from the surface of SIHP # -31124 *makai* of Feature J (see Table 19, Figure 86, and Figure 87).

The machine-made vessel exhibits a continuous threaded finish and a ring handle. The base bears the maker's mark of an oval superimposed by a diamond with an "I". A series of numbers are embossed around the maker's mark: "23" to the left, "350" below and "[?]4" to the right. These marks indicate the bottle was manufactured by the Owens Illinois Glass Company in Los Angeles, California after 1934 (Lockhart and Hoening 2016:301–308).

Catalog # 072 is an intact, brown glass one-gallon Clorox jug collected from the surface of SIHP # -31124 *makai* of Feature J (see Table 19, Figure 88, and Figure 89). The machine-made vessel has a "four-finger" handle and a continuous thread finish. The brand name "Clorox" is embossed along the shoulder of the bottle. The base of the bottle is marked in the center by a diamond with "Clorox" in the center and a B inside of the circle. A series of numbers are embossed around the diamond: top left "5", top right "2", bottom left "20", and bottom right "0". The text "Pat Design 187113" is also embossed above the diamond. The design of the four-finger handle indicates the bottle was manufactured by Clorox Chemical Company during 1959-1962 (The Clorox Company 2011).

5.1.2.2 Other Historic Artifacts

Five artifacts were selected for presentation herein as representative of the historic non-bottle assemblage from SIHP #s -31124 and -31126. These are common household items generally thought to date from the early 1900s or older through the mid-twentieth century.

Catalog # 008 is a metal horseshoe recovered from Stratum I *makai* of the terrace wall during the excavation of TU-1 at SIHP # -31126 (see Table 16 and Figure 90). It is tapered iron and exhibits four nail holes on either end. The horseshoe measures 12.5 cm long, 11.45 cm wide, 1.0 cm thick, and weighs 209.8 g. The relatively small size of the horseshoe may indicate it was used for a donkey. There are no identifying marks to determine age or manufacturer of the horseshoe.

Catalog # 009 is a chipped, purple glass with white swirl marble recovered while screening sediment from Stratum I *makai* of the terrace wall during the excavation of TU-1 at SIHP # -31126 (see Table 16 and Figure 91). These marbles were common throughout the twentieth century.

Catalog # 011 is a rubber bottle stopper recovered while screening sediment from Stratum I *makai* of the terrace wall during the excavation of TU-1 at SIHP # -31126 (see Table 16 and Figure 91). According to Lindsey (2020), rubber stoppers "appear to have been primarily used during the first half of the 20th century and possibly even to the present in some specialty situations (chemical reagent bottles). Most notably, rubber stoppers were common in Clorox® and Lysol® bottles during the 1920s and 1930s."

Catalog # 029 is a round, four-hole white glass button recovered while screening sediment from Stratum I during the excavation of TU-7 at SIHP # -31124 (see Table 16 and Figure 92). The button has a diameter of 1.15 cm, is 0.29 cm thick, and weighs 0.4 g. There are no identifying marks to determine age or manufacturer of the button.

Catalog # 046 is an iron nail recovered while screening sediment from Stratum I during the excavation of TU-11 at SIHP # -31124 (see Table 16 and Figure 92). The nail is heavily corroded and broke into two pieces during examination. The nail measures 6.0 cm long, 1.3 cm wide, 0.5-1.0 cm thick, and weighs 7.1 g. There are no identifying marks to determine age or manufacturer.

Figure 90. Photo of Catalog # 008, iron horseshoe

Figure 91. Photos of Catalog # 009, glass marble (left); and Catalog # 011, rubber stopper (right)

Figure 92. Photos of Catalog # 029, glass button (left); and Catalog # 046, iron nail (right)

5.2 **Faunal Analysis**

CSH personnel collected faunal osseous remains from three (23%) of the 13 test excavations (TU-2, TU-4, and TU-9 at SIHP # -31124). The identified faunal remains, as shown in Table 20, include cow (*Bos taurus*) and bird (Aves). These remains include historic introduced species, supporting historic occupation and use of the project area. Stratigraphically, faunal osseous material was collected from upper portions of Stratum I, natural silty clay loam. All collected osseous material exhibits heavy weathering (i.e., eroded margins, cortical flaking) indicating the remains may have spent some time on the surface. By and large, these faunal remains are considered food refuse. Additionally, one piece of cow bone (Catalog # 074) exhibits historic evidence of butchering as indicated by striated cut marks from a saw.

Table 20. Faunal osseous remains identified during the AIS

Catalog #	SIHP # (50-10-28)	Test Unit	Context (Stratum; depth)	Species	Weight (grams)	Description
073	-31124 Feature J	TU-2	Str. I, 0–20 cmbs	*Bos taurus* (cow)	8.8	Proximal femur, fragment of greater trochanter
074	-31124 Feature I	TU-4	Str. I, 0–15 cmbs	*Bos taurus* (cow)	3.6	Long bone cortical section, saw cut
075	-31124 Feature I	TU-4	Str. I, 0–15 cmbs	Aves (bird)	0.6	Long bone shaft portion
076	-31124 Feature E	TU-9	Str. Ia, 0–50 cmbs	*Bos taurus* (cow)	8.3	Lower limb fragment

5.3 Charcoal Analysis

Procurement of charcoal samples for chronological analysis was one of the goals of the subsurface testing program. Charcoal was collected from the screen in four (31%) of the 13 test units (TU-9, TU-10, TU-11, and TU-12 excavated within SIHP # -31124 Features D and E) (Table 21). Select charcoal samples were subjected to wood taxa identification; samples identified as short-lived wood species were then submitted for radiocarbon analysis.

Table 21. Charcoal catalog

Catalog #	SIHP # (50-10-28)	Unit	Context (stratum; depth)	Weight (grams)	Description
077	-31124 Feature E	TU-9	Str. Ia and Ib; 0–57 cmbs	2.1	Charcoal (6 pcs)
078	-31124 Feature E	TU-10	Str. I; 0–51 cmbs	0.4	Charcoal (4 pcs)
079	-31124 Feature E	TU-11	Str. I; 0–52 cmbs	8.3	Charcoal (11 pcs)
080	-31124 Feature D	TU-12	Str. I; 0–47 cmbs	12.8	Charcoal (20 pcs)

5.3.1 Wood Taxa Identification

Fifteen pieces of charcoal collected from four test units (TU-9, TU-10, TU-11, and TU-12) were submitted to the Wood Taxa Identification Lab (WIDL) on O‘ahu for the purpose of identifying short-lived taxa appropriate for radiocarbon dating. A summary of the results of the wood taxa identification are listed in Table 22, as adapted from the 4 May 2020 report prepared by Gail Murakami at the WIDL. The full Murakami (2020) report is in Appendix D.

Murakami (2020) provides the following summary of findings:

> Two charcoal samples from Feature E, Samples 34 and 45, contained charred wood of the Pinaceae family. The hardwoods in these samples were not further identified once the presence of the possible *Pseudotsuga* sp. (Douglas fir) in Sample 34 and a pine (Pinaceae) in Sample 45 were detected. The presence of these evergreen woods suggests the samples are of historical origin or contaminated by historical material.
>
> The third sample, Sample 61 from Feature D, did not contain any evergreen woods. The taxa identified include *‘akoko* (*Euphorbia* sp.), *alahe‘e* (*Psydrax odorata*), *a‘ali‘i* (*Dodonaea viscosa*) and *neleau* (*Rhus sandwicensis*). The species identified in this sample are native and are found on Hawai‘i Island. […]

Table 22. Summary of charcoal wood taxa identifications, adapted from Murakami (2020)

WIDL #	Taxon	Common Name	Plant Part	Count	Comment
Sample 34 [CSH Catalog # 078]: TU-9, SIHP # -31124, Feature E					
2008-1	Indeterminate hardwood		Wood	4	
2008-2	Indeterminate hardwood		Wood	1	
2008-3	cf. *Pseudotsuga* sp.	Douglas fir	Wood	1	
Sample 45 [*sic*] [CSH Catalog # 080]: TU-11, SIHP # -31124, Feature E					
2008-4	Indeterminate hardwood		Wood	2	
2008-5	cf. woody vine		Stem	2	
2008-6	cf. Pinaceae	Pine	Wood	2	
2008-7	Indeterminate		Fruit/embryo	4	
Sample 61 [CSH Catalog # 081]: TU-12, SIHP # -31124, Feature D					
2008-8	cf. *Euphorbia* sp.	*‘Akoko*	Wood	2	Shrub, short-lived
2008-9	cf. *Rhus sandwicensis*	*Neleau*	Wood	9	
2008-10	cf. *Psydrax odorata*	*Alahe‘e*	Wood	5	
2008-11	cf. *Dodonaea viscosa*	*‘A‘ali‘i*	Wood	3	Shrub, short-lived
2008-12	Indeterminate hardwood		Wood	1	
Sample 45 [CSH Catalog # 079]: TU-10, SIHP # -31124, Feature E					
2008-13	Indeterminate hardwood		Wood	2	
2008-14	cf. *Dodonaea viscosa*	*‘A‘ali‘i*	Wood	1	twig
2008-15	Indeterminate hardwood		Wood	1	

> The fourth sample, Sample 45 from TU-10 in Feature E did not contain any evergreen tree wood. While two of the taxa are indeterminate, the remaining charcoal is of a twig probably from the native *a‘ali‘i* (*Dodonaea viscosa*) shrub.
>
> Short-lived plant and plant parts are recommended for radiocarbon dating. [Murakami 2020:1–2]

The identified short-lived species recommended for radiocarbon dating (*‘akoko* and *a‘ali‘i*) are described as follows:

> EUPHORBIACEAE (Spurge family)
>
> *Euphorbia* spp. (*‘Akoko*)
>
> Distribution of the 15 endemic Hawaiian shrubs and small trees in this genus range from coastal environments to upper forest zones on the main islands (Wagner et al. 1990:602-617). Eight native species, and a number of naturalized introductions, are found on Hawai‘i Island today in a wide range of habitats. *‘Akoko* was once valued for firewood by the Hawaiians (Hillebrand 1981:396) and the milky sap was once considered a possible source for rubber (Rock 1974:261). Some members of this genus were once known as *Chamaesyce* but the Hawaiian species have since been reassigned to the genus *Euphorbia* (Govearts et al. 2000; Steinman and Porter 2002; Yang and Berry 2011). [Murakami 2020:3]
>
> SAPINDACEAE (Soapberry family)
>
> *Dodonaea viscosa* Jacq. (*‘A‘ali‘i*)
>
> These indigenous shrubs or small trees are 2 to 8 m tall and range in distribution from coastal dunes to dry, mesic, and wet forest, at 3 to 2,350 m elevations on all of the main islands (Wagner et al. 1990:1227-1228; Starr et al. 2006:41). The red papery fruit capsule clusters and leaves of some varieties were made into *lei* (Pukui and Elbert 1986:3). The trunks were once used for house posts (Buck 1957:83). [Murakami 2020:3]

5.3.2 Radiocarbon Analysis

Following the recommendations of Murakami (2020), two charcoal samples representing short-lived wood species were submitted to Beta Analytic in Florida for radiocarbon analysis. These included WIDL # 2008-8 and WIDL # 2008-11 from CSH Catalog # 061, collected from TU-12 at SIHP # -31124 Feature D (Table 23).

A 2-sigma calibration of the radiocarbon analysis of Sample WIDL2008-8 suggested three possible date ranges, AD 1669 to 1780 (43.1%), AD 1798 to 1891 (36.8%), and AD 1908 to 1944 (15.5%), with the late pre-Contact/early post-Contact date range (1669 to 1780) being the most probable (Figure 93).

A 2-sigma calibration of the radiocarbon analysis of WIDL2008-11 suggested two possible date ranges, AD 1682 to 1736 (27.1%) and AD 1805 to 1935 (68.3%), with the post-Contact date range (1805 to 1935) being the most probable (Figure 94). The full Beta Analytic report is in Appendix E.

Table 23. Radiocarbon dating analysis (2-sigma calibration)

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age	2-Sigma Calibration
Beta–559910 (WIDL2008-8; CSH Catalog # 061 at TU-12)	170 +/- 30 BP	-26.9 o/oo	140 +/- 30 BP	AD 1669 to 1780 (43.1%) AD 1798 to 1891 (36.8%) AD 1908 to 1944 (15.5%)
Beta–559911 (WIDL2008-11; CSH Catalog # 061 at TU-12)	110 +/- 30 BP	-25.9 o/oo	100 +/- 30	AD 1805 to 1935 (68.3%) AD 1682 to 1736 (27.1%)

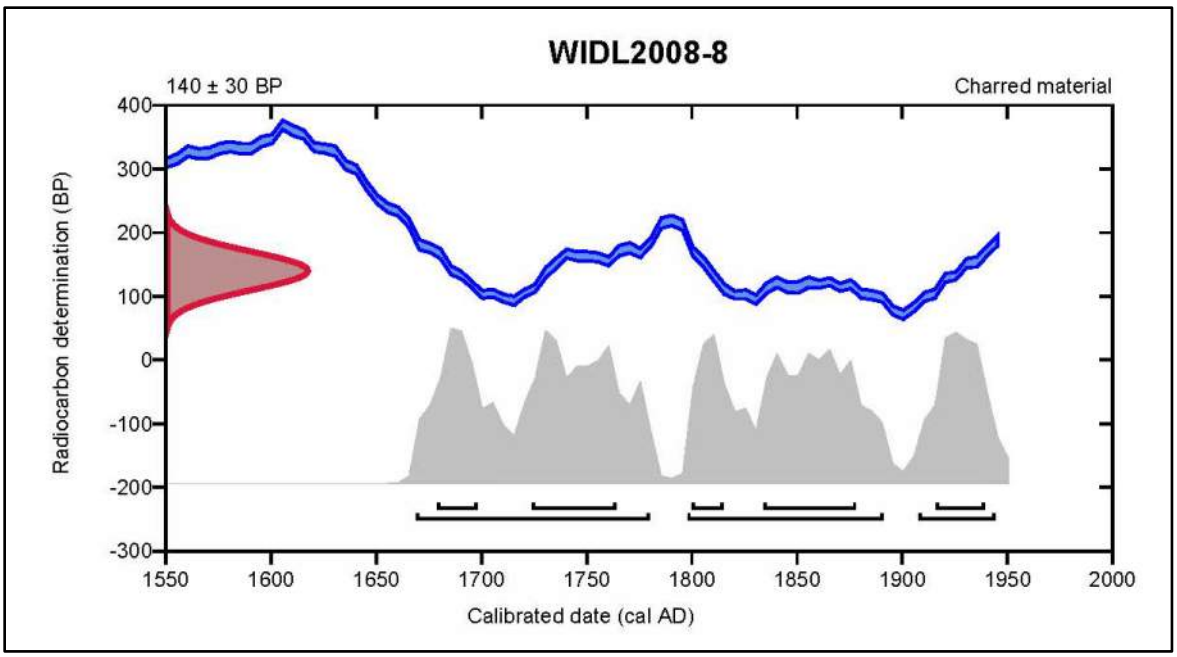

Figure 93. Calibration data and calibration curve for Sample WIDL # 2008-8 from TU-12 at SIHP # -31124 Feature D (courtesy of Beta Analytic)

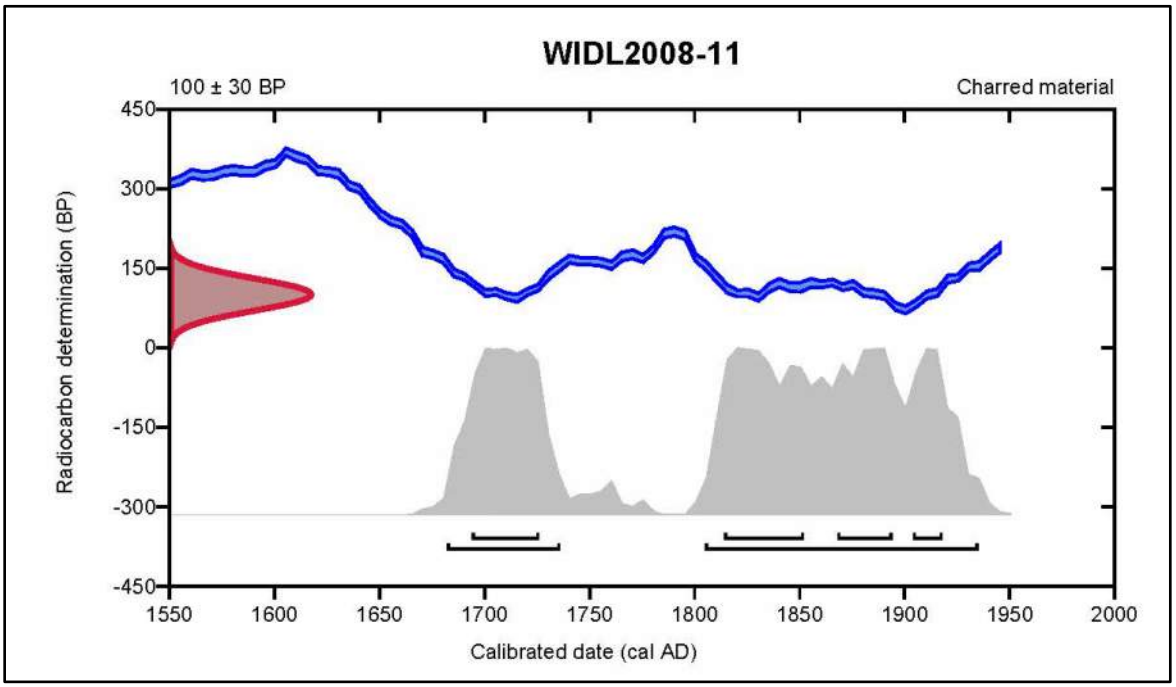

Figure 94. Calibration data and calibration curve for Sample WIDL # 2008-11 from TU-12 at SIHP # -31124 Feature D (courtesy of Beta Analytic)

Section 6 Historic Property Descriptions

6.1 SIHP # 50-10-28-31124

FORMAL TYPE:	Complex
FUNCTION:	Agriculture, habitation
NUMBER OF FEATURES:	13
AGE:	Pre-Contact through historic
TAX MAP KEY:	[3] 7-5-014:001
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # 50-10-28-31124 is a complex comprising 13 features located in the northwestern, undeveloped portion of the project area (see Figure 17). The complex covers an area of 732.28-sq-m, or 0.18 acres (Figure 95). It is bound to the north by the adjacent developed parcel, to the west by a heavily disturbed area (Figure 96), to the south by a bulldozer swath and the coffee trees beyond (see Figure 27), and to the east by additional bulldozer disturbance (Figure 97). The site is situated on a moderately sloping hillside covered in dense vegetation. Observed plant species include avocado (*Persea Americana*), Christmas berry (*Schinus terebinthifolius*), robusta coffee (*Coffea canephora*), palm trees, papaya (*Carica papaya*), passion fruit (*Passiflora edulis*), orange (*Citrus sinensis*), guinea grass (*Panicum maximum*), ti (*kī, Panicum maximum*), rubber vine (*Cryptostegia grandiflora*), ginger (*‘awapuhi, Zingiber zerumbet)*, turmeric (*‘olena, Curcuma longa*), Buddha’s palm (*Alocasia cucullate*)*,* snake plant (*Sansevieria trifasciata Laurentii*). The main feature comprising the “backbone” of the site is Feature A, a *mauka-makai* rock wall running along the northern property boundary. Features B through J are rock terraces extending south from Feature A. Features K and L are concrete foundations situated within the terraces. The surface of the site is scattered with an extensive assortment of historic artifacts. Twelve test units were excavated throughout the site (TU-2 through TU-13; see Section 4.2), revealing numerous traditional and historic artifacts and other cultural materials including faunal bone and charcoal.

Feature A is a *mauka/makai*-oriented stone wall located along the northern project area boundary (see Figure 95, Figure 98, Figure 99, and Figure 100). The wall serves as the backbone from which all the associated terrace walls extend southward or cross-slope. Feature A continues *mauka* beyond SIHP # -31124 along but just beyond the property boundary. West of SIHP # -31124, the wall has been blown out by bulldozing at the northwest corner of the project area; some modern wall segments present in this disturbed area along the property boundary may have utilized material from the original Feature A wall. Feature A is dry stacked 5-6 courses high and exhibits facing. It is not of historic core-filled construction. The wall measures 63.0 m long (east/west) by 1.0 m to 2.0 m wide, with a maximum height of 1.05 m. Two metal survey pins were observed in the feature near its western end. The wall is in good condition exhibiting only a few areas of collapse.

Feature B is a linear terrace wall. This is the most *mauka* cross-slope terrace wall in the site complex (see Figure 95, Figure 101, and Figure 102). The terrace wall measures 8.1 m long (north/south) by 0.9 m wide (east/west) with a maximum height of 1.2 m. The terrace wall is neatly

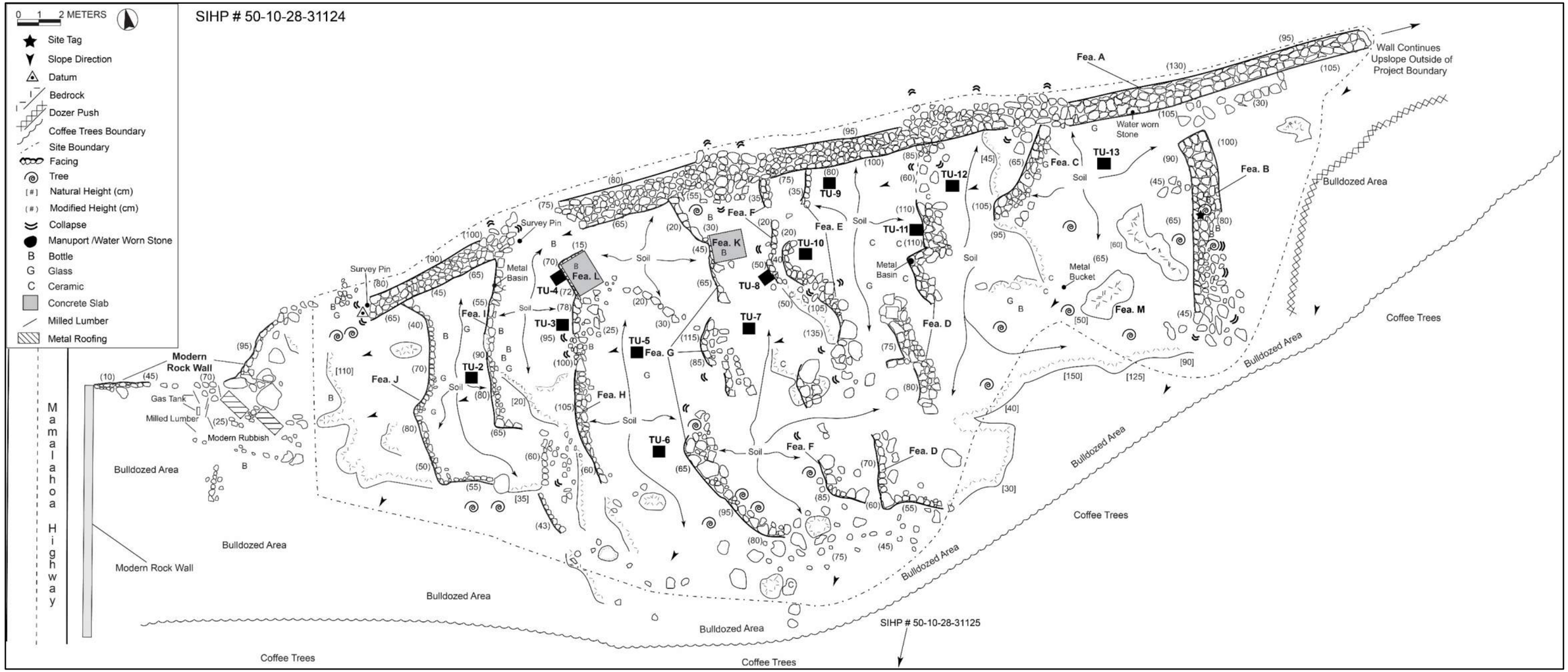

Figure 95. Plan view map of SIHP # 50-10-28-31124

Figure 96. Photo looking up toward SIHP # -31124 from the disturbed area at the northwest corner of the project area; view to northeast

Figure 97. Photo looking down toward SIHP # -31124 from the disturbed area to the east (SIHP # -31124 Feature B is under the tree in the background); view to west

Figure 98. Photo showing a portion of SIHP # -31124 Feature A *mauka-makai* wall; view to west

Figure 99. Photo showing a portion of SIHP # -31124 Feature A *mauka-makai* wall; view to northeast

Figure 100. Photo showing construction of SIHP # -31124 Feature A *mauka-makai* wall; view to northwest

Figure 101. Photo of SIHP # -31124 terrace wall; view to northeast

Figure 102. Photo showing the southern impacted portion of SIHP # -31124 Feature B terrace wall; view to north

Figure 103. Photo of SIHP # -31124 Feature C terrace wall; view to east

stacked 4-5 courses high and exhibits facing. Overall, the wall is in good condition except for at its southern end, where it has been impacted by bulldozing during the development of the coffee orchard. Several historic era bottles were located on the wall and numerous ceramic fragments were observed scattered on the surface of the feature.

Feature C is a linear terrace wall located approximately 5.0 m *makai* of Feature B (see Figure 95, Figure 103, and Figure 104). The terrace wall consists of larger basalt cobbles and boulders loosely stacked 1-3 courses high atop exposed bedrock. It measures 5.5 m long (north/south) by 0.85 m wide (east/west) with a maximum height of 0.8 m. This feature is less formally constructed than the other terrace walls in the complex. Overall, the condition is fair with some collapse. Several pieces of glass and assorted ceramic fragments were observed on and around the feature. TU-13 was excavated in the northern portion of the terrace and yielded fragmental earthenware and volcanic glass (see Figure 95 and Section 4.2.13).

Feature D is an irregularly shaped terrace wall located approximately 3 m *makai* of Feature C (see Figure 95, Figure 105, and Figure 106). The terrace wall is neatly stacked 4-6 courses high and exhibits facing. The feature is breached in three locations. Overall, the terrace wall measures 18.75 m long (north/south) by 0.90 m wide (east/west) with a maximum height of 1.0 m. Overall, the condition of the feature is good except for these breaches and a disturbed portion at the southern end, impacted during the development of the coffee orchard. Numerous historic era artifacts were observed on the wall and scattered around it. These include a metal wash basin, glass and ceramic fragments, and unidentifiable metal fragments. TU-12 was excavated in the northern portion of the terrace and yielded cultural materials including charcoal, a basalt adze fragment, and fragmental glass and porcelain (see Figure 95 and Section 4.2.12).

Feature E is a curved terrace wall located approximately 6 m *makai* of Feature D (see Figure 95 and Figure 107). The wall is stacked 2-4 courses high and exhibits facing. The feature has a breach near Feature A that may have served as a trail providing access to adjacent terraces. The terrace wall measures 6.20 m long (north/south) by 0.90 m wide (east/west) with a maximum height of 0.65 m. A large fallen tree on the terrace has collapsed the central portion of the terrace wall. Overall the feature is in fair condition. Artifacts such as historic-era glass and ceramic fragments are scattered on and around the feature. Three test units were excavated at Feature C: TU-9, TU-10, and TU-11 (see Figure 95). Excavation at these units yielded cultural materials including cow bone, a basalt flake, charcoal, metal nails, and fragmental ceramics, glass, and volcanic glass (see Sections 4.2.9, 4.2.10, and 4.2.11).

Feature F is a linear terrace wall constructed just *makai* of Feature E (see Figure 95, Figure 108, and Figure 109). The wall is stacked 2-4 courses high and exhibits facing. It is breached in three locations along its length. The breach near Feature A may have served as a pathway to the concrete foundation (Feature K). Overall, the terrace wall measures 12.30 m long (north/south) by 0.75 m wide (east/west) with a maximum height of 1.2 m. The southern portion was disturbed during the development of the coffee orchard. The overall condition of the feature is fair. Numerous historic-era artifacts including glass and ceramic fragments were observed on the terrace wall and scattered across the terrace surface.

Feature G is a linear terrace wall situated approximately 3 m *makai* of Feature F (see Figure 95 and Figure 110 through Figure 112). A portion of the terrace wall bounds the *makai* edge of Feature K (concrete pad). The terrace wall is stacked 3-5 courses high and exhibits facing. It is breached in two locations. The terrace wall measures 16.80 m long (north/south) by 0.90 m wide

Figure 104. Photo overlooking the SIHP # -31124 Feature C terrace; view to northeast

Figure 105. Photo of the northern portion of the SIHP # -31124 Feature D terrace wall and terrace behind; view to northeast

Figure 106. Photo showing the southern portion of the SIHP # -31124 Feature D terrace wall; view to southeast

Figure 107. Photo overlooking the SIHP # -31124 Feature E terrace wall and terrace behind; view to northeast

Figure 108. Photo of SIHP # -31124 Feature F terrace wall; view to northeast

Figure 109. Photo showing the SIHP # -31124 Feature F terrace wall interface with the Feature A *mauka-makai* wall (at left); view to northeast

Figure 110. Photo overlooking the northern portion of the SIHP # -31124 Feature G terrace; view to northeast

Figure 111. Photo overlooking the southern portion of the SIHP # -31124 Feature G terrace (scale rod at 2 m); view to southeast

Figure 112. Photo showing the impacted southern portion of the SIHP # -31124 Feature G terrace wall; view to north

Figure 113. Photo overlooking the SIHP # -31124 Feature H terrace wall and terrace behind; view to northeast

(east/west) with a maximum height of 1.2 m. The southern portion was disturbed during the development of the coffee orchard. The overall condition of the feature is fair. Numerous historic-era artifacts were observed on the wall and scattered across the terrace surface. These artifacts include intact glass jugs and bottles, metal buckets and wash basins, and glass and ceramic fragments. Two test units (TU-7 and TU-8) were excavated in the central portion of Feature G (see Figure 95). Excavation at these units yielded fragmental ceramics, glass, and a glass button (see Sections 4.2.7 and 4.2.8).

Feature H is a linear terrace wall located approximately 10 m *makai* of Feature G (see Figure 95, Figure 113, and Figure 114). A portion of the terrace wall bounds the *makai* edge of the Feature L concrete pad, and the terrace wall may have been adapted for the Feature L construction. The terrace wall is neatly stacked 4-6 courses high and exhibits facing. This terrace is detached from Feature A, possibly to facilitate access to adjacent features of the site. The terrace wall measures 13.40 m long (north/south) by 0.90 m wide (east/west) with a maximum height of 1.2 m. The terrace wall is one of the more notable terraces in the site complex based on size, condition, and abundance of historic-era artifacts. The feature is in excellent condition with artifacts such as glass one-gallon jugs, Clorox bottles, metal wash basins and tubs, and scattered glass and ceramic fragments. The southernmost portion of the terrace wall, like other terraces upslope, has been impacted during the development of the coffee orchard. Two test units (TU-5 and TU-6) were excavated in the central portion of Feature G (see Figure 95). TU-5 was sterile; TU-6 yielded fragmental ceramics and glass (see Sections 4.2.5 and 4.2.6).

Feature I is a linear terrace wall situated approximately 4 m *makai* of Feature H (see Figure 95, Figure 115, and Figure 116). The wall is neatly stacked 2-4 courses and exhibits facing. The terrace wall measures 13.0 m long (north/south) by 0.95 m wide (east/west) with a maximum height of 1.0 m. The feature is in good condition with minimal collapse. Artifacts such as glass gallon jugs, Clorox bottles, metal wash basins, and glass and ceramic fragments are scattered across the feature. The southernmost portion of the terrace wall, like other terraces upslope, has been impacted during the development of the coffee orchard. Two test units (TU-3 and TU-4) were excavated in the northern portion of Feature I (see Figure 95). Excavation at these units yielded cultural materials including faunal bone and fragmental glass and metal (see Sections 4.2.3 and 4.2.4).

Feature J is an irregular terrace wall located approximately 3 m *makai* of Feature I (see Figure 95 and Figure 118). This is the most *makai* terrace in the site complex and one of the most intact and well-constructed. The terrace wall is built directly atop exposed bedrock. Feature J is neatly stacked 2-3 courses high and exhibits facing. The terrace wall measures 11.0 m long (north/south) by 0.60 m wide (east/west) with a maximum height of 0.90 m. The feature is in excellent condition. Historic-era artifacts such as glass one-gallon jugs, Clorox bottles, metal wash basins, and fragmental glass and ceramic are scattered across the feature. TU-2 was excavated in the central portion of Feature J and yielded fragmental glass and metal (see Figure 95 and Section 4.2.2).

Feature K is a small square concrete pad or foundation located along the northern portion of the Feature G terrace wall (see Figure 95 and Figure 119). It measures 2.3 m long (north/south) by 2.3 m wide (east/west). The concrete pad is 5.0 cm thick. It is in fair condition, intact but exhibiting numerous cracks. Several glass one-gallon jugs and glass and ceramic fragments were observed on the concrete slab. The feature may have supported machinery or a fixture of some type and likely served as an activity or processing area.

Figure 114. Photo showing the southern portion of the SIHP # -31124 Feature H terrace wall; view to northeast

Figure 115. Photo showing the SIHP # -31124 Feature I terrace wall and terrace behind, at the interface with Feature A *mauka-makai* wall; view to northeast

Figure 116. Photo overlooking the southern portion of the SIHP # -31124 Feature I terrace wall and terrace behind; view to east

Figure 117. Photo overlooking the northern portion of the SIHP # -31124 Feature J terrace wall; view to east

Figure 118. Photo overlooking the southern portion of SIHP # -31124 Feature J; view to northeast

Figure 119. Photo of SIHP # -31124 Feature K; view to northeast

Feature L is a small, rectangular concrete pad or foundation similar to Feature K, located along the northern end of the Feature H terrace wall (see Figure 95 and Figure 120). It measures 2.0 m long (north/south) by 1.2 m wide (east/west). The concrete pad is 3.0 cm thick; it was poured atop a rectangular stone base that appears to be a modification to the Feature H terrace wall. It is in fair condition, intact but exhibiting numerous cracks. Several glass one-gallon jugs, a metal basin, and glass and ceramic fragments were observed on the concrete slab. The feature may have supported machinery or a fixture of some type and likely served as a historic activity or processing area.

Feature M is a petroglyph of a *kanji* character that translates as “gold” or “money.” The character is located on a bedrock outcrop approximately 5.0 m west of Feature B (see Figure 95 and Figure 121). The symbol measures 15 cm long by 22 cm wide. The feature was created by chiseling into the bedrock outcrop. The depth of the inscription ranges from 3-5 mm. It is in excellent condition. The feature was likely created by Japanese farmers occupying the site in the early part of the twentieth century.

SIHP # -31124 is a pre-Contact through historic era site complex characterizing an intact portion of the Kona Field System that was subsequently modified for use into the twentieth century. Radiocarbon dates from charcoal samples collected during testing at the site yielded date ranges in line with this assessment (see Section 5.3.2). The terrace system extending from Feature A is a remnant of a planting field or *kīhāpai* situated within the greater field system. These terraces were modified and utilized during the historic era for habitation and associated activity, as evidenced by the presence of concrete foundations and an extensive assemblage of historic artifacts. In pre-Contact times this complex would have likely extended further outward in all directions, but the surrounding areas were impacted over time by progressive land uses. Based on the presence of the *kanji*, other Japanese artifacts (ceramics, bottles), and the establishment of a Japanese community in this part of upland Kona historically, it is likely the site was utilized by Japanese farmers.

SIHP # 50-10-28-31124 retains integrity of location, design, setting, materials, workmanship, and feeling, despite its historic and modern disturbance. The site no longer retains integrity of association, as it represents only an isolated remnant of what was once an extensive and continuous field system. It is assessed as significant under Criterion d for the important information it has yielded about pre-Contact and historic land use.

Figure 120. Photo of SIHP # -31124 Feature L; view to southeast

Figure 121. Photograph of SIHP # -31124 Feature M; view to west

6.2 **SIHP # 50-10-28-31125**

FORMAL TYPE:	Causeway
FUNCTION:	Transportation
NUMBER OF FEATURES:	1
AGE:	Historic
TAX MAP KEY:	[3] 7-5-014:001
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # 50-10-28-31125 is an earth and stone causeway located within the western portion of the project area (see Figure 17 and Figure 122 through Figure 126). The site is within maintained rows of coffee and is situated between the modern asphalt driveway and the bulldozer swath adjacent to SIHP # -31124. It extends cross-slope, or roughly north-south, through a natural depression.

The SIHP # -31125 causeway is tapered from the bottom up creating a level, two-track travel surface narrower than its base. The site measures 90.5 m long (north/south) by 7.0 m wide (east/west) at the base and 3.2 m wide at the surface, with a maximum height of 1.6 m. At either end the causeway height decreases until it is flush with the natural topography. The overall area of the site is 519.60-sq-m or 0.13 acres. The site is generally in good condition and appears to have not been significantly impacted by the planting of coffee trees upon it. The southernmost approximately 14.0 m of the berm have been disturbed by bulldozing, which likely occurred when the modern asphalt driveway was constructed. The northern end terminates at the bulldozer swath adjacent to SIHP # -31124 Feature C. No cultural materials were observed on the surface, which was as expected given the ongoing maintenance of the coffee plantation.

The morphology of SIHP # -31125 is consistent with a raised travel surface such as a driveway or cart road. The berm would have allowed a single vehicle access from Māmalahoa Highway through a topographical depression in the project area. It may have been associated with a structure depicted in the interior of the project area on a 1924 USGS map (see Figure 11). The 1954 USGS map (see Figure 12) does not depict this interior structure, but does indicate the presence of structures on the properties adjacent to the north and south. In order to access the structure(s) to the north directly, the causeway travel route would have needed to cross SIHP # -31124, and there is no evidence of this. It is possible the causeway may have been intended to access the SIHP # -31124 site, where historic activity was occurring. Alternatively, it may have functioned to access and maintain agricultural fields such as those visible in the project area on the 1977 aerial photo (see Figure 13). On the 1977 photo, the causeway can be seen running along the western side of two distinct rectangular agricultural plots.

Despite its impacts from agricultural and modern driveway development, SIHP # -31125 retains integrity of location, design, setting, materials, and workmanship. It is assessed as significant under Criterion d for the information it has yielded about historic land use in the study area.

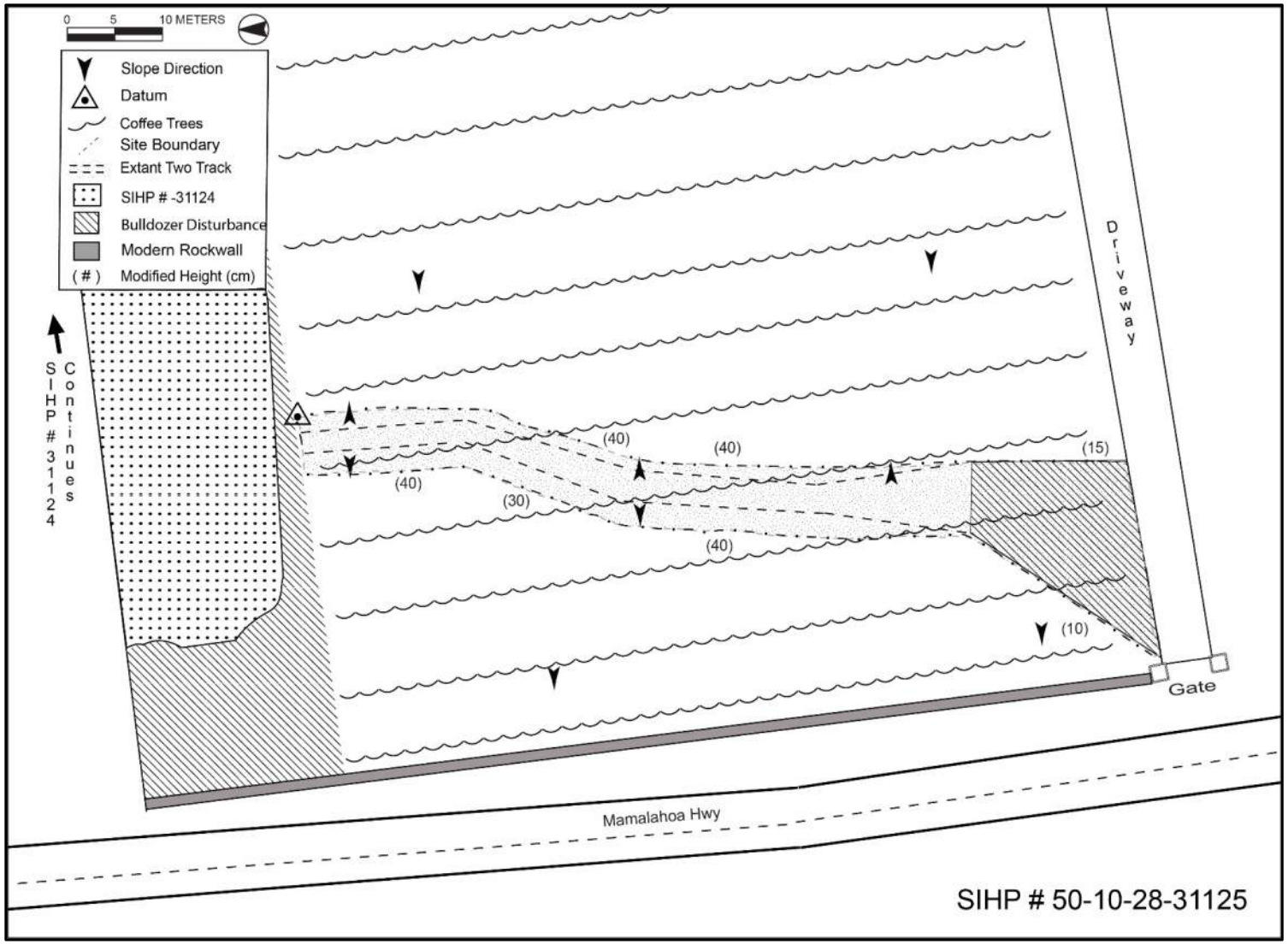

Figure 122. Plan view map of SIHP # 50-10-28-31125

Figure 123. Photo of the northern portion of SIHP # -31125; view to north

Figure 124. Photo showing the tapered *mauka* edge of SIHP # -31125, which is planted in coffee; view to northwest

Figure 125. Photo showing the disturbed southern portion of SIHP # -31125; view to southwest

Figure 126. Photo showing the interface of SIHP # -31125 with the modern asphalt driveway; view to northwest

6.3 **SIHP # 50-10-28-31126**

FORMAL TYPE:	Terrace
FUNCTION:	Agriculture
NUMBER OF FEATURES:	1
AGE:	Pre-Contact through historic
TAX MAP KEY:	[3] 7-5-014:001
LAND JURISDICTION:	Private
PREVIOUS DOCUMENTATION:	None

SIHP # 50-10-28-31126 is a terrace situated in the central portion of the project area between the driveway and the southern project boundary (see Figure 17). Downslope of the terrace are rows of mature coffee trees. The area directly *mauka* of the terrace wall is densely vegetated with mature trees including royal palm, African tulip, and an orange tree. Dense roots are visibly intertwined within the structure of the terrace wall.

The SIHP # -31126 terrace wall is oriented cross-slope, or north-south, and measures 16.0 m long (north/south) by 1.1 m wide with a maximum height of 0.80 m (Figure 127 through Figure 129). It is constructed with dry stacked large cobbles and small to medium boulders. The stones are neatly stacked 2-4 courses high on soil and bedrock, and the more intact northern end of the feature closer to the driveway exhibits facing. An area of retained soil is present above the terrace wall. The wall is in fair condition with intermittent areas of collapse due to root disturbance; the southern portion of the wall has been largely scattered. Including the level area that the terrace wall retains to the east, the entire site measures approximately 16.0 m long (north/south) by 8.5 m wide (east/west), with an overall area of 136.04 sq-m or 0.3 acres. Several ceramic and glass fragments were observed on the ground surface at the site.

TU-1 was excavated through the northern-central portion of the SIHP # -31126 terrace wall (see Figure 127). Volcanic glass and historic artifacts including a small horseshoe (possibly for a donkey), marble, bottle stopper, and fragmental glass, porcelain, metal, and stoneware were collected from the portion of the unit downslope of the terrace wall (see Section 4.2.1). These materials were evenly distributed throughout this portion of the unit, suggesting a secondary deposition in surface runoff and/or due to bulldozing for the coffee plantation around the site. No artifacts were encountered in the portion of the unit *mauka* of the terrace wall, though the sediments here have been heavily disturbed by the numerous tree roots.

The nature and location of SIHP # -31126 identifies it as a traditional Hawaiian agricultural feature that has undergone historic and/or modern modification. This terrace wall is an isolated remnant of a planting field or *kīhāpai* situated within the greater Kona Field System. Like SIHP # -31124 on the northern project boundary, SIHP # -31126 is within a portion of the project area not improved to plant coffee. The facing at the northern end closer to the driveway may be a historic or modern improvement to the original terrace wall. While the historic artifacts in TU-1 may not have originated at SIHP # -31126, their presence is indicative of the historic land use that occurred on the property. Despite its modifications, the site retains integrity of location, design, setting, materials, and workmanship. It is assessed as significant under Criterion d for the information it has yielded about pre-Contact and historic land use in the study area.

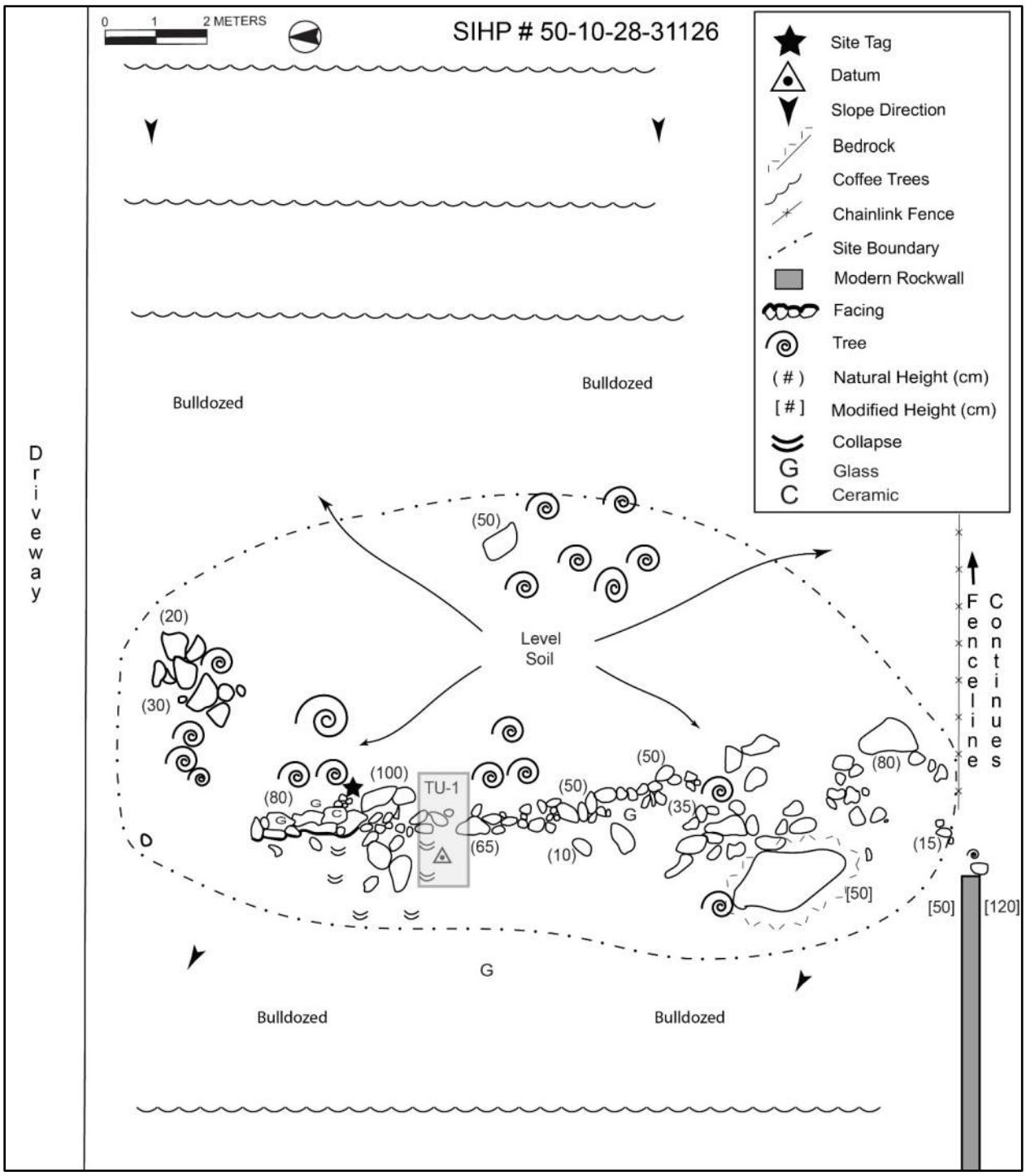

Figure 127. Plan view map of SIHP # 50-10-28-31126

Figure 128. Photo of SIHP # -31126; view to east

Figure 129. Photo of SIHP # -31126; view to south

Section 7 Summary and Interpretation

Fieldwork for this AIS was undertaken intermittently between 12 November 2019 and 12 February 2020. The fieldwork included a 100% pedestrian inspection of the project area, a program of subsurface testing, and associated GPS data collection. Except for two areas of dense vegetation in the vicinity of SIHP #s -31124 and -31126, ground visibility was very good.

The project area has been extensively altered by agricultural activity beginning in the pre-Contact era with the development of the Kona Field System. In the latter half of the nineteenth century the project area came to be used for new types of agriculture and related habitation, and small farming villages began to form along the Māmalahoa Highway. This land use has continued into the modern era, as the project area parcel has been developed as a coffee plantation subject to ongoing maintenance and harvesting activities.

Three historic properties were newly identified within the project area during the AIS. These include SIHP #s -31124, a complex representing a portion of the Kona Field System adapted for historic use; -31125, a berm utilized as a historic driveway; and -31126, a pre-Contact agricultural terrace with historic and/or modern modifications.

A program of manual subsurface testing was conducted for the AIS. Twelve test units were excavated within seven features at SIHP # -31124, and one test unit was excavated at SIHP # -31126. The subsurface testing effort revealed one to two distinct layers of natural brown to dark grayish brown silty clay loam consistent with Honuaulu series soils. All 13 units were excavated to bedrock. Sediments ranged in depth from 32–75 cm below surface (cmbs). While a variety of cultural materials were identified during the subsurface testing program, no lava tubes or human remains were encountered.

The cultural materials encountered during the subsurface testing program were consistent with expectations regarding previous land use in the project area. Radiocarbon analysis of charcoal from short-lived native wood species collected from TU-12 indicate SIHP # -31124 was likely in use from the latter 1600s into the 1930s. While some traditional lithic materials were encountered, including a piece of a basalt adze, no marine shell midden was present. These findings are supportive of the analysis that SIHP # -31124 was part of a pre-Contact agricultural site, where agricultural work activities were taking place as opposed to habitation. The SIHP # -31124 artifact assemblage indicates that in historic times the site functioned more as a habitation-related or multi-purpose space; in addition to the numerous household-type artifacts, cow bones interpreted as food remains were identified at two features. The historic materials were concentrated within the upper limits of the test units. Subsurface testing at SIHP # -31126 yielded a similar assemblage of lithic material (volcanic glass) and historic artifacts.

Geochemical analysis of the adze fragment found at SIHP # -31124 indicates consistency with a group of basalt objects encountered in Kona for which the material may have originated from another Hawaiian island, underscoring the wide reach of pre-Contact trade networks. Another basalt flake found during excavation at SIHP # -31124 was sourced to Mauna Kea. Volcanic glass found through the project area was consistent with more localized sources, including Pu‘u Wa‘awa‘a and Mauna Loa.

Section 8 Significance Assessments

Under HRS §6E, for a historic property to be significant under HAR §13-275-6 (applicable to government projects), the historic property should possess integrity of location, design, setting, materials, workmanship, feeling, and/or association, and meet one or more of the following significance 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; or

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.

SIHP #s 50-10-28-31124, -31125, and -31126 within the project area possess integrity of location, design, setting, materials, and workmanship. SIHP # -31124 also possesses integrity of feeling.

Pursuant to HAR §13-275-6, all three sites in the project area (SIHP #s 50-10-28-31124, -31125, and -31126) are assessed as significant under Criterion d for the important information they have yielded about pre-Contact and historic land use.

Section 9 Project Effect and Mitigation Recommendations

9.1 Project Effect

In accordance with HAR §13-275-7, the DHHL has determined the project effect is "effect, with proposed mitigation commitments."

9.2 Mitigation Recommendations

The three archaeological historic properties documented within the project area (SIHP #s 50-10-28-31124, -31125, and -31126) have been assessed as significant under Criterion d pursuant to HAR §13-275-6(b) for the information they have yielded about pre-Contact and historic land use within the project area. These historic properties have been adequately documented and, thus, no further archaeological documentation or any mitigation is recommended.

Archaeological monitoring of project-related ground disturbance is proposed to facilitate identification for information purposes of any subsurface remnants of historic properties beneath the coffee fields that may be encountered, including but not limited to culturally modified lava tubes, although such findings are unexpected.

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2014 *Archaeological Monitoring Report for Hōlualoa Elementary Electrical Upgrade Project, Hōlualoa Ahupua‘a, North Kona District, Island of Hawai‘i, TMK (3) 7-6-004:002 and 7-6-005:015.* Cultural Surveys Hawai‘i, Inc., Kailua, Hawai‘i.

Worth Point

2020 *Dainippon Brewery Co. Ltd. Beer Vintage WW-II Bottle.* Electronic document, https://www.worthpoint.com/worthopedia/dainippon-brewery-co-ltd-beer-vintage-119057839.

Appendix A SHPD Correspondence

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

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

May 14, 2019

IN REPLY REFER TO:
Log No.: 2019.00795
Doc. No.: 1905SN19
Archaeology

Andrew Choy, Acting Planning Program Manager
Department of Hawaiian Home Lands
91-5420 Kapolei Parkway
Kapolei, HI 96805
Andrew.H.Choy@hawaii.gov

Dear Mr. Choy:

SUBJECT:

HRS Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review – Department of Hawaiian Home Lands' Initiation of Consultation for the North Kona Well Construction Project
Kahului Ahupua‘a, North Kona District, Island of Hawai‘i
TMK: (3) 7-5-014:001

This letter provides the State Historic Preservation Division's (SHPD's) review of the proposed Department of Hawaiian Home Lands (DHHL) well construction project that was received by our office on April 12, 2019. The submittal included a letter from DHHL initiating consultation pursuant to HRS 6E-8 and HAR §13-275-5(b). This DHHL project will receive funding from the US Department of Agriculture (USDA) and is therefore a federal undertaking as defined in 36 CFR 800.16(y). The proposed project is subject to compliance with Section 106 of the NHPA and with historic preservation review under Hawaii Revised Statutes (HRS) Chapter 6E-8.

At this time, the USDA has not yet determined that the current project as an undertaking and has not initiated the Section 106 process with the SHPO. The USDA has also not provided the SHPO with an area of potential effects (APE), identified potential historic properties, initiated consultations or provided a determination of effect. DHHL has provided information regarding potential historic properties located within the current project area.

The project involves the construction of a 2.0-million-gallon reservoir, with wells, pumps, a control building, and an access road linking the project area to the Mamalahoa Highway. The reservoir will be approximately 200 ft. x 200 ft. with a maximum depth of 25–30 ft. The access road will be approximately 500 ft. long and 30 ft. wide. The current submittal includes an archaeological literature review and field inspection report (Bautista et al, February 2019) that indicates the presence of historic properties in the vicinity and that the current project area is within the boundaries of the Kona Field System (SIHP 50-10-32-06601). Pursuant to HAR §13-275-5(b), the DHHL requests concurrence from SHPD regarding the need to conduct an archaeological inventory survey for the current project area.

Due to the presence of identified historic properties in the vicinity, as described in the LRFI, and the current project's location within the boundaries of the Kona Field System, **the SHPD concurs with DHHL's proposed request for an AIS** to be conducted in order to identify and document any historic properties present within the current project area and to provide any necessary mitigation measures. This AIS also will aide in the identification processed required under 36 CFR 800. Consultation with SHPD will determine the level of subsurface testing for the proposed project area.

Mr. Yee
May 14, 2019
Page 2

Please contact Sean Nāleimaile at (808) 933-7651 or at Sean.P.Naleimaile@Hawaii.gov if you have any questions or concerns regarding this letter.

Aloha,
Alan Downer

Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

cc. Joanne Hiramatsu, jhiramatsu@bchdesign.com
Halealoha Ayau, e.halealoha.ayau@hawaii.gov
JamesDuPont, james.w.dupont@hawaii.gov
Stewart Matsunaga, stewart.t.matsunaga@hawaii.gov
Jeffrey Fujimoto, jeffrey.y.fujimoto@hawaii.gov

Appendix B HRHP Archaeological Cover Sheet for SIHP # 50-10-32-06601 (Kona Field System)

ARCHAEOLOGICAL COVER SHEET 7-7-04:20 Allenglow

HAWAII REGISTER OF HISTORIC PLACES

50 - 10 - 37 - 6601 (1 2 3 4 5 6 7 8 9)
SITE IDENTIFICATION NUMBER

SITE NAME/TYPE: KONA Field System
DISTRICT: North and South KONA
AREA: 1,392 square Kilometers
CATEGORY: ___Single Feature X Complex ___Places
OWNERSHIP: X Public X Private
PHOTOGRAPHS: X Yes ___No (Temp/Tech)
KNOWN PRESSURES ON SITE: URBANIZATION

2 (10) 1 (11) PRE-1778 (12 13 14 15 16 17 18 19 20)
CARD No. DATE/PERIOD

PRESENT LAND USES: MULTIPLE

DESTRUCTION: ___No Known Future Danger X Possible Future Danger ___Future Danger Certain ___Present Danger ___Presently Being Destroyed

STATUS: ✓Occupied ✓Unoccupied CONDITION: ___Excellent ✓Good ___Fair ___Deteriorated

INTEGRITY: ✓Unaltered, Orig Loc ___Unaltered, Moved ___Altered, Orig Loc ___Altered, Moved

ACCESSIBILITY: ___Unrestricted ✓Restricted ___Inaccessible

LEGENDARY MATERIALS KNOWN: ___Yes ✓No WRITTEN HISTORICAL MATERIALS: ✓Yes ___No

IMPORTANCE AS EXAMPLE OF TYPE SITE: ✓Good ___Moderate ___Poor

SUSCEPTABILITY TO INTERPRETATION: ✓Good ___Moderate ___Poor

RESEARCH POTENTIAL: ✓Good ___Moderate ___Poor

LOCAL ATTITUDES ABOUT SITE: ___Valuable ___Moderate Value ___Low Value ___Ambivalent ✓Unknown

BRIEF DESCRIPTION (Columns 21-80): MASSIVE ANCIENT HAWAIIAN Field System measuring 3 by 18 miles

STAFF EVALUATION: X High Value ___Valuable ___Reserve ___Marginal

SUGGESTED THEMES: Polynesian Hawaii, AGRICULTURE, SETTLEMENT PATTERNS, Habitation

DATE SUBMITTED TO REVIEW BOARD: _____

REVIEWER'S RECORD AND EVALUATION

NAME: _____ DATE REVIEWED _____

CATEGORY: ___High Value ___Valuable ___Reserve ___Marginal

SIGNIFICANCE: ___National ___State ___Local

RECOMMENDED DISPOSITION: ___Nominate National Register ___State Register ___Staff Files

RECOMMENDED THEMES: _____

REVIEWER'S COMMENTS: _____

REVIEW BOARD EVALUATION RECORD

DATE REVIEWED: _____ RECORDER: _____

OFFICIAL CATEGORY: ___High Value ___Valuable ___Reserve ___Marginal

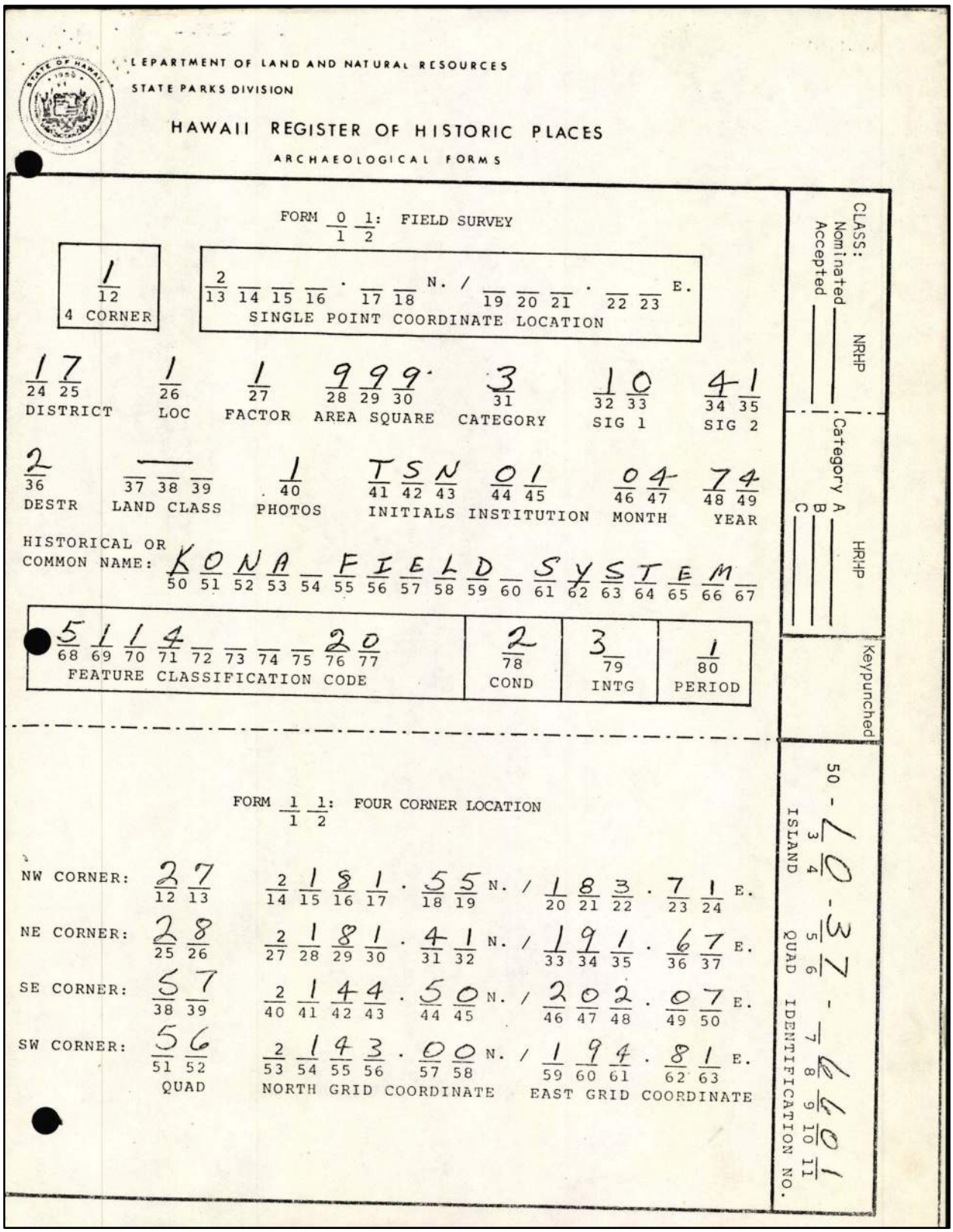
OFFICIAL SIGNIFICANCE: ___National ___State ___Local

OFFICIAL THEMES: _____

OFFICIAL DISPOSITION: ___National Register Nomination ___State Register ___Staff Files

REVIEW BOARD COMMENTS: _____

VOTING RECORD: Daws ___ Hormann ___ Jackson ___ Kikuchi ___
Lind ___ Mark ___ Nagata ___ Paglinawan ___
Roche ___ Tuggle ___



DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE PARKS DIVISION

HAWAII REGISTER OF HISTORIC PLACES
ARCHAEOLOGICAL FORMS

FORM 01: FIELD SURVEY

CLASS: Nominated / Accepted — NRHP — Category A / B / C — HRHP — Keypunched

1 (12) 4 CORNER

2 (13) __ __ __ __ . __ __ N. / __ __ __ . __ __ E. (19–23)
SINGLE POINT COORDINATE LOCATION

17 (24 25)	1 (26)	1 (27)	999. (28 29 30)	3 (31)	10 (32 33)	41 (34 35)
DISTRICT	LOC	FACTOR	AREA SQUARE	CATEGORY	SIG 1	SIG 2

2 (36)	— (37 38 39)	1 (40)	TSN (41 42 43)	01 (44 45)	04 (46 47)	74 (48 49)
DESTR	LAND CLASS	PHOTOS	INITIALS	INSTITUTION	MONTH	YEAR

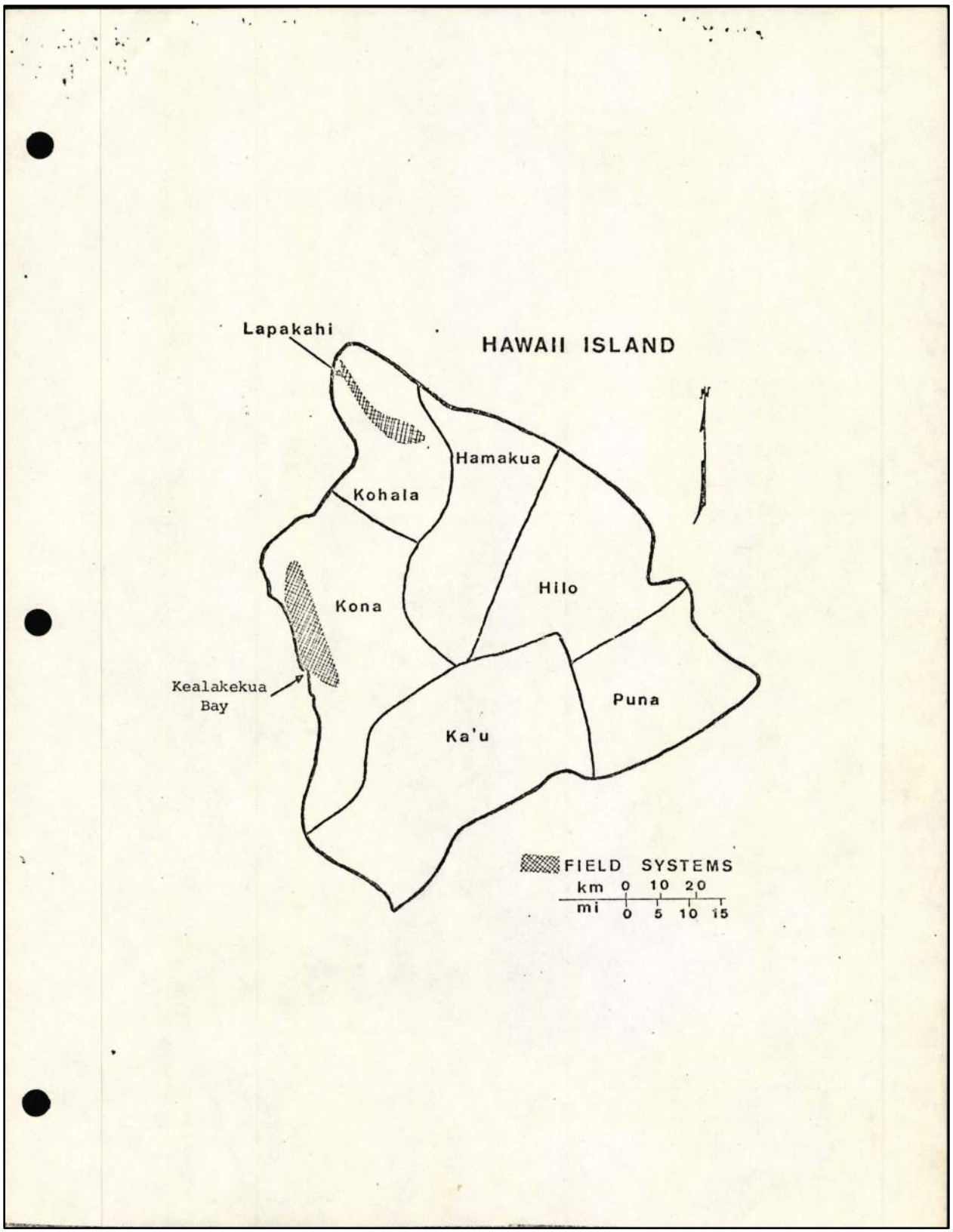
HISTORICAL OR COMMON NAME: KONA FIELD SYSTEM (50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67)

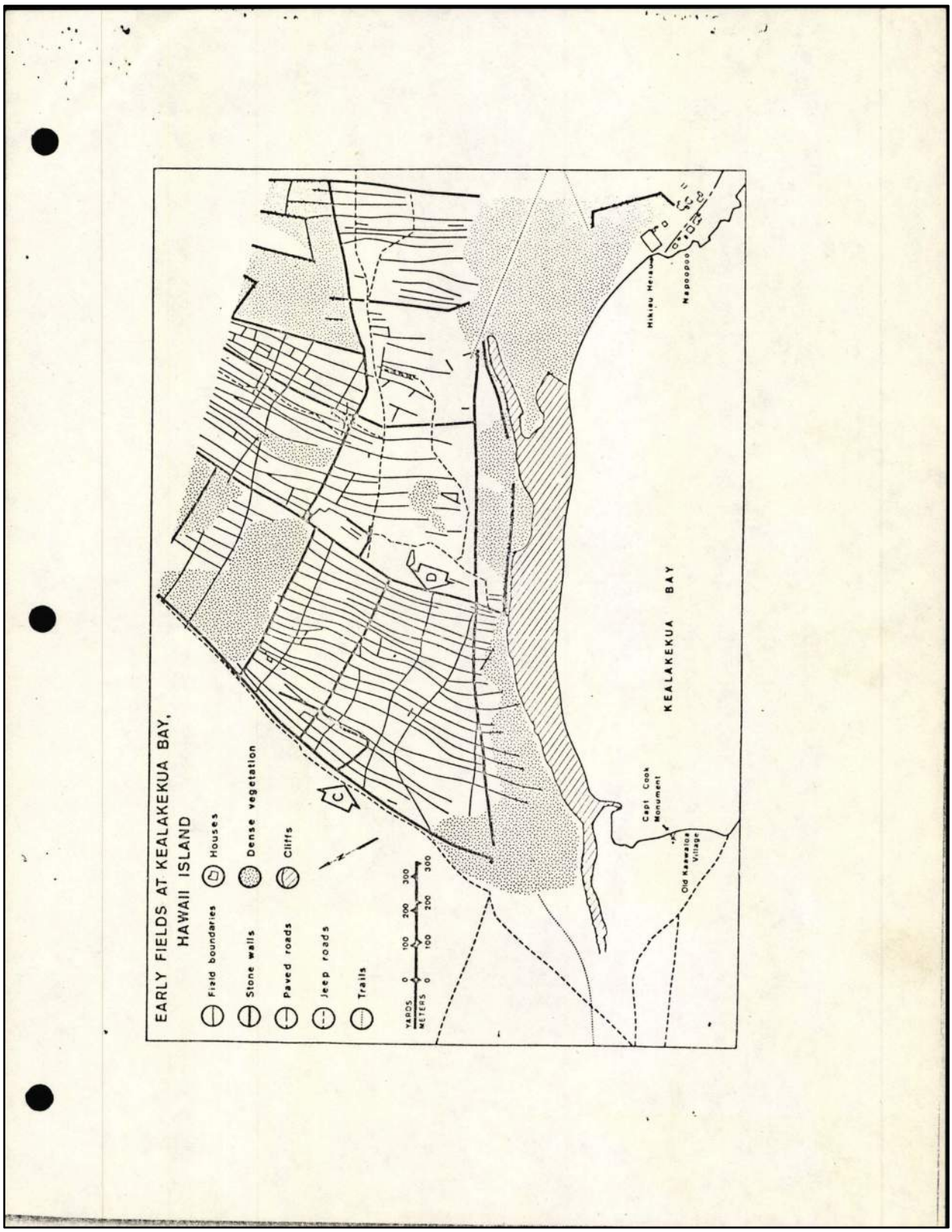
5114 __ __ __ __ 20 (68 69 70 71 72 73 74 75 76 77)	2 (78)	3 (79)	1 (80)
FEATURE CLASSIFICATION CODE	COND	INTG	PERIOD

FORM 11: FOUR CORNER LOCATION

NW CORNER:	27 (12 13)	2 (14) 18 (15 16) 17 (17) . 55 (18 19) N. / 183 (20 21 22) . 71 (23 24) E.	
NE CORNER:	28 (25 26)	2 (27) 18 (28 29) 17 (30) . 41 (31 32) N. / 191 (33 34 35) . 67 (36 37) E.	
SE CORNER:	57 (38 39)	2 (40) 14 (41 42) 43 (43) . 50 (44 45) N. / 202 (46 47 48) . 07 (49 50) E.	
SW CORNER:	56 (51 52)	2 (53) 14 (54 55) 36 (56) . 00 (57 58) N. / 194 (59 60 61) . 81 (62 63) E.	
	QUAD	NORTH GRID COORDINATE	EAST GRID COORDINATE

50 - 10 (3 4) - 37 (5 6) - 6601 (7 8 9 10 11)
ISLAND QUAD IDENTIFICATION NO.


Lapakahi
HAWAII ISLAND
N
Hamakua
Kohala
Kona
Hilo
Kealakekua
Bay
Puna
Ka'u
FIELD SYSTEMS
km 0 10 20
mi 0 5 10 15


EARLY FIELDS AT KEALAKEKUA BAY,
HAWAII ISLAND
Field boundaries
Houses
Stone walls
Dense vegetation
Paved roads
Cliffs
Jeep roads
Trails
YARDS
METERS
KEALAKEKUA BAY
Capt Cook Monument
Old Kaawaloa Village
Napoopoo

FEATURE DESCRIPTION FORM

50 - 10 - 37 - 6601
ISLAND QUAD IDENTIFICATION NO.

VERBAL DESCRIPTION MUST INCLUDE: bearings and sources used to locate feature; size; shape; construction technique; materials used; terrain features; condition; surface artifacts; midden. SIGNIFICANCE STATEMENT MUST INCLUDE: research potential; interpretive potential; unusual or important characteristics; probable function; importance as representative of its class; recommendation of Register status.

DESCRIPTION:
The most extensive and monumental work of ancient Hawaii is the Kona Field System, lying along the western side of Hawaii Island. This field system is so extensive that it can only be appreciated from an airplane or by air photos, for it is an integrated complex of remains three by eighteen miles in size. The fields form a patterned network of elongated rectangles lying as a band parallel to the sea.

Ground inspections in the Kealakekua Bay area have shown that the patterning is caused by earthen and rock ridges which enclose rectangular field areas, generally oriented with their long axis perpendicular to the sea. This places the long sides of each rectangular field perpendicular to the topographic contours and parallel to the terrain slope. Individual fields vary in size from 9 meters (30 feet) wide by 15 meters (50 feet) long to fields measuring 50 by 300 meters (150 by 1,000 feet). The field dimensions appear related to local topography. A field may widen to take in a feature, such as an outcropping, or it may narrow to go around one, for example.

Some field boundaries are well constructed of stacked stone while others are merely piles of rock lining the field borders. These walls vary in height from about 0.5 to 1.0 meters (1.5 to 3 feet). The earthen mounds vary from about 0.5 to 1 meters (1.5 to 3 feet) in height and are quite rounded. The width of these field boundaries ranges from about 1 meter (3 feet) for well constructed stone walls to about 3 meters (9 feet) for the rounded earthen mounds.

There was no evidence of irrigation as shown by traces of water diversion or by terracing; the mounds and walls apparently were for rainfall retention, boundary markers and depositories for field rocks. In addition, the upslope orientation of the fields rules against their use for holding surface water, indicating that water was limited to rainfall.

The general symmetry of the Kealakekua fields, and of the whole Kona System, is well designed to take advantage of the western Hawaii Island environment. The orientation maximizes the available sunlight and exposure to periodic rain showers. The alignment would have made the crops susceptible to high velocity trade winds were it not for the protection of Mauna Loa. On-shore winds are generally light so physical damage or excessive plant evapo-transpiration would not have been a crucial factor in field alignment, contrary to the situation in Kohala.

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

VERBAL DESCRIPTION MUST INCLUDE PERTINENT DATA ON: bearings and sources used to locate feature; terrain and vegetation; size; shape; construction technique; materials used; condition; surface artifacts or midden visible. SIGNIFICANCE STATEMENT MUST INCLUDE: unusual or important characteristics; accessibility; interpretive and research potential; evaluation of the site's importance as a representative of its class; recommendations for register category.

(Page Two)

Excellent historical documentation exists for the Kona Field System, primarily through the journal of Archibald Menzies, the surgeon and naturalist with Captain George Vancouver, who visited periodically between A.D. 1792 and 1794. He made two trips inland through portions of the Kona Field System, from the coast to its upper elevations. In his walk through the northern portion of the Kona Field System, Menzies left Kailua to ascend Hualalai, noting:

> "We commenced our march with a slow pace, exposed to the scorching heat of the meridian sun, over a dreary barren track of a gradual ascent, consisting of little else than rugged porous lava and volcanic dregs, for about three miles, when we entered the breadfruit plantations whose spreading trees with beautiful foliage were scattered about that distance from the shore along the side of the mountain as far as we could see on both sides. Here the country began to assume a pleasant and fertile appearance, through which we continued our ascent for about two miles further, surrounded by plantations of the esculent roots and vegetables of the country, industriously cultivated, till we came to the uppermost village consisting of a few scattered huts ... (p. 154).

After reaching the summit of Hualalai, Menzies and his group angled south directly toward Kaawaloa at Kealakekua Bay instead of returning to Kailua. Descending out of the forest, he noted:

> "... we found the lower edge of it (the forest) as in other places, adorned with rich plantations of plantains and bananas (p. 167)."

The most extensive description of the Kona Field System comes from a similar trip by Menzies at Kealakekua Bay, near the southern end of the field system. After leaving Kaawaloa, Menzies observed:

> The forenoon was far spent in arranging and equipping the party before we left the village (Kaawaloa), and as our route lay directly back from it, over a dry barren rocky country, up a steep ascent, in the scorching heat of the day, the first part of our journey was rather fatiguing, before we gained the summit of the eminence over the bay, where we met a refreshing breeze, and had

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

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(Page Three)

an extensive prospect of the country and villages to the southward of us. The tract which extended along shore, if we might judge from its appearance and our knowledge of that which we had already traveled over, we were ready to pronounce a dreary naked barren waste, if we except a few groves of cocoa palms here and there near the villages. But that which stretched higher up along the verge of the woods from the manner it was industriously laid out in little fields exhibited a more pleasing and fertile appearance.

On leaving this station, we soon lost sight of the vessels, and entered their bread-fruit plantations, the trees of which were a good distance apart, so as to give room to their boughs to spread out vigorously on all sides, which was not the case in the crowded groves of Tahiti, where we found them always planted on the low plains along the sea side. But here the size of the trees, the luxuriancy of their crop and foliage, sufficiently show that they thrive equally well on an elevated situation. The space between these trees did not lay idle. It was chiefly planted with sweet potatoes and rows of cloth plant /wauke/. As we advanced beyond the bread-fruit plantations, the country became more and more fertile, being in a high state of cultivation. For several miles round us there was not a spot that would admit of it but what was with great labor and industry cleared of the loose stones and planted with esculent roots or some useful vegetables or other. In clearing the ground, the stones are heaped up in ridges between the little fields and planted on each side, either with a row of sugar cane or the sweet root of these islands (Dracena ferrea, Linn) /ti/ where they afterwards continue to grow in a wild state, so that even these stony, uncultivated banks are by this means made useful to the proprietors, as well as ornamental to the fields they intersect.

The produce of these plantations, besides the above mentioned, are the cloth plant (Morus papyriferus, Linn.) /wauke/, taro, and sweet potatoes. The latter are here planted three or four feet apart and earthed up around their stems much in the same manner as the common

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

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(Page Four)

potatoes are treated in England. When they dig up any, we remarked that, after stripping off the potatoes, they carefully put the old plant back again in the ground for the ensuing crop. But the taro, being naturally an aquatic plant, required in this dry soil a very different treatment. There were generally two or three of them planted together in a hole about nine inches below the surface of the ground. These holes were about four feet apart, and as the plants grew up, the earth is gathered round their stems in the form of a basin to retain the water, either from rain or otherwise, about their roots. The whole field is generally covered with a thick layer of hay, made from long, coarse grass or the tops of sugar cane, which continually preserves a certain degree of moisture in the soil that would otherwise be parched up by the scorching heat of the solar rays. In this way they rear up these roots to very great perfection even on a dry elevated situation.

The land here is divided into plantations, called ili, which take their rise at the sea side and proceed up the country, preserving a certain breadth without any limitations, or as far as the owner chooses to cultivate them, and without the protection either of high walls or gates. (p. 77)

After breakfast, we pursued our course onward with a fair prospect of a fine day and soon after entered the wood by a well trodden path, on both sides of which were luxuriant groves of plantains and bananas reared up with great industry in the neatest order of cultivation. These being tender vegetables, required a sheltered situation and good soil to bring them to perfection. (p. 80)

Menzies continued inland above the field sytem and returned to the coast at Honaunau, just south of Kealakekua Bay.

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - ____ - ____ - ____ ____ ____ ____ ____

ISLAND QUAD IDENTIFICATION NO.

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(Page Five)

The routes of Menzies and other early observers were plotted, observations matched to specific land areas, and the observations and the areas were analyzed according to modern environmental data to determine the characteristics controlling the agriculture. The following subzones for the Kona Field System were developed:

Sweet Potato/Wauke Zone

Elevation: Sea level to about 500 feet (0 to 150 meters)

Annual Rainfall: Seasonal; 30 to 50 inches (.8 to 1.2 meters)

Crops: Sweet potatoes and wauke grown in very rocky areas.

Breadfruit/Sweet Potato/Wauke Zone

Elevation: 500 to 1,000 feet (150 to 300 meters)

Annual Rainfall: 30 to 60 inches (.8 to 1.5 meters)

Crops: breadfruit trees, with sweet potatoes and wauke planted between them.

Sweet Potato/Dry Land Taro Zone

Elevation: 1,000 to 2,500 feet (300 to 750 meters)

Annual Rainfall: 60 to 80 inches (1.5 to 2.0 meters)

Crops: no breadfruit trees; sweet potatoes in the lower part, dry land taro in the upper part. Field boundaries planted with ti and sugar cane.

DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

VERBAL DESCRIPTION MUST INCLUDE PERTINENT DATA ON: bearings and sources used to locate feature; terrain and vegetation; size; shape; construction technique; materials used; condition; surface artifacts or midden visible. SIGNIFICANCE STATEMENT MUST INCLUDE: unusual or important characteristics; accessibility; interpretive and research potential; evaluation of the site's importance as a representative of its class; recommendations for register category.

(Page Six)

Plantains and Banana Zone

Elevation: 2,000 to 3,000 feet (600 to 900 meters)

Annual Rainfall: 80 to 100 inches (2.0 to 2.5 meters)

Crops: bananas and plantains planted just below and within the forest.

All environmental variables are relatively constant for the sub-zones except those of elevation and rainfall, demonstrating the regulating effect of these two variables on agriculture in the Kona Field System. These divisions are not to be construed as clear-cut but rather show a gradual change from one sub-zone to the next, correlated with steady increases in elevation and rainfall.

SIGNIFICANCE

The Kona Field System is without equal in Hawaii, and probably in the nation in terms of the extensiveness of a prehistoric modification of the land. It is quite comparable in terms of complexity and size with the well known field systems of Central and South America, although differing in specific characteristics. It is a physical demonstration of the highly developed farming economy of ancient Hawaii and illustrates the complexity and advanced state of aboriginal Hawaiian culture. The system is so extensive that it cannot be seen in its entirety except from extremely high altitudes, but the physical remains are sufficiently well preserved and in such generally good condition that they may still be detected on the ground, although it is difficult to realize what is viewed is part of such a massive system. In all, it is a magnificent monument to the exhaustive labors and industry of the ancient Hawaiians.

The study of environmental and crop factors shows the ancient Hawaiians were knowledgeable and adept in molding their needs in consonance with environmental restraints. Historical records show a strong appreciation of good conservation measures, such as fallowing, and mulching. This illustrates the close partnership with nature which was so much a characteristic of ancient Hawaii.

SIGNED: DATE:

FEATURE DESCRIPTION FORM

50 - 1 0 - 3 7 - 6 6 0 1
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(Page Seven)

The vastness and complexity of the system show the excellent practical engineering and environmental knowledge of the ancient Hawaiians, as well as the highly evolved social organization which could coordinate the labors of a multitude of people to create and maintain such a system. Yet, within the overall system, it is possible to see the role of the 'ohana, the basic Hawaiian kinship and land-controlling grouping, for the boundaries of the traditional 'ili and ahupua'a land divisions are clear. This gives an unparallel opportunity for research into the organization and interrelationships of ancient Hawaiian society.

The innumerable habitation remains, as well as the remains of complete assemblages of other physical remains, such as burial areas, religious structures (heiau), cave shelters, refuge caves, animal enclosures, and work platforms all contribute to the research importance of this system.

Finally, the Kona Field System is a dramatic illustration of the dependence of ancient Hawaii upon the production of land foods, their primary subsistence source. Truly, this is worthy of entry into the Hawaii and National Registers of Historic Places as a district of high value.

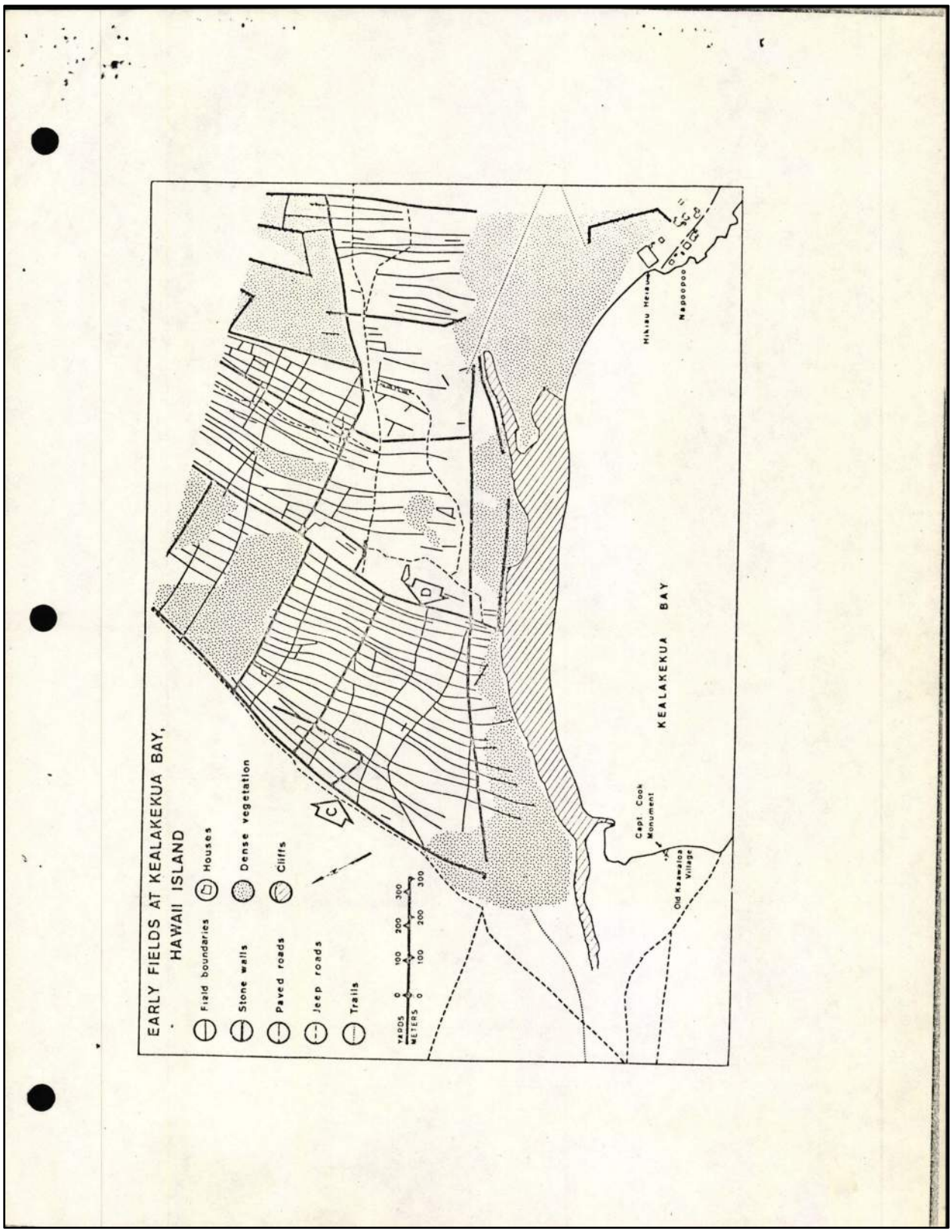
Urban development and modern agriculture has caused moderate damage to the system, but ample remains are still in existence to delimit the system and to warrant a high value evaluation.

N.B. Quotations are from:
Menzies, Archibald
1920 Hawaii Nei 128 Years Ago.... Honolulu.

N.B. The Quad number in the site identification was arbitrarily chosen since the district extends through multiple quads.

	LAT.	LONG.
NW	19°42'15"N	156°00'27"W
NE	19°42'16"N	155°56'27"W
SE	19°22'20"N	155°50'10"W
SW	19°21'32"N	155°54°18"W

SIGNED: J. Stell Mason DATE: May 15, 1979


EARLY FIELDS AT KEALAKEKUA BAY,
HAWAII ISLAND
Field boundaries
Houses
Stone walls
Dense vegetation
Paved roads
Cliffs
Jeep roads
Trails
YARDS
METERS
KEALAKEKUA BAY
Capt. Cook Monument
Old Kaawaloa Village
Napoopoo
Hikiau Heiau

FORM 3 1: PROPERTY OWNERSHIP

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

12 13	14 15	16	17	18	19	20	21	22 23 24	25 26 27
2 1	1 1	1	3	2	2				
USE 1	USE 2	STAT	OWNR	ATTD	ACCS	zone	sect	plat	parcel
						T A X		M A P	K E Y

PROPERTY OWNER: M U L T I P L E (28–45)

STREET ADDRESS: (46–63)

TOWN OR CITY: (64–73) STATE (74 75) ZIP CODE (76–80)

FORM 4 1: BACKGROUND DATA

50 - 1 0 - 3 7 - 6 6 0 1
ISLAND QUAD IDENTIFICATION NO.

AHUPUA'A: M U L T I P L E (12–26)

PREVIOUS SURVEYS: N O N E (27–44)

PREVIOUS SITE DESIGNATION(S): N O N E (45–62)

LAST NAME OF SURVEYOR: (63–74)

75 76	77 78	79 80
INSTITUTION	YEAR	FILED AT

Appendix C EDXRF Analysis Report

EDXRF Analysis Report

UH Hilo Geoarchaeology Lab

Sample List: Puaa 5 from O Bautista
Analysis Technique: Linear
Method File: C:\...\Documents\Methods\Master Methods\9-19-Kona Puaa 5 CSH.mth

Analyzed: 03/03/20 08:47:12
Last Calibrated: 08/27/19 11:30:58
Software version: 7.2 (Build 134)

Conditions

High Zb

Voltage	50 kV	Current	Auto
Livetime	250 seconds	Counts Limit	0
Filter	Cu Thick	Atmosphere	Vacuum
Maximum Energy	40 keV	Count Rate	Medium
Warmup time	0 seconds		

Mid Za

Voltage	16 kV	Current	Auto
Livetime	200 seconds	Counts Limit	0
Filter	Pd Thin	Atmosphere	Vacuum
Maximum Energy	40 keV	Count Rate	Medium
Warmup time	0 seconds		

Mid Zc

Voltage	28 kV	Current	Auto
Livetime	250 seconds	Counts Limit	0
Filter	Pd Thick	Atmosphere	Vacuum
Maximum Energy	40 keV	Count Rate	Medium
Warmup time	0 seconds		

Low Za

Voltage	6 kV	Current	Auto
Livetime	200 seconds	Counts Limit	0
Filter	No Filter	Atmosphere	Vacuum
Maximum Energy	40 keV	Count Rate	Medium
Warmup time	0 seconds		

Results

Element	Concentration	Peak (cps/mA)	Background (cps/mA)
Puaa 5-10 basalt flake 1.0g			
Na2O	2.7 %	272	229
MgO	2.5 %	1213	137
Al2O3	14.0 %	18858	-835
SiO2	45.0 %	97730	-5241
K2O	1.4 %	279	34
CaO	9.0 %	2951	-106
TiO2	4.3 %	2479	60
V	516 ppm	101	410
Cr	[5.9] ppm	1	91
MnO	1798 ppm	459	84
Fe	10.3 %	40773	696
Ni	25 ppm	18	24
Cu	35 ppm	13	17
Zn	179 ppm	64	12
Rb	34 ppm	74	47
Sr	572 ppm	1364	39
Y	39 ppm	94	119
Zr	304 ppm	827	383
Nb	39 ppm	105	285
Mo	0 ppm	0	507
Ba	407 ppm	149	146

Puaa 5-59 adze frag 12.4g

Na2O	3.5 %	436	272
MgO	4.11 %	1795	175
Al2O3	15.1 %	28744	-1419
SiO2	49.7 %	134461	-7446
K2O	1.5 %	365	35
CaO	8.6 %	3315	-118
TiO2	4.6 %	3092	54
V	366 ppm	85	522
Cr	0 ppm	0	103
MnO	2008ppm	608	98
Fe	10.0 %	47349	754
Ni	3 ppm	2	29
Cu	13 ppm	9	23
Zn	163ppm	80	17
Rb	37 ppm	108	71
Sr	1003 ppm	3297	48
Y	32 ppm	106	159
Zr	237 ppm	878	754
Nb	53 ppm	198	381
Mo	0 ppm	0	674
Ba	599 ppm	371	270

Puaa 5-10 vg 1.3g

Na2O	8.5 %	299	113
MgO	0.4 %	218	184
Al2O3	17.5 %	11188	-186
SiO2	48.1 %	68094	-3732
K2O	5.6 %	424	-21
CaO	1.4 %	118	27
TiO2	0.6 %	115	19
V	0 ppm	0	32
Cr	0 ppm	0	16
MnO	4006 ppm	383	-0
Fe	4.0 %	6905	161
Ni	6 ppm	2	7
Cu	5 ppm	3	10
Zn	226ppm	52	6
Rb	141ppm	182	18
Sr	38 ppm	56	30
Y	63 ppm	94	106
Zr	1063 ppm	1854	109
Nb	155 ppm	266	181
Mo	8 ppm	13	383
Ba	364 ppm	79	87

Puaa 5-44 vg 1.5g

Na2O	2.3 %	189	176
MgO	6.2 %	2171	-26
Al2O3	13.0 %	12796	-471
SiO2	46.2 %	87287	-4594
K2O	0.4 %	52	20
CaO	10.5 %	2329	-103
TiO2	2.0 %	772	51
V	329 ppm	44	136
Cr	391 ppm	63	43
MnO	1700 ppm	292	47
Fe	9.0 %	24409	396
Ni	114 ppm	55	12
Cu	109 ppm	26	12
Zn	129 ppm	34	8
Rb	8 ppm	16	31
Sr	298 ppm	547	34
Y	27 ppm	50	76
Zr	128 ppm	255	209
Nb	9 ppm	16	214
Mo	[0.4] ppm	1	358

Ba	98 ppm	30	134
Puaa 5-62 vg 0.7g			
Na2O	7.5 %	388	166
MgO	0.8 %	395	177
Al2O3	16.6 %	14759	-420
SiO2	49.1 %	94288	-5213
K2O	4.7 %	641	-21
CaO	1.6 %	259	43
TiO2	0.5 %	194	34
V	14 ppm	2	57
Cr	0 ppm	0	33
MnO	3576 ppm	612	10
Fe	3.5 %	11346	247
Ni	12 ppm	6	14
Cu	24 ppm	10	16
Zn	197ppm	70	12
Rb	127 ppm	259	33
Sr	38 ppm	89	48
Y	58 ppm	138	162
Zr	980 ppm	2706	200
Nb	144 ppm	392	286
Mo	3 ppm	7	606
Ba	353 ppm	106	118
Puaa 5-49 vg 0.6g			
Na2O	8.0 %	509	194
MgO	0.6 %	409	233
Al2O3	17.1 %	19392	-614
SiO2	50.8 %	123877	-6965
K2O	4.6 %	817	-25
CaO	1.1 %	190	62
TiO2	0.4 %	195	43
V	0 ppm	0	64
Cr	0 ppm	0	37
MnO	3500 ppm	785	15
Fe	3.1 %	13598	287
Ni	4 ppm	2	20
Cu	4 ppm	6	22
Zn	197 ppm	100	15
Rb	130 ppm	375	46
Sr	34 ppm	113	71
Y	59 ppm	198	237
Zr	987 ppm	3851	295
Nb	143 ppm	551	418
Mo	3 ppm	11	871
Ba	317 ppm	122	151
BHVO-2 11-19.2 3-2-20.1			
Na2O	2.1 %	302	317
MgO	7.1 %	2840	175
Al2O3	13.5 %	24934	-1280
SiO2	51.3 %	143971	-8180
K2O	0.6 %	140	49
CaO	11.5 %	4785	-206
TiO2	2.7 %	1944	86
V	392 ppm	96	335
Cr	279 ppm	84	95
MnO	1617ppm	515	108
Fe	8.7 %	44121	711
Ni	112 ppm	101	27
Cu	120 ppm	56	23
Zn	108 ppm	54	19
Rb	10 ppm	36	63
Sr	389 ppm	1389	63
Y	26 ppm	94	157
Zr	170 ppm	672	463

Nb	18 ppm	70	416
Mo	[2.4] ppm	9	718
Ba	127 ppm	84	289

Appendix D Wood Taxa Identification Report

ANALYSIS OF CHARCOAL FROM CULTURAL SURVEYS HAWAII PUAA 5 PROJECT, NORTH KONA, HAWAI‘I (TMK [3]7-5-014:001 POR.)

By

Gail M. Murakami
Wood Identification Laboratory
International Archaeological Research Institute, Inc.

May 4, 2020

INTRODUCTION

Four charcoal samples from CSH's (Cultural Surveys Hawaii) Puaa 5 Project were submitted to the Wood Identification Laboratory at International Archaeological Research Institute, Inc. (IARII) for analysis. The samples, from a site in Kahului Ahupua‘a, North Kona District on the island of Hawai‘i, were examined for the selection of short-lived taxa for radiocarbon dating. This service includes taxa identification of known short-lived woody plants or plant parts, such as nutshells or tubers, as well as a screening of the sample for the presence of known historically introduced woody plants or plant parts.

METHODS

The freshly fractured transverse, tangential, and radial facets of charcoal fragments were examined with the aid of a dissecting microscope at magnifications of up to 80X. Taxonomic identifications were made by comparing observed anatomical characteristics with those of woods in the IARII reference collection. Vouchers associated with this collection have been verified and archived at the Department of Botany, University of Hawai‘i at Mānoa. Other published references, including books, journal articles, technical documents, and wood atlases, were also consulted.

RESULTS

Two charcoal samples from Feature E, Samples 34 and 45, contained charred wood of the Pinaceae family. The hardwoods in these samples were not further identified once the presence of the possible *Pseudotsuga* sp. (Douglas fir) in Sample 34 and a pine (Pinaceae) in Sample 45 were detected. The presence of these evergreen woods suggests the samples are of historical origin or contaminated by historical material.

The third sample, Sample 61 from Feature D, did not contain any evergreen woods. The taxa identified include *‘akoko* (*Euphorbia* sp.), *alahe‘e* (*Psydrax odorata*), *a‘ali‘i* (*Dodonaea viscosa*) and *neleau* (*Rhus sandwicensis*). The species identified in this sample are native and are found on Hawai‘i Island. A summary of the results is presented below in a table.

The fourth sample, Sample 45 from TU-10 in Feature E did not contain any evergreen tree wood. While two of the taxa are indeterminate, the remaining charcoal is of a twig probably from the native *a‘ali‘i* (*Dodonaea viscosa*) shrub.

Short-lived plant and plant parts are recommended for radiocarbon dating. These include twigs, nutshells, and short-lived plant species. Wood from potentially long-lived, slow-growing, and/or large trees are not ideal for dating as it could contain considerable in-built age. There are several papers on selecting materials for radiocarbon dating in Pacific Island contexts including Allen and Huebert 2014 and Rieth and Athens 2013.

Summary of Charcoal Identifications in Samples from CSH Puaa 5 Project.

WIDL No.	Taxon	Common Name	Plant Part	Count	Comment
Sample 34: TU-9, CSH-1, Feature E					
2008-1	Indeterminate hardwood		Wood	4	
2008-2	Indeterminate hardwood		Wood	1	
2008-3	cf. *Pseudotsuga* sp.	Douglas fir	Wood	1	
Sample 45: TU-11, CSH-1, Feature E					
2008-4	Indeterminate hardwood		Wood	2	
2008-5	cf. woody vine		Stem	2	
2008-6	cf. Pinaceae	Pine	Wood	2	
2008-7	Indeterminate		Fruit/embryo	4	
Sample 61: TU-12, CSH-1, Feature D					
2008-8	cf. *Euphorbia* sp.	*'Akoko*	Wood	2	Shrub, short-lived
2008-9	cf. *Rhus sandwicensis*	*Neleau*	Wood	9	
2008-10	cf. *Psydrax odorata*	*Alahe'e*	Wood	5	
2008-11	cf. *Dodonaea viscosa*	*'A'ali'i*	Wood	3	Shrub, short-lived
2008-12	Indeterminate hardwood		Wood	1	
Sample 45: TU-10, CSH-1, Feature E					
2008-13	Indeterminate hardwood		Wood	2	
2008-14	cf. *Dodonaea viscosa*	*'A'ali'i*	Wood	1	twig
2008-15	Indeterminate hardwood		Wood	1	

A brief systematic review is given below; for more information on Hawaiian plants, suggested references are the Manual of the Flowering Plants of Hawai'i (Wagner et al. 1990; also available online at http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/query2.cfm) and the Bishop Museum's Hawaiian Ethnobotany Online Database (http://data.bishopmuseum.org/ethnobotanydb).

TAXA REVIEW

ANACARDIACEAE (Mango family)

Rhus sandwicensis (*Neleau, neneleau*)

This endemic tree stands 3-8 meters and has milky sap. It forms dense patches by producing numerous suckers from the spreading roots. It is known from specific wet to dry areas on Kaua'i, O'ahu, Moloka'i and scattered localities on Maui and Hawai'i, most common in areas near Hilo and Waimea,

Hawai‘i. The lightweight coarse-textured wood was formerly used for saddle trees, yokes and plows; the bark was once used for tanning (Wagner et al. 1990:197).

EUPHORBIACEAE (Spurge family)

Euphorbia spp. (*‘Akoko*)

Distribution of the 15 endemic Hawaiian shrubs and small trees in this genus range from coastal environments to upper forest zones on the main islands (Wagner et al. 1990:602-617). Eight native species, and a number of naturalized introductions, are found on Hawai‘i Island today in a wide range of habitats. *‘Akoko* was once valued for firewood by the Hawaiians (Hillebrand 1981:396) and the milky sap was once considered a possible source for rubber (Rock 1974:261). Some members of this genus were once known as *Chamaesyce* but the Hawaiian species have since been reassigned to the genus *Euphorbia* (Govearts et al. 2000; Steinman and Porter 2002; Yang and Berry 2011).

PINACEAE (Pine family)

The Pinaceae family consists of nearly 200 species of resinous, mostly evergreen trees, including pines (*Pinus*), larches (*Larix*), spruces (*Picea*), hemlocks (*Tsuga*), firs (*Abies*), and Douglas firs (*Pseudotsuga*). They are found mainly in the cooler Northern Hemisphere forests world-wide and are valued for their wood (Staples and Herbst 2005:69). Members of the Pinaceae family are not native to the Hawaiian Islands although five *Pinus* species have naturalized in the islands (Imada 2012: A-177).

Pseudotsuga sp. (Douglas fir)

These large evergreen trees can grow to over 60 m. The wood has been used in building and construction as lumber, timbers, piling and plywood; as veneer; railroad ties; pulp; planning mill products such as sash, doors, flooring, and general millwork; boxes and crates; ship- and boatbuilding; and furniture (Brown and Panshin 1940:395-396).

RUBIACEAE (Coffee family)

Psydrax odorata (G. Forster) Seem. (*Alahe‘e*)

This indigenous shrub or small tree is usually 3 to 6 m tall but may be up to 15 m. It has been found in dry shrublands and dry to mesic forests at 10 to 1,160 m elevation on all of the main islands except Ni‘ihau and Kaho‘olawe (Wagner et al. 1990:1119). Its hard wood was once used for making *‘ō‘ō* digging sticks and its leaves made a black dye (Handy and Handy 1972:117; Pukui and Elbert 1986:17; Rock 1974:437). This species was previously referred to *Canthium* but is now placed in *Psydrax* (Smith and Darwin 1988:230).

SAPINDACEAE (Soapberry family)

Dodonaea viscosa Jacq. (*‘A‘ali‘i*)

These indigenous shrubs or small trees are 2 to 8 m tall and range in distribution from coastal dunes to dry, mesic, and wet forest, at 3 to 2,350 m elevations on all of the main islands (Wagner et al. 1990:1227-1228; Starr et al. 2006:41). The red papery fruit capsule clusters and leaves of some varieties were made into *lei* (Pukui and Elbert 1986:3). The trunks were once used for house posts (Buck 1957:83).

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Appendix E Radiocarbon Analysis Report

Beta Analytic Inc
4985 SW 74 Court
Miami, Florida 33155
Tel: 305-667-5167
Fax: 305-663-0964
info@betalabservices.com

ISO/IEC 17025:2005-Accredited Testing Laboratory

June 12, 2020

Mr. Olivier Bautista
Cultural Surveys Hawaii
399 Hualani St.
Suite 124
Hilo, HI 96720
United States

RE: Radiocarbon Dating Results

Dear Mr. Bautista,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

Thank you for prepaying the analyses. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

Digital signature on file

Ronald E. Hatfield President

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REPORT OF RADIOCARBON DATING ANALYSES

Olivier Bautista — Report Date: June 12, 2020

Cultural Surveys Hawaii — Material Received: June 03, 2020

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	
Beta - 559910	**WIDL2008-8**	**140 +/- 30 BP**	IRMS δ13C: -26.9 o/oo
(43.1%)	**1669 - 1780 cal AD**	**(281 - 170 cal BP)**	
(36.8%)	**1798 - 1891 cal AD**	**(152 - 59 cal BP)**	
(15.5%)	**1908 - 1944 cal AD**	**(42 - 6 cal BP)**	

Submitter Material: Charcoal
Pretreatment: (charred material) acid/alkali/acid
Analyzed Material: Charred material
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 98.27 +/- 0.37 pMC
Fraction Modern Carbon: 0.9827 +/- 0.0037
D14C: -17.28 +/- 3.67 o/oo
Δ14C: -25.56 +/- 3.67 o/oo (1950:2020)
Measured Radiocarbon Age: (without d13C correction): 170 +/- 30 BP
Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

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REPORT OF RADIOCARBON DATING ANALYSES

Olivier Bautista — Report Date: June 12, 2020

Cultural Surveys Hawaii — Material Received: June 03, 2020

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	
Beta - 559911	**WIDL2008-11**	**100 +/- 30 BP**	IRMS δ13C: -25.9 o/oo
(68.3%)	**1805 - 1935 cal AD**	**(145 - 15 cal BP)**	
(27.1%)	**1682 - 1736 cal AD**	**(268 - 214 cal BP)**	

Submitter Material: Charcoal
Pretreatment: (charred material) acid/alkali/acid
Analyzed Material: Charred material
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 98.76 +/- 0.37 pMC
Fraction Modern Carbon: 0.9876 +/- 0.0037
D14C: -12.37 +/- 3.69 o/oo
Δ14C: -20.70 +/- 3.69 o/oo (1950:2020)
Measured Radiocarbon Age: (without d13C correction): 110 +/- 30 BP
Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

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BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -26.9 o/oo)

Laboratory number **Beta-559910**

Conventional radiocarbon age **140 ± 30 BP**

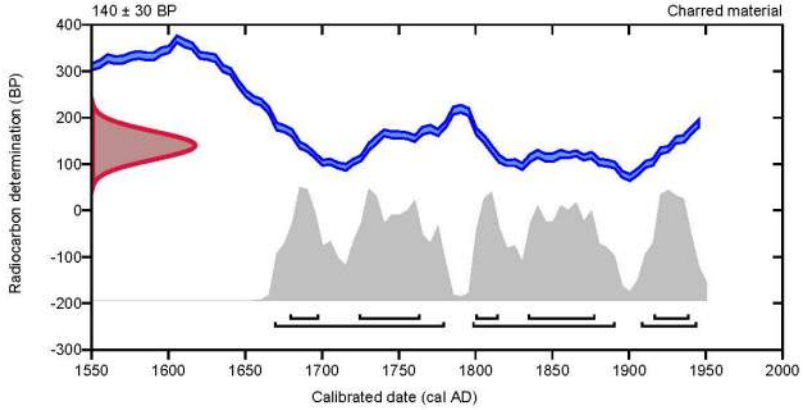
95.4% probability

(43.1%)	1669 - 1780 cal AD	(281 - 170 cal BP)
(36.8%)	1798 - 1891 cal AD	(152 - 59 cal BP)
(15.5%)	1908 - 1944 cal AD	(42 - 6 cal BP)

68.2% probability

(19.8%)	1834 - 1878 cal AD	(116 - 72 cal BP)
(19.5%)	1724 - 1764 cal AD	(226 - 186 cal BP)
(12%)	1916 - 1939 cal AD	(34 - 11 cal BP)
(9.6%)	1679 - 1698 cal AD	(271 - 252 cal BP)
(7.3%)	1800 - 1815 cal AD	(150 - 135 cal BP)

WIDL2008-8



Database used

INTCAL13

References

References to Probability Method

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References to Database INTCAL13

Reimer, et.al., 2013, Radiocarbon55(4).

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BetaCal 3.21

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: d13C = -25.9 o/oo)

Laboratory number **Beta-559911**

Conventional radiocarbon age **100 ± 30 BP**

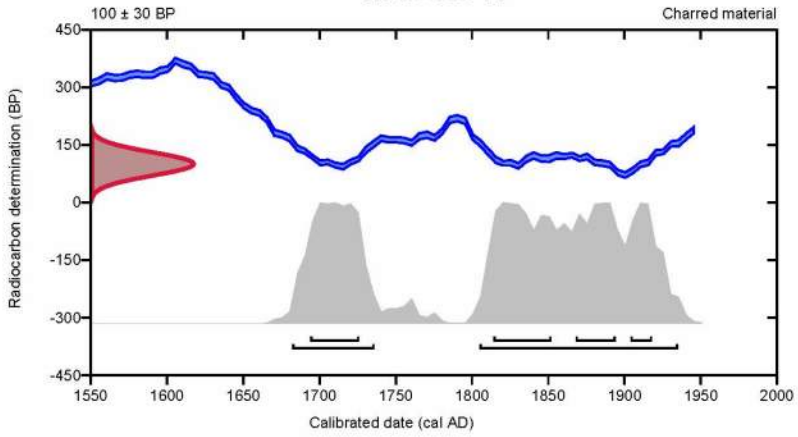
95.4% probability

(68.3%)	1805 - 1935 cal AD	(145 - 15 cal BP)
(27.1%)	1682 - 1736 cal AD	(268 - 214 cal BP)

68.2% probability

(22.2%)	1814 - 1852 cal AD	(136 - 98 cal BP)
(20.8%)	1694 - 1726 cal AD	(256 - 224 cal BP)
(16.8%)	1868 - 1894 cal AD	(82 - 56 cal BP)
(8.4%)	1904 - 1918 cal AD	(46 - 32 cal BP)

WIDL2008-11



Database used

INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, Radiocarbon55(4).

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APPENDIX E

Ka Pa‘akai Framework Analysis

Ka Paʻakai Framework Analysis for a Proposed DHHL Water Development Project in Waiaha, Kahului and Puapuaʻa Ahupuaʻa at the Gianulias Property (TMK: [3] 7-5-014:001) and Keauhou Ahupuaʻa at the Kamehameha Schools Well Site (TMK: [3] 7-8-004:013 and -015)

Prepared by

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Prepared for

DEPARTMENT OF HAWAIIAN HOME LANDS

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2024 Ka Paʻakai Framework Analysis for a Proposed DHHL Water Development Project in Waiaha, Kahului and Puapuaʻa Ahupuaʻa at the Gianulias Property (TMK: [3] 7-5-014:001) and Keauhou Ahupuaʻa at the Kamehameha Schools Well Site (TMK: [3] 7-8-004:013 and -015)

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Kahaluʻu Manowai muliwai with the heiau Keʻekū and Hāpaialiʻi in background

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Introduction

He Leo Mahalo

Nohopapa would like to mahalo the individuals who shared their precious time, memories, and manaʻo for this study. This important project would not have been possible without their willingness to share personal recollections and stories. The manaʻo that was shared will help us all better understand, appreciate, and protect the precious resources of Kona Akau. We also mahalo Kaleo Manuel for providing invaluable manaʻo to help our hui better understand wai in its cultural, environmental, and political dimensions, specifically for Kona. Kaleo also challenged Nohopapa to shape and present the cultural, historical, and contemporary community manaʻo regarding wai within the framework of He Mele No Kāne. We accepted this challenge to ground our approach in ʻike kupuna. Lastly, mahalo to the Department of Hawaiian Homelands (Andrew Choy, Lilliane Makaila, Kuʻupua Mossman, and Cherie Kaʻanana) as well as their consultant, Jonathan Scheuer for being true partners in this effort to complete a Ka Paʻakai Analysis that meets its true purpose and intent.

He Mele No Kane

He ui, he nīnau:	*A query, a question,*
E ui aku ana au iā ʻoe,	*I put to you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ka hikina a ka Lā,	*At the Eastern Gate*
Puka i Haʻehaʻe,	*Where the Sun comes in at Haʻehaʻe,*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i Kaulana a ka lā,	*Out there with the floating Sun,*
I ka pae ʻōpua i ke kai,	*Where the cloud-forms rest on Ocean's breast,*
Ea mai ana ma Nihoa,	*Uplifting their forms of Nihoa,*
Ma ka mole mai o Lehua;	*This side the base of Lehua;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ke kuahiwi, i ke kualono,	*Yonder on mountain peak, on the ridges steep,*
I ke awāwa, i ke kahawai;	*In the valleys deep, where the rivers sweep;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i kai, i ka moana,	*Yonder at the sea, on the ocean,*
I ke kualau, i ke ānuenue,	*In the driving rain, in the heavenly bow,*
I ka pūnohu, i ka uakoko,	*In the piled-up mist wraith, in the blood-red rainfall,*
I ka ʻālewalewa;	*In the ghost-place cloud from;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*

Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i luna ka Wai a Kāne,	*Up on high is the water of Kāne,*
I ke ao uli, i ke ao ʻelʻele,	*In the heavenly blue, in the black piled cloud,*
I ke ao panopano,	*In the black black cloud,*
I ke ao pōpolo hua mea a Kāne lā, ē!	*In the black mottled sacred cloud of the gods;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i lalo, i ka honua, i ka wai hū,	*Deep in the ground, in the gushing spring,*
I ka wai kau a Kāne me Kanaloa	*In the ducts of Kāne and Kanaloa,*
He wai puna, he wai e inu,	*A well spring of water, to quaff,*
He wai e mana, he wai e ola.	*A water of magic power - the water of life!*
E ola nō ʻeā!	*Life! O give us this life!*

Found in Emerson's *Unwritten Literature of Hawaii: The Sacred Songs of the Hula* (1909:257-259). Collected from Kauaʻi, Author Unknown.

As the most isolated island chain in the world, Hawaiʻi is surrounded by ocean. It is understood that wai, or fresh water, is precious for modern use as well as for the traditional customary practices, identity, and spiritual beliefs of Native Hawaiians. In 2014 the DHHL finalized the *Hawaiian Homes Commission Water Policy Plan*. This plan defines water as including:

> ...mists, fog, rain, and other precipitation; water as it flows above or below ground, and into the ocean; water used for homesteading; alternative sources including waste, brackish, and saltwater; water used in the exercise of traditional and customary practices; infrastructure used to produce, store and transmit water; and water we use as well as water to which we have rights.

Nohopapa Hawaiʻi LLC (Nohopapa) approached this project through the lens of *He Mele No Kāne: The Waters of Kāne*[1]. With the project research and outreach framed around the components of the use of wai as described throughout the mele and summarized in its last few lines,

He wai puna, he wai e inu, he wai e mana, he wai e ola
wellspring of water, water to quaff, water of magic power, the water of life.

Approaching the research and consultation for the Ka Paʻakai Framework Analysis within the context of *The Waters of Kāne* allowed Nohopapa to explore what is unique about the Native Hawaiian worldview around wai.

[1] Mahalo nui to Kaleo Manuel for gifting the idea to ground this Ka Paʻakai Analysis of wai through Kāne and this foundational mele.

Project Description

On behalf of the DHHL, Nohopapa completed a Ka Paʻakai Framework Analysis for a proposed DHHL water development project at:

1. Waiʻaha, Kahului and Puapuaʻa Ahupuaʻa at the Gianulias property (TMK: [3] 7-5-014:001) (see Figure 1-Figure 7)
2. Keauhou Ahupuaʻa at a Kamehameha Schools well site (TMK: [3] 7-8-004:013 and -015) (see Figure 1-Figure 9).

Once construction on Laʻi ʻŌpua Village 4 Hema is completed, DHHL will have exhausted all of its water credits for homestead and community development in Kona. DHHL will need to seek additional water credits from the County in order to continue with the planned development of its homestead and community lands in Kealakehe. The County of Hawaiʻi Department of Water Supply (DWS) has asked that in order for DHHL to gain additional water credits, DHHL must add new water sources to the County system in Kona. This means the development of well sites and transmission lines to connect each well site to the nearest existing water lines in the DWS system. No long-distance transmission pipelines from the proposed groundwater well sites to DHHL lands in Kealakehe are being proposed by this project, just the water transmission lines from the well sites to the nearest DWS interconnection point in their existing system.

Nohopapa's specific scope of work entails analysis within the "Ka Paʻakai" legal framework, a seminal case that operationalizes the State of Hawaiʻi's constitutional mandate to "affirmatively protect" Native Hawaiian rights and practices.[2] Hawaiʻi's constitution requires government agencies to "conserve and protect Hawaiʻi's natural beauty" as a public trust on behalf of and "[f]or the benefit of present and future generations ..."[3] Co-extensive with State public trust protections are also federal requirements to protect the public trust with respect to lands that were ceded from the Hawaiian Kingdom from both the Main Hawaiian Islands ("MHI") and the Northwest Hawaiian Islands ("NWHI")/Papahānaumokuākea during the transition of Hawaiʻi as a U.S. territory to America's 50th State per the Admissions Act in 1959.[4]" (Akutagawa 2023:14-15)

Purpose

The purpose of the Ka Paʻakai Framework Analysis is to ensure the DHHL is in compliance with Article VII, Section 7 of Hawaiʻi's Constitution, which "places an affirmative duty on the State and its agencies to preserve and protect traditional and customary native Hawaiian rights and confers upon the State and its agencies the power to protect these rights and to prevent any interference with the exercise of these rights."[5] In order to fulfill its constitutional obligations agencies, like the DHHL, must consider the following three considerations regarding possible impacts of their proposed actions

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[2] Ka Paʻakai O Ka ʻAina v. Land Use Comm'n, 94 Haw. 31, 7 P.3d 1068, 1083-84 (2000).

[3] HAW. CONST. art. XI, § 1 (1978)

[4] Hawaii Admission Act, Pub.L. No. 8603, 73 Stat. 5 (1959).

[5] Ka Paʻakai o Ka ʻĀina v. State of Hawaiʻi Land Use Com'n [*Ka Paʻakai*], 94 Haw. 31, 47, 7 P.3d 1068, 1084 (2000).

(1) the identity and scope of 'valued cultural, historical, or natural resources' in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;

(2) the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and

(3) the feasible action, if any, to be taken … by the [State and/or its political subdivisions] to reasonably protect native Hawaiian rights if they are found to exist.[6]

[6] Ibid

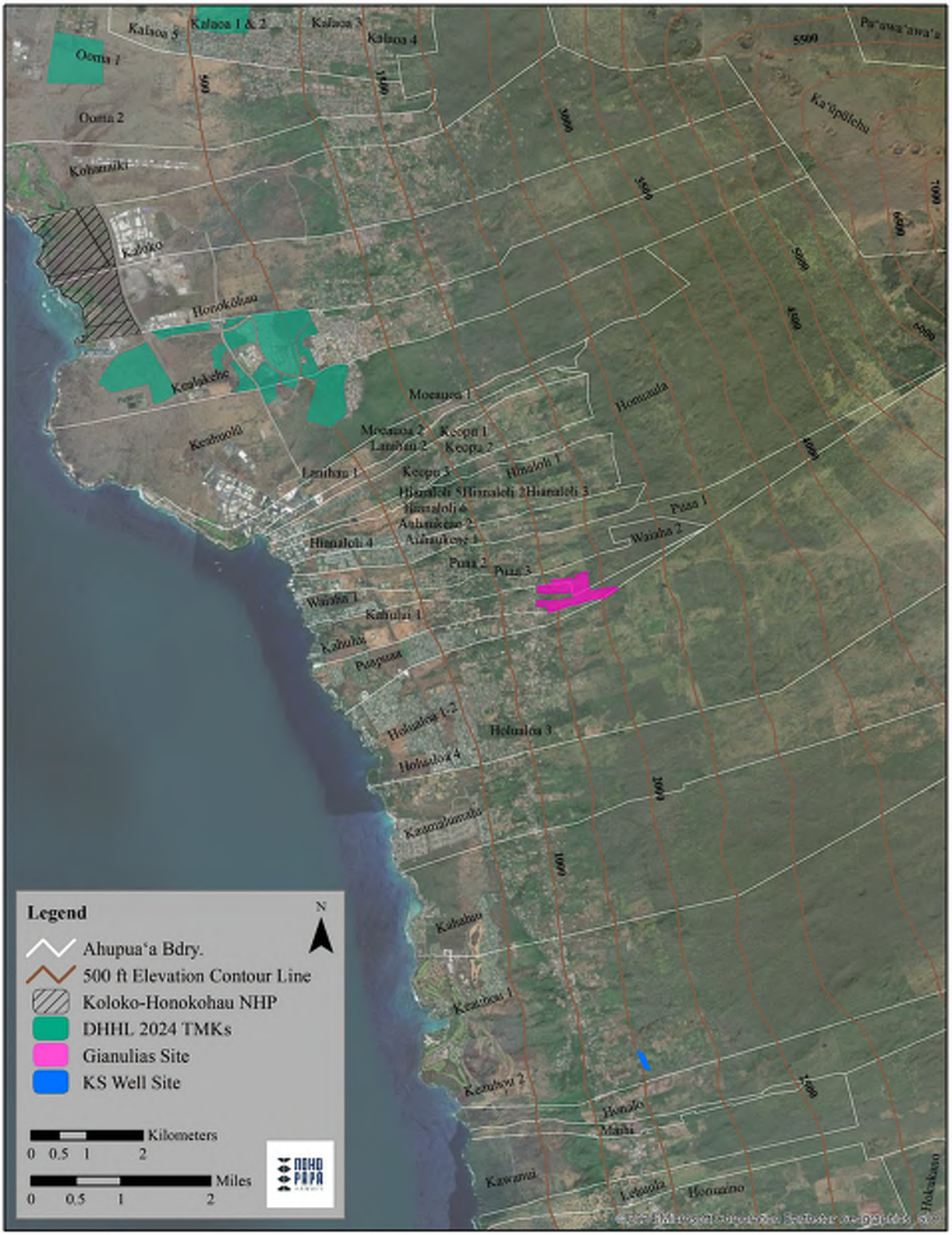

Figure 1. Aerial image illustrating the two proposed water development locations (pink and blue) as well as the exiting DHHL parcels in Kona (green).

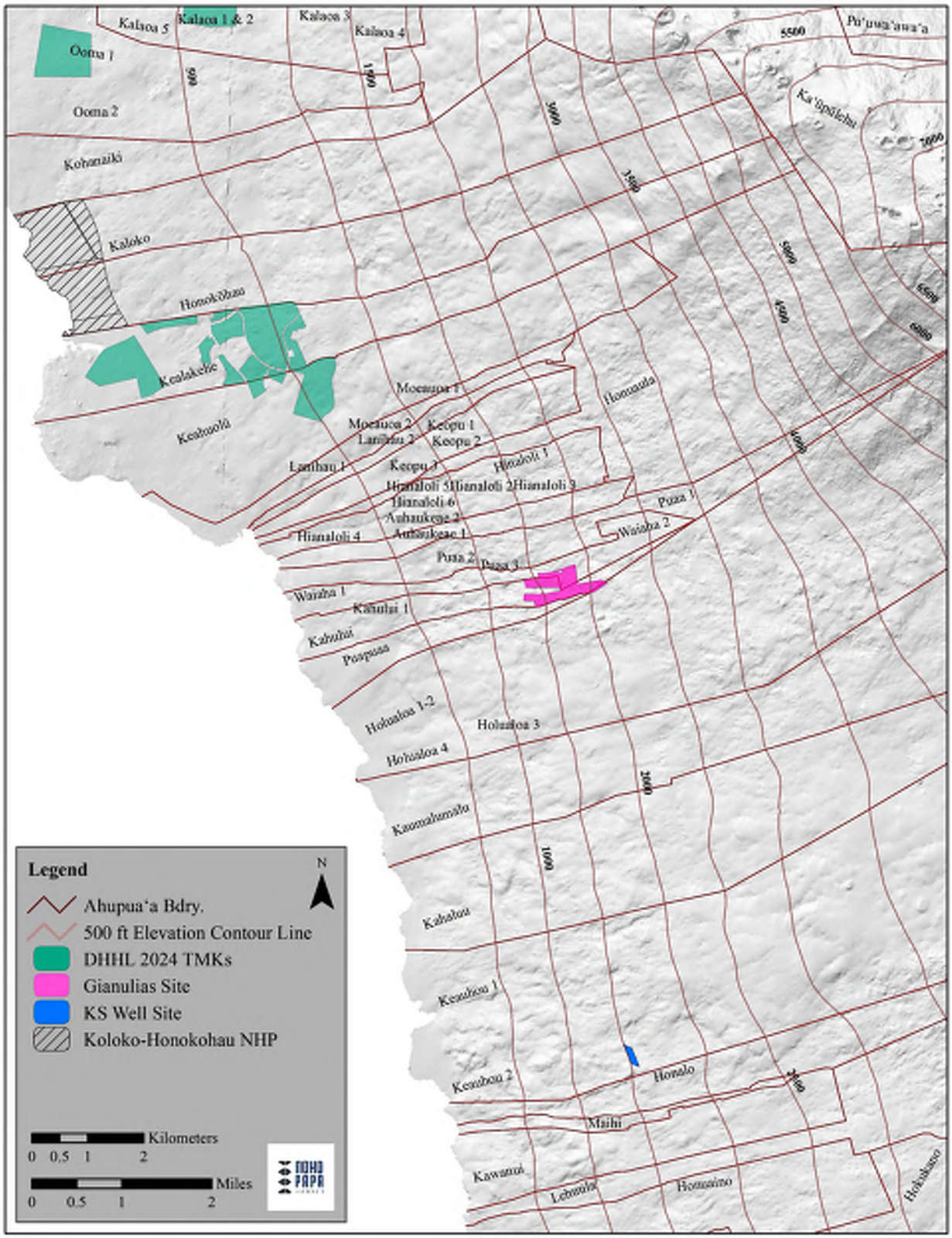

Figure 2. Contour and DEM map illustrating the two proposed water development locations (pink and blue) as well as the exiting DHHL parcels in Kona (green).

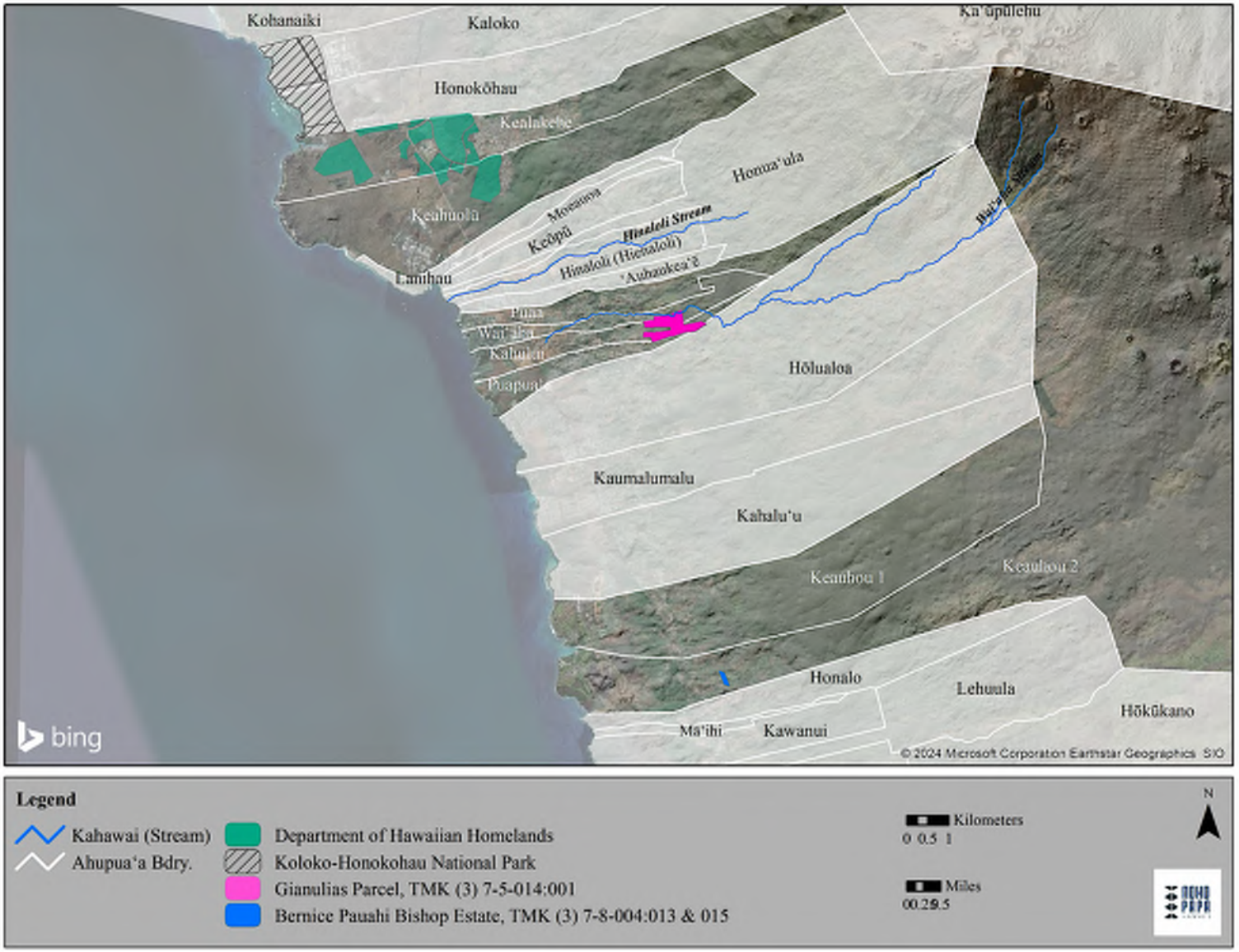

Figure 3. Aerial image illustrating the study are ahupua'a from north to south: Kealakehe, Keahuolū, Pua'a, Wai'aha, Kahului, Puapua'a, Keauhou 1, and Keauhou 2

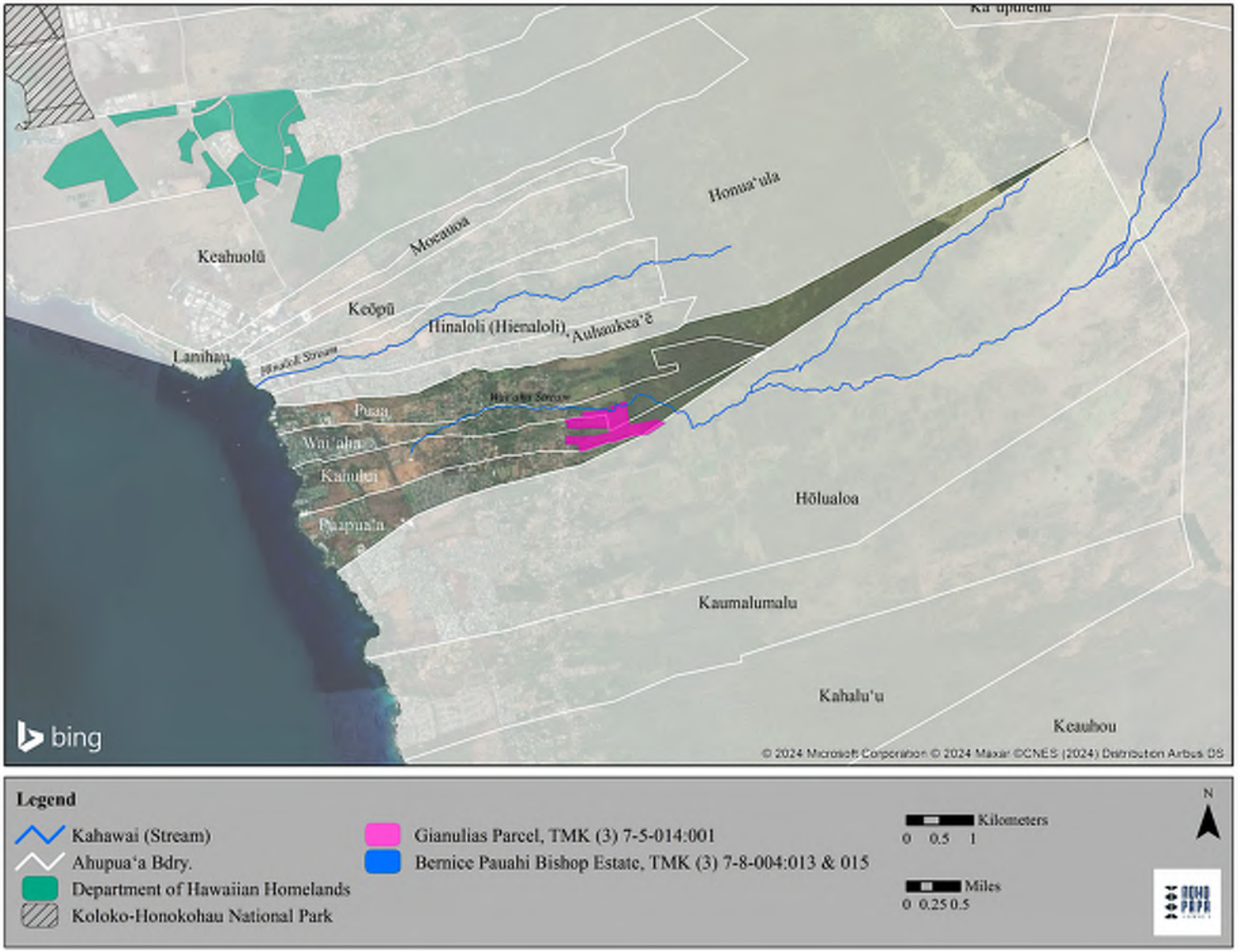

Figure 4. Close up aerial image of Puaʻa, Waiʻaha, Kahului, and Puapuaʻa Ahupuaʻa

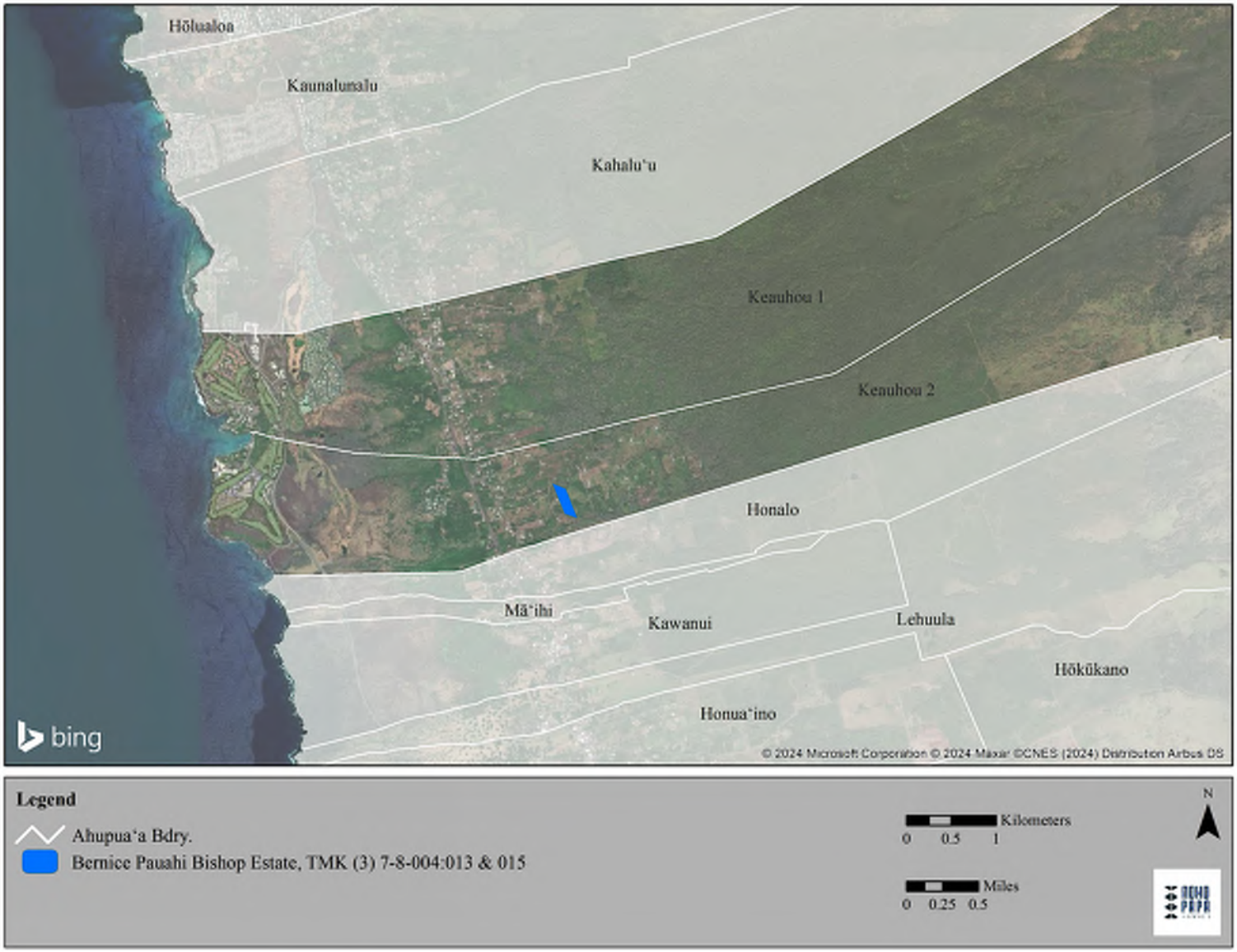

Figure 5. Close up aerial image of Keauhou 1 and Keauhou 2 Ahupua'a

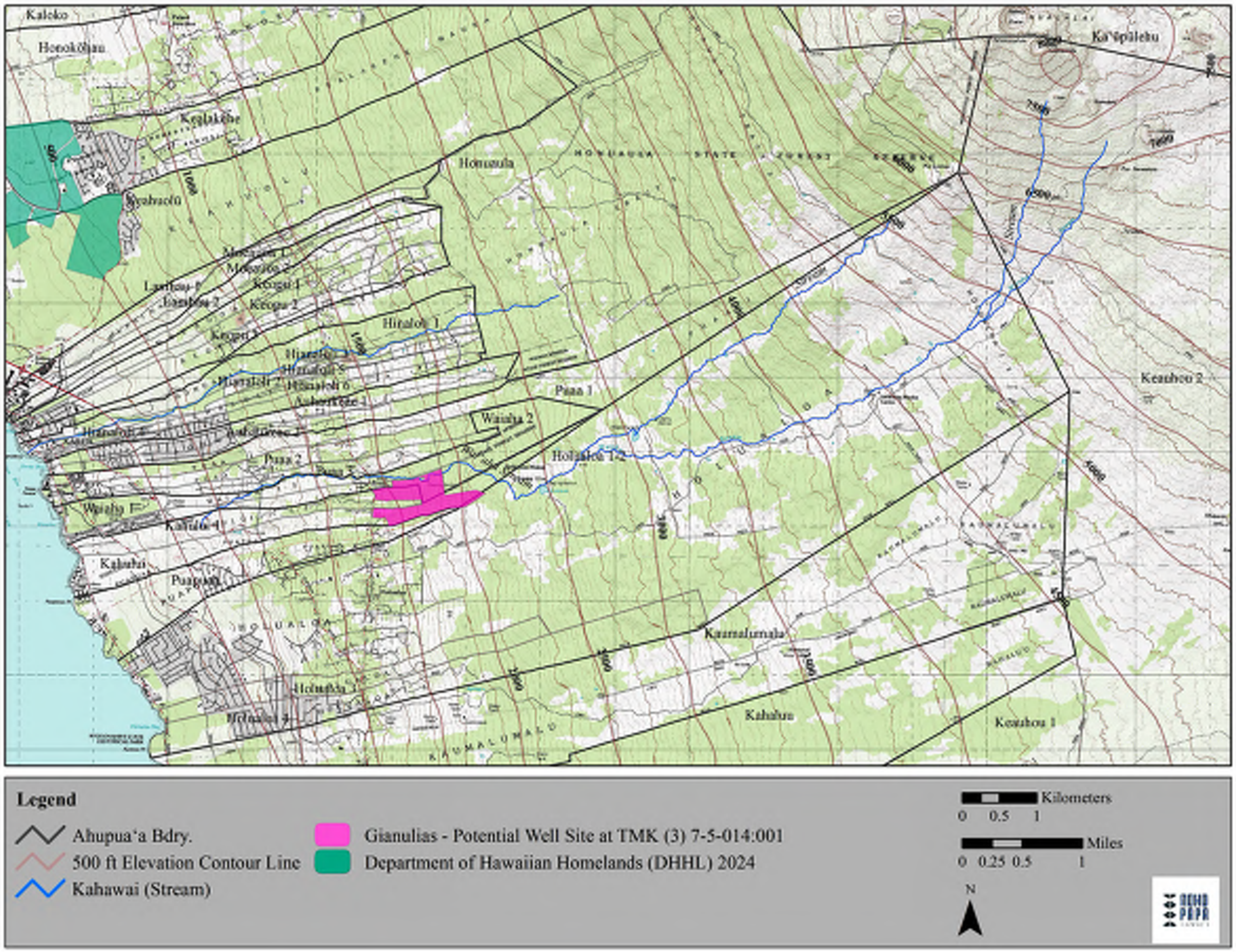

Figure 6. USGS map showing the DHHL TMK parcels (green) and the Gianulias potential well site TMK (pink)

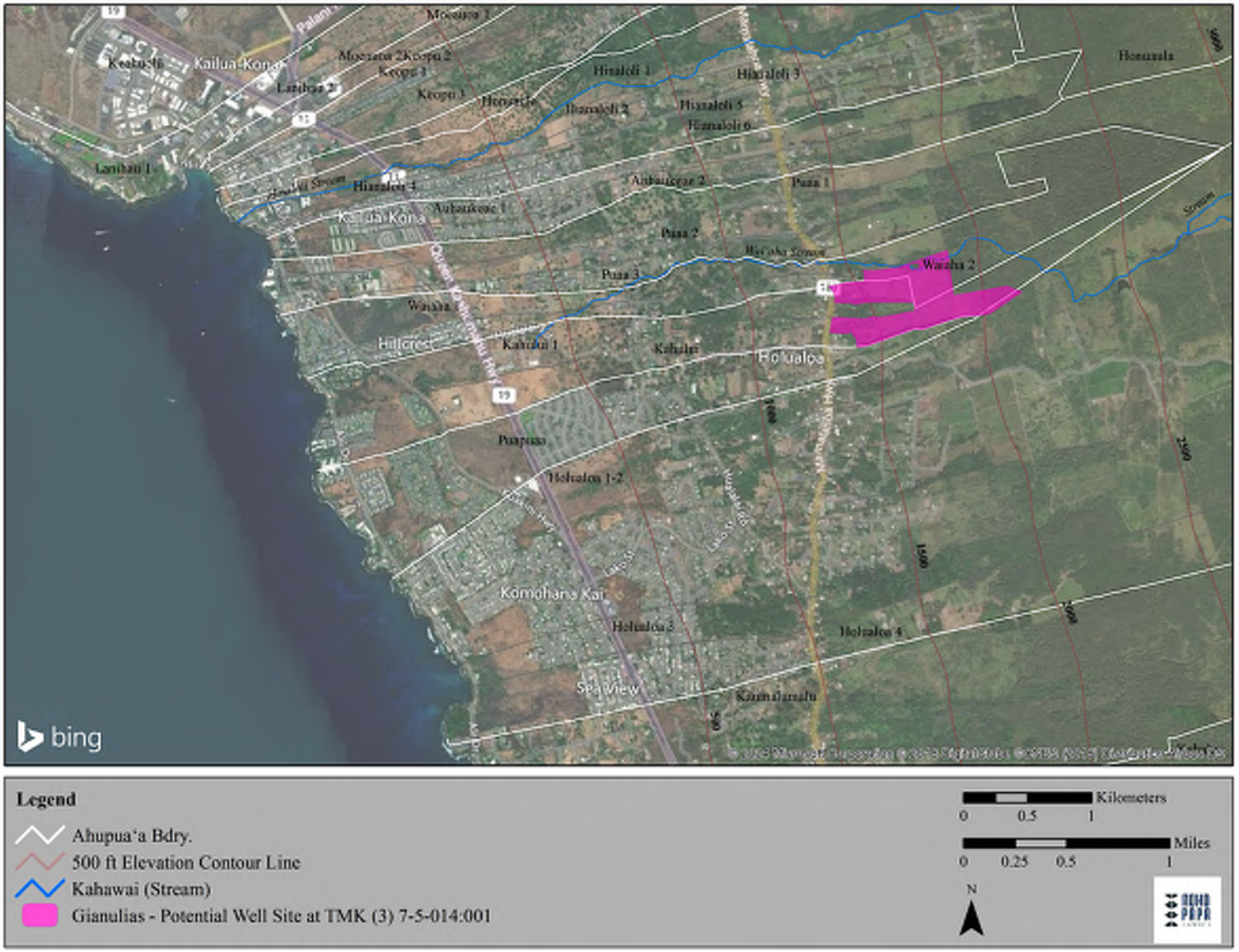

Figure 7. Close up aerial image showing the Gianulias TMK located within Wai'aha, Kahului, and Puapua'a Ahupua'a, which also includes a portion of Wai'aha Stream

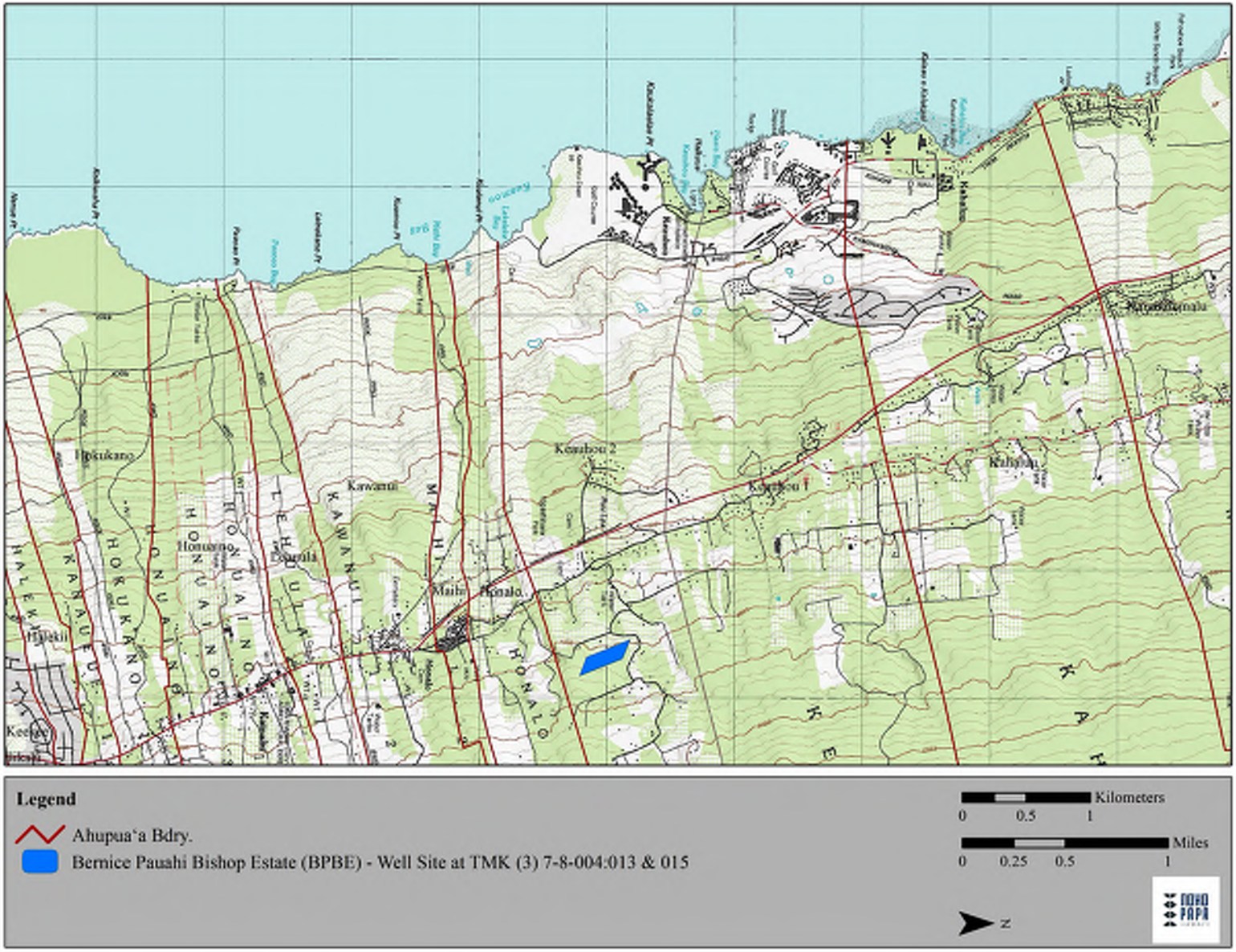

Figure 8. USGS map of the BPBE Kamehameha Schools existing well site in blue.

Figure 9. Close up aerial image showing the location of the Kamehameha Schools well site in Keauhou 2 Ahupua'a

Ka Paʻakai Legal Overview

What is the agency's obligation under Ka Paʻakai?

An understanding of the DHHL's responsibilities and obligations under the *Ka Paʻakai* Analysis framework must be rooted in the legal history of the sovereign Hawaiian Kingdom, and an overview of the unique jurisprudence contained in Hawaiʻi's Constitution and a constellation of state laws. Concurrently, it must be contextualized in an ecosystem and broader dialogue of federal and global policies and declarations concerning the rights of Indigenous peoples and the responsibilities of entities and agencies asserting agency and authority in Indigenous spaces.

Accordingly, the review and discussion below begins with an exposition on foundational understandings. It then explains why the Hawaiʻi State constitution and Hawaiʻi State laws require the protection of Hawaiian traditional and customary practices and related cultural resources - primary amongst them rights to freshwater, gathering, access to places and spaces, and the continued right to exercise an array of traditional and customary practices. These topics are followed by an overview of the DHHL's unique fiduciary obligations this *Ka Paʻakai* Framework Analysis is designed to satisfy. The section concludes with a discussion of how the purposes and goals of the *Ka Paʻakai* Framework Analysis are reflected and upheld by federal and global jurisprudence regarding the rights of indigenous peoples.

Foundational Truths About Hawaiian Culture and Traditional and Customary Practices

It is important to acknowledge a series of foundational, intertwined truths and realities that are frequently ignored and sidelined:

- **Hawaiian culture is living and dynamic**;
- **Traditional and customary practices, as aspects of a living, dynamic human cultural system, are an expansive spectrum**. They have the potential to be revealed and layered with ancestral knowledge and additional information through pathways that include but are not limited to: intentional revelation or sharing by knowledge carriers, cultural practitioners, and ʻohana, research, discovery, and new translations. **Therefore, the changing and emergent nature of *some* traditional and customary practices does not invalidate them**;
- **Hawaiian oral traditions and testimony are valid lines of empirical evidence that require no external validation[7];**

[7]*See* Ashford, 50 Haw. 314, 316, 440 P.2d 76, 77 (1968); Malia Akutagawa & Amanda Lerma, *Legal & Ka Paʻakai Analysis for the Nomination of the Papahānaumokuākea National Monument as a National Marine Sanctuary*, 49-50, 2023; Advisory Council on Historic Preservation, *Traditional Knowledge and the Section 106 Process: Information for Federal Agencies and Other Participants* (2021), https://www.achp.gov/sites/default/files/2021-05/TraditionalKnowledgePaper5-3-21.pdf; Council on Environmental Quality, Offices of Science and Technology Policy, the White House, *Guidance for Federal Departments and Agencies on Indigenous Knowledge*, (Nov. 30, 2022), https://www.whitehouse.gov/wp-content/uploads/2022/12/OSTP-CEQ-IK-Guidance.pdf; Advisory Council on Historic Preservation,

- ***Ka Paʻakai* mandates the respect and protection of traditional and customary practices by State agencies; it does not require their understanding by outsiders, nor their defense or justification by cultural practitioners[8]**. Failure to grasp their essence is a lack of knowledge and understanding as well as an inability (or unwillingness) of agencies and their representatives to uphold and fulfill their fiduciary obligations.

Ka Paʻakai as an Outgrowth of Ancient Hawaiian Cultural Practices and Customs

In their recent *Ka Paʻakai* Analysis for the National Marine Sanctuary designation for Papahānaumokuākea, Professor of Hawaiian Studies and Hawaiian Legal Expert Malia Akutagawa, Esq., and co-author Amanda Lerma, J.D., write that the "The Kumulipo[9] and Hawaiian cosmogenic origins determined cultural practices and native customary norms," (Akutagawa and Lerma 2023: 18). The authors write:

> Much of the law around Native Hawaiian rights are grounded in the understanding of the ʻohana. The late kumu hula John Kaʻimikaua stated that "the whole culture of our ancestors was based upon the ʻohana" in the manner that the land was cared for.[10] He adds that this truth can be found "from the beginning of time in our moʻolelo that tells of the creation of our islands … with the union of earth and sky."[11]

The remainder of their discussion is featured below, inclusive of their footnotes for informational sources:

> Kumu John Kaʻimikaua describes lōkahi as "balance between the land, the people that lived upon the land, and the akua," which results in "pono, the spiritual balance in all things."[12] From these relationships stem kuleana, the responsibility to advance spiritually with the akua, to engage meaningfully with our fellow kānaka, and to foster right relationship with ʻāina, the land and sea which the "kūpuna [knew to be] living beings."[13]

Notice of Approval of Exemption for Indigenous-Knowledge Informed Activities by Native Hawaiian Organizations, Federal Register (Nov. 08, 2024), https://www.federalregister.gov/documents/2024/11/08/2024-25984/notice-of-approval-of-exemption-for-indigenous-knowledge-informed-activities-by-native-hawaiian.

[8] *See* Ka Paʻakai o Ka ʻĀina v. State of Hawaiʻi Land Use Comʼn (*Ka Paʻakai*), 94 Haw. 31, 47, 7 P.3d 1068, 1084 (2000); See also discussion below of the court case below.

[9] Described by Queen Liliʻuokalani as "an Hawaiian creation myth," and "[a]n ancient prayer for the dedication of the high chief Lonoikamakahiki to the gods soon after his birth,..." (see Queen Liliʻuokalani 1897/2021: cover and introduction).

[10] *A Mau A Mau (To Continue Forever): Cultural and Spiritual Traditions of Molokaʻi,* (Nālani Minton and Nā Maka O Ka ʻĀina 2000).

[11] *Id.*

[12] *Id.*

[13] Video interview of Dean Wilhelm, Hoʻokuaʻāina, see website: https://hookuaaina.org/find-a-program/resources/hawaiian-values-based-lessons/

Inherent in this understanding is the ʻōlelo noʻeau, "He Aliʻi Ka ʻĀina, He Kauwā Ke Kanaka" – the land is chief, the people are its servants.[14] The moʻokūʻauhau of Kānaka ʻŌiwi teaches that ʻohana encompasses the natural world, that there is no separation between the people and the land. From this comes kuleana, of which the highest responsibility fell to the aliʻi, who served as intermediaries facilitating the "destructive-reproductive forces of the unseen divinities of the cosmos."[15] When aliʻi failed to follow proper religious protocols and mistreated the people, the makaʻāinana were justified in abandoning their aliʻi as poor leaders and unfit conduits of the gods' favor.[16] The makaʻāinana were free to move and make another ʻāina momona if they were unhappy with their aliʻi. This provided an incentive for aliʻi to treat the people fairly and generously.[17] More importantly, as Danielle Espiritu, former Program Specialist with the cultural program Hoʻokuaʻāina, expressed:

> Embedded within [the ʻōlelo noʻeau, he aliʻi ka ʻāina, he kauwā ke kanaka is] the idea that [the aliʻi] were not going to be oppressive to [the] people, [nor] domineering. [They] were going to steward that authority, that kuleana in a way that protected [the] people and provided for their needs. So really, that's what it meant to be an aliʻi that was pono, an aliʻi that was good and righteous. We see this in our ʻāina. If ʻāina is honored and stewarded well, it can provide abundantly for Kānaka, and it can allow the rest of the world to thrive. When we see that second part of the ʻōlelo noʻeau, *he kauwā ke kanaka*, that people are the servants, it is important for us to pause and ask ourselves, how is the health and well-being of our ʻāina directly tied to how well we as kānaka steward it? And so, what is our kuleana, what is our responsibility, what is our privilege as Kānaka to really steward ʻāina? What is our relationship to ʻāina? We can all ask ourselves this … And if we notice that our relationship [with ʻāina] is not healthy, then we can think about, "Okay what can we do to improve that? What can we do to make our relationship with ʻāina healthier? [What can we do] to really care for and to really mālama ʻāina in the way that it deserves, so that ʻāina can return to being ʻāina?" Embedded in the word ʻāina is ai which means to feed and to eat. How can we care for our relationship with ʻāina so that ʻāina can be thriving and can be a land of abundance?[18]

All of Hawaiian society was responsible to take on this kuleana of mālama ʻāina. The makaʻāinana, however, by cultivating the land, enjoyed the greatest intimacy

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[14] Mary Kawena Pukui, ʻŌlelo Noʻeau: Hawaiian Proverbs & Poetical Sayings 531 (1983).
[15] Lilikalā Kameʻeleihiwa, Native Lands & Foreign Desires: Pehea Lā e Pono Ai?, 36 - 37 (1992).
[16] *Id.* at 39 .
[17] *Id.* at 26; Marion Kelly, Changes in Land Tenure in Hawaii, 1778-1850 (June 1956) (unpublished thesis, University of Hawaiʻi at Mānoa) (on file with author).
[18] Danielle Espiritu video interview, Program Specialist with Hoʻokuaʻāina. See website: https://hookuaaina.org/he-alii-ka-aina-he-kauwa-ke-kanaka/.

with ʻāina. Mary Kawena Pukui emphasized that "the fundamental unit in the social organization [of Hawaiian society is the] ʻohana … tied by ancestry, birth and sentiment to a particular locality which was termed ʻāina."[19] These practices stem from the pre-contact era when ka poʻe kahiko lived under a communal land tenure system. The makaʻāinana tended to raise generations upon generations within the same ahupuaʻa, with extended ʻohana sharing provisions from the land and sea with each other.[20]

The long-standing presence of the makaʻāinana on their ʻāina hānau and their rights of occupation, access, and gathering survived as a hallmark within Hawaiʻi's laws from the Kingdom period into the present day, despite a shifting at the Māhele from a communal land system to a private property regime. This is evidenced by the fact that all the crown, government, and chiefs' lands remained subject to the rights of native tenants, with the clause "koe nae na kuleana o na kanaka" affixed to all royal patents and land commission awards.[21] To this day, all property in Hawaiʻi (both public and private) are encumbered with this reservation.[22] [Akutagawa and Lerma 2023: 20, 21]

In the Office of Hawaiian Affairs-sponsored *Hoʻohana Aku, a Hoʻōla Aku: A Legal Primer for Traditional and Customary Rights in Hawaiʻi*, legal scholars David M. Forman and Susan K. Serrano synthesize the ancient cultural basis for the respect and protection of Hawaiian customs and practices. The authors specifically emphasize gathering, access, and their holistic connections to Hawaiian resource stewardship, health, and abundance:

The cultural and spiritual identity of the Hawaiian people derives from their relationship with the ʻāina; because the land is part of their ʻohana, traditional Hawaiian customs and practices emphasize respect and care for the ʻāina and surrounding resources. Accordingly, the traditional and customary practices of the Hawaiian people include gathering, hunting, and fishing in a manner that allows natural resources to reproduce and replenish themselves. [Forman and Serrano 2012:3]

They describe "[a] system of trails and access" that veined every island in the archipelago and was open for access and utilization by everyone from commoners to chiefs (Forman and Serrano 2012:4). The authors also note:

Access along the shore, between adjacent ahupuaʻa (loosely defined as watersheds), to the mountains and the sea, and to small areas of land cultivated or harvested by native tenants, were all necessary parts of early Hawaiian life. Gathering activities supplemented everyday food and medicinal supplies, while

[19] E.S. Craighill Handy & Mary Kawena Pukuʻi, The Polynesian Family System In Kaʻu, Hawaiʻi (1998).
[20] *Id.*
[21] Lorenz Gonschor & Kamanamaikalani Beamer, *Toward an Inventory of Ahupuaʻa in the Hawaiian Kingdom: A Survey of Nineteenth- and Early Twentieth-Century Cartographic and Archival Records of the Island of Hawaiʻi.* 48 Haw'n J. Hist. 62 (2014).
[22] David M. Forman & Susan K. Serrano, Hoʻohana Aku, a Hoʻola Aku: A Legal Primer for Traditional and Customary Rights in Hawaiʻi 9 (2012).

> cultural and religious practices sustained the people in a variety of ways. [Forman and Serrano 2012:3]

Regarding cultural gathering practices, the authors state:

> Although early Hawaiians may have cultivated only small areas compared to the total acreage on each major island, they were able to utilize much greater land areas through gathering. Tenant farmers supplemented their subsistence lifestyle with plants and animals that either did not grow or could not be supported on or near the tenant's house lot or cultivated plot of land. They also gathered items for medicinal and religious purposes. During times of famine, gathering helped the people to survive. When crops or sea life had diminished significantly due to drought or other adverse climate conditions, gathering or foraging for food became the primary means of survival. When called upon by the resident chief, ahupuaʻa tenants would retrieve large products from the land for communal purposes, such as a tree for a canoe or rafters for a hālau (meeting house).
>
> Restrictions on gathering practices were also an extension of the kapu system, which not only held religious significance, but also served as an efficient means of conserving resources. For instance, with regard to makai gathering practices, there was a kapu placed during spawning season on deep-water fishes such as aku (ocean bonito) and ʻōpelu (mackerel). Because these fish bear their young in the open ocean, they were susceptible to overfishing—as compared with the manini (tang), uhu (parrotfish), palani (surgeonfish), and kala (unicornfish) in protected tidal pool areas. The resident chiefs could impose kapu regulating the size, type, and number of items gathered, as well as the manner in which they were gathered—subject to being overruled by a higher-ranking chief. [Forman and Serrano 2012:4]

Ka Paʻakai's Roots in the Legal History of the Sovereign Hawaiian Kingdom

Hawaiian Kingdom-era laws and jurisprudence recognized, privileged, and upheld Hawaiian cultural systems of resource management, especially those concerning water and traditional customary rights like gathering and access. King Kamehameha III (Kauikeaouli) was the first to enshrine protections for Hawaiian customs and practices into the legal system. Tenants' rights codified in 1839 retained elements of the kapu system described in the preceding section(Forman and Serrano 2012:4). The Constitution of 1840 and Kingdom judiciary of 1847 integrated elements of English common law and American civil law "...so far as they are deemed to be founded in justice, and not in conflict with the laws and usages of this kingdom," a legal structure that persisted for over a century through statehood (Akutagawa and Lerma 2023:23).

Akutagawa and Lerma (2023) write:

> In the post-contact era when the Hawaiian archipelago became united under one rule, the early monarchs began to codify these ancient understandings. The 1840 constitution of the Hawaiian Kingdom makes clear the stature of ʻāina as paramount over Kānaka ʻŌiwi, with a trusteeship held by the mōʻī to care for the chiefs and people through sound management of the land:

> Kamehameha I, was the founder of the kingdom, and to him belonged all the land from one end of the Islands to the other, though it was not his own private property. It belonged to the chiefs and people in common, of whom Kamehameha I was the head, and had the management of the landed property.[23]

The constitution reflected the ancient understanding that the aliʻi possessed the kuleana to govern the people wisely and to observe religious and ceremonial protocols that ensured the protection of the land and people.[24] The makaʻāinana farmed the land and made it productive. While the aliʻi's tenure on the land was impermanent due to acts of conquest among them, the makaʻāinana, for the most part (especially when they were treated well), remained a permanent fixture upon the land and devoted their endeavors to making ʻāina momona (fat, abundant land).[25]

The constitution also laid the groundwork for the Māhele, the privatization and division of the lands among the king, chiefs, and makaʻāinana. The Māhele (1848) introduced a hybridized system of private property that adopted some western constructs while protecting the vested rights of makaʻāinana – rights inherent to them via Hawaiian cosmology and grounded in custom and practice through the ancient land tenure system.[26] The Māhele sought to divide the formerly undivided interests in land shared in common between the King, chiefs, and makaʻāinana. The first stages of the Māhele involved the King and 252 chiefs quit-claiming their interests between each other. The lands, now considered freehold, were converted into allodial titles. The chiefs were then awarded royal patents for konohiki lands once they paid a commutation fee.[27] The King dedicated the bulk of his landholdings to the government, while keeping the remainder as crown lands for himself and his heirs.[28]
As the Kingdom was evolving towards a private property regime, it did not wholly adopt a western framework.[29]

All of the Crown, government, and chiefs' lands remained subject to the rights of native tenants. The clause "koe nae na kuleana o na kanaka" is affixed to all LCAs,

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[23] *Nā Kumukānāwai O Ka Makahiki 1839 A Me Ka 1840*, 1.1 Ka Hoʻoilina: Journal of Hawaiian Language Sources, Luna Hoʻoponopono et al., eds., Jason Kāpena Achiu trans., Mar. 2002 [hereinafter L.1840], at 41, *available at* http://hooilina.org/collect/journal/index/assoc/HASH0166.dir/1.pdf (last visited Feb. 11, 2023).
[24] Lilikalā Kameʻeleihiwa, Native Lands & Foreign Desires: Pehea Lā e Pono Ai?, 36-39 (1992).
[25] Kamanamaikalani Beamer, No Mākou Ka Mana: Liberating The Nation, 45 (2014); E.S. Craighill Handy & Mary Kawena Pukuʻi, The Polynesian Family System In Kaʻu, HAWAIʻI 2 (1998).
[26] Kamanamaikalani Beamer, No Mākou Ka Mana: Liberating The Nation, 144 (2014).
[27] Lorenz Gonschor & Kamanamaikalani Beamer, *Toward an Inventory of Ahupuaʻa in the Hawaiian Kingdom: A Survey of Nineteenth- and Early Twentieth-Century Cartographic and Archival Records of the Island of Hawaiʻi*. 48 Haw'n J. Hist. 59 (2014).
[28] *Id*. at 58.
[29] *Pub. Access Shoreline Haw. v. Haw. Cnty. Planning Comm'n* (*PASH*), 79 Hawaiʻi 425, 447, 903 P.2d 1246, 1268 (1995) (concluding that the "western concept of exclusivity [in private property law] is not universally applicable in Hawaiʻi" and that "the issuance of [ ] Hawaiian land patent[s]" at the time of the Māhele conveyed "a limited property interest.").

Royal Patents issued to konohiki, private citizens, Crown and government lands. This clause reaffirms that all lands throughout Hawai‘i to the present-day are encumbered by “reserved rights of native tenants.”[30] The courts to this present day recognize a kuleana reservation attaches to private property holdings in Hawai‘i.[31]

Hoa‘āina were able to acquire small land-holdings, or kuleana, for themselves through the 1850 Kuleana Act as well as acquire government lands through purchase.[32] The Kuleana Act and the kuleana reservations attached to landholdings reflect traditional and customary understandings that pre-date Statehood and even the time of Kamehameha and his monarchy. These legal provisions represent hoa‘āina relationships to their ahupua‘a and recognize their rights to access lands from mauka to makai to gather materials for their basic needs (e.g., thatch and aho cordage for making rope and building hale, firewood for imu, ti leaf for wrapping food items, lei-making, and to serve spiritual and ceremonial purposes). Today, the Kuleana Act is memorialized in state law as Hawai‘i Revised Statutes, Section 7-1

Hawai‘i Revised Statutes, Section 1-1 is another source of law that was enacted in 1892 as part of the civil code[33] of the Hawaiian Kingdom and has survived into Statehood. H.R.S. § 1-1 instructs Hawai‘i’s courts to look to English and American common law decisions for guidance, except where they conflict with “Hawaiian judicial precedent, or … Hawaiian [custom and] usage” pre-dating 1892.[34] The origins of this law can be traced even further back to the early period of the Hawaiian Kingdom prior to 1838, when it was acknowledged that the islands were “governed … without other system than [Hawaiian custom and] usage, and with a few trifling exceptions, without legal enactments.”[35] Under Kamehameha III, the constitutional monarchy took shape with the establishment of an Executive Department comprised of a Privy Council and Ministers to the King. This was followed by the creation of a Judiciary in 1847 authorized to “cite and adopt ‘[t]he reasonings and analysis of the common law, and of the civil law [of other countries] … so far as they are deemed to be founded in justice, and not in conflict with the

[30] Lorenz Gonschor & Kamanamaikalani Beamer, *Toward an Inventory of Ahupua‘a in the Hawaiian Kingdom: A Survey of Nineteenth- and Early Twentieth-Century Cartographic and Archival Records of the Island of Hawai‘i.* 48 Haw’n J. Hist. 61 (2014).

[31] David M. Forman & Susan K. Serrano, *Ho‘ohana Aku, a Ho‘ola Aku: A Legal Primer for Traditional and Customary Rights in Hawai‘i,* 9 (2012).

[32] Lorenz Gonschor & Kamanamaikalani Beamer, *Toward an Inventory of Ahupua‘a in the Hawaiian Kingdom: A Survey of Nineteenth- and Early Twentieth-Century Cartographic and Archival Records of the Island of Hawai‘i,* 48 Haw’n J. Hist. 61 (2014).

[33] L.1892, c. 57, s 5, approved on November 25, 1892 which states, “Section 5. The common law of England, as ascertained by English and American decisions, is hereby declared to be the common law of the Hawaiian Islands in all cases, except as otherwise expressly provided by the Hawaiian Constitution or laws, or fixed by Hawaiian judicial precedent, or established by Hawaiian national usage, provided however, that no person shall be subject to criminal proceedings except as provided by the Hawaiian laws.”

[34] State v. Zimring, 52 Haw. 472, 475 (1970) (citing De Freitas v. Trustees of Campbell Estate, 46 Haw. 425, 380 P.2d 762 (1963)).

[35] *PASH*, 79 Haw. at 437, 903 P.2d at 1246 (note 21, citing 1 *Statute Laws of His Majesty Kamehameha III, King of the Hawaiian Islands* 3 (1845-46)).

> laws and usages of this kingdom.'"[36] (emphasis added). This law also encompasses the entire spectrum of Hawaiian traditional and customary practices beyond the specific items listed in H.R.S. § 7-1. [Akutagawa and Lerma 2023:21—23]

Especially relevant in Kona, the 1859 Hawai'i Revised Statutes (HRS) § 7-1, as amended, entitled "Miscellaneous Rights of the People – Building materials, water, etc.; landlords' titles subject to tenants' use," protects the right to gather for personal, non-commercial use, and a right to "drinking water, and running water, and the right of way." It states:

> Where the landlords have obtained, or may hereafter obtain, allodial titles to their lands, the people on each of their lands shall not be deprived of the right to take firewood, house-timber, aho cord, thatch, or ki leaf, from the land on which they live, for their own private use, but they shall not have a right to take such articles to sell for profit. The people shall also have a right to drinking water, and running water, and the right of way. The springs of water, running water, and roads shall be free to all, on all lands granted in fee simple; provided that this shall not be applicable to wells and watercourses, which individuals have made for their own use. [HRS Hawaii Revised Statutes (HRS) § 7-1]

Hawaiian Rights Enshrined in Hawai'i Constitutional and State Law Underpinning Ka Pa'akai

Akutagawa and Lerma offer a discussion of the pivotal modern events and legal history underpinning *Ka Pa'akai*. They write:

> During the Hawaiian Renaissance period when Kānaka Maoli began to fight for native access and gathering rights, resist evictions from ancestral lands, and organize against the Navy's bombing of Kaho'olawe, a State constitutional convention was held. This rare opportunity prompted Kānaka and local environmentalists to strategically position themselves as delegates in these proceedings. It was at the 1978 constitutional convention that certain key amendments were adopted. With respect to native rights, the delegates adopted a new amendment, Article XII, Section 7, which reads as follows:
>
> > The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.[37]
>
> This provision solidifies and enhances H.R.S., §§ 1-1 and 7-1, by making it a constitutional mandate for the State and its political subdivisions to "protect the reasonable exercise of customar[y] and traditional[] rights of Hawaiians to the

[36] *Id.* (note 21, citing Act of September 7, 1847, ch. I, § IV; 2 *Statute Laws of His Majesty Kamehameha III, King of the Hawaiian Islands* (1847) (emphasis added)).
[37] HAW. CONST. art. XII, § 7 (1978).

extent feasible."[38] Over the next forty years, a body of jurisprudence developed around these statutory and constitutional provisions which addressed issues of where Hawaiian rights are protected and to what extent.

The first landmark Native Hawaiian rights case emerged in 1982 with William "Billy" Kalipi, Sr. asserting his kuleana rights.[39] The Hawai'i Supreme Court strictly interpreted H.R.S., § 7-1 in *Kalipi v. Hawaiian Trust Co.* ("*Kalipi*") as protective only of access and gathering rights of native tenants actually residing within the ahupua'a and that these practices may occur only on undeveloped lands.[40] However, as more cases have been litigated since *Kalipi*, the Hawai'i Supreme Court has revisited the notion of whether traditional and customary practices are viable only on undeveloped lands. The court's decision in *Public Access Shoreline Hawaii v. Hawai'i County Planning Commission* ("*PASH*") acknowledged that these traditions exercised on "less than fully developed" lands may also warrant protection.[41]

In *Pele Defense Fund v. Paty* ("*Pele I*"), the Hawai'i Supreme Court expanded its ruling in *Kalipi* and acknowledged that gathering rights may extend to other ahupua'a without benefit of tenancy if it can be demonstrated that this was the accepted custom and long-standing practice.[42] The court gave great weight to kama'āina evidence and acknowledged that "traditional and customary rights associated with tenancy in an ahupua'a [may] extend[ ] beyond the boundaries of the ahupua'a."[43]

These cases tend to reflect the practices of hoa'āina in the terrestrial realms, particularly the wao nahele (upper rainforests with permanent cloud cover), the wao lā'au (lower forests of characterized by traditional hardwoods utilized for building materials and permanent fruiting trees where human interactions and gathering practices were more pronounced), and the wao kanaka (where human settlements existed and the land was actively farmed). The wao kanaka also extended into the sea to include estuarine environments where loko i'a (fishponds)

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[38] *PASH*, 79 Hawai'i 425 at437, 903 P.2d at 1246.

[39] Kalipi v. Hawaiian Trust Co., 66 Haw. 1, 656 P.2d 745 (1982).

[40] FORMAN & SUSAN K. SERRANO, HO'OHANA AKU, A HO'OLA AKU at 9 (citing Kalipi, 66 Haw. at 9, 656 P.2d at 750).

[41] *See PASH*, 79 Hawai'i at 451.

[42] Pele Def. Fund v. Paty (*Pele I*), 73 Haw. 578, 620, 837 P.2d 1247, 1272 (1992). *See* FORMAN & SUSAN K. SERRANO, HO'OHANA AKU, A HO'OLA AKU, at 13 (citing *Pele I*, 73 Haw. at 620, 837 P.2d at 1272). In *Pele I*, the plaintiffs, the Pele Defense Fund ("PDF") challenged the state's decision to exchange specific ceded lands for privately owned land on Hawai'i Island. PDF claimed that after the land swap, its Native Hawaiian members seeking to exercise traditional subsistence, cultural, and religious practices were denied access to the undeveloped and now privately owned land. PDF provided testimony and affidavits attesting to the actual practices of Native Hawaiians living in in the Puna region as traditionally gathering outside of their ahupua'a of residence onto the lands subject in this litigation. This evidence formed the basis for the court's decision to affirm these practices as rights protected by law.

[43] FORMAN & SUSAN K. SERRANO, HO'OHANA AKU, A HO'OLA AKU, at 13-14 (citing *Pele I*, 73 Haw. at 620-21, 837 P.2d at 1272; citing also Pele Def. Fund v. Estate of James Campbell, Civ. No. 89-089, 2002 WL 34205861 (Haw. 3d Cir. Aug. 26, 2002)).

were constructed and where the nearshore reefs existed. [Akutagawa and Lerma 2023: 24, 25]

The authors go on to discuss water and other gathering rights, and the public trust:

> In a post-Territory Hawai'i, the Hawai'i Supreme Court, in a series of groundbreaking cases, began a decolonize the law and reinvigorate the sources of law protecting native rights. Some of those cases have been described above in the section above. In 1973, the Court in *McBryde Sugar Co. v. Robinson* rejected the notion of prescriptive rights and private ownership of water, stating that from the time Hawai'i became a kingdom, the King maintained certain "sovereign prerogatives" which included "encourag[ing] and even ... enforc[ing] the usufruct of lands for the common good[,]" water being one of them.[44] Applied to the State of Hawai'i as the new "sovereign" this court decision had the effect of returning water as a public trust. The Court further reinforced this understanding in *Robinson v. Ariyoshi* (1982):
>
> > [W]e believe that by [the sovereign reservation], a public trust was imposed upon all the waters of the kingdom. That is, we find the public interest in the waters of the kingdom was understood to necessitate a retention of authority and the imposition of a concomitant duty to maintain the purity and flow of our waters for future generations and to assure that the water of our land are put to reasonable and beneficial uses. This is not ownership in the corporeal sense where the State may do with the property as it pleases; rather, we comprehend the nature of the State's ownership as a retention of such authority to assure the continued existence and beneficial application of the resource for the common good.[45]
>
> Reflecting on the implications of *McBryde* and *Robinson v. Ariyoshi* necessitates a deeper acknowledgement that the public trust as understood from the Kingdom's perspective encapsulates the understanding of the ali'i, through divine right and mo'okū'auhau tracing to origins in the Kumulipo, having kuleana to care for the 'āina and their people for the common good. Indeed, the Court has acknowledged of the kuleana the chiefs had to the maka'āinana where the "public trust [comprises] a dual concept of sovereign right and responsibility[,]" a hallmark of "the ancient Hawaiian system."[46]
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> Subsequent to the landmark decision in *McBryde*, the delegates to the 1978 constitutional convention solidified this case by adopting Article XI. Section 7 specifically refers to water and affirms the State's "obligation to protect, control and

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[44] McBryde Sugar Co. v. Robinson, 54 Haw. 174, 186 (1973); McBryde Sugar Co. v. Robinson, 55 Haw. 260, 270 (1973).
[45] Robinson v. Ariyoshi, 65 Haw. 641,674, 658 P.2d 287, 310 (1982)
[46] *In re* Waiāhole Combined Contested Case Hearing, 94 Haw. 97, 135, 9 P.3d 409, 447 (2000) (citing Reppun v. Board of Water Supply, 65 Haw.531, 547-48 and n. 14, 656 P.2d 57, 68-69, and n. 14 (1982)).

regulate the use of Hawaii's water resources for the benefit of its people."[47] Section 1 provides the State's and Counties' responsibilities under the Public Trust:

> For the benefit of present and future generations, the State and its political subdivisions shall conserve and protect Hawai'i'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. All public natural resources are held in trust by the State for the benefit of the people.[48]

The Hawai'i Supreme Court recognizes both Article XI, section 1 and article XI, section 7 as the public trust doctrine and "a fundamental principle of constitutional law in Hawai'i."[49] These constitutional provisions have had profound effects on our jurisprudence, one that is unmatched in any other jurisdiction throughout the United States. A survey of the cases arising out of the public trust include strong language from the Hawai'i Supreme Court rejecting arguments from private commercial interests that they are protected under this doctrine and that to return water back to the stream would constitute "waste."[50] Rather, the Court has made clear that resource protection is an important underlying public trust responsibility. The public trust also extends to ocean and fisheries health.[51]

Native Hawaiian traditional and customary rights are also deemed a public trust purpose as Hawai'i's indigenous people are inextricably tied to the natural environment.[52] The Court traces this public trust responsibility to Native Hawaiians as derivative of protections afforded under the Kuleana Act/H.R.S., § 7-1 which recognized the rights of hoa'āina to traverse freely within their ahupua'a, to access traditional trails, and to gather specific items that were critical to their daily survival, including water.[53] Thus, native rights are not only protected by Article XII, § 7 of the constitution, but doubly so under the public trust.

More recently, the Court has further expanded its understanding of native rights and the public trust to include a "duty to mālama 'āina" or "to care for the land[,]"[54] and that the State must exercise its fiduciary obligations as a trustee for lands it holds and manages.[55] The Court in *Ching v. Case* (2019), which centered on the

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[47] Haw. Const. art. XI, § 7 (1978).
[48] Haw. Const. art. XI, §1 (1978).
[49] *In re* Waiāhole Combined Contested Case Hearing, 94 Haw. 97, 132, 9 P.3d 409, 444 (2000).
[50] *Id.* at 137-138, 9 P.3d 409, 449-450 (2000).
[51] *See generally,* Kelly v. 1250 Oceanside Partners, 111 Hawai'i 205, 140 P.3d 985 (2006).
[52] *In re* Waiāhole Combined Contested Case Hearing, 94 Haw. 97, 137, 9 P.3d 409, 449 (2000).
[53] HAW. REV. STAT. § 7-1 (1994) (ensuring hoa'āina "right[s] to take firewood, house-timber, aho cord, thatch, or ki leaf ... [and] a right to drinking water, and running water, and the right of way. ...").
[54] Ching v. Case, 145 Haw. 148, n. 26, 449 P.3d 1146, n. 26 (2019).
[55] *Id.* at 1168, 170, (citing In re Conservation Dist. Use Application HA-3568 (In re TMT), 143 Haw. 379, 400, 431 P.3d 752, 773 (2018); State ex rel. Kobayashi v. Zimring, 58 Haw. 106, 121, 566 P.2d 725, 735) (1977)).

State's obligation to properly manage ceded lands it had leased to the federal government for military training exercises, made clear also that:

> [P]ublic lands ceded to the United States following the overthrow of the Hawaiian Monarchy and returned to Hawai'i upon its admission to the Union hold a special status under our law. These lands are held by the State in trust for the benefit of Native Hawaiians and the general public. Accordingly, our constitution places upon the State duties with respect to these trusts much lie those of a common law trustee, including an obligation to protect and preserve the resources however they are utilized."[56]

The ceded lands, and thus the trusts currently managed by the State of Hawaii for the betterment of the conditions of native Hawaiians, are comprised of land originally set aside in 1848 by the laws and customs of the Kingdom of Hawaii. In 1848, the lands set aside as crown lands and government lands were made subject to a trust inspired by Native Hawaiian tradition. In 1893, the Kingdom was overthrown, and the Crown and Government lands subsequently were stolen by the Republic of Hawaii. When these land groupings were ceded to the United States by the Republic in 1898, federal law made them subject to a special trust,[57] and at statehood they were placed in what is known as the ceded lands trust. In the 1959 Hawai'i Admission Act, provisions explicitly protected lands and resources for "native Hawaiian" beneficiaries as defined in the Hawaiian Homes Commission Act.[58] As a condition of statehood, section 5(f) of the Admission Act mandated that the State of Hawai'i manage certain ceded lands for any number of the five trust purposes, including the "betterment of the conditions of native Hawaiians.[59] Section 5(b) of the Admissions Act officially conveyed to the new State of Hawai'i title to 1,400,000 of the 1,800,000 of Kingdom crown and government lands.[60] The OHA was the State's vehicle for fulfilling its duty to Native Hawaiians under section 5(f). It was established at the 1978 constitutional convention for that purpose. [Akutagawa and Lerma 2023:46—49]

Ka Pa'akai o Ka 'Āina v. State of Hawai'i Land Use Commission

The court case *Ka Pa'akai o Ka 'Āina v. State of Hawai'i Land Use Commission (Ka Pa'akai)* established state agencies have an onus to fulfill their fiduciary duties to uphold Hawaiian rights enshrined in the State Constitution and state law. The Supreme Court of the State of Hawai'i

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[56] *Id.* at 152, 449 P.3d at 1150.

[57] D. Kapua'ala Sproat & MJ Palau-McDonald, *The Duty to Aloha 'Āina: Indigenous Values as a Legal Foundation for Hawai'i's Public Trust*, 57 Harvard Civil Rights-Civil Liberties L. Rev. 525 (2022) (stating that, "Both the Joint Resolution of Annexation and Hawai'i's Organic Act, which established a U.S. territorial government, recognized the special trust status of the Crown and Government Lands and also stipulated that revenue from the lands must be used to benefit residents of the islands." Joint Resolution to Provide for Annexing the Hawaiian Islands to the United States, July 7, 1898, 30 Stat. 750; Hawaiian Organic Act, § 91, April 30, 1900, ch. 339, 31 Stat. 141 (1900).

[58] Hawaii Admission Act, Pub. L. No. 86-3, §§ 4-5, 73 State. 5, 5-6 (1959).

[59] *Id.* § 5(f).

[60] *Id.* § 5(b).

determined Article VII, Section 7 of Hawai'i's Constitution "...places an affirmative duty on the State and its agencies to preserve and protect traditional and customary native Hawaiian rights and confers upon the State and its agencies the power to protect these rights and to prevent any interference with the exercise of these rights."[61] The court asserted:

> (1) The state and its agencies are obligated to protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians to the extent feasible;
> (2) Agencies are obligated to make an assessment, independent of the developer or applicant, of the impacts on customary and traditional practices of Native Hawaiians; and
> (3) The independent assessment must include three factors known as the '*Ka Pa'akai*' framework.[62]

The case also "...established a three-pronged framework for assessing Native-Hawaiian constitutionally protected rights and further held that the state has an obligation to protect those rights and may not transfer its duties to a third party." [Palacat-Nelsen 2023]
The opinion resulting from *Ka Pa'akai* stated that in order to fulfill its legal obligations, state agencies, like the DHHL, must measure the potential impacts of proposed projects against the following considerations:

(1) The identity and scope of "valued cultural, historical, or natural resources" in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;

(2) The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and

(3) The feasible action, if any, to be taken ... by the [State and/or its political subdivisions] to reasonably protect native Hawaiian rights if they are found to exist.[63]

How are Hawaiian Customs Determined?

Akutagawa and Lerma (2023) also detail the legal precedent for determining Hawaiian customs:

> ...HRS §1-1 instructs Hawai'i's courts to look to English and American common law decisions for guidance, except where they conflict with "Hawaiian judicial precedent, or ... Hawaiian [custom and] usage."[64] One of the threshold issues in determining whether or not the law governing Native Hawaiian rights, then, is determining whether or not a purported practice is actually a Hawaiian custom.

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[61] *Ka Pa'akai*, 94 Haw. at 47, 7 P.3d at 1084.
[62] *See id.*
[63] *Id.*
[64] State v. Zimring, 52 Haw. 472, 475 (1970) (citing De Freitas v. Trustees of Campbell Estate, 46 Haw. 425, 380 P.2d 762 (1963)).

Courts look to kamaʻāina expert testimony as the foundation for authenticating Hawaiian custom and usage. This was first discussed in *Application of Ashford*[65] which relied on "reputation evidence" of a kamaʻāina over a shoreline boundary dispute rather than accept the conclusions of a certified land surveyor. The Court has recognized the definition of "kamaʻāina" to mean as stated in the Hawaiian dictionary as one who is "[n]ative born, one born in a place, host[.][66] The *Ashford* court stated:

> Kamaʻāina witnesses may testify to the location of seashore boundaries dividing private land and public beaches according to reputation and ancient Hawaiian tradition, custom and usage. The method of locating the seaward boundaries was by reputation evidence from kamaʻāinas and by the custom and practice of the government's survey office. It is not solely a question for a modern-day surveyor to determine the boundaries in a manner completely oblivious to the knowledge and the intention of the king and old-time kamaʻāinas who knew the history and names of various lands and the monuments thereof.[67] [Akutagawa and Lerma 2023:49, 50]

The DHHL's Fiduciary Responsibilities Under Ka Paʻakai

Per the discussion above, the DHHL's fiduciary obligations under *Ka Paʻakai o Ka ʻĀina v. State of Hawaiʻi Land Use Commission* include obligations to: 1) "…to protect the reasonable exercise of customarily and traditionally exercised rights of native Hawaiians to the extent feasible;" 2) Assess the potential impacts of a proposed project on customary and traditional practices of Native Hawaiians; and 3) Ensure an independent assessment is performed that employs the '*Ka Paʻakai*' framework.[68]

From our place of expertise in Hawaiian culture and consultation, the authors offer additional cornerstones of best practices in the execution of a *Ka Paʻakai* Analysis framework. These include:

- project-specific consultation as well as the avoidance of repurposing and recycling consultation from one project for another;
- consultation processes that recognize and uphold the intellectual property rights of consultees, including but not limited to *continued* free, prior, and informed consent;
- ensuring consultation participants are provided a clear and accurate understanding of how consultation will be used;
- and, the good faith realization of desired mitigations and meaningful integration of perspectives shared during consultation into project planning and impact avoidance.

Ka Paʻakai in Global and Federal Legal Contexts and Dialogues

Global and federal policies, best practices, and guidelines for working in indigenous spaces, with indigenous communities and knowledge, align with the purpose and goals of *Ka Paʻakai*

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[65] *In re* Ashford, 50 Haw. 314, 440 P.2d 76 (1968).
[66] *Ka Paʻakai*, 94 Hawaiʻi at 31, 7 P.3d at 1068.
[67] *In re* Ashford, 50 Haw. 314, 316, 440 P.2d 76, 77 (1968).
[68] *Id.*

Framework analysis. Reviewed chronologically below, they offer a breadth and depth of critical considerations and pathways for state agencies to uphold their fiduciary responsibilities to Hawaiians, alongside, of course, the good faith realization of the mitigations and best practices identified by Hawaiian stakeholders for impacts to their rights and resources.

The 2007 *United Nations Declaration on the Rights of Indigenous People* (United Nations 2007) articulates the unique human rights belonging to indigenous people, and "...the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world," (United Nations 2007:28). It acknowledges:

> ...that indigenous peoples have suffered from historic injustices as a result of, inter alia, their colonization and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their right to development in accordance with their own needs and interests... [United Nations 2007:3]

The entire document upholds the purpose and goals of the Ka Paʻakai Framework analysis. It recognizes a holistic array of indigenous human rights, including around traditional and customary practices that include gathering, access to places and spaces, and the right to the health and continuity of cultural resources and practices. The following tenets are especially relevant and underscore how the state's fiduciary responsibility to protect Hawaiian rights is part of a broader global dialogue regarding the rights of indigenous peoples:

> ...[the] urgent need to respect and promote the inherent rights of indigenous peoples which derive from their political, economic and social structures and from their cultures, spiritual traditions, histories and philosophies, especially their rights to their lands, territories and resources,...[United Nations 2007:3]
>
> ...that control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs,...[United Nations 2007:4]
>
> ...respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment,...[United Nations 2007:4]

Elements of the United Nations' "standard of achievement to be pursued in a spirit of partnership and mutual respect," are important to emphasize. The underlined text below, specifically, articulates with and reflects the purpose and goals of the Ka Paʻakai Framework analysis:

> Article 2: Indigenous peoples and individuals are free and equal to all other peoples and individuals and have the right to be free from any kind of discrimination, in the exercise of their rights, in particular that based on their indigenous origin or identity.[United Nations 2007:2]
>
> Article 8.1. Indigenous peoples and individuals have the right not to be subjected to forced assimilation or destruction of their culture.[United Nations 2007:10]
>
> Article 11.1. Indigenous peoples have the right to practise and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as

archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature. [United Nations 2007:11]

Article 11.2. States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs. [United Nations 2007:12]

Article 12.1. Indigenous peoples have the right to manifest, practise, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of their ceremonial objects; and the right to the repatriation of their human remains. [United Nations 2007:12]

Article 15.1. Indigenous peoples have the right to the dignity and diversity of their cultures, traditions, histories and aspirations which shall be appropriately reflected in education and public information. [United Nations 2007:14]

Article 20.1. Indigenous peoples have the right to maintain and develop their political, economic and social systems or institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities. [United Nations 2007:16]

Article 20.2. Indigenous peoples deprived of their means of subsistence and development are entitled to just and fair redress. [United Nations 2007:16]

Article 24.1. Indigenous peoples have the right to their traditional medicines and to maintain their health practices, including the conservation of their vital medicinal plants, animals and minerals... [United Nations 2007:18]

Article 25. Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard. [United Nations 2007:18]

Article 26.1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. [United Nations 2007:19]

Article 26.2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired. [United Nations 2007:19]

Article 26.3. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due respect to the customs, traditions and land tenure systems of the indigenous peoples concerned. [United Nations 2007:19]

Article 27. States shall establish and implement, in conjunction with indigenous peoples concerned, a fair, independent, impartial, open and transparent process, giving due recognition to indigenous peoples' laws, traditions, customs and land tenure systems, to recognize and adjudicate the rights of indigenous peoples pertaining to their lands, territories and resources, including those which were traditionally owned or otherwise occupied or used. Indigenous peoples shall have the right to participate in this process. [United Nations 2007:20]

Article 29. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination. [United Nations 2007:21]

Article 31.1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions. [United Nations 2007:22,23]

Article 31.2. In conjunction with indigenous peoples, States shall take effective measures to recognize and protect the exercise of these rights.[United Nations 2007:23]

Article 32.1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources. [United Nations 2007:23]

Article 32.2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources. [United Nations 2007:23]

Article 32.3. States shall provide effective mechanisms for just and fair redress for any such activities, and 24 appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact. [United Nations 2007:23]

Article 34. Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, in accordance with international human rights standards.

A series of recent memorandums intended for Federal agencies and application in Federal regulatory contexts recognize the validity and importance of Indigenous Knowledge. In 2021, the

White House Office of Science and Technology Policy (OSTP) and Council on Environmental Quality (CEQ) recognized "…Indigenous Knowledge as one of the many important bodies of knowledge that contributes to the scientific, technical, social, and economic advancements of the United States, and to our collective understanding of the natural world," (Prabhakar and Mallory 2022:3). They also called for "…the recognition and inclusion of Indigenous Knowledge," that is "…founded on the understanding that multiple lines of evidence or ways of knowing can lead to better-informed decision making," (Prabhakar and Mallory 2022:3). The Advisory Council on Historic Preservation (ACHP) issued similar guidance mandating culturally-appropriate use of Indigenous Knowledge only with "free, prior, and informed consent," in Federal implementation of Section 106 of the National Historic Preservation Act (ACHP 2021:4). In 2024, the ACHP "…approved an exemption that would relieve Federal agencies from the historic preservation review requirements under Section 106 of the National Historic Preservation Act regarding the effects of various undertakings in Hawaii that are proposed or directed by a Native Hawaiian Organization (NHO), or substantially led, designed, or managed by an NHO, informed by Indigenous Knowledge of that NHO, and related to traditional cultural practices of Native Hawaiians," (ACHP 2024).

Methods

Conducting this Ka Paʻakai Framework Analysis consisted of three primary tasks: (1) ethnohistorical research, synthesis, and analysis; (2) community outreach and consultation, and (3) Ka Paʻakai analysis and report preparation.

Nohopapa conducted research and outreach to identify 'valued cultural, historical, or natural resources' to better understand if and how groundwater development may impact traditional customary Native Hawaiian practices and rights in the area of North Kona spanning from the ahupuaʻa of Kāloko to Keauhou. Additionally, the Ka Paʻakai Framework Analysis requires the identification of appropriate mitigation measures (feasible actions) that can be implemented to protect identified impacted resources and Native Hawaiian rights and practices associated with those resources.

While conducting this work, Nohopapa's research team incorporated a set of living values and beliefs to help guide our research, analysis, behavior, perspective, and overall frame of reference. These values represent the underlying foundation, spirit, and structure for this study:

- ***Aloha ʻĀina****- to have a deep and cherished love for the land which created and sustains us*
- ***Haʻahaʻa****- to be humble, modest, unassuming, unobtrusive, and maintain humility*
- ***Hoʻomau****- to recognize, appreciate, and encourage the preservation, perpetuation, and continuity of our wahi pana and kaiāulu*
- ***ʻImi Naʻauao****- to seek knowledge or education; be ambitious to learn*
- ***Kuleana****- to view our work as both a privilege and responsibility*

Ethnohistorical Research

Ethnohistorical information lays the foundation for understanding a place's natural, cultural, and historical background. To provide a more comprehensive understanding of the project areas, Nohopapa researched cultural and historical sources for Kona Akau, including historical maps, place and ua (rain) names, moʻolelo (stories), ʻōlelo noʻeau (proverbs), and historical land use

documents. Inoa ʻāina, moʻolelo, and ʻōlelo noʻeau were compiled from Hawaiian language and English sources in books, newspapers, and online databases and archives. Historical land use accounts were derived from land documents, such as Boundary Commission Certificates and Testimonies, the Buke Mahele and Awards Books, Native & Foreign Testimonies and Registers, Government Land Grants, Crown lands, and Government Surveys.

To assist with the historical land use research for this project, Nohopapa was fortunate to contract and collaborate with Kumu Pono Associates, LLC. Kumu Pono provided an extensive compilation, Hawaiian language translations, and summaries of Boundary Commission testimony and Māhele claims (Native Testimony and Native Register) across North Kona. In addition, Kumu Pono associates shared their compiled works of the moʻolelo *Kaao Hooniua Puuwai no Ka-Miki*, by John Wise and J. W. H. I. Kihe, which ran in the nūpepa "Ka Hoku o Hawaii" in a series from Jan. 8, 1914 to Dec. 6, 1917. While the 1917 portion of the series can be found on online nūpepa collections, Kumu Pono associates painstakingly located, compiled and translated Ka-Miki, a labor over many years.

In this report, Kumu Pono also authored the following three sections:

- Boundary Commission Proceedings Of The Boundary Commission Lands Of: Keahuolū, Puaʻa, Waiʻaha, Kahului, Puapuaʻa and Keauhou
- The Māhele ʻĀina and Issuance of Kuleana to Hoa ʻĀina
- Excerpts from Kuleana Claims in the Ahupuaʻa of Keauhou 1 & 2, Kahaluʻu, Waiʻaha-Kahului, Keahuolū-Kealakehe

Their authorship of important sections and primary resource contributions greatly increased the waiwai of the inventory of resources and practices in, around and potentially impacted by proposed actions at the study area.

Community Consultation

Community Outreach

Prior to Nohopapa's individual consultation efforts, the Department of Hawaiian Home Lands (DHHL) with support from Nohopapa, held a kick-off meeting at the Kamehameha Schools Kahaluʻu Manowai (Ma Kai) site on April 18, 2024 to share information about the DHHL Kona Ka Paʻakai Framework Analysis project for water source development related to the proposed water improvement sites at Waiʻaha and Keauhou and larger project area (Kaloko to Keauhou) Kona, Hawaiʻi. Twenty-fine individuals attended the public meeting and shared their contact information with DHHL and Nohopapa to follow-up with them about future project updates.

Individual Consultation

One on one community consultation efforts were conducted from July to October 2024. As a multi-phase study, the consultation process consisted of identifying appropriate and knowledgeable individuals, reaching out to them to participate (Appendix A: Community Consultation Letter), conducting in-person, phone, or online interviews (Appendix B: Consultation Questionnaire), summarizing the community manaʻo, analyzing the data, and preparing a summary of findings for the Analysis. In particular, information was gathered relating to the many manifestations of Kāne and the resources, traditional customary practices, and rights that rely on them. Thirty-four individuals were contacted to participate in this study. Of the thirty-four individuals, twenty-four responded, and thirteen committed to an interview. Eleven individuals were unable to participate for various reasons.

Nohopapa engaged with individuals, ʻohana, and/or organizations with relationships to study area. In particular, we focused on gathering information relating to the many manifestations of Kāne and the resources, traditional customary practices, and rights that rely on them; as related to the proposed water improvement sites (at Waiʻaha and Keauhou) and larger project area (Kāloko to Keauhou):

- Biocultural forms of water in the study area, including, rainfall, fog, mist, seeps, catches, springs, flowing water, where water enters the sea, algae blooms, anchialine ponds, loko, clouds, storm patterns, etc.
- Observation of *changes* over time to the area's water resources, as well as to the birds, plants, and animals, marine or terrestrial, that rely on those waters.
- Moʻolelo, kaʻao, inoa ʻāina, mele, oli, ʻōlelo noʻeau, and hula and other stories related to the knowledge of wahi pana, wahi kapu, and wahi kūpuna and cultural practices and resources associated with these wahi
- Traditional and historical land use and specific use or larger area models relate to water
- Coastal to upland traditional and local relationships, especially regarding water
- Recommended traditional & local strategies for resource management and conservation in Kona
- Traditional practices you or those you know engage with or have engaged with in the past
- Potential short and long-term impacts of the proposed project on Hawaiian cultural resources, rights, and traditional customary practices
- Recommended mitigations for the proposed project
- Referrals of kūpuna and kamaʻāina who are knowledgeable of the project area and might be willing to participate in this study

Data Integration

After the interviews were conducted, the recorded interviews were transcribed then sent to the participants for review, an accuracy check, and to confirm they were comfortable with the thoughts, information, and comments being shared. Nohopapa worked hard to ensure that the voices of the community were honored, respected, correctly heard, and properly conveyed.

Ethics

Throughout the project, it was explained to all participants that their involvement was strictly voluntary. An informed consent process was initiated and completed, including providing ample project background information explaining the project focus and the purpose of the plan. Verbal or written informed consent was gathered from all contributors to this study (see Appendix C).

In alignment with professional best practices committed to doing no harm and protecting the best interests and intellectual property of participants, all contributions to this document have been anonymized. Additionally, per consultation professional standards, ethics, and all applicable laws and regulations, the intellectual property generously shared by consultation participants and featured in this study **cannot and should not** be reproduced, applied to other projects or studies, or utilized without free, prior, and informed consent.

Ka Paʻakai Analysis

The Analysis looked at the information compiled from both the ethnohistorical research and community consultation in order to:

(1) identify cultural resources, practices, beliefs, and features associated with the project area and vicinity
(2) identify impacts the proposed project will have on any identified cultural resources and practices, and
(3) identify appropriate mitigation commitments and recommendations for best practices.

Ka Nohona Hawai‘i – Cultural Resources, Practices, and Beliefs

This section of the report draws from a variety of oral and documented resources to present an overview of the cultural resources and practices associated with the current study areas focused primarily on **Kealakehe, Keahuolū, Pua‘a, Wai‘aha, Kahului, Puapua‘a, and Keauhou Ahupua‘a** of Kona. The goal of this broad overview is to contextualize the study areas, as well as the greater landscape of Kona, through the compilation of mo‘olelo and ka‘ao, ‘ōlelo no‘eau, mele, and historical accounts. As it is said in the ‘ōlelo no‘eau–*Kona, kai ‘ōpua i ka la‘i–Kona, where the horizon clouds rest in the calm,* (Pukui 1983:199, #1844)–a rich reservoir of stories and traditions also rests beneath the calm of these Kona clouds. Presented here is a selection of mo‘olelo that conveys some of the valued resources and significant practices associated with the study areas.

Mo‘olelo and Ka‘ao - Oral Traditions

Hawaiian oral traditions have been passed down by word of mouth from one generation to the next and recorded in more contemporary times. Hawaiian oral traditions are important; they convey a general sense of Kanaka ‘Ōiwi (Native Hawaiian) history, people’s connection to land, how they lived, and their traditional land tenure. Hawaiian oral traditions are relayed in the form of mele (songs), ‘ōlelo no‘eau (proverbs), pana no‘eau (sayings), mo‘olelo (stories), mo‘okūauhau (genealogies), and accounts in nūpepa (historic newspaper articles). These forms of oral traditions can be woven into each other. For instance, a mo‘olelo may present a mele about a mo‘okū‘auhau. Hawaiian oral traditions are vehicles for the intergenerational transmission of knowledge. They serve as a timeless bridge to cultural insights and beliefs that have guided Hawaiians across centuries and generations.

Today, through written form and English translations, these cultural traditions persist as sources of ancestral wisdom. Hawaiian oral traditions tell of the resources of the land, akua (gods), kupua (supernatural deities), ‘aumākua (familial guardians), ali‘i (chiefs), and ka po‘e kānaka (the Hawaiian people) whose stories weave a unique and treasured history of this ‘āina. Though many more mo‘olelo connected to the study areas may likely exist, the selected mo‘olelo presented in this section relay specific information regarding water features connected to the area and/or cultural practices associated with the place.

He Ka‘ao no ka Manu ‘Elepaio

“He Kaao no ka Manu Elepaio” appeared in the Hawaiian language newspaper, *Ka Hoku o ka Pakipika*, in 1862.[69] This mo‘olelo was written by an individual whose initials read; “S. W. K.” Little is known of the author aside from the individual's connection to Honolulu having had signed and dated his/her initials at the end of the publication with, “Kamakela, Honolulu, Mei 12, 1862.” Though the author appears to have written this mo‘olelo from the island of O‘ahu, the story itself takes place on the mokupuni of Hawai‘i, Kona Moku, Kahului Ahupua‘a. “He Kaao no ka Manu

[69] This mo‘olelo has been more recently adapted into a widely circulated bilingual children‘s book. *No Ka ‘Elepaio Kolohe: the Naughty ‘Elepaio* (Kruger, Furchgott, Andrews, & Akana-Gooch: 2008)

Elepaio" is a tale that describes the kolohe (mischievous) deeds of an ʻelepaio–a native flycatcher bird who dwells in the forests. Various subspecies of ʻelepaio exist that are particular to the island they are found. Hawaiʻi Mokupuni subspecies of ʻelepaio are identified as *Chasiempis sandwichensis sandwichensis* (Pukui and Elbert 1986:41). What is of significance to this study is the setting that this moʻolelo takes place and the water resource that is recounted in the story.

A kanaka named Piʻiwai set off on a journey into the mountains of Kahului, Kona in search of water. There in the uplands, he reached a freshwater spring and filled his huewai or water gourd with water from the pūnāwai (freshwater spring). With his huewai filled with the needed water, Piʻiwai readied himself for his return home. While descending the uplands, Piʻiwai set his huewai down in order to prepare a place for him to rest for a moment. While he was gone a manu ʻelepaio, referred to by the name, ʻElepaio, flew and settled on top of Piʻiwai's water gourd. ʻElepaio pecked at the gourd until all the water emptied from the hole that was made by his pecking. When Piʻiwai returned to the spot where he had left his huewai, he picked it up for a drink only to find it empty. Wondering how this could have happened, Piʻiwai looked up and saw ʻElepaio perched up on a tree branch. Realizing this bird was what caused his water to be wasted, Piʻiwai exclaimed that he would kill ʻElepaio. He picked up a stone and chucked it at ʻElepaio's head. Fortunately for ʻElepaio, he was not killed by the stone and instead was able to escape. Thus begins the start of where this story unfolds. "He Kaao no ka Manu ʻElepaio" begins:

> I kekahi la, pii aku la kekahi kanaka o Piiwai kona inoa, i ke kuahiwi i ka wai e inu, no ka mea, aia no ka wai oia wahi i ke kuahiwi, oia hoi o Kahului, i Kona, Hawaii. Mai o a o oia wahi o Kona, he wai no o kai, he wai kai nae, he awaawa ke inu, o ka wai huihui ono loa i ka inu ana, o ko uka o ke kuahiwi, oia mau mai no a hiki i keia manawa, ke kii o ka wai i ke kuahiwi.
>
> Ia pii ana aia nei, a hiki keia i ka punawai, ukuhi ilo la oia i kana huewai a piha ka huewai i ka wai, o ka hoi mai la no ia a ke ahua, hoomaha iho la ia. Kuu iho la, keia i kana huewai, a kukulu iho la, a hele aku la oia ma kahi e aku.
>
> Ia manawa, lele mai la kekahi manu, oia hoi ka Elepaio, a kau iho la ia i ka nuku o ka huewai a ua kanaka nui, ke kikokiko iho la no ia o ua wahi manu nei i ka huewai a na kanaka nei, a pau ka wai i ke kahe, hoi mai la ua kanaka nei a kahi o kana huewai i kukulu ai, lele aku la ua wahi manu nei a ma kahi e aku, kau iho la.
>
> Ike aku la no nae ua kanaka nei i ka lele ana aku a ua wahi manu nei, aole nae oia i manao ua kikokiko ia kana huewai e ua wahi manu nei. Ka lalau iho la no ia i ka huewai, i kaikai ae ka hana, mama ana, i nana iho ka hana o ua kanaka nei, ua puka ka huewai, o ka manao ae la no ia o ia nei, na ka manu no i kikokiko a puka, o ka pii mai a no ia o ka manao huhu o ua kanaka nei i ka manu; i iho la iloko ona, ka! He wahi manu kolohe maoli ka hoi oe, e maka ana oe ia'u.
>
> O ka lalau iho la no ia o ua kanaka nei i ka pohaku, o ka pehu aku la no ia i ua wahi manu nei a pa io no; aole nae i make. O ka lele aku la no ia o ua wahi manu nei; o ke kumu o keia lele ana o ua wahi manu nei, e lele ana e hookolo i ka hui manu o lakou, no keia pa ana ona i ka pohaku a ke kanaka.
> [S. W. K. 1862:1]

Provided below is the English translation of the moʻolelo interpreted by ethnographer Kepā Maly:

One day, a certain man named Piʻiwai, climbed up the mountainside to get water to drink, this was because there was a place on the mountainside that fresh water was found. It was at Kahului, in Kona, Hawaiʻi. Indeed, all around this place of Kona, the water in the lowlands was salty, it was brackish and bitter to drink. The cool sweet water for drinking came from the uplands on the mountain. It is still the same to this day, the fresh water is fetched from the mountain.

Now when he climbed up, he reached the spring and dipped his water gourd into it, filling the gourd with water. Now as he returned, he reached a hillock and stopped there to rest. He set his water gourd down, building an area to set it, and then went over to the side to rest.

At that time, a certain bird flew by, it was the ʻElepaio, and it perched itself on the spout of the man's water gourd. The bird then began pecking at the man's water gourd, and all the water was lost as it poured out. When the man returned to the place where he had left his water gourd, the bird flew a little ways off and set down.

Now the man saw this bird fly away, but he did not think that the bird had pecked at his water gourd. He bent down to pick up the water gourd, and as he lifted it, it was light. Looking for the reason, the man saw that there was a hole in the water gourd. It was then that he understood that the bird had pecked out the hole, and the man's anger at the bird welled up. He said within himself, "So that's it! You are a truly mischievous bird, and you are going to be killed by me."

The man then picked up a stone and threw it at the bird, striking it, but, it was not killed, and the bird flew away. Now the reason the bird flew off was because it was going to inquire of the other birds what they felt about his having been hit by the man's stone.
[Translated by Maly in Maly 1997:5-7]

Recounted in this excerpt of the moʻolelo, and of particular importance to this study, is the description of a **pūnāwai** located in the uplands of **Kahului, Kona**. What is gleaned from this account is both the presence of a freshwater spring in Kahului, as well as the **practice of kānaka gathering water** from its source. People were not always living where fresh water was available and the access to the uplands, connectivity and travel, was important for subsistence and traditions around gathering and caring for that distribution of resources.

The remainder of the moʻolelo continues with ʻElepaio's effort to seek empathy from the other manu of the forest for having been struck by Piʻiwai. After fleeing from Piʻiwai, ʻElepaio flies in search of other birds to tell them of what Piʻiwai has done. ʻElepaio seeks pity from the other manu he encounters and asks them their opinion as to who they believe is to blame in the hopes that they will fault Piʻiwai for the wrongdoing he felt has happened. However, each time ʻElepaio inquires with a new manu and retells the story of how he caused Piʻiwai's water gourd to empty which angered him, each time ʻElepaio is told that he, himself is in fact the one at fault. Tired and saddened by having had no empathy from the birds he spoke to, ʻElepaio was forced to self-reflect and realize that he was at fault and repented for it. The remainder of the story of ʻElepaio is recounted below:

Ia lele ana a ia nei, e nana hele ana i na manu, a liuliu ia lele ana a ia nei, ike mua aku la keia Pueo, lele aku la keia a kokoke io Pueo la, kaheea aku la keia penei;

“Pueo–e, Pueo–la.” A lohe o Pueo i keia kahea ana aku a Elepaio, ka haliu mai la no ia o Pueo a hoohai mai la me ke kolonahe, ninau mai la o Pueo, penei. “E! Elepaio, E! Elepaio, Heaha ka’u?” Hai aku la o Elepaio, i kana mea i hana ai i ka huewai a ke kanaka, hana aku la oia na ke ano olioli, penei, “Ua pa wau, i ka pohaku, a ke kanaka.”

Ninau mai la o Pueo ia Elepaio penei, “Nawai ka hala.” Olelo aku no o Elepaio, ma ke ano oli no penei, Na’u ka hala, I ka pao ana, I ka huewai, A ke kanaka. I mai la o Pueo ma ke ano oli no, penei. “Hookolo ia, i ka nui manu, o kakou.”

O ka huli aku la no ia o ua o Elepaio, o ka lele aku la no ia a liuliu, ike aku la keia ia Io, e kauaheahe ana iluna o na makani kolonahe, kahea aku la o Elepaio penei. “E Io–e, E Io–la.” Huli mai la o Ia a ninau mai la ia. “Heaha ka’u?” Hai aku la o Elepaio penei. “Ua pa wau, i ka pohaku a ke kanaka.” Ninau mai la o Io, “na wai ka hala?” I mai o Elepaio. “Na’u ka hala, i ka pao ana, i ka huewai a ke kaknaka.” I mai la o Io, ua like pu nae ka laua olelo me Pueo, penei. “Hookoloia, i ka nui manu, o kakou.”

I ka huli aku la no ia o Elepaio lele no, a ia lele ana a ia nei, ike aku la keia ia Amakihi alo, kahea aku la no o Elepaio. “Amakihi–e, Amakihe–la.” Huli mai la o Amakihi a ninau mai la, “Heaha ka’u?” Hai aku la o Elepaio penei. “Ua pa wai i ka pohaku a ke kanaka.” Ninau o Amakihi ma ano olioli penei. “Nawai ka hala?” I mai la o Elepaio. “Na’u ka hala, i ka pao ana, i ka huewai, a ke kanaka.” Ia manawa, lulilulu iho la ke poo o ua wahi Amakihi nei, a ea mai la ia iluna, a nana mai la ia Elepaio, a olelo aku ia ia ma ke olioli ana.

Elepaio–e, Elepaio–la,
Hewa ha oe,
I ka pao ana,
I ka huewai,
A ke kanaka.
A make no oe,
A e pono,
He kolohe oe.

Ia lohe ana o Elepaio i keia manao o Amakihi, o ka pii mai la no ia o kona huhu, a mele oli aku la oia, penei ia Amakihiki.

Kau pono ka ia,
Kela Amakihi,
Pupua awaawa,
He hohono pakui,
Ke pulehu aku,
He hauna e ke kai,
Io ole e ka mole,

O ka pau no ia o ko Elepaio kamailio pu ana me Amakihi, o ka lele aku la no ia, ia lele ana aku o Elepaio, nui kona kaumaha no kela ike ana a Amakihi i ko Elepaio hewa, a lele aku la ia me ke kaumaha o ka manao. Aka, aole i pau loa kona manao e hele e huli i ka nui manu e like me kona manao paa. Lele aku la no ia a ike aku la o Elepaio ia Iiwimakapolena, kahea aku la ia e like me kona hai ana i na manu mua.

I mai la o Iiwi e like me ka Amakihi olelo ana aku ua hewa ia. O ka pau no ia o kona hookolo ana i ka nui manu, a kaumaha ka manao o ua o Elepaio, a mihi io iho la oia, au hewa ia.
[S. W. K. 1862:1]

The excerpt is translated below:

While flying, he looked around to see other birds, and after flying a little while, the first bird he saw was Pueo (Owl). He flew close to Pueo and called out like this, "Oh Pueo, say Pueo." Pueo heard the call of ʻElepaio, and turned to Elepaio, encouraging him with a question, "Oh Elepaio, say Elepaio, what can I do for you?" Elepaio then told him what he had done to the water gourd of the man, and explained it in the form of a chant, "Ua pâ wau, i ka pôhaku, a ke kanaka" (I was struck with a stone by the man).

Pueo then asked ʻElepaio, "Whose fault is it." ʻElepaio answered in the form of a chant, "Naʻu ka hala, i ka pao ana, i ka hue wai, a ke kanaka" (The fault is mine for pecking at the water gourd of the man). Pueo then responded in the form of a chant, "Hoʻokolo ia, i ka nui manu, o kâkou" (Go inquire of other birds of our kind).

ʻElepaio then went in search of others. In a little while, he saw ʻIo soaring above in the gentle winds. ʻElepaio called out, "O ʻIo, hail ʻIo." ʻIo turned and asked, "What do you want of me?" ʻElepaio said, "I have been struck with a stone by the man." ʻIo asked "Whose fault was it?" Elepaio answered, "The fault is mine for pecking at the water gourd of the man.." ʻIo then answered with the same words as those of Pueo, "Go inquire of other birds of our kind."

ʻElepaio then turned, flying away, he flew and came in the presence of ʻAmakihi. ʻElepaio called, "O ʻAmakihi, hail ʻAmakihi." ʻAmakihi turned and asked, "What do you want of me?" ʻElepaio said, "I have been hit with a stone thrown by the man." ʻAmakihi then asked in a chant, "Who's fault is it?" ʻElepaio answered, "The fault is mine for pecking at the water gourd of the man.." This time, ʻAmakihi shook his head, and rising above, he looked at ʻElepaio, and spoke in a chant:

O ʻElepaio, ʻElepaio,
Indeed you have erred
By digging
Into the water gourd
Of the man.
It is right
That you should die,
You are so mischievous.

When ʻElepaio heard what ʻAmakihi thought, his anger rose and he chanted to Amakihi:

This is what is just
For that ʻAmakihi,
That he be made into a condiment to go with the ʻawa.
The scent is unpleasant,

And when it is broiled,
The gravy is foul,
There is no meat within.

This was the end of ʻElepaio's conversation with ʻAmakihi; he then flew away. As ʻElepaio was flying, he was greatly saddened because ʻAmakihi knew ʻElepaio's fault. So he flew with heavy thoughts. But he had not given up his thoughts of inquiring of the other birds about this. As he was flying, ʻElepaio saw ʻIʻiwimakapôlena and he called out as he had to the other birds. ʻIʻiwi spoke the same words as ʻAmakihi had, "The fault was with ʻElepaio." This was the end of his inquiring of the birds, and ʻElepaio's thoughts were truly sad. He repented within himself, saying "I was indeed at fault."
[Translated by Maly in Maly 1997:5-7]

Through this moʻolelo we learn about several resources and traditional cultural practices within and around the study area in Kahului Ahupuaʻa; a traditional value of aloha i kekahi, several manu are identified in the uplands of Kahului, and specifically that ʻāmakihi was broiled and a pūpū eaten while drinking ʻawa, and most importantly the importance of wai, and the work it took to collect it, and the fact that people traveled to the uplands regularly, possibly daily based on the moʻolelo, for potable water.

He Moʻolelo Kaʻao no Kepakaʻiliʻula

The moʻolelo of Kepakaʻiliʻula is a tale of a young boy who was born prematurely, traditionally referred to by the term "ʻeʻepa;" a birth of this nature is associated with being born possessing "miraculous powers," (Pukui and Elbert 1986:37). The version of the story that will be referenced in this section is attributed to David Malo and originates from the Hawaiian language newspaper, *Ka Hoku o Hawaii*. The articles appeared weekly in *Ka Hoku o Hawaii* and was published in the newspaper from March 19, 1919 through December 9, 1920, totaling 79 printed articles. Maly introduces "He Moʻolelo Kaʻao no Kepakaʻiliʻula" as follows:

Like Ka-Miki, the story of Kepakaʻiliʻula is about a youth who was born in an ʻeʻepa (premature - mysterious) form, who was given up for dead by his parents. Kepakaʻiliʻula's father was Maka-o-Kū, and his mother was Hina-ai-ka-malama, both of whom were descended from Kūahailo and Hina the akua - aliʻi (god-chiefs) who came from Kahiki and established the highest chiefly bloodlines of Hawaiʻi. At the time of Kepakaʻiliʻula's birth, Makaokū and Hina dwelt near Moku-ola (now called Coconut Island) and ruled the district of Hilo.

Kepakaʻiliʻula's birth was accompanied by numerous displays of natural phenomena including fragmented rainbows that rested upon the ocean, rains that poured upon the land, and rivers that overflowed upon the land. His maternal uncles, Kiʻinoho and Kiʻihele, took these signs as omens of Kepakaʻiliʻula's supernatural nature. Without the knowledge of Makaokū or Hina, Kiʻinoho and Kiʻihele rescued Kepakaʻiliʻula and raised him while instructing him in all manner of fighting techniques, and in the uses of his supernatural powers. When Kepakaʻiliʻula came of age, his uncles went in search of a suitably beautiful and highly ranked chiefess to whom Kepakaʻiliʻula could be married. The journey took them around Hawaiʻi, where they met with sacred chiefesses of the island's districts. In Kona, the uncles met with the chief Keolonāhihi and his wife Kahaluʻu, who were parents of the sacred chiefess Mākoleʻā. Mākoleʻā was found to be the

most suitable chiefess for Kepakaʻiliʻula, and a wedding was arranged. When the uncles departed, Keolonāhihi was approached by Kaikipaʻananea, a chief from Maui, and he broke the betrothal between Kepakaʻiliʻula and Mākoleʻā. This action set in motion the events of the legend's narratives. By association with other figures identified in the legend, the time period seems to be set in the 16th century, immediately before the time of Lono-i-ka-Makahiki.
[Malo 1919-1920 in Maly 1997:24-25]

The relevancy of this kaʻao in regards to a study whose focus is Kona, lies in the recollection of the numerous place names, natural features, and practices of Hawaiʻi that are revealed in the telling of this story. As detailed in the summary above, Kepakaʻiliʻula's uncle, Kiʻihele went in search for a suitable wahine for his nephew. Traveling through Hilo, Puna, and Kaʻū, he eventually arrived in Kona and was taken aback by the beauty of Mākoleʻā, the young aliʻi wahine (chiefess) of Kona. Thus, Kiʻihele returned to Hilo to retrieve Kiʻinoho and their nephew, Kepakaʻiliʻula so that he could take Mākoleʻā as his wahine. Maly provides a summary Kepakaʻiliʻula's journey and the moʻolelo that unfolds:

Once in Kona, Kepakaʻiliʻula waited in the uplands of Kahaluʻu at the great banana plantation of the chief Kahoʻoaliʻi, which extended from Kaumalumalu-Kāpalaʻalaea to Keʻei, while preparations were made for his meeting with Mākoleʻā. When all things were made ready, Kepakaʻiliʻula and his guardians descended to the shore of Kahaluʻu, where they stood not far from the royal house of Mākoleʻā.

Standing before them was the priest of Kahaluʻu who was named Hāliʻikolomea. Through the priest's divining skills he had seen the true dual nature of Kepakaʻiliʻula, and understood that he was descended from the aliʻi-akua of antiquity. Hāliʻikolomea presented offerings to Kepakaʻiliʻula, and when the observances were completed, Kepakaʻiliʻula responded with a mele kānaenae (chant offering) to Mākoleʻā and those gathered with her:

Kau iluna ka wai a ka Nāulu
ʻAlohi ʻula i ka pali o Koholālele e
Lehulehu i ka luna o Koaʻekea a
Paʻa pono mai Kona i ka ehu a ke kai a
Kīpū lua i ke one o Kaiakeakua
He akua ka hoa he ʻike ʻole mai e
ʻAuwe ka mea aloha oia la e hoʻi a!

The Nāulu showers which are placed above
Appear to glow red in the light on the cliff of Koholālele
Indeed, the multitudes are gathered at the heights of Koaʻekea
But Kona is firmly embraced by the sea mists
And there is two-fold calm upon the shore of Kaiakeakua
A god [-chief] is the companion which is not seen
But here is one that can indeed be cherished!

Hāliʻikolomea then called Kepakaʻiliʻula within the compound telling him that he was indeed welcome to know the famous waters of Kahaluʻu. Because Mākoleʻā desired to be near Kepakaʻiliʻula, she beckoned him to join her upon her sacred platform (nuʻu kapu) calling to him with her own chant of affection…

> All things having been fulfilled, the chiefess Kahaluʻu could not deny the value of this relationship, thus Kahaluʻu the chiefess—i ka ʻāina kaulana i ka wai puka iki o Helani (of the land famous for the small flowing spring of Helani) gave her blessings to Mākoleʻā and Kepakaʻiliʻula… (June 19-26, 1919).
>
> Unknown to Kahaluʻu, Mākoleʻā and the others, Keolonāhihi had broken his agreement allowing Mākoleʻā to marry Kepakaʻiliʻula, and had instead promised to take the young chiefess to Maui nui a Kama (Maui great island of the chief Kama) where she would wed the high chief Kaikipaʻananea (Kaiki). Having prepared the canoes, Keolonāhihi forced Kahaluʻu and Mākoleʻā to travel to Maui.
>
> This turn of events greatly angered Kepakaʻiliʻula and he challenged Keolonāhihi to a fight. Frightened, Keolonāhihi fled to Maui as well, thus Keolonāhihi left behind those he loved and his favorite places. Among the favorite places of the Kona chiefs was the spring of Wai-kuʻi at Kahaluʻu, where the aliʻi gathered to relax and play the game of kōnane (July 3-17, 1919).
> [Malo 1919-1920 in Maly 1997:25-26]

Revealed in this section of Kepakaʻiliʻiula's story are a number of water resources and agricultural features associated with Kona. Kepakaʻiliʻula is said to have waited in the **uplands of Kahaluʻu** where a great **plantation of bananas** is located. This cultivated area of banana is noted to belong to the aliʻi, Kahoʻoaliʻi and stretches from **Kaumalumalu-Kāpalaʻalaea to Keʻei** (Malo 1919-1920 in Maly 1997:25). When Kepakaʻiliʻula meets the beauty of Mākoleʻā, he offers a chant whose first lines recite: *Kau iluna ka wai a ka Nāulu*, (Malo 1919-1920). The opening of this chant translates to, *The Nāulu showers which are placed above*, poetically identifying the **Nāulu rain** as the rain of the area and the source of water placed above. Mākoleʻā's mother, Kahaluʻu gives the approval to Kepakaʻiliʻula to take her daughter as his wife. The author of this moʻolelo references Kahaluʻu as, "i ka ʻāina kaulana i ka wai puka iki o Helani," which Maly translates as, "of the land famous for the small flowing spring of Helani;" thus revealing a **spring associated with Helani and the ʻāina of Kahaluʻu** (Malo 1919-1920 in Maly 1997:26). When Mākoleʻā's father, Keolonāhihi, is challenged by Kepakaʻiliʻula for having broken his promise to wed his daughter to him, the author writes that Keolonāhihi flees Kona leaving behind a favored **spring named Waikuʻi located at Kahaluʻu**. This spring was favored by the chiefs of Kona and was also the area aliʻi took pleasure in relaxing and playing **kōnane** (ancient game resembling checkers), (Malo 1919-1920 in Maly 1997:26)

The valuable information that is gathered from this portion of Kepakaʻiliʻula's moʻolelo is the acknowledgement of two named springs associated with the Kahaluʻu ahupuaʻa–one of which is noted to be favored by the chiefs of Kona; the Nāulu rainfall of Kahaluʻu; great cultivated areas of bananas located in the uplands of Kahaluʻu which also holds chiefly associations having belonged to the aliʻi, Kahoʻoaliʻi; as well as the acknowledgement of aliʻi passing time by playing kōnane.

Though much has been revealed of Kona, and specifically of the Kahaluʻu Ahupuaʻa in but a small chapter of Kepakaʻiliʻula's tale, the moʻolelo continues. Maly summarizes the events that unfold after Keolonāhihi is challenged by Kepakaʻiliʻula:

> Because many of the aliʻi of Kona were related to Kahaluʻu, Keolonāhihi, and Mākoleʻā, they rallied to challenge Kepakaʻiliʻula in battle. These chiefs included Kahoʻoaliʻi (k) who controlled the upland plantation called Kaumalumalu which extended from Kaumalumalu-Kāpalaʻalaea to Kaʻawaloa and Kealakekua, Kuapehu (k), Kāināliu (k), Hōlualoa (k), Onouli-ākea (k), Hōkūkano (k), and

Kailua (k). When the chief Hōlualoa took up the challenge against Kepakaʻiliʻula on behalf of the Kona chiefs, Hōlualoa called upon his god **Kālaipāhoa** to assist him in his battle. Hōlualoa was the first chief to call upon the god Kālaipāhoa, and this was the beginning of this gods' use by the chiefs of Hawaiʻi. All of the chiefs were related, and all associated with the lands which now bear their names.

Calling upon his god **Kāʻili**, Kepakaʻiliʻula defeated each of the chiefs in battle, and came to control all of Kona from Kekaha wai ʻole in the north, to Keʻei in the south. At this time the land was greatly populated, and because Kepakaʻiliʻula was found to be a just chief, the people of the land were satisfied with his benevolence, and they accepted him as the aliʻi ʻai moku (chief who consumes - controls the district). Following the people's acceptance of Kepakaʻiliʻula as their chief, tribute from all Kona was presented to Kepakaʻiliʻula. All of the offerings of the wealth of the land were gathered at one site and presented to Kepakaʻiliʻula. The mound of offerings was so great that it looked as if a hill had been formed. To this day, the site where the offerings were gathered is called Puʻu which is above the place named for Keolonāhihi.

Kepakaʻiliʻula divided the wealth, offering the first portion to his god, he then provided a portion to the families of his trusted supporters, and returned the rest to the people of the land. To Kepakaʻiliʻula is attributed the saying:

> ʻO ke aliʻi mālama kānaka a hoʻomanaʻo mau i ka mōhai i nā akua, ʻoia ana no ke aliʻi e kū i ka moku — The chief who cares for his people and remembers to pay tribute to his gods, is the chief who will stand upon [be supported by] the island (July 24-November 13, 1919).

...Seeing that there was peace in Kona, Kepakaʻiliʻula then departed from the lands of the Kahaluʻu area... Kepakaʻiliʻula traveled to Kohala to test the Chief Kukuipahu, Mākoleʻā's uncle. Kukuipahu was a just chief, who saw that Keolonāhihi had acted inappropriately, and Kukuipahu joined Kepakaʻiliʻula in mounting an attack on Maui.

Kukuipahu went to the compound of Kaikipaʻananea at Olowalu, Maui and told Mākoleʻā about the events that had occurred on Hawaiʻi, and informed her of her father's treachery, and told her that Kepakaʻiliʻula still desired her as his wife (November 20, 1919).

Upon hearing these things from her uncle Kukuipahu, Mākoleʻā chanted to him asking that he would give her message to Kepakaʻiliʻula. In the chant she spoke of the beauty of Helani at Kahaluʻu and the pleasant time which she had spent with Kepakaʻiliʻula:

> Kuʻu hoa o ka malu niu o Helani
> E hea puaʻi nei iaʻu e hoʻi aku wau
> Kuʻu hoa i ka peʻa huli luna e Kona e
> He ʻEka ka makani o kāua e ʻolu ai...
>
> *My companion sheltered there by the coconut palms of Helani*
> *My call flows forth to you, I will return*

You are my companion of the upper reaches of Kona
Where the ʻEka breezes refresh us two…

While Kukuipahu was on Maui, Kiʻihele journeyed to Hilo and revealed Kepakaʻiliʻula's identity to his parents Makaokū and Hina, who joined him, along with over 30,000 warriors of Hawaiʻi, in the quest of reclaiming Mākoleʻā (November 27, 1919–February 26, 1920).

When the battle preparations were completed, the canoe fleet set sail, and it stretched from Kohala, Hawaiʻi to Kahikinui, Maui. Landing at Puʻunoa, final battle preparations were made, and the people of Lānaʻi and Molokaʻi joined together in supporting Kepakaʻiliʻula against Kaikipaʻananea, as well (March 4, 1920). The battle took place upon the kahua (battle field) of Waineʻe, a short distance above the Waineʻe Church. It was there that Kaikipaʻananea was killed by Kepakaʻiliʻula, and Keolonāhihi was killed by Makaokū. So it was in this way that Mākoleʻā the beautiful chiefess of Kahaluʻu came to marry Kepakaʻiliʻula (March 11-April 1, 1920).

As a result of the battle on Maui, Kahaluʻu was killed, and Kepakaʻiliʻula and Mākoleʻā were reunited. Kepakaʻiliʻula mā lived in Lāhaina for one year, and then Kepakaʻiliʻula desired to visit Oʻahu, Kauaʻi, Niʻihau, and journey on to Kahiki, the land of his ancestors. Following numerous events, Kepakaʻiliʻula returned to Hawaiʻi and with Mākoleʻā, he settled in his compound which was a short distance from the heiau of Pākaʻalana at Waipiʻo. Thus they lived out the rest of their lives in peace (April 8-December 9, 1920).
[Malo 1919-1920 in Maly 1997:#27]

The moʻolelo of Kepakaʻiliʻula ends happily with him and Mākoleʻā finally being able to live their lives out together. During the portion of the story where Mākoleʻā chants out to Kepakaʻiliʻula, she describes several significant resources specific to Kahaluʻu. The first line of her chant recites: *Kuʻu hoa o ka malu niu o Helani*, which Maly translates as, *My companion sheltered there by the coconut palms of Helani* (Malo 1919-1920 in Maly 1997:27). Mākoleʻā ends her chant with the line, *He ʻEka ka makani o kāua e ʻolu ai…*, translated by Maly as, *Where the ʻEka breezes refresh us two…* (Malo 1919-1920 in Maly 1997:27). What is conveyed in Mākoleʻā's chant to Kepakaʻiliʻula is the imagery of the natural resources and elements associated with Kahaluʻu, Kona. A **niu (coconut or *Cocos nucifera*) grove** associated with Helani is described, as well as the **ʻEka wind** known affectionately for belonging to Kona. It is significant to note that the Helani that is identified here with the niu grove was mentioned previously in the description of the spring in Kahaluʻu, "i ka ʻāina kaulana i ka wai puka iki o Helani," (Malo 1919-1920 in Maly 1997:26). Lastly, note the constant travel that is ongoing in this moʻolelo, which indicates there was voyaging between islands and across the sea to Kahiki at this time. In later sections we describe connections between the uplands of Kona, in the study area, and the koa trees prized for kaʻele (canoe hulls).

Puʻu o Kaloa

From 1923 through 1924 an article series entitled "Na Hoonanea o ka Manawa," meaning, "Pleasurable Pastimes," was published in the Hawaiian language newspaper, *Ka Hoku o Hawaii*. The series was written by Isaac W. H. Kihe, a kupa of Kona, who wrote to the newspaper under the pen name "Ka Ohu Haʻaheo i na Kuahiwi Ekolu" (The Proud Mist of the Three Mountains). "Na Hoonanea o ka Manawa" celebrates the many storied places and traditions of Kona. One of the moʻolelo included in this series concerns a certain puʻu or hill and the clouds patterns that the

people of Kona observed as an indicator of rain. This landmark known as Puʻu o Kaloa, is a significant feature of this region.

Kihe's segment regarding Puʻu o Kaloa was printed in the newspaper in September of 1923. The section below shares the moʻolelo as it was printed in its original Hawaiian text, followed by an English translation interpreted by Hawaiian language translators and scholars of the Institute of Hawaiian Language Research and Translation, Emmanuel Kilikia Bennett and Puakea Nogelmeier. Regarding Puʻu o Kaloa, Kihe writes:

> He wahi puu keia aia mawaena o Kealakehe a me Keahuolu, e kokoke ana i ke puhi a Kahikini i kahakai. O ka moolelo o keia wahi puu.
>
> I ka wa kahiko, oiai, ua maloo a papaala ka aina mai o a o aohe ua, ua neeia e ka La a pikaʻo aohe wai o na punawai.
>
> Maloo na huli kalo, kalina uala maloo, aohe mea kanu ulu. Aia i kekahi manawa, e ike ia aku ana he kilihune ua e koʻiaweawe iho ana iluna pono o ua wahi puu nei.
>
> Ae o ka poe mahiai i noho a kamaaina, a ike lakou i kela wahi hoailona ua lu iho ana iluna o ua wahi puu nei o Puu o Kaloa, oiai no ka la nee ana. Olelo ae la lakou, akahi a ola ka aina, ke hehi mai la na manamana o ka ua iluna o Puu o Kaloa.
> [Kihe 1923:2]
>
> *This is a small hill between Kealakehe and Keahuolū near the blowhole of Kahikini on the shore. The story of this little hill.*
>
> *In ancient times, there were times that the land was dry and parched everywhere, lacking rain, traversed by the sun, with no water in the springs.*
>
> *The taro cuttings dried, so did the slips of sweet potato, and no plant grew. Sometimes light drizzle could be seen moving directly above that hill.*
>
> *The resident farmers there, when they saw this sign of rain over this hill of Puʻuokaloa, even though the sun was still moving along, would say, "The land shall finally prosper, for the fingers of rain tread over Puʻuokaloa."*
> [Translated by Bennet and Nogelmeier 2017]

The account relays that though the lands of Kona were dry, when clouds could be seen carrying a light drizzle over Puʻuokaloa, the people knew that rain would come and the land would flourish. This puʻu rests between **Kealakehe** and **Keahuolū** and is an **indicator of rain** for those of Kona. Anticipating the coming of rain, kamaʻāina of the area readied their lands to take advantage of this precious resource. Kihe continues to write:

> Ke ike ia keia hoailona e na poe kahiko, o ka hoomaka no ia e puhi makawela, a pau waiho, a huli kahi e loaa ai ka lau uala.
>
> Nana aku o ka ike hou ia o ka hoailona ua, a ina e ike hou alaila, makakau e kanu meia nui no o ka la, aohe maopopo o ka ua.
>
> I ke kanu ana a paa ka makawela (mala i puhi la i ke ahi) i ka lau, alaila ike hou ia ka ua iluna o Puu o Kaloa, a oia ka wa e ike ia ai ka ua e kaʻi lalani ana ma ke kula,

a ike na poe e no i keia ka'i hele o ka ua ma ke kula, hoomaka e waele ke pulu a kali aku la o ka ua mai alaila kanu aku la ka lau uala.

O ka mea nana ka maka wela mua loa i kinohi, ua kapuapua kana lau, a ke olohio ala, a ke apoapo mai la a pau i ka pue.

Haule hou i ke kuaua o ka hu noia o ka lau a pau i ka wili a moku mai la ka naaupua, oia ka lala, (oia ka uala e kaka ana i ke ka o ka lau i moku mai i ka pue ana, a oi a uala ke kahukahu mua).
[Kihe 1923:2]

When this sign was seen by the people of old, they would immediately go and scorch the land, and once finished, leave it and search for a place to get sweet potato vines.

They would watch to see the sign of rain again, and if it was seen, then they would prepare to plant, even though the sun still beat down, with no visible sign of rain.

When the patch burned for cultivation was sowed with the sweet potato slips, the rain could be seen again atop Puʻuokaloa. It is at that time that the rain could be seen proceeding in a line along the plains, and when others saw the procession of clouds, they would begin to clear the mulch and wait for the rain, and whereupon they would plant the sweet potato slips.

For the one who first scorched the land at the outset, his sweet potato slips would have flourished, and he would be cultivating them, and hilling them all into mounds.

When the showers fell again, the slips would all rise to the surface, and the naʻaupua would become twisted and severed, that being the branch. (This is the sweet potato clustered on the vine of the slip severed in the hilling of the mound, and this sweet potato would be the first offering of the season).
[Translated by Bennet and Nogelmeier 2017]

The natives of Kona were attentive to the natural cycles and seasons of their environment. The cloud movement over Puʻu o Kaloa was an indicator of rain, so thus, began the preparations of the ʻuala patches. Specifically, the moʻolelo describes a **makawela style of ʻuala cultivation** which Pukui describes is a method of land cultivation that involves slashing and burning the cultivated area (Pukui and Elbert 1986:228).

Hala ae la elua a ekolu malama hoomaka mai la ka ua mai o a o o ka aina, a o ka mea mua loa hana ka makawela i kanu mua o ua puunui kana uala, a ke uhai aia ka uala a kalua i ka imu me ka puaa.

A ike aku la ka mea nohoaihalale a hele aku la malaila e noho ai e ake o ka loaa mai o ka uala, a manao ke ola o ka la pololi.

Oiai e huai ana ka inu uala, a ohi aku mahai o ka imu, a ike i ikeai ai halale e noho ana, a ninau mai la i keia nimau; "Ua ka na i Puu o Kaloa ihea oe?" A ina e pane aku, I Kona nei no au, alaila aole e loaa ka uala iaia. Ina hoi e pane aku, I Kohala au, ai ole i Kau paha, alaila e loaa ana ka uala iaia.

No keia wahi Puu kela olelo kaulana o ka paanaau o ka poina ole a hiki i keia la, “Ua ka ua i Puu o Kaloa–I hea oe?” I Kohala au-loaa ka uala. I Kona nei no au-aole loaa ka uala.

Ua hala keia poe kahiko, ko kakou mau kupuna i ka po, a eia no keia wahi puu ke ku nei no he kiahoomanao poina ole no na manao e ola ana i keia la.

He hoailona olalo loa no kela a ke ike ia nei no ia hoailona, a ke ike ia no i ka wa la keia wahi ua kamahao a kupanaha alaila, he hoike maopopo loa ia o ka ua e hoea mai ana.

Ina he wa papaala ia o ka aina a ike ia keia wahi hoailina ua ilina o keia wahi hoailoa ua iluna o keia wahi puu kuanea hoomaopopo ole ia aia he mea ano nui loa ke hoea mai ana. Aole i Pau.
[Kihe 1923:2]

After the passing of two or three months, that rain would begin to fall all over the land, so that first person who had the burned patch and who planted first, his sweet potato would have grown large and the sweet potato would be carried off to be cooked in the oven with pork.

Gluttons would see and go to stay there, wanting to get some sweet potato, hoping to satisfy their hunger.

As the underground oven was uncovered and collected near the underground oven, and the glutton was seen sitting, the question would be asked “The rain fell atop Puʻuokaloa, where were you?” And if the answer was [“]I was here in Kona[”] then he would not get any sweet potato. If he were to say [“]I was in Kohala” or perhaps “Kaʻū[”], then he would get sweet potato.

For that hill was this famous memorized saying unforgotten until this day, “The rain fell at Puʻuokaloa–Where were you?” [“]I was in Kohala[”]–one would receive sweet potato. [“]I was in Kona[”]–one would not get sweet potato.

Those people of old, our ancestors, have passed over into the night, and here the hill still stands as an unforgettable memorial for the descendants living today.

That is a very real sign, and is still being seen. When this strange and remarkable rain is seen during the day, it is a clear sign of coming rain.

If it is a parched period of the land and this symbol is seen atop this desolate hill, you never know, there may be something big coming your way. To be continued.
[Translated by Bennet and Nogelmeier 2017]

This account informs its readers that after two to three months of the initial rainfall, those who prepared and cultivated their lands first would have yielded ʻuala ready to be harvested and cooked in the imu (underground oven). Understanding the biocultural indicators such as the cloud patterns above Puʻu o Kaloa and dedicating the effort to make the necessary preparations in order to take advantage of the window of rain, paid off greatly with prosperous lands and large yields.

Ke Puhi a Kaleikini

Similar to the moʻolelo shared above, "Ke Puhi a Kaleikini," is a story that appeared in the article series "Na Hoonanea o ka Manawa" regarding Kona that was written by Kihe. This particular story was published in *Ka Hoku o Hawaii* in 1923 and describes a blowhole named Hiʻiaka-noho-lae. In Place Names of Hawaiʻi, Pukui, Elbert and Mookini describe the location of Hiʻiaka-noho-lae to be situated in the ahupuaʻa of Keahuolū "between Kona Inn and the end of the wall at Kailua Village, Kona, Hawaiʻi," (Pukui et al: 1974:45). They interpret the literal translation of this site as, "Hiʻiaka living [at] point," and also remarks that "One of Pele's Hiʻiaka sisters lived here. In one legend the stone is the shark form of a priest turned to stone in response to an enemy's prayer to Pele," (Pukui et al: 1974:45). Regarding the blowhole Hiʻiaka-noho-lae, Kihe shares a story which includes an individual named Kaleikini. The moʻolelo as found in Ka Hoku o Hawaii is as follows:

> Aia keia Puhi ma ma kahi i kapaia o Hiiaka-Noho-Lae. Ka moolelo o keia "Puhi."
>
> I ka wa kahiko ke puhi keia "Puhi," pu-ko ke kai a pii iluna o ka lewa a o ke ohu kai aoia puhi ana uhi aku la iluna o ka aina a maloo na mea kanu o uka o ke kula a hiki i kaluulu.
>
> I ka wa o Kaleikini i kaahele ai a ike i keia Puhi e pii ana ke kai iluna oia kona wa i kii ai e pani i ke kauila, a oia paa a hiki i keia la, aohe hiki hou i ke ehu kai ke hoomaloo hou ma mea kanu o uka.
>
> He aiwawao Kaleikini, na olelo ia he ikaika papalua ko keia kanaka a he ano kupua hoi, he nui na "Puhi" ana i pani ai, a ke waiho nei ia Puhi a hiki i keia la, he mau kia hoomanao poina ole no na hana aiwaiwa pookela a ku i ka hookala kupua a kela kupueu o na la i hala o Hawaii nei, a keia hanauna hou e nana aku nei me ka paha'oha'o no keia mau hana, me he kaao aia no kekahi kupua.
> [Kihe 1923:2]

Presented below is an English translation of the account interpreted by The Institute of Hawaiian Language Research Team of ʻIke Wai.

> *This blowhole is located at a place called Hiʻiakanoholae. This story of this blowhole.*
>
> *In ancient times, when this "blowhole" would blow, the sea would crash and the sea spray would rise up into the air, then that spray would cover the land until the plants on the field all the way up to the brush line dried out.*
>
> *When Kaleikini traveled, and saw this blowhole, with the sea spray rising up, that is when he fetched and laid a grid of kauila tree branches over the hole, completely shutting it. It remains shut until this day; the sea spray could no longer dry out the vegetation on shore.*
>
> *Kaleikini was mysterious, and it was said that he also had supernatural strength, and was a supernatural being. There are several blowholes that he shut and that remain until this day; unforgettable monuments of outstandingly wonderful and magical feats of this hero of Hawaiʻi's past; monuments for this new generation to look to with wonder because of these feats like a heroic tale.*

[translated by The Institute of Hawaiian Language Research Team,ʻIke Wai]

As the story recalls, Hiʻiakanoholae is the blowhole that is located in the ahupuaʻa of **Keahuolū**. The ʻehukai or sea spray that the blowhole would shoot was problematic for the fact that the salt of the spray that blew over the ʻāina caused the land to dry so that no vegetation could grow. In order to solve this problem, the author shares that Kaleikini covers the Hiʻiakanoholae with kauila tree branches. In regards to the type of resources known of this area, from this account we learn that the native **kauila (*Alphitonia ponderosa*)** tree was present at Keahuolū.

Kaʻao Hoʻoniua Puʻuwai no Ka-Miki

Another celebrated moʻolelo that has been preserved and documented in the Hawaiian language newspaper is the epic saga, "Kaʻao Hoʻoniua Puʻuwai no Ka-Miki," (The Heart Stirring Story of Ka-Miki). This moʻolelo was published serially in *Ka Hoku o Hawaii* beginning in 1914. The saga ran for four years ending its final publication in 1917. The primary authors noted to have contributed to the publication of this moʻolelo are Hawaiian historians John Wise and J.W.H.I. Kihe. The story of Ka-Miki takes place in the 1300s at the time when the aliʻi, Pili-a-Kaʻaiea, was the district chief of Kona (Maly 1997:10). Maly, who is credited for his synopsis of Ka-Miki summarizes the moʻolelo:

> This legend is an account of 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 Ka-Miki and Maka-ʻiole competed 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 reincarnate form of the goddess Haumea (the creative force of nature; also called Papa or Hina; who was also a goddess of priests and competitors).
> [Maly 1997:10]

Included in this section are Maly's translated summary of select excerpts of "Kaʻao Hoʻoniua Puʻuwai no Ka-Miki" in which he paraphrases the important events that occurred during Ka Miki's journey. The story begins with the birth of Ka-Miki:

> Born in ʻeʻepa (mysterious – premature) forms, Ka-Miki and Maka-ʻiole were the children of Pōhaku-o-Kāne (k) and Kapaʻihilani (w), the aliʻi of the lands of Kohana-iki and Kaloko. Maka-ʻiole was the first born child and Ka-Miki was the second. Following their birth, Ka-Miki was given up for dead and placed in the cave of Pōnahanaha. Ka-uluhe retrieved Ka-Miki from the cave and reared him at Kalamaʻula on the heights of Hualālai. It was there that Ka-uluhe began instructing Ka-Miki in the uses of his supernatural powers, and when Maka-ʻiole joined his young brother, together, they learned various techniques of contest skills, in preparation for their journey around Hawaiʻi Island.
> [Maly 1997:12]

> After a period of training and tests, the brothers joined their ancestress in an ʻawa ceremony. When Ka-uluhe-nui-hihi-kolo-i-uka (Ka-uluhe) fell asleep, the brothers ventured from their residence at Kalamaʻula to visit some of the places of Kona. Their journey took them as far as the cliffs of Kealakekua, and upon returning to Kalamaʻula, Ka-uluhe inquired about what the brothers had seen. As they described the places visited, Ka-uluhe explained to the brothers the nature of the lands, features and people which they had seen.
> [Maly 1997:12]

> Departing from Kalamaʻula, Ka-Miki and Maka-ʻiole set out on their quest. The journey took the brothers first through the lands of Kona — O Kona i ka pohu nāʻū ke keiki e kāohi ala i ke kukuna o ka lā, O Kona ia (Kona in the calm where children take in their breath and then chant, claiming the rays of the sun as their own, Indeed it is Kona). Their path took them first to the kahua (contest site) at Ahuʻena in Lanihau, where the brothers met with Kauakāhiahāola one of the contest champions of Puapuaʻa…
> [Maly 1997:14]

Recounted in this segment of the moʻoleo is a kahua, translated by Maly as a "contest site." Maly described that the kahua is located at Ahuʻena, Lanihau and is referred to as a **kahua mokomoko leʻaleʻa** or contest and game. This field was known by the name **Hinakahua** and is located in the **Kahelo plains of Puapuaʻa Ahupuaʻa** (Maly 1999:10). In the moʻolelo of Ka-Miki, Kauakahiakahaola is identified as the champion of Puapuaʻa and Keiki-puʻi-puʻi is noted as the champion of Kailua. Maly relays that the moʻoleo compares them to "*Ke kumu ʻulu-pū-loa o noe ʻokana ʻāina o Puapuaʻa*" (The well-formed, oval-fruited breadfruit of the lands of Puapuaʻa [said in praise of strength and handsome features]), (Maly 1999:12). These champions of Puapuaʻa and Kailua are memorialized in two heiau that bear their names. According to Maly, **Kauakahiakahaola heiau** is located in Puapuaʻa and Keiki-puʻi-puʻi rests in the boundary between Keōpū and Honuaʻula (Maly 1997:15). Ka-Miki challenged Kauakahiakahaola on the contest grounds in Puapuaʻa and quickly defeated him. From there, Ka-Miki and his brother journey onward to another kahua at Hōlualoa (Wise and Kihe 1914-1917 in Maly 1999:12).

In another chapter of this saga, Ka-Miki travels along the coast of Kona to a place called **Niumalu**. Regarding the location of this wahi, Maly notes that it is described as being situated in the ahupuaʻa of Puaʻa, (Maly 1997:22). It is also noted that there is a māla ʻuala, or a sweet potato garden that stretches between Niumalu and Puapuaʻa Ahupuaʻa (Wise and Kihe 1914-1917 in Maly 1999:12). This māla ʻuala is described as the place where the opponents of Ka-Miki go to recover and sleep after being defeated by the young boy (Wise and Kihe 1914-1917 in Maly 1999:12). Ka-Miki meets Pili-nui-kapu-kuʻi-a-ka-lani-kua-liholiho-i-ke-kapu ("Pili bound in great sacredness, the chief with the burning back *kapu"* — a restriction that forbade approaching the chief from behind, and which carried a penalty of death by fire), who was an aliʻi of this wahi. Referred to by the shortened name, Pili, this aliʻi enjoyed the games of competitions. The games played at this wahi were:

> The contests and events held at Hinakahua included *maika, mokomoko, leʻaleʻa, a me hoʻopāpā* (bowling or tripping stones, wrestling and boxing, pleasurable pastimes, and contests of wit and strength). It was while the chief and his *ʻōlohe* champions were at Hinakahua, that Ka-Miki presented himself to some of Pili's stewards, claiming the right to care for the chief's possessions and foods. Word of this claim was carried to Pili, who in-turn called his key counselors and champions to Niumalu discuss the claims made by Ka-Miki…

(April 5, 1917)
[Wise and Kihe 1914-1917 in Maly 1999:11]

Here in this account, specifics of the type of traditional games played at Hinakahua are described. The games associated with Hinakahua and therefore the broader **ahupuaʻa of Puapuaʻa** are **maika** (bowling), **mokomoko** (wrestling and boxing), **leʻaleʻa** (pleasurable pastimes), and **hoʻopāpā** (contest of wit and strength), (Maly 1999:11). When Ka-Miki arrived at Hinakahua and made the claim that he would come to care for the aliʻi's possessions, Pili, the aliʻi of the ʻāina questioned Ka-Miki as to why he thought himself able to boast such statements. Ka-Miki responded that it was the chief that said anyone who excelled in lua and possessed unmatched ʻōlohe skills would be able to gain the privileges to the favorite of the aliʻi. Being that Pili had no proof of Ka-Miki's skill, Pili instructed the Ka-Miki should compete and defeat all 150 of Pili's champions and secure the lū heʻe (octopus lure) from Lālāmilo. If Ka-Miki should succeed, Pili agreed to give Ka-Miki half of Kona and the privilege of being his favorite (Wise and Kihe 1914-1917 in Maly 1999:11-13). Accepting the challenge, Ka-Miki prepares for the contests by calling out to Ka-uluhe with a mele paha (spoken chant) to evoke her mana and be empowered by the gods (Wise and Kihe 1914-1917 in Maly 1999:13). The mele is offered:

E ala e Kaulu-i-ke-kihi-o-Kamalama	*Arise o Kaulu – [star] point of light [knowledge] of Kamalama*
E ala e kīkoʻokoʻo ka lani	*Arise expanse of the heavens*
E ala e kīkoʻokoʻo ka honua	*Arise expanse of the earth*
E ala e kīkoʻokoʻo ka mauna	*Arise expanse of the mountain*
E ala e kīkoʻokoʻo ka moana…	*Arise expanse of the ocean…*

[Wise and Kihei 1914-1917 in Maly 1999:13]

No competitor could match the skill of Ka-Miki. Every champion Ka-Miki faced was defeated. Following through with their arrangements, Ka-Miki was named the favorite of Pili and given the power of the kingdom of Kona (Wise and Kihe 1914-1917 in Maly 1999:13). Ka-Miki ordered Pili's **ʻeleʻele** or messengers to spread the word of his victories to Kalamaʻula (Wise and Kihe 1914-1917 in Maly 1999:13). Pili sent other messengers throughout all the districts of Kona to inform the people and chiefs that Ka-Miki possessed the rights of the aliʻi over these lands(Wise and Kihe 1914-1917 in Maly 1999:13).

Having won the competitions, Ka-Miki also won the lūheʻe of Lālāmilo which he presented to Pili. Regarding the lū heʻe, Maly summarizes this section of the moʻolelo:

> Now this leho (octopus lure) was a favorite of Pili's, and filled his eyes with pleasure. Pili's canoes were prepared to go octopus fishing – lawaiʻa lūheʻe as Pili wanted to see how the lure worked. The lure was made by securing the kākala (hook), and a sinker stone (ʻōahi) near the cowrie (on a wooden shaft) with three ply olonā (Touchardia latifolia) rope. When Pili mā arrived at the octopus fishing site, he removed the lure from a gourd container and set it in the water. The chief and all those with him were startled to see unlimited numbers of heʻe (octopus) rise up to the lure, and even lobsters were attached to some of the octopus (July 26, 1917)…
> [Wise and Kihe 1914-1917 in Maly 1997:22]
>
> As the lure was drawn up to the canoe, the heʻe followed it right into the canoe, and the moment the lure was covered, the heʻe stopped rising to the canoe. Pili returned to the shore of Niumalu at Oneō, and had the heʻe divided among all of the people.

> So the fame of the lure went about the island and many chiefs, fishermen, and people traveled to see the lure as well. It was in this way that Lālāmilo learned his lure was in Kona (August 2, 1917)...
> [Wise and Kihe 1914-1917 in Maly 1997:22]

Relayed in this excerpt is information regarding waʻa off shore **fishing practices** that occurred in Puaʻa, Kona. Specifically, it is recounted that the lūheʻe method for gathering octopus was used at the shore of Niumalu at a place called Oneō (Wise and Kihe 1914-1917 in Maly 1997:22), which was near a known heʻe spot, that was also rich in lobster.

Regarding the **Waiʻaha and Kahului Ahupuaʻa** of Kona, Maly shares an excerpt from the moʻolelo of Ka-Miki that describes **Waiʻaha stream**, one of only two perennially flowing surface streams in Kona, which connects the two ahupuaʻa which is said to feed **puʻepuʻe**, a mounded style of upland farming, indicating kalo cultivation to have occurred in this area. The excerpt also recounts that a paved spring named Wai-a-Kekea is located in the same area. The account as translated by Maly reads:

> ...the stream of Waiʻaha joins with the lands of Kahului. The waters filled the upland taro mounds of the sacred prostration chiefs Kaleiʻeha, Kapahu (or Kapahu-a-Loʻi), and Kaʻalaea, who possessed the kapu (restrictions) of Lono-Makahiki... There too, you see — ka luawai ua kīpapa ʻia i ka pōhaku ʻalā e ulu pōhai ʻia e nā lāʻau loulu, o ka punawai i ka oʻioʻina pali o Waiakekea — a spring paved with dense [ʻalā] stones and surrounded by loulu palms, this is the spring of Wai-a-Kekea, which was near the trail side resting place... (IN Ka Hōkū o Hawaiʻi, April 9, 1914; Maly translator)
> [Wise and Kihe 1914-1917 in Maly 1998:3]

Another one of the study areas that is highlighted in the moʻolelo of Ka-Miki concerns the ahupuaʻa of Keahuolū. The hill, Puʻu o Kaloa is a significant feature recorded as a puʻu of Keahuolū and Kealakehe. A summary of this segment of Ka-Miki regarding Keahuolū and Puʻu o Kaloa was translated by Maly as follows:

> Ka-noenoe (The mist, fogginess) The mound-hill called Puʻu-o-Kaloa sits upon the plain of Kanoenoe which is associated with both Keahuolu and Kealakehe. The settling of mists upon Puʻu-o-Kaloa was a sign of pending rains; thus the traditional farmers of this area would prepare their fields. This plain was referenced by Pili when he described to Ka-Miki the extent of the lands which Ka-Miki would oversee upon marrying the sacred chiefess Paehala of Honokōhau. The inheritance lands included everything from the uplands of Hikuhia above Nāpuʻu and the lands of the waterless Kekaha, which spanned from the rocky plain of Kanikū (Keahualono) to the plain of Kanoenoe at Puʻukaloa (Ka Hoku o Hawaiʻi 10/25/1917, as translated by Maly 1994:A-4).
> [Wise and Kihe 1914-1917 in Simonson 2010:8]

Echoing the previous account examined by Kihe in the article “Na Hoonanea o ka Manawa,” Puʻu o Kaloa is also described in the moʻolelo of Ka-Miki as being a landmark telling of signs of rain.

ʻŌlelo Noʻeau - Hawaiian Proverbs and Poetical Sayings

ʻŌlelo noʻeau or Hawaiian proverbs and poetical sayings are valuable in perpetuating Hawaiian cultural knowledge, presenting kaona (concealed reference), and illustrating creative expressions

that incorporate observational knowledge with educational values, history, and humor. They can be reflected upon to inform an individual of the conditions or characteristics of a place, group of people, common sentiments of an era, or event in history. They can be looked towards to glean insight on the peculiarities of a given landscape or the behavior of people in general or specifically, and oftentimes provide guidance in understanding the wisdom and warnings left to us by those of the past. Today, ʻōlelo noʻeau serve as a traditional source to learn about people, places, and the environment of Hawaiʻi. As one of the many celebrated works penned by Pukui during her time, the 1983 publication of *ʻŌlelo Noʻeau: Hawaiian Proverbs and Poetical Sayings*, is one of which holds no end in its relevance and richness as it relates to an epistemological worldview that is Hawaiian.

Listed in this section are ʻōlelo noʻeau gathered from Pukui's collection of traditional sayings that reference the cultural practices, resources, and traditions related to the study areas located in the Kona Moku of Hawaiʻi. Particular emphasis is placed upon traditional sayings related to water resources associated with the study areas and vicinity. Additionally, the ʻōlelo noʻeau offered here serve to illuminate insight on various places, winds, rains, famed aliʻi, akua, and other moʻolelo and characteristics particular to the study areas and vicinity that have been preserved in the poetics of these traditional sayings.

Though the focus of this study is centralized to arrive at a deepened understanding of Kealakehe, Keahuolū, Puaʻa, Waiʻaha, Kahului, Puapuaʻa, and Keauhou Ahupuaʻa, this section of the report also offers a compilation of ʻōlelo noʻeau that pertains to the larger geographical region of Kona, Hawaiʻi. Though these set of ʻōlelo noʻeau may not always speak directly to the study area ahupuaʻa, they have been selected as relevant to the holistic understanding of the cultural and environmental landscape as a whole. Inclusion of the broader Kona Moku is paramount to fully and properly grasp the significance of the study areas as it relates to the practices, resources, and traditions unique to the district. To analyze the cultural context of the study areas isolated from the cultural significance of the region it is situated upon and has coexisted within, disconnects the wealth of history embedded within the landscape. For these reasons, this section highlights ʻōlelo noʻeau that illuminate the practices, resources, and traditions of the study areas Kealakehe, Keahuolū, Puaʻa, Waiʻaha, Kahului, Puapuaʻa, and Keauhou Ahupuaʻa, as well as the broader Kona Moku of Hawaiʻi.

The following ʻōlelo noʻeau offers insight regarding water resources associated with the moku of Kona. Recounted in several ʻōlelo noʻeau, the presence and formation of **ʻōpua**, or "cumulus clouds," and **ao ʻōpiopio** or "young clouds," are environmental indicators unique to Kona relaying that rain is expected to occur in the area (Pukui 1983:9,27,2134; ʻŌlelo Noʻeau #55, #232, #2134). Another water resource associated with Kona acknowledges a thriving **coconut grove in an area named Helani** where water is retained by gathering and drinking from coconuts (Pukui 1983:179, #1661). Though not a part of the immediate study area, the saying "Kekaha wai ʻole o na Kona," characterizes the Kekaha Ahupuaʻa of Kona as a waterless place beloved by the natives of Kehaha, despite the lack of water (Pukui 1983:185:1716). These set of ʻōlelo noʻeau which describe the natural resources of wai and the cultural traditions surrounding it are listed below:

55 **Aia ka wai i ka maka o ka ʻōpua.**
Water is in the face of the ʻōpua clouds.
In Kona, when the ʻōpua clouds appear in the morning, it's a sign that rain is to be expected.
[Pukui 1983:9, #55]

232 **Ao ʻōpiopio.**
Young cloud.
A cloud that rises from sea level or close to the cloud banks and is as white as steam. When seen in Kona, Hawaiʻi, this is a sign of rain.
[Pukui 1983:27, #232]

1661 **Ka wai puka iki o Helani.**
The water of Helani that comes from a small opening.
Refers to Helani, Kona, Hawaiʻi. Here a coconut grove thrived, and from a small opening in the shell of the nut one could get water to drink.
[Pukui 1983:179, #1661]

1716 **Kekaha wai ʻole o na Kona.**
Waterless Kekaha of the Kona district.
Kekaha in Kona, Hawaiʻi, is known for its scarcity of water but is dearly loved by its inhabitants.
[Pukui 1983:185, #1716]

2134 **Māmā Kona i ka wai kau mai i ka maka o ka ʻōpua.**
Kona is lightened in having water in the face of the clouds.
Kona is relieved, knowing that there will be no drought, when the clouds promise rain.
[Pukui 1983:232, #2134]

2154 **Me he makamaka la ka ua no Kona, ke hele la a kipa i Hanakahi.**
The rain is like a friend from Kona–it goes and calls on Hanakahi.
These are two lines from an old chant used to express a friendly visit with one who dwells in a distant place.
[Pukui 1983:234-235, #2154]

The ʻōlelo noʻeau listed below identify two named winds of Kona; **Hau**, a wind belonging to Maʻihi and is described as a breeze that does not exceed beyond the boundaries of Kainaliu and **Keauhou**, and **ʻEka**, a particular wind associated with the moku of Kona whose presence is telling of **signs optimal for fishing**. These ʻōlelo noʻeau regarding the winds of Kona are as follows:

1303 **Ka Hau o Maʻihi.**
The Hau [breeze] of Maʻihi.
Refers to Maʻihi, Kona, Hawaiʻi. Because of this locality was named for Maʻihi-ala-kapu-o-Lono, daughter of the god Lono-a-ipu, this wind was regarded as sacred and did not blow beyond Kainaliu and Keauhou.
[Pukui 1983:142, #1303]

1467 **Ka makani kūkulu peʻa nui, he ʻEka.**
The ʻEka, the wind that sets up the big sails.
When the ʻEka wind blew in Kona, Hawaiʻi, the fishermen sailed out to the fishing grounds.
[Pukui 1983:159, #1467]

1690 **Ke ʻEka, makani hoʻolale waʻa o na Kona.**
The ʻEka breeze of Kona that calls to the canoe men to sally forth to fish.

Refers to Kona, Hawai‘i.
[Pukui 1983:182, #1690]

Several ‘ōlelo no‘eau commemorate the chiefly lineage of Kona and also offer a glimpse into the political climate that took place in the region. In particular, the sayings “Kona, kai malino a Ehu”– *“Kona land of the calm sea of Ehu,”* and “Na la‘i a Ehu”– *“The calm regions of Ehu,”* honors Ehunuikaimalino and Ehunuikaumanamana as ali‘i (chief) of Kona. Ehunuikaimalino is noted as the ali‘i of Kona who reigned during the time of Liloa (Pukui 1983:199, #1843). Ehunuikaumanamana was another named chief whose domain was Kona (Pukui 1983:246, #2248). The ‘ōlelo no‘eau, “E pale lau‘ī i ko akua ke hiki aku i Kona,” which translates to “*Place a shield of ti leaves before your god when you arrive in Kona,”* shines light upon the political climate that stirred throughout the pae ‘āina (archipelago) when the push to abolish the kapu system and traditions of old Hawai‘i was enacted in order to facilitate a transition towards Western belief systems (Pukui 1983:45, #370). The ‘ōlelo no‘eau, “Keauhou i ka ‘ihi kapu,” which translates to *“Keauhou, where strict kapu were observed,”* is a phrase descriptive of the area of particular interest for this study that highlights the level of prestige and sacredness associated with this wahi as it is acknowledged as the residence of many high ranking chiefs and the birth place of Kauikeaouli, Kamehameha III (Pukui 1983:181, #1682).

253 **E akahele i ka mamo a I, o kolo mai ka mole uaua.**
Beware the descendants of I, lest the tough roots crawl forth.
A warning uttered by Palena, a chief of Kohala, who saw Kua‘ana-a-I cruelly treated by the chiefs of Kona. Kua‘ana later went to see the people of his mother, Ho‘oleiali‘i, in Hāna, and to help the chiefs of Hilo in fighting those of Kona.
[Pukui 1983:31, #253]

370 **E pale lau‘ī i ko akua ke hiki aku i Kona.**
Place a shield of ti leaves before your god when you arrive in Kona.
A message sent by Ka‘ahumanu to Liholiho requesting him to free the *kapu* of his god Kūkā‘ilimoku. Ka‘ahumanu was at that time striving to abolish the *kapu* system.
[Pukui 1983:45, #370]

1682 **Keauhou i ka ‘ihi kapu.**
Keauhou, where strict kapu were observed.
Keauhou, Kona. This was the place where many of the highest chiefs resided and where Kamehameha III was born.
[Pukui 1983:181, #1682]

1843 **Kona, kai malino a Ehu.**
Kona, land of the calm sea of Ehu.
Ehunuikaimalino was a chief of Kona, Hawai‘i, under the ruler Liloa.
[Pukui 1983:199, #1843]

2248 **Na la‘i a Ehu.**
The calm regions of Ehu.
The districts of Kona, Hawai‘i, where Ehunuikaumanamana once ruled. Also, an epithet for Kalākaua, taken from a name chant.
[Pukui 1983:246, #2248]

The ʻōlelo noʻeau listed below describe natural features and boundaries related to the Kona Moku of Hawaiʻi:

1519 **Ka ʻōwili makani ʻino o Kāwili.**
The stormy wind of Kāwili.
Kāwili is the current that comes from Kona and goes out to sea at Kalae, Kaʻū.
[Pukui 1983:164, #1519]

1731 **Ke kai malino o Kona.**
The calm sea of Kona.
Refers to Kona, Hawaiʻi.
[Pukui 1983:186, #1731]

1839 **Kona ʻākau, mai Keahualono a Puʻuohau.**
North Kona, from Keahualono to Puʻuohau.
The boundary of North Kona, Hawaiʻi.
[Pukui 1983:198, #1839]

1840 **Kona hema, mai Puʻuohau a Kaheawai.**
South Kona from Puʻuohau to Kaheawai.
The boundaries of South Kona.
[Pukui 1983:199, #1840]

1842 **Kona i ke kai māʻokiʻoki.**
Kona of the sea that is cut up.
From a distance one can see the smooth surface of the sea at Kona, Hawaiʻi, cut by innumerable streaks of color.
[Pukui 1983:199, #1842]

1844 **Kona, kai ʻōpua i ka laʻi.**
Kona, where the horizon clouds rest in the calm.
[Pukui 1983:199, #1844]

1846 **Kona, mauna uliuli;**
Kona mauna ulupō.
Kona, of the green mountains;
Kona of the dense forest.
North and South Kona, Hawaiʻi.
[Pukui 1983:199, #1846]

Other ʻōlelo noʻeau offer insight into some of the cultural practices occurring in Kona. "Kona, poʻo kuʻi" which translates to *"Kona of the added head,"* cleverly articulates the farming practices that occurred in Kona by describing the imagery of a farmer carrying his/her load upon their shoulders (Pukui 1983:199, #1847). The other two ʻōlelo noʻeau regarding the named winds of Kona (ʻŌlelo Noʻeau #1467 and #1690), were shared previously in an earlier discussion; however, they are revisited here as pertinent to noting the cultural practices associated with Kona. As relayed in the ʻōlelo noʻeau that describes the winds of Kona, the arrival of the ʻEka wind meant the mobilization of fishermen in Kona who readied their canoes and headed out to their fishing grounds (Pukui 1983:159,182). Recounted in the ʻōlelo noʻeau presented below are descriptions of the **farming and fishing practices** that are associated with the Kona Moku:

1847 **Kona, poʻo kuʻi.**
Kona of the added head.
Said of farmers of Kona, Hawaiʻi, returning from the fields with a load on the shoulders and a child sitting atop the load.
[Pukui 1983:199, #1847]

1467 **Ka makani kūkulu peʻa nui, he ʻEka.**
The ʻEka, the wind that sets up the big sails.
When the ʻEka wind blew in Kona, Hawaiʻi, the fishermen sailed out to the fishing grounds.
[Pukui 1983:159, #1467]

1690 **Ke ʻEka, makani hoʻolale waʻa o na Kona.**
The ʻEka breeze of Kona that calls to the canoemen to sally forth to fish.
Refers to Kona, Hawaiʻi.
[Pukui 1983:182, #1690]

The following ʻōlelo noʻeau are traditional sayings whose origin is tied to the study area of Keauhou and are descriptive of the characteristics of this ahupuaʻa and its people. During background research, ʻōlelo noʻeau associated with the Kahului, Waiaha, and Puapuaʻa Ahupuaʻa were not found.

1411 **Ka ʻiole ʻaihue moa o Keauhou.**
The chicken-stealing rat of Keauhou.
One who steals another's sweetheart or mate. Any place name may be used, depending on where the "rat" is from.
[Pukui 1983:153, #1411]

1682 **Keauhou i ka ʻihi kapu.**
Keauhou, where strict kapu were observed.
Keauhou, Kona. This was the place where many of the highest chiefs resided and where Kamehameha III was born.
[Pukui 1983:181, #1682]

1683 **Keauhou, kai nehe i ka ʻiliʻili.**
Keauhou, where the sea murmurs to the pebbles.
Keauhou, Puna, Hawaiʻi.
[Pukui 1983:181, #1683]

The ʻōlelo noeʻau compiled below are other traditional sayings associated with and descriptive of the broader district of Kona:

48 **Aia i Kona i Honalo.**
It is in Kona, in Honalo.
A play on *nalo* (lost). You've lost it and it is gone.
[Pukui 1983:8, #48]

1072 **Hoʻokāhi no Hāwaʻe, lauhue Kona.**
Only one Hāwaʻe, and poisonous gourds grow all over Kona.

In Kona, Hawai‘i, a priest named Hāwa‘e lived during the reign of Ehukaipo. In every important *heiau* in that district, an image named for this priest was kept. Many people were sacrificed to these evil namesakes of Hāwa‘e.
[Pukui 1983:114, #1072]

1755 **Ke kope ho‘ohia‘ā maka o Kona.**
The coffee of Kona that keeps the eyes from sleeping.
This saying applies not only to coffee, but also to love. To be in love with a person of Kona is to lose much sleep.
[Pukui 1983:188, #1755]

2046 **“Mai hea mai ‘oe?”**
“Mai Kona mai.”
“Pehea ka ua o Kona?”
“Palahī pua‘a ka ua o Kona.”
“A pehea ke aku?”
“Hī ka pā, hī ka malau,”
“Where are you from?”
“From Kona.”
“How is the rain of Kona?”
“The rain of Kona pours like the watery excreta of a hog.”
“How are the aku fish?”
“They run loose from the hook and the bait carrier.”
Said in fun of one suffering from loose bowels. Once, a chief was out relieving himself when his bowels were very loose. A runner came by the little-traveled path through the underbrush and seeing the chief there extended his greetings. The chief began to ask questions, which the runner answered. When the chief went home he told those of his household of the sundance of rain and the run of fish in Kona. His servant, whose curiosity was roused, asked, “What were you doing at the time?” “I was excreting, and my bowels were loose,” answered the chief. “He wasn’t talking about the rain and fish,” said the servant, “he was talking about you.” The chief was angry when he heard this, but it was too late to do anything about it.
[Pukui 1983:222, #2046]

2469 **O ko Kona mau no ia o ka la‘i.**
Calm is typical of Kona.
Said of a Kona person who is always poised and calm.
[Pukui 1983:269, #2469]

2471 **O Kona i ka paka ‘ona–ke ha‘u iho ‘oe kūnewanewa.**
Kona of the potent tobacco–a draw would make one stagger.
Kona is said to be a land of potent lovemaking.
[Pukui 1983:270, #2471]

2645 **Pili aloha o Kona, ho‘oipo i ka mālie.**
Love remains close to Kona, who woos the calm.
Kona is a land beloved for its calm and pleasant weather.
[Pukui 1983:290, #2645]

The remaining sayings listed below are a compilation of ʻōlelo noʻeau associated with other ahupuaʻa and wahi pana (storied places) located within the Kona Moku:

682 **He Keʻei ʻoe no lalo lilo.**
You are a person of Keʻei, from far below.
You are of no consequence. Two chiefesses peered into a pool together at Keʻei, in Kona, Hawaiʻi. The reflection of the one from Hanauma appeared above that of the one from Keʻei, so she made this remark.
[Pukui 1983:76, #682]

708 **He kukāhi au, he wauke no Kūloli.**
I stand alone, for I am a wauke plant of Kūloli.
A boast–"Like the lone *wauke* plant of Kūloli, I stand alone in my battles." At Kūloli, in Kona, Hawaiʻi, grew a lone *wauke* plant around which none other grew.
[Pukui 1983:78-79, #708]

1636 **Kau pō Kāneiahuea.**
All night long rode Kāneiahuea.
Said of one who wastes time in useless effort. From the story of a man who started out from the inlet of Kāneiahuea, Kona, one night. Because he was unfamiliar with the place, he went back and forth all night without finding an outlet to the open sea. Similar to the saying *Naʻaupō wale o Kāneiahuea*.
[Pukui 1983:176, #1636]

1730 **Ke kai maka koholua o Keahole.**
The sea of Keahole that pierces like the point of a koholua stick.
Keahole in Kona, Hawaiʻi, is a cold place to swim.
[Pukui 1983:186, #1730]

1841 **Kona Honua-ʻino.**
Kona, [the] Bad Land.
Said in humor of Kona, Hawaiʻi, for within its boundaries is a place called Honuaʻino.
[Pukui 1983:199, #1841]

2188 **Moku ka ihu ia Hio la!**
Bitten off is the nose by Hio!
Used by adults to frighten children into staying at home. Hio was an *akua* (ghost) who wandered about peering into the doors of homes and biting off the noses of those who annoyed him. He escaped when his companions were caught in a fishnet set by the supernatural hero Kamiki at Kuʻunaakeakua (Net-let-down-for-*akua*), Makalawena, Kona.
[Pukui 1983:238, #2188]

2478 **Ola aku la ka ʻāina kaha, ua pua ka lehua i kai.**
Life has come to the kaha lands for the lehua blooms are seen at sea.
"*Kaha* lands" refers to Kekaha, Kona, Hawaiʻi. When the season for deep-sea fishing arrived, the canoes of the expert fishermen were seen going and coming.
[Pukui 1983:271, #2478]

2515 **O na hōkū o ka lani luna, o Paʻaiea ko lalo.**
The stars are above, Paʻaiea below.
Refers to Kamehameha's great fishpond, Paʻaiea, in Kona, Hawaiʻi. Its great size led to this saying–the small islets that dotted its interior were compared to the stars that dot the sky. The pond was destroyed during a volcanic eruption.
[Pukui 1983:275, #2515]

2753 **Pupuhi ka ʻulu o Keʻei; ua koe ka ʻaʻaiole.**
The breadfruit of Keʻei are gone; only those blown down by the wind are left.
Said when something mysteriously vanishes. A *konohiki* of Keʻei in Kona, Hawaiʻi, was placed in charge of a fine breadfruit grove. In spite of his watchfulness, the fruit were stolen as soon as they matured. Secretly he asked all of his relatives to help him watch for the culprit. However, some were related to the thief as well, who learned about the watch and evaded capture. Long after, a slip of the tongue revealed the thief.
[Pukui 1983:301, #2753]

2939 **Wili i ke au wili o Kāwili.**
Swirled about by the swirling Kāwili.
Said of a confusing, bewildering situation. Kā-wili (Hit-and-twist) is a current at Kalae, Kaʻū, Hawaiʻi, that comes from the Kona side and flows out to the ocean. It is the router of the two currents that meet off Kalae.
[Pukui 1983:320, #2939]

No ka Ua - Regarding Rain

The intimacy developed by Kānaka ʻŌiwi (Native Hawaiians) in relation to the natural environment is evident in the practice of naming natural features, resources, and environmental elements. Hawaiians honored and celebrated the world around them by the careful, thoughtful, and intentionality of giving a name, and therefore, mana (authority or power) to a person, place or thing. Natural features of the landscape, oceanscape, and skyscape were observed intimately by those who were of, and frequented a place so deeply, that the particularities of the natural elements were understood and named affectionately to honor, describe, and celebrate its connection.

Hānau Ka Ua is a comprehensive publication that delves into the richness of rain names associated with various places throughout Hawaiʻi. The authors, Collette Leimomi Akana and Kiele Gonzalez, are Native Hawaiian scholars and teachers whose publication honors the unique rains of Hawaiʻi and the places they are associated with. Akana and Gonzalez further describe this intimacy specific to rain:

> Our kūpuna 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 trees, the scent it carried, and the effect it had on people. [Akana and Gonzalez 2015:xv]

The collection of rain names included in *Hānau ka Ua* is often paired with a mele, or song, that references the rain and its association to a featured place. This section of the report utilizes Akana and Gonzalez's work and the cited sources included in this publication in order to identify the rains associated with the study areas and the broader moku of Kona, Hawai'i. Rain names specific to **Kealakehe, Keahuolū, Pua'a, Wai'aha and Kahului Ahupua'a** of Kona were not identified during this background study; however, this is not to say that they do not exist. Named rains belonging to **Puapua'a Ahupua'a** and **Keauhou Ahupua'a** as well as the broader region of Kona study were found and in listed in Table #. The discussion that follows offers a narrative that describes the characteristics of each of the rains identified in this section so as to better understand the unique qualities and cultural significance they possess.

Table #: Table of rain names associated with the Kona Moku of Hawai'i.

Ka Ua *The Rain*	**Ka Wahi** *The Place*	**Nā Kūmole** *References*
Palahī Pua'a	Kona, Hawai'i	Described as an "intermittent rain," and translated to mean "pig diarrhea," (Akana and Gonzales 2015:218,219).
		"Mai hea mai 'oe?" "Mai Kona mai." "Pehea ka ua o Kona?" "Palahī pua'a ka ua o Kona." "A pehea ke aku?" "Hī ka pā, hī ka malau." *"Where are you from?"* *"From Kona."* *"How is the rain of Kona?"* *"The rain of Kona pours like the watery excreta of a hog [palahī pua'a]."* *"How are the aku fish?"* *"They run loose from the hook and the bait carrier."*[70] [Akana and Gonzales 2015:218]
		"Ka ua palahī pua'a–falls, stops, falls, stops, etc.," (Akana and Gonzales 2015:219).[71]
Kēhau	Kona, Hawai'i	Described as a dew and mist and is noted as both the name of specific rain and wind (Akana and Gonzales 2015:73).
		Indexed as a rain associated with Kona, Hawai'i (Akana and Gonzales 2015:316).

[70] Author notes: A traditional saying. Source: Pukui, *'Ōlelo 222. Note: Pukui says that this was "said in fun of one suffering from loose bowels,"* (Akana and Gonzales 2015:218).
[71] Author notes: "From a list of rain names and their descriptions. Source Kelsey, "Rains,"" (Akana and Gonzales 2015:219).

Ka Ua *The Rain*	**Ka Wahi** *The Place*	**Nā Kūmole** *References*
Nāulu	Kona, Hawai‘i	Described as a sudden shower and is noted as being also the name of a rain cloud and a wind (Akana and Gonzales 2015:187).
		‘O Kona ia o ke kai malino a ‘Ehu ē! Ke ala a ‘Ehu, ke ala a kāua i hele ai I ke ao, i ka pō, pōwehiwehi i ka ua Nāulu a weli He weliweli, he maluhia i ke aloha iā ‘oe Iā ‘oe, iā ‘oe, e Kalopelekei i ka lā ē! *Oh, Kona it is, of the tranquil sea of ‘Ehu, oh!* *The pathway of ‘Ehu, the path we two traversed* *By day, by night, made dim and threatening by the stormy Nāulu rains* *Frightful, but peaceful because of love for you* *For you, for you, O Kalopelekei of the day, oh!*[72] [Akana and Gonzales 2015:188,189]
	Puapua‘a Ahupua‘a	Indexed as a rain associated with Puapua‘a (Akana and Gonzales 2015:324).
‘Awa‘awa	Kona, Hawai‘i	Described as a “bitter, cold, dark rain, vog, or smoke of the mountains; acidic rain;” and is noted as being the same as the ‘Awa rain and also the name of a wind (Akana and Gonzales 2015:17).
		Indexed as a rain associated with Kona, Hawai‘i (Akana and Gonzales 2015:316).
	Keauhou Ahupua‘a	Indexed as a rain associated with Keauhou (Akana and Gonzales 2015:315).
‘Awa	Keauhou Ahupua‘a	Described as a “bitter, cold, dark rain, mist, fog, vog, or smoke of the mountains; acidic rain;” and is noted as being the same as the ‘Awa‘awa rain and also a name of a wind (Akana and Gonzales 2015:73).
		Indexed as a rain associated with Keauhou (Akana and Gonzales 2015:315).
Kualau	Keauhou Ahupua‘a	Described as a rain that showers over the seas and is accompanied by wind (Akana and Gonzales 2015:121).

[72] Author notes: “From a kanikau, or lament, for Kamehameha IV by his wife, ‘Emalani Kaleleonālani,” (Akana and Gonzales 2015:189).

Ka Ua *The Rain*	Ka Wahi *The Place*	Nā Kūmole *References*
		Indexed as a rain associated with Keauhou (Akana and Gonzales 2015:315).
Nahunahu	Keauhou Ahupua‘a	Described as a “pelting rain associated with Hawai‘i,” and translated to mean “to bite,” (Akana and Gonzales 2015:184).
		Indexed as a rain associated with Keauhou (Akana and Gonzales 2015:315).
Noe	Keauhou Ahupua‘a	Described as a fog and a mist that is “lighter than the uhiwai [heavy fog], but heavier than ‘ohu [mist, fog, vapor], ‘ehu [spray, foam, mist], and ‘ehu‘ehu [reduplication of ‘ehu];” and is noted as both a rain and wind, (Akana 2015:208).
		Indexed as a rain associated with Keauhou (Akana and Gonzales 2015:315).

Nāulu is the rain associated specifically with **Puapua‘a Ahupua‘a**, as well as the general region of Kona (Akana and Gonzales 2015:324, 188-189). Nāulu is defined by Pukui and Elbert as a “sudden shower,” (Pukui and Elbert 1986:263). Not only is it noted as the name of a particular rain, Nāulu is also identified as the name of a shower cloud, a sea breeze, as well as a type of wind (Pukui and Elbert 1986:263; Akana and Gonzales 2015:187).

As a cloud or as rain, records reference many different characteristics that describe the type of rainfall and patterns typical of a Nāulu rain. Kānaka ‘Ōiwi and renowned historian, David Malo wrote that the Nāulu rain is strong in intensity but short in duration. He characterized the rain as: “He ua Nāulu he ua ‘uku ia, he ikaika na‘e.” *“A Nāulu rain, a brief rain, though it is intense,”* (Malo in Akana and Gonzales 2015:206; translated by Akana and Gonzales). The short and sudden characteristic that Malo described the Nāulu rain to be is also mirrored by another one of Hawai‘i’s noted historians, Samuel Mānaiakalani Kamakau. Published in the Hawaiian language newspaper, *Ke Au Okoa* in 1869, Kamakau shared an account regarding traditional cultivation methods of ‘uala (*Ipomoea batatas* or sweet potato) in which he acknowledged the Nāulu rain:

> He ua Nāulu ka ua e loa‘a i ka Makali‘i, he ua kūhewa ia, aia ma kona wahi e hā‘ule ai, ua ulu ka laulele, ka pōpolo, a ua ola ia wahi i ka lau nāhelehele. [Kamakau 1869:1]
>
> *Sudden showers (ua Nāulu) fall during the Makali‘i season. These are rains accompanied by wind gusts, and where they fall, laulele and pōpolo plants spring up, and that place comes to life with wild growth.*
> [Translated by Akana and Gonzales 2015:206]

According to Kamakau, Nāulu is again referred to here as a shower that arrives suddenly–he ua kūhewa, (Kamakau 1869:1). What is also detailed in this account is that this particular rain is often joined by wind; and with it, entices the ‘āina the rain falls upon to sprout with vegetation such as laulele (*Asclepias curassavica* or butterfly weed), pōpolo (*Solanum nigrum*), and other wild growing flora. Other accounts offer similar depictions of the life brought with the coming of

the Nāulu rain as it falls upon the earth. A mele hoʻāeae or love chant poetically references the Nāulu rain as a rain that softens the forest:

> He ipo aloha naʻu ka nani o Kūkiʻi e waiho nei
> I lohia ʻia mai e nā lehua o Hōpoe, ʻau i ke kai
> Ke kaʻikaʻikū ʻia maila a Kalanamaihiki
> Hikiwawe ka hana a ka ua i ka nahele
> Ke hoʻowali ʻia maila e ka ua Nāulu
> Kū helahela ke kula o Kamāʻoa, nopu i ka lā
> [Pukui 1995:76 in Akana and Gonzales 2015:205]
>
> *Kukuni wela i ka ʻili o ka malihini*
> *The beauty of Kūkiʻi, my intimate lover, lies there*
> *Sparkling from the lehua of Hōpoe, reaching out into the sea*
> *Carried about until arriving at Kalanamaihiki*
> *The rain works hastily upon the forest*
> *Softened by the Nāulu rain*
> *The plain of Kamāʻoa is extensive, heated by the sun*
> *That scorches the skin of newcomers*
> [Translated by Akana and Gonzales 2015:205]

A chant entitled, "Haui Kalani," offers the imagery of the Nāulu rain as a rain that makes the land glisten: "He ʻā, he haʻihaʻi pua, he Nāulu kaupua liko moku." *"A booby bird, a flower breaker, a Nāulu rain cloud that gathers, making the land glisten,"* (Fornander 1916-1920:381 in Akana and Gonzales 2015:205; translated by Akana and Gonzales).

A mele inoa or name chant for the chief, Kūaliʻi, describes the Nāulu rain as the rain that carries the kēhau mist:

> ʻAʻole i like i ka Nāulu — *Unlike the Nāulu shower*
> Ia ua hoʻohali kēhau — *The rain that bears the kēhau mist*
> Me he ipu wai i ninia lā — *Like a water gourd that was poured*
> Nā hau o Kūmomoku — *Upon the hau trees of Kūmomoku*
> [Na Mele Aimoku 2001:94; translated by Akana and Gonzales 2015:204-205]

The accounts shared above each characterizes Nāulu as a rain that brings life to the ʻāina. As Kamakau recalled, ʻuala and other native wild flora began to sprout as a result of the Nāulu rain (Kamakau 1869:1). Pukui described it as a rain that softens the forest (Pukui 1995:76 in Akana and Gonzales 2015:205). Fornander wrote of a chant that described the Nāulu rain as a rain that makes the land glisten, while another chant described it as a rain that carries mist (Fornander 1916-1920:381 in Akana and Gonzales 2015:205; translated by Akana and Gonzales; Na Mele Aimoku 2001:94; translated by Akana and Gonzales 2015:204-205).

In the moʻolelo of Kamapuaʻa, compiled and translated by Lilikalā Kameʻeleihiwa, Nāulu is recounted as a body form of one of Hina's daughter, named Leialoha. When she is born, the body manifests into rain, which is identified as Kauanāulu, meaning, the Nāulu rain:

> Ua hāpai aʻela ʻo Hina… ʻO ka ʻehā o nā keiki i hānau mai ai, he kaikamahine, ʻo ia hoʻi ʻo Leialoha. A i ka manawa i nui ae ai ʻo ia kaikamahine, ua lele akula ʻo ia i ka lani, a lilo kona kino he kino ua, a ua kapa ʻia ʻo Kauanāulu.
> [Kameʻeleihiwa 1996 in Akana 202-203]

> *Hina was pregnant… The fourth child born was a daughter, Leialoha. And when this girl grew up, she flew into the sky, and her body took the form of rain, and it was called Kauanāulu.*
> [Translated by Akana and Gonzales 2015:202-203]

ʻAwa, ʻAwaʻawa, Kualau, Nahunahu, and Noe are rains associated with the **Keauhou Ahupuaʻa**. The rains, **ʻAwa** and **ʻAwaʻawa**, are the same type of rains that vary in its naming. Both rains are described to mean, "bitter, cold, dark rain, vog, or smoke of the mountains; acidic rain," (Akana and Gonzales 2015:17,73). Metaphorically, this type of rain is used to convey emotions of grief and tragedy and speak towards hardships of misfortune (Akana and Gonzales 2015:17; Pukui and Elbert 1986:33).

Pukui categorizes the **ʻAwa** rain as a "cold mountain rain." Similarly, Malo described the various rains of Hawaiʻi and of ʻAwa, he wrote: "He ua ʻawa, ma ka mauna ia ua." (*An ʻawa rain, this rain falls on the mountains),* (Malo 1951:14 in Akana and Gonzales 2015:15). The characterization of the ʻAwa rain as rain associated with the mountains is also seen in a 1866 newspaper article titled "Manao Wehewehe" that was written by an individual named L. Z. E. Kalaaukumuole:

> Ua ʻAwa–He ua kēia ma ka mauna, he ua ʻawa, he ua liʻiliʻi, ʻo ke ehu wale nō; ʻaʻole i loku ʻo ka ua, ʻo ke poʻo ke kuakea me he kanaka poʻo hina lā, he ua poʻo nui o ke kuahiwi, ʻo ke anu naʻe ka mea nui, no laila mai kēia inoa ua ʻAwa, he ua noe.
> [Kalaaukumuole 1866:3]

> *ʻAwa rain–This is a rain in the mountains, a bitter rain, a fine rain; it is only mist; it doesn't pour down; the head is white like a gray-haired man, a troublesome "poʻo nui" rain in the mountains, though the cold is the main problem, and therefore this name, ua ʻAwa, a misty rain.*
> [Translated by Akana and Gonzales 2015:14]

The ʻAwa rain is also associated with possessing a station of high rank and divinity. The ʻōlelo noʻeau, "He lupe lele a pulu i ka ua ʻawa" is translated by Pukui as, *A kite that flies till it is dampened by icy cold [ʻawa] raindrops,* (Pukui 1983:85, #775). The phrase is interpreted by Pukui as being descriptive of someone "whose station has risen very high," (Pukui 1983:85). In the moʻolelo of Keaomelemele, recorded by Hawaiian historian Moses Manu, the birth of Hina's child is detailed. During the birth, many hōʻailona or signs telling of the childs' high rank and kapu (scaredness) were observed. Among them was the downpour of the ʻAwa rain:

> I ka manawa i ʻike maopopo loa ʻia aʻe ai ua hāpai ʻo Hina, ua noho aku lāua ma ia ʻano a kokoke i nā lā nahunahu hānau keiki, ua ʻike ʻia nā ʻōuli o ka lani a me nā ao polohiwa e haʻakokōhi ana i loko o ka lewa nuʻu, a ke hoʻokūkū maila nā ʻōpua i ka ʻili o ke kai, a ke ʻōkūkū maila nā ʻale kūpikipikiʻō o ka moana, a ke neʻe paʻa aʻela ka ʻohu e uhi i nā awāwa a me ka piko o nā mauna, a ke ʻaneʻane maila ʻo Kūlanihākoʻi e hoʻohanini iho i kona wai lani, a ʻike ʻia akula ka lalapa o ka uila i ka lewa, a ke lohe ʻia akula nā leo pohāpohā nunulu o ka hekili e nākolo ana i ka honua, aia hoʻi nā ānuenue ke haʻaheo maila i loko o nā kilihune ua ʻawa, ka ua koko hoʻi ke haʻaheo maila ma nā awāwa i luna o nā lau lāʻau, "me he ua ʻUlalena lā no Piʻiholo e kīheʻaheʻa ana i kukui o Lilikoʻi."
> [Manu 2002:8]

When it became clearly known that Hina was pregnant, the two of them waited together, and when the days of birth pangs approached, the omens were seen in the heavens: there were dark, heavy clods pressing on the skies above, and the billowing clouds were heaped upon the surface of the sea, while the wild swells of the ocean rose on high, the sea spray blanketed the valleys and the mountain tops, and Kulanihakoi was nearly read to overflow its heavenly waters when the flashes of the lighting were seen in the sky, and the rumbling roar of the thunder was shaking the earth, then the rainbows appeared proudly in the droplets of the Awa rain, and the red rainbow patches showed their glory over the tree tops of the valley, "like the Ulalena rain of Piiholo, streaking the kukui leaves of Lilikoi."
[Translated by Pukui in Manu 2002:100]

As noted previously, this particular rain is also noted as being a vog. Amongst the many sources compiled by Akana and Gonzales in their comprehensive inventory of rain names, the authors share a segment of an oral interview between two native speakers, Hilda Hoohila Kawelo and Clinton Kanahele in 1970 (Akana and Gonzales 2015;15-17). In their discussion, Kawelo describes ʻAwa as a fog and its association with Pele. She also shares with him an oli which references the ʻAwa fog. Their conversation is as follows:

Kawelo: Hele mai ʻo Pele mai Kahiki. Kona manawai i hele mai ai, hele mai nō ka ua. Hele mai ka ua Noe me ka ua ʻAwa. He aha ia mea he ua ʻAwa? Maopopo anei iā ʻoe?
Pele came from Kahiki. When she arrived, so too came the rain. The Noe rain and the ʻAwa rain came. What is this thing known as an ʻAwa rain? Do you know?

Kanahele: ʻAʻole.
No.

Kawelo: ʻAe, ka ua ʻAwa, ʻo ia nō ka uahi.
The ʻAwa rain, it is smoke.

Kanahele: Oh.

Kawelo: Ka uahi o kēlā ahi, o kēlā, no ka mea, he ahi hoʻi ʻo ia i hele maila. Kēlā uahi e pōhina nei ka ʻāina āna i hele mai nei, e ʻike ʻia aku nei i ka maka o nā keiki a kānaka, mea, inā ʻoe e honi i kēlā, ʻano, mea, pōniuniu nō ʻoe.
The smoke of that fire, of that, because she came as fire. That smoke that creates a haze over the land she came to, that is seen and felt by the eyes of the children of men, if you were to inhale that, you would get dizzy.

Kanahele: Ua ʻAwa kēlā?
That's the ʻAwa rain?

Kawelo: Ka ua ʻAwa hoʻi ia. Kēlā ua, ʻaʻole ʻoe pulu. ʻAʻole ʻoe pulu i kēlā ʻAwa.
The ʻAwa rain, indeed. That rain, you don't get wet. You don't get wet from that ʻAwa.

Kanahele: He hanu wale nō ʻoe i kēlā ua.

You just inhale that rain.

Kawelo: ʻAe, hanu wale nō. “Hele mai ʻo Pele mai Kahiki, hele mai ka ua ʻAwa me ka ua Noe. Uhi aʻela, paʻa nā pali paʻa o Kahiki, ʻakahi ka hikina ʻana mai o kō aloha iaʻu.”
Yes, it is just inhaled. “Pele came from Kahiki; the ʻAwa rain and the Noe rain came; completely smothering the cliffs of Kahiki; your love has finally reached me.”

Kanahele: He hīmeni kēlā?
Is that a song?

Kawelo: ʻAe, he olioli hoʻi paha.
Yes, an olioli chant.

Kanahele: He olioli?
An olioli?

Kawelo: ʻAe, he olioli kēlā.
Yes, it is an olioli.

Kawelo [e olioli ana]:
He mai ʻo Pele mai Kahiki
Hele mai ka ua ʻAwa me ka ua Noe
Uhi ʻia aʻela, paʻa nā pali paʻa o Kahiki
ʻAkahi ka hikina ʻana mai o kou aloha i oʻu nei
E Kalani mā ē
E iho koke mai i lalo nei
I maha aʻe au
E Kāne mā ē
ʻOki ʻia ka lili, ka inaina o lākou nei lā ē
ʻAe

Kawelo [chanting]:
Pele came from Kahiki
The ʻAwa rain and the Noe rain came
Completely smothering the cliffs of Kahiki
Your love has finally reached me
O Heavenly One and company
Come quickly down here
That I may be at ease
O Kāne and company
End their jealousy and rage
Yes

Kualau is another rain associated with the Keauhou ahupuaʻa (Akana and Gonzales 2015:121). When referring to the kualau rain, Malo wrote: “He ua kualau, ma ka moana ia ua.” *A kualau rain, this rain occurs at sea.* (Malo 1951:14).

Nahunau means “to bite,” and is characterized as a pleting rain associated with Keauhou (Akana and Gonzales 2015:184). **Noe**, is another rain of Keauhou that is also referred to as Noenoe (Akana and Gonzales 2015:208). Noe is the name of a specific type of rain as well as a general term for mist, fog, vapor, or rain (Pukui and Elbert 1986:268).

Palahī Puaʻa, Kēhau, Nāulu, and ʻAwaʻawa are rains associated with the general **Kona Moku** of Hawaiʻi. **Nāulu** was described previously as a rain and a cloud also associated with the Puapuaʻa Ahupuaʻa. Malo characterized it as a sudden rain of strong intensity and Kamakau provided a description of Nāulu rainfall that was associated with ʻuala cultivation and the sprouting of wild native flora (Malo in Akana and Gonzales 2015:206; Kamakau 1869:1). Several chants reviewed noted that Nāulu is a "rain that softens the forest," a "rain that makes the land glisten," and a "rain that carries the kēhau mist," (Pukui 1995:76 in Akana and Gonzales 2015:205; Fornander 1916-1920:381 in Akana and Gonzales 2015:205; Na Mele Aimoku 2001:94 in Akana and Gonzales 2015:204-205).

Similarly, the **ʻAwaʻawa** rain was previously identified and discussed as a rain associated with the Keauhou Ahupuaʻa. As noted, its overall characteristics is a dark rain or fog most commonly associated with the mountain regions. Metaphorically, it can be associated with hardships and misfortunes.

Palahī Puaʻa is a rain exclusively associated with the Kona Moku. Its name literally translates to mean "pig diarrhea" and is described as a rain that "falls and stops, falls and stops," (Akana and Gonzales 2015:218-219). **Kēhau** is another rain of Kona and is also recorded as a dew and misty and is described to be "a cold fine rain floating in the air, mostly in the mountainous regions," (Akana and Gonzales 2015:76).

Nā Hana a ke Kupa ʻĀina – Summary of Traditional and Customary Practices

This section highlights the traditional and customary practices noted to occur within the project area ahupuaʻa and the larger landscape of Kona Akau that have originated from the select moʻolelo and kaʻao presented in this report. These practices emphasize the generations of kupa ʻāina (native of the land) in Kona Akau who maintained a deep pilina with the vast natural and cultural resources of this ʻāina. The cultivation of the land and sea, and the gathering and utilization of freshwater resources that originate from the storied places of this ʻāina, have, and continue to feed Kona's community physically and spiritually. These practices are a testament to the enduring legacy of Kona Akau and reaffirm the right for Kānaka ʻŌiwi to actively maintain traditional and customary practices in these spaces today.

As is recorded in the last paukū or stanza of He Mele no Kāne–he wai e ola! Water is life. The source of all things is wai. The same is true for this report as the focal point of this study is centered around wai and the way in which the movement and presence of freshwater experienced in Kona Akau has influenced the culture, practices, and lifestyle of the community who cherish this ʻāina. Examining the influence of freshwater within Kona emphasizes the importance it imparts to the well-being of both the ʻāina it nourishes as well as the people who benefit from it. Thus, the protection of freshwater and the proper management of it is of utmost importance.

To frame this discussion, He Mele no Kāne is reflected upon to highlight the many manifestations of water sources that surface when analyzing the select moʻolelo and kaʻao presented in this report associated with Kona. The perseverance of moʻolelo captures valuable knowledge sets relaying traditional practices, resources, and cultural lessons. Each of the moʻolelo shared in this report impresses the underlying fact that Kona is not to be thought of as a place absent of water. Rather, as expressed and reiterated in He Mele no Kāne, the life-giving waters of Kāne are indeed present in all ways. *Aia i ka hikina a ka lā… A i lalo, i ka honua…* From the rising of the sun, to the aquifers that rest beneath the earth, wai is everywhere. The lessons learned in He Mele no Kāne transcends the barriers of time and resonates today as much as it did when first composed. The framing of this discussion presented in this way is intended to elevate a holistic understanding of water resources within the study areas, while also highlighting some of the traditions and practices revealed in the reflection of moʻolelo.

He ui, he nīnau:
E ui aku ana au iā ʻoe,
Aia i hea ka Wai a Kāne?

A query, a question,
I put to you
Where is the water of Kāne?

Cloud Formations

The first paukū of He Mele no Kāne establishes that freshwater can be found at the rising of the sun.

He ui, he nīnau:	*A query, a question,*
E ui aku ana au iā ʻoe,	*I put to you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*

Aia i ka hikina a ka Lā	*At the Eastern Gate*
Puka i Haʻehaʻe,	*Where the Sun comes in at Haʻehaʻe,*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

"Aia i ka hikina a ka lā, puka i Haʻehaʻe." *At the Eastern Gate, where the sun comes in at Haʻehaʻe*. The poetic references that introduce the sun as a source of water is an example of the deep intellect Kānaka ʻŌiwi possessed having understood the sun's role in creating water vapor–an essential step in the water cycle. The heat that radiates from the sun is the mechanism that enables liquid water to turn into water vapor, which is recognized universally as the process called evaporation. The water vapor that is created by the heat of the sun rises to the atmosphere and as it cools, the vapor condenses to eventually create clouds. The clouds then produce rain that will fall and recharge the honua–continuing the cycle of water. As is documented in the first paukū of the chant, the role the sun plays in radiating heat and creating the appropriate fluctuating temperatures for these atmospheric changes to occur is critical in the movement of water.

The second paukū of the chant describes the transition of water that began from the sun, now evolved into clouds. Thus, freshwater is found in the clouds.

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i Kaulana a ka lā,	*Out there with the floating Sun,*
I ka pae ʻōpua i ke kai,	*Where the cloud-forms rest on ocean's breast,*
Ea mai ana ma Nihoa,	*Uplifting their forms of Nihoa,*
Ma ka mole mai o Lehua;	*This side the base of Lehua;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

Specifically the chant recalls that wai is found, "I ka pae ʻōpua i ke kai." *Where the cloud-form rests on ocean's breasts*. An ʻōpua cloud is a cumulus or billow cloud that Pukui describes as "puffy clouds, as banked up near the horizon, often interpreted as omens," (Pukui and Elbert 1986:293). This particular type of cloud is associated with interpreted omens as well as its ability to carry and release freshwater in the form of rain. Several ʻōlelo noʻeau encapsulate this cultural understanding of ao ʻōpua (cumulus clouds):

7 **Aia i ka ʻōpua ke ola: he ola nui, he ola laulā, he ola hohonu, he ola kiʻekiʻe**
Life is in the clouds: great life, broad life, deep life, elevated life.
The reader of omens knows by their shape and color whether clouds promise rain and prosperity, or warn of disaster.
[Pukui 1983:7, #42]

356 **E nānā ana i ka ʻōpua o ka ʻāina.**
Observing the horizon clouds of the land.
Seeking to discover future events by observing the cloud omens.
[Pukui 1983:43, #356]

1907 **Kūkulu ka ʻike i ka ʻōpua.**
Knowledge is set up in the clouds.
Clouds are observed for signs and omens.
[Pukui 1983:205, #1907]

2328 **Noho no ke kanaka a ka lā mālie, kau ka ipu hōkea o ka lawai‘a, nānā ana i ka ‘ōpua.**
A person waits for a clear day, sets up the gourd that holds the fisherman’s paraphernalia, and observes the clouds.
To a fisherman, a clear day, his tools, and the signs and omens seen in the clouds are important.
[Pukui 1983:253, #2328]

2482 **Ola i ka wai a ka ‘ōpua.**
There is life in the water from the clouds.
Rain gives life.
[Pukui 1983:271, #2482]

2487 **Ola na ‘ilima wai ‘ole i ke ao ‘ōpua.**
Healed are the ‘ilima of waterless places by the rain cloud.
[Pukui 1983:272, #2487]

The ‘ōlelo no‘eau presented below are traditional expressions regarding ao ‘ōpua that are distinct to the Kona Moku and the study areas.

55 **Aia ka wai i ka maka o ka ‘ōpua.**
Water is in the face of the ‘ōpua clouds.
In Kona, when the ‘ōpua clouds appear in the morning, it’s a sign that rain is to be expected.
[Pukui 1983:9, #55]

232 **Ao ‘ōpiopio.**
Young cloud.
A cloud that rises from sea level or close to the cloud banks and is as white as steam. When seen in Kona, Hawai‘i, this is a sign of rain.
[Pukui 1983:27, #232]

2134 **Māmā Kona i ka wai kau mai i ka maka o ka ‘ōpua.**
Kona is lightened in having water in the face of the clouds.
Kona is relieved, knowing that there will be no drought, when the clouds promise rain.
[Pukui 1983:232, #2134]

Revealed in these ‘ōlelo no‘eau is the knowledge that one of Kona’s distinct sources of freshwater rests in the ‘ōpua clouds. For this reason, knowing that the presence of ao ‘ōpua may bring rain, the practice of **nānā ao** (observing clouds) or **kilokilo** (to observe and forecast) are significant practices carried out by the natives of Kona in order to understand the nuances of their environmental seasons and inform their work.

The mo‘olelo concerning Pu‘uokaloa described this practice and its significance to informing when other practices for the people of Kona should occur. Kihe described Pu‘uokaloa as a hill situated between Kealakehe and Keahuolū (Kihe 1923:2). When the people of Kona saw clouds over Pu‘uokaloa, the kama‘āina of the area understood it as a sign of rain and readied their lands to take advantage of the bounty the rain would bring. In this perspective, the presence of clouds over Pu‘uokaloa is an environmental indicator of rain for those of Kona. Informed by the movement of clouds observed over Pu‘uokaloa, paired with being attentive to the natural cycles

and seasons of their environment, Kihe recounts that kamaʻāina understood this as a sign to make the necessary preparations to plant ʻuala patches (Kihe 1923:2). Specifically, Kihe writes that the people of this region utilized a makawela style of ʻuala planting. This style of planting involves slashing and burning the land before planting (Pukui and Elbert 1986:228). The notion of ʻuala cultivation practices that occurred in Kona is also revealed in the moʻolelo of Ka-Miki. At a place called Niumalu in the Puapuaʻa Ahupuaʻa, a māla ʻuala is said to stretch throughout Puapuaʻa. This ʻuala garden is described as the place where Ka-Miki's opponents go to recover and sleep after being defeated by the young boy (Wise and Kihe 1914-1917 in Maly 1999:12).

From the moʻolelo and ʻōlelo noʻeau reviewed, several practices are revealed to occur in the study area: **nānā ao or kilokilo of clouds**, **ʻuala cultivation**, and specifically, **makawela method of cultivation**.

Forests and Streams

The third paukū in He Mele no Kāne describes that wai can be found in the upland areas.

E ui aka ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ke kuahiwi, i ke kualono,	*Yonder on mountain peak, on the ridges steep,*
I ke awāwa, i ke kahawai;	*In the valleys deep, where the rivers sweep;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

"Aia i ke kuahiwi, i ke kualono. I ke awāwa, i ke kahawai…" *Yonder on the mountain peak, on the ridges steep, in the valleys deep, where the rivers sweep…* These lines of the chant speak to freshwater being found throughout the ʻāina and specifically in the upland forests, valleys, and streams.

In several moʻolelo shared in this report, the individuals of the stories ventured in the mountains and discovered wai. In "He Kaʻao no ka Manu ʻElepaio," which was published in *Ka Hoku o Hawaii* in 1862, the author tells the story of a man named Piʻiwai who traveled ma uka with his huewai (water calabash) in the forests of Kahului Ahupuaʻa to collect wai (S. W. K. 1862:1). The **practice of gathering freshwater** is revealed in this moʻolelo.

In the story of Kepakaʻiliʻula which appeared in *Ka Hoku o Hawaii* from 1919 through 1920, Kepakaʻiliʻula and his uncles journeyed in the uplands of Kahuluʻu and there they found water in the form of springs. During this chapter of the moʻolelo, the author noted that the great banana plantation of the aliʻi, Kahoʻoaliʻi was there as well (Malo 1919-1920 in Maly 1997:25-26). This cultivated area of maiʻa (banana) was said to stretch from Kaumalumalu-Kāpalaʻalaea to Keʻei (Malo 1919-1920 in Maly 1997:25). The mention of there being a large banana plantation dedicated to an aliʻi, indicates **agriculture practices** to occur in Kahaluʻu Ahupuaʻa, and specifically, **maiʻa cultivation**.

In the moʻolelo of Ka-Miki, while he and his brother are journeying through Kona, the author offers descriptions of the various places they travel through. Regarding the Waiʻaha and Kahului Ahupuaʻa of Kona, Ka-Miki is said to travel past a **stream** that connects the two ahupuaʻa. The translated excerpt reads:

> …the stream of Waiʻaha joins with the lands of Kahului. The waters filled the upland taro mounds of the sacred prostration chiefs Kaleiʻeha, Kapahu (or Kapahu-a-Loʻi), and Kaʻalaea, who possessed the kapu (restrictions) of Lono-

> Makahiki... There too, you see — ka luawai ua kīpapa ʻia i ka pōhaku ʻalā e ulu pōhai ʻia e nā lāʻau loulu, o ka punawai i ka oʻioʻina pali o Waiakekea — a spring paved with dense [ʻalā] stones and surrounded by loulu palms, this is the spring of Wai-a-Kekea, which was near the trail side resting place... (IN Ka Hōkū o Hawaiʻi, April 9, 1914; Maly translator)
> [Wise and Kihe 1914-1917 in Maly 1998:3]

This stream is said to feed puʻepuʻe or mounds of kalo, indicating that agriculture practices of **kalo cultivation** would have occurred in this area of Waiʻaha and Kahului.

Though not located in the upland forests, but still located on ʻāina, the moʻolelo of Kepakaʻiliʻula describes a **niu grove** of Kona associated with Helani (Malo 1919-1920). This grove is also mentioned in the ʻōlelo noʻeau, **"Ka wai puka iki o Helani."** *The water of Helani that comes from a small opening,* (Pukui 1983:179, #1661). Pukui states that this expression refers to "Helani, Kona, Hawaiʻi. Here a coconut grove thrived, and from a small opening in the shell of the nut one could get water to drink," (Pukui 1983:179). Culturally, coconuts are recognized as a source of freshwater as one could nourish their quench with water derived from the shells of coconuts. This understanding is conveyed in the ʻōlelo noʻeau, "Ka wai lewa i ka makani." *The water that sways in the breeze*, (Pukui 1983:179, #1656). Here, Pukui interprets this saying as "the coconut, which contains water and is found in clusters high up in the tree," (Pukui 1983:179). The moʻolelo of Kepakaʻiliʻula and the accompanying ʻōlelo noʻeau reveal that the **niu grove of Helani** is a resource that produces viable **drinking water**.

From the moʻolelo and ʻōlelo noʻeau reviewed, water in the form of streams, as well as drinking water derived from the niu grove of Helani come to surface. Practices associated with these accounts convey that the practice of gathering freshwater, agricultural practices, maiʻa cultivation, and kalo cultivation occurred in the study areas.

Rains

The fourth paukū of the chant expresses that water is found out at sea and in the rains, rainbows, and mists.

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i kai, i ka moana,	*Yonder at the sea, on the ocean,*
I ke kualau, i ke ānuenue,	*In the driving rain, in the heavenly bow,*
I ka pūnohu,	*In the piled-up mist wraith,*
i ka uakoko,	*In the blood red rainfall*

A Kona expression conveys the pleasant feeling when rain visits the ʻāina of Kona–**"Me he makamaka la ka ua no Kona, ke hele la a kipa i Hanakahi."** *The rain is like a friend from Kona–it goes and calls on Hanakahi,* (Pukui 1983:234-235, #2154). Palahī Puaʻa, Kēhau, Nāulu, and ʻAwaʻawa are rains associated with the general Kona Moku of Hawaiʻi. ʻAwa, ʻAwaʻawa, Kualau, Nahunahu, and Noe are rains associated with the Keauhou Ahupuaʻa. Nāulu is the rain associated specifically with Puapuaʻa Ahupuaʻa.

- **Palahī Puaʻa** is a rain exclusively associated with the Kona Moku. Its name literally translates to mean "pig diarrhea" and is described as a rain that "falls and stops, falls and stops," (Akana and Gonzales 2015:218-219).

- **Kēhau** is another rain of Kona and is also recorded as a dew and misty and is described to be "a cold fine rain floating in the air, mostly in the mountainous regions," (Akana and Gonzales 2015:76).
- **Nāulu** is described as a rain and a cloud associated with the Puapuaʻa Ahupuaʻa and the general Kona Moku. Malo characterized it as a sudden rain of strong intensity and Kamakau provided a description of Nāulu rainfall that was associated with **ʻualа cultivation** and the sprouting of wild native flora (Malo in Akana and Gonzales 2015:206; Kamakau 1869:1). Several chants note that Nāulu is a "rain that softens the forest," a "rain that makes the land glisten," and a "rain that carries the kēhau mist," (Pukui 1995:76 in Akana and Gonzales 2015:205; Fornander 1916-1920:381 in Akana and Gonzales 2015:205; Na Mele Aimoku 2001:94 in Akana and Gonzales 2015:204-205). The Nāulu rain is also referred to in the moʻolelo of Kepakaʻiliʻula when he offers a mele kānaenae to Mākoleʻā:

  Kau iluna ka wai a ka Nāulu
  ʻAlohi ʻula i ka pali o Koholālele e
  Lehulehu i ka luna o Koaʻekea a
  Paʻa pono mai Kona i ka ehu a ke kai a
  Kīpū lua i ke one o Kaiakeakua
  He akua ka hoa he ʻike ʻole mai e
  ʻAuwe ka mea aloha oia la e hoʻi a!
  The Nāulu showers which are placed above
  Appear to glow red in the light on the cliff of Koholālele
  Indeed, the multitudes are gathered at the heights of Koaʻekea
  But Kona is firmly embraced by the sea mists
  And there is two-fold calm upon the shore of Kaiakeakua
  A god [-chief] is the companion which is not seen
  But here is one that can indeed be cherished!
- **Kualau** is a rain associated with the Keauhou ahupuaʻa (Akana and Gonzales 2015:121). When referring to the kualau rain, Malo wrote: "He ua kualau, ma ka moana ia ua." *A kualau rain, this rain occurs at sea.* (Malo 1951:14).
- **Nahunau** means "to bite," and is characterized as a pleting rain associated with Keauhou (Akana and Gonzales 2015:184).
- **Noe** is a rain of Keauhou that is also referred to as Noenoe (Akana and Gonzales 2015:208). Noe is the name of a specific type of rain as well as a general term for mist, fog, vapor, or rain (Pukui and Elbert 1986:268).
- **ʻAwa** is a rain of Keauhou and is described by Pukui as a cold mountain rain (Pukui and Elbert 1986:33) Malo wrote: "He ua ʻawa, ma ka mauna ia ua." (*An ʻawa rain, this rain falls on the mountains),* (Malo 1951:14 in Akana and Gonzales 2015:15). Metaphorically, this type of rain is used to convey emotions of grief and tragedy and speak towards hardships of misfortune (Akana and Gonzales 2015:17; Pukui and Elbert 1986:33). This rain is also associated with being of high rank and divinity. The ʻōlelo noʻeau, "He lupe lele a pulu i ka ua ʻawa" is translated by Pukui as, *A kite that flies till it is dampened by icy cold [ʻawa] raindrops,* (Pukui 1983:85, #775). The phrase is interpreted by Pukui as being descriptive of someone "whose station has risen very high," (Pukui 1983:85). In the moʻolelo of Keaomelemele, recorded by Hawaiian historian Moses Manu, the birth of Hina's child is detailed. During this birth, many hōʻailona telling of the childs' high rank and kapu (scaredness) were observed. Among them was the downpour of the ʻAwa rain.
- **ʻAwaʻawa** is a rain noted to be the same as the ʻAwaʻ rain. It is a rain associated with the Keauhou Ahupuaʻa. As noted, its overall characteristics is a dark rain or fog most commonly associated with the mountain regions. Metaphorically, it can be associated with hardships and misfortunes.

The recollection of inoa ua (rain names) detail that the Palahī Puaʻa, Kēhau, Nāulu, ʻAwa, ʻAwaʻawa, Kualau, Nahunahu, and Noe rains sources of wai ua that belong to the study areas and broader Kona Moku, each with various characteristics and qualities. In the account detailed by Malo, the Nāulu rain is associated with agricultural practices of ʻuala cultivation (Malo in Akana and Gonzales 2015:206; Kamakau 1869:1).

Springs

The fifth paukū of the chant details the movement of water from the ʻāina, cycling back into the atmosphere in the form of clouds. The sixth and final paukū of He Mele no Kāne speaks to the recharge of the honua when water seeps underground and is retained in aquifers, springs and estuaries. "Aia i lalo, i ka honua, i ka wai hū. I ka wai kau a Kāne me Kanaloa." *Deep in the ground, in the gushing spring. In the ducts of Kāne and Kanaloa.*

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i luna ka Wai a Kāne,	*Up on high is the water of Kāne,*
I ke ao uli, i ke ao ʻeleʻele,	*In the heavenly blue, in the black piled cloud,*
I ke ao pōpolo hua mea a Kāne lā, ē!	*In the black mottled sacred cloud of the gods;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i lalo, i ka honua, i ka wai hū,	*Deep in the ground, in the gushing spring,*
I ka wai kau a Kāne me Kanaloa.	*In the ducts of Kāne and Kanaloa,*
He wai puna, he wai e inu,	*A well spring of water, to quaff,*
He wai e mana, he wai e ola.	*A water of magic power–the water of life!*
E ola nō ʻeā!	*Life! O give us this life!*

"He Kaao no ka Manu ʻElepaio" detailed a **pūnāwai located in the uplands of Kahului, Kona**. In this story, Piʻiwai journeys ma uka and is able to collect water in his huewai before the mischievous ʻElepaio had his way with the calabash, causing it to leak. From this account, both the presence of a freshwater spring in Kahului, as well as the **practice of kānaka gathering water** from its source is revealed.

"He Moolelo Kaao no Kepakaʻiliʻula" included two references of springs. When Kepakaʻiliʻula and his uncles journey through Kahaluʻu Ahupuaʻa in search of Mākoleʻā for whom he is to marry, the author refers to Kahaluʻu as, **"i ka ʻāina kaulana i ka wai puka iki o Helani,"** which Maly translates as, "of the land famous for the small flowing spring of Helani;" thus revealing a **spring associated with Helani and the ʻāina of Kahaluʻu** (Malo 1919-1920 in Maly 1997:26). In another chapter of this moʻolelo, Mākoleʻā's father is challenged by Kepakaʻiliʻula for breaking his promise to wed his daughter to him. As a result, her father flees Kahaluʻu, leaving behind a favored **spring named Waikuʻi located at Kahaluʻu**. This spring is said to have been a favorite of the chiefs of Kona (Malo 1919-1920 in Maly 1997:26).

"Kaao Hooniua Puuwai no Ka-Miki" briefly noted the **Waiakekea spring** located near the stream that joins Waiʻaha and Kahului. This pūnāwai is described as being paved with ʻalā stones (dense waterworn volcanic stones) and surrounded by loulu (fan palms or *Pritchardia*). The passage translated by Maly reads:

> There too, you see — ka luawai ua kīpapa ʻia i ka pōhaku ʻalā e ulu pōhai ʻia e nā lāʻau loulu, o ka punawai i ka oʻioʻina pali o Waiakekea — a spring paved with dense [ʻalā] stones and surrounded by loulu palms, this is the spring of Wai-a-Kekea, which was near the trail side resting place... (IN Ka Hōkū o Hawaiʻi, April 9, 1914; Maly translator)
> [Wise and Kihe 1914-1917 in Maly 1998:3]

From these moʻolelo, it is recorded that freshwater springs are significant features associated with the study area–the pūnāwai found in the uplands of Kahului, the spring associated with Helani in Kahaluʻu, the Waikuʻi spring at Kahaluʻu, and the Waiakekea spring near Waiʻaha and Kahului.

The water that surges from the pūnāwai and all the other manifestations of water discussed in this section are indeed the life-giving waters of Kāne. The moʻolelo and oral traditions examined in this discussion are a testament to the presence of water associated with the study areas and broader moku of Kona, as well as the practices and traditions that are a result of, and sustained by the gift of wai.

He wai puna, he wai e inu, He wai e mana, he wai e ola.
A water of magic power–the water of life! A well spring of water, to quaff.

E ola nō ʻeā!
Life! O give us this life!

Additional Practices

Woven into the telling of these moʻolelo are tidbits of information that describe certain resources and other practices to occur within and around the study areas.

Regarding Agricultural Practices

As discussed in the moʻolelo concerning Puʻuokaloa, Kepakaʻiliʻula, and Ka-Miki, agricultural practices of ʻuala, kalo, and maiʻa cultivation occurred in the ahupuaʻa study areas (Kihe 1923:2; Wise and Kihe 1914-1917 in Maly 1999:3,12; Malo 1919-1920 in Maly 1997:25-26). A Kona ʻōlelo noʻeau offers additional insight into understanding that agriculture practices occurred in Kona. The ʻōlelo noʻeau, **"Kona, poʻo kuʻi"** which translates to *"Kona of the added head,"* cleverly articulates the farming practices that occurred in Kona by describing the imagery of a farmer carrying his/her load upon their shoulders (Pukui 1983:199, #1847).

Supporting these moʻolelo and ʻōlelo noʻeau that describe agricultural practices, authors of *Native Planters in Old Hawaiʻi*, E.S. Craighill Handy, Elizabeth Green Handy, and Mary Kawena Pukui, describe the environment of Kona and briefly discuss the agricultural practices associated with this moku. According to Handy, Handy, and Pukui, Kona was one of the places where the **cultivation of ʻuala and ipu** (gourd) was frequent (Handy, Handy, and Pukui 1972:14). It is documented that:

> The sweet potato and gourd were suitable for cultivation in the drier areas of the islands. The cult of Lono was important in those areas, particularly in Kona on Hawaii and ʻUlupalakua on Maui. At both of these places there were temples dedicated to Lono. The sweet potato was particularly the food of the common people. The festival of Lono, preceding and during the rainy season, was essentially

> a festival for the whole people, in contrast to the war rite in honor of Ku which was a ritual identified with Ku as god of battle.
> [Handy, Handy, and Pukui 1972:14]

Because of the specific crops and agricultural practices associated with Kona, Handy, Handy, and Pukui share that the akua Lono is associated with Kona; and therefore the **religious practices and ceremonies** such as **makahiki** are tied to this place:

> …he is plainly identified with Kona, Hawaii and is said to have introduced the main food plants, taro, sweet potato, yams, sugar cane, and bananas to Hawaii, and also *ʻawa*. Hogs were likewise identified with Lono, but there is no mention of his having brought them to Hawaii. The fact that the *Makahiki* festival and the rituals for inducing rainfall and fertility centered in Kona comes out clearly in the description of the *Makahiki*.
> [Handy, Handy, and Pukui 1972:523]

These traditional moʻolelo and historical accounts demonstrate that **agricultural practices and religious ceremonies associated with agricultur**e were significant traditions that occurred in Kona.

Regarding Fishing Practices

In the chapter of "Kaao Hooniua Puuwai no Ka-Miki," after defeating all of his opponents, Ka-Miki is gifted the **lūheʻe of Lālāmilo** (Wise and Kihe 1914-1917 in Maly 1997:13). He presents the lūheʻe to the aliʻi, Pili-nui-kapu-kuʻi-a-ka-lani-kua-liholiho-i-ke-kapu, and the moʻolelo recounts that the chief and his entourage excitedly ready their canoes to **lawaiʻa lūheʻe**–the method of fishing for gathering heʻe (octopus) with a lure. The passage details the following regarding the favored lūheʻe and the fishing practice associated with it:

> Now this leho (octopus lure) was a favorite of Pili's, and filled his eyes with pleasure. Pili's canoes were prepared to go octopus fishing – lawaiʻa lūheʻe as Pili wanted to see how the lure worked. The lure was made by securing the kākala (hook), and a sinker stone (ʻōahi) near the cowrie (on a wooden shaft) with three ply olonā (Touchardia latifolia) rope. When Pili mā arrived at the octopus fishing site, he removed the lure from a gourd container and set it in the water. The chief and all those with him were startled to see unlimited numbers of heʻe (octopus) rise up to the lure, and even lobsters were attached to some of the octopus (July 26, 1917)…
> [Wise and Kihe 1914-1917 in Maly 1997:22]

> As the lure was drawn up to the canoe, the heʻe followed it right into the canoe, and the moment the lure was covered, the heʻe stopped rising to the canoe. Pili returned to the shore of Niumalu at Oneō, and had the heʻe divided among all of the people. So the fame of the lure went about the island and many chiefs, fishermen, and people traveled to see the lure as well. It was in this way that Lālāmilo learned his lure was in Kona (August 2, 1917)…
> [Wise and Kihe 1914-1917 in Maly 1997:22]

Relayed in this account is information regarding the **lawaiʻa lūheʻe** practice to have occurred in Puaʻa, Kona at the shore of Niumalu at a place called Oneō (Wise and Kihe 1914-1917 in Maly 1997:22). Additional ʻōlelo noʻeau provide information regarding fishing practices occurring in the Kona Moku. ʻEka is a named wind of Kona whose presence is an environmental indicator

telling of **signs optimal for fishing**. These ʻōlelo noʻeau regarding the makani ʻEka of Kona and fishing are as follows:

1467 **Ka makani kūkulu peʻa nui, he ʻEka.**
The ʻEka, the wind that sets up the big sails.
When the ʻEka wind blew in Kona, Hawaiʻi, the fishermen sailed out to the fishing grounds.
[Pukui 1983:159, #1467]

1690 **Ke ʻEka, makani hoʻolale waʻa o na Kona.**
The ʻEka breeze of Kona that calls to the canoemen to sally forth to fish.
Refers to Kona, Hawaiʻi.
[Pukui 1983:182, #1690]

As relayed in the ʻōlelo noʻeau that describes the winds of Kona, the arrival of the ʻEka wind meant the mobilization of fishermen in Kona who readied their canoes and headed out to their fishing grounds (Pukui 1983:159,182).

Regarding Recreations

The premise of Ka-Miki's moʻolelo is his journey to become the most skillful champion and defeat any challenger he is met with. Throughout this saga, Ka-Miki battles on a **kahua mokomoko leʻaleʻa** or contest and game known by the name **Hinakahua**, and is said to be located in the Kahelo plains of Puapuaʻa Ahupuaʻa (Maly 1999:10). Ka-Miki challenged his opponent, Kauakahiakahaola on the contest grounds in Puapuaʻa and quickly defeated him. From there, Ka-Miki and his brother journeyed onward to another **kahua** at Hōlualoa (Wise and Kihe 1914-1917 in Maly 1999:12). The author of this account names the different types of traditional games played at Hinakahua. The games associated with Hinakahua and therefore the broader ahupuaʻa of Puapuaʻa are **maika** (bowling), **mokomoko** (wrestling and boxing), **leʻaleʻa** (pleasurable pastimes), and **hoʻopāpā** (contest of wit and strength), (Maly 1999:11).

Another type of recreation past time is kōnane, which is often likened to Hawaiian checkers. In the moʻolelo of Kepakaʻiliʻula, Malo references Waikuʻi spring. This pūnāwai is described as a favored spring of the chiefs of Kona. Included in the description of this place, Malo writes that this was also the area where aliʻi took pleasure in relaxing and enjoying a game of **kōnane** (Malo 1919-1920 in Maly 1997:26).

Additional Resources

Mention of resources included in the details of the selected moʻolelo of this report are significant to note in this discussion as the presence of resources is telling of the potential of particular practices to have occurred in the study areas.

The moʻolelo of Kepakaʻiliʻula describes Waikuʻi spring in Kahaluʻu as the favored pūnāwai of the Kona chiefs. The description of where Waikuʻi is located highlighted that the spring was paved with **ʻalā stones** and that the native **loulu** palm grew surrounding the pūnāwai (Wise and Kihe 1914-1917 in Maly 1998:3). The details of these resources existing in this area provides information that other practices associated with these resources could have occurred.

A spring paved with ʻalā stones indicates that ʻalā was available in this area. Pukui describes that ʻalā is a type of stone that could be used for pōhaku kuʻi ʻai (poi pounders), adzes, and hula (Pukui and Elbert 1986:16).

Loulu is an endemic fan palm of Hawai‘i. Botanist, teacher, and historian, Beatrice H. Krauss, author of *Plants in Hawaiian Cultural*, offers a description of loulu:

> Loulu is a name applied to several native Hawaiian fan palms. The leaves are borne in a cluster at the top of a ringed trunk, the rings being the scars of once-attached leaf stems. The leaves are very large, most are rigid, ordinarily broadly wedge-shaped and shallowly cut with numerous bifid segments (twice-divided clefts). The underside of the leaves, the strong spineless leaf stems, and the flower stems may have a waxy or feltlike covering. The numerous flowers occur in clusters; they are perfect, having a three-toothed calyx and a tubular corolla with three segments, the segments falling off upon the opening of the flower. There are six stamens, and a three-lobed and three-celled ovary, one cell only of color ranging from green to yellow to brown or black at maturity. It is externally smooth, with a fleshy or fibrous later covering a thin woody shell, which, in turn, covers a hard seed.
> [Krauss 1993:216]

The characteristics of this plant, and specifically its leaves, presents itself as being pliable. Krauss also notes that the loulu leaves were used in **weaving practices** (Krauss 1993:31). Kānaka ‘Ōiwi scientist, mānaleo (fluent Hawaiian language speaker), and educator Dr. Isabella Abbott published *Lā‘au Hawai‘i: Traditional Hawaiian Uses of Plants* in which she discusses the various uses and cultural significance of Hawai‘i’s plants. Regarding loulu, Abbott notes that “*Loulu* palm (*Pritchardia* species), used to construct *heiau loulu*, where gods of fishing were seasonally propriatied,” (Abbott 1992:17). The insight that Abbott provides deepens an understanding of loulu with association to constructing a type of temple referred to as **heiau loulu**. According to Abbott, this heiau is associated with the fishing gods and therefore, **fishing practices**.

Ke Puhi a Kaleikini is one of the mo‘olelo that appeared in the article series “Na Hoonanea o ka Manawa” regarding Kona that was written by Kihe. This particular story was published in *Ka Hoku o Hawaii* in 1923 and described a blowhole named Hi‘iaka-noho-lae. As the story recalls, Hi‘iakanoholae is the blowhole that is located in the ahupua‘a of Keahuolū. The ‘ehukai or sea spray that the blowhole would shoot was problematic for the fact that the salt of the spray that blew over the ‘āina caused the land to dry so that no vegetation could grow. In order to solve this problem, the author shares that a man named Kaleikini covered Hi‘iakanoholae with branches of kauila. In regards to the type of resources known of this area, from this account we learn that the native **kauila** (*Alphitonia ponderosa*) tree was present at Keahuolū.

Kauila, also seen spelt as “kauwila” is a plant endemic to Hawai‘i. Krauss writes that:

> The name *kauila* or *kauwila* is given to two different native Hawaiian trees, both members of the buckthorn family: *Alphitonia ponderosa* and *Colubrina oppositifolia*. The former is found on all six of the main Hawaiian islands. It has alternate, thin, oblong to narrow leaves that are grayish or rusty-woolly on the underside; petioles are up to an inch long. The wood is hard and red-and-black streaked. The latter species has opposite, thin, pale green, ovate or oblong leaves that may be up to seven inches long; petioles are up to two inches long. A conspicuous gland is found at the base of each vein on the underside of the leaves. The wood is hard (even harder than the first-mentioned *kauila*), heavy and dark red. *Colubrina oppositifolia* is only found on O‘ahu and Hawai‘i.
> [Krauss 1993:182]

The characteristic of kauila is that it is a hard wood. Abbott shares that ʻōʻō (digging sticks) used for farming and other **agricultural practices** were made of kauila (Abbott 1992;11-12). In a discussion regarding featherwork and **ceremonial regalia**, Abbott writes that the poles in which kāhili (feather standard) which were symbolic of royalty were suspended and carried were primarily made out of koa *(Acacia koa*) and kauila (Abbott 1992:107-108). Kauila was also used in creating **hula implements** and was the wood of choice for making kālaʻau (stick dancing), (Abbott 1992:120). Kauila was used in **religious ceremonies** and in **carving** sacred images (Abbott 1992:20,114). Particularly, the wood of kauila was used in ***makahiki ceremonies*** as the staff of the akua Lono was made of kauila (Abbott 1992:20-21). Abbott writes that it is likely that kauila was used in these types of religious ceremonies dedicated to Lono because the word kauila means lightning, which is one of the kinolau or manifestations of Lono (Abbott 1992:21). Another usage of kauila was seen in the making of **weaponry**. Kauila was the hardwood used in making pāhoa or daggers (Abbott 1992:111).

Boundary Commission Proceedings Of The Boundary Commission Lands Of: Keahuolū, Puaʻa, Waiʻaha, Kahului, Puapuaʻa and Keauhou – by Kumu Pono Associates

The Māhele and Land Grant program of the Kingdom of Hawaiʻi saw a rapid growth of business interests. In an address before the Annual Meeting of the Royal Hawaiian Agricultural Society (1857), J. F. B. Marshall spoke of the growing business ventures in the islands which included —the cultivation of sugar and coffee; harvesting pulu for mattresses and pillows, and kukui for oil; ranching and export of hides, tallow and wool; farming for trade and export, and salt manufacture (see *Pacific Commercial Advertiser*; November 5, 1857). As a part of growing business interests, large land owners pursued the establishment of formal boundaries on their land holding, in order to protect their private property "rights."

In 1862, a Commission of Boundaries (the 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 Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them (cf. W. D. Alexander in Thrum 1891:117-118). Rufus A. Lyman served as the Commissioner of Boundaries for the Third Judicial Circuit (J. C.)—the island of Hawaiʻi. The primary informants for the boundary descriptions were old native residents of the area being discussed. Some of the native witnesses were born as early as the 1770s, and the youngest (for the early proceedings, born at least by ca, 1840.

Most of the witnesses were either born on in the ahupuaʻa under consideration, or they had lived there for extended periods of time. All of the witnesses had learned of the boundaries from their elders, and described the landscape by the nature of the terrain, presence of resources, land use, and features which were of significance to the residents of the land. Their testimonies demonstrate the relationship of lands, residency, practices and access to resources that span the biocultural landscape from the ocean to the mountain lands and top of ahupuaʻa being described. Some of the testimonies also describe the relationships shared between ahupuaʻa in management of the natural resources. These records describe many resources which are in traditional lifeways.

The native witnesses spoke in Hawaiian, and their testimony was usually translated into English and transcribed as the proceedings occurred. Readers here will note in the verbatim transcript prepared from the original handwritten documents that there are often inconsistencies in spelling of particular words such as place names, people names and natural or man-made features (see Appendix D). Furthermore, it will be noted that there are often multiple spellings of the same name or word. Examples of this include, but are not limited to Honokōhau, written as "Honokahau," and Hienaloli, written as "Hinaloli, Hianaloli, Hiananaloli, and Hianalole," and pūhala, written as "puuhala" etc.

Over several years of researching the Boundary Commission testimonies, we have also observed that often, when two of the same vowels were written by the original translator/transcriber, it indicated that he heard a lengthened pronunciation of a particular vowel. This emphasis of pronunciation is now indicated by a macron mark—for example, the place name "Kahiihiia" (where the two Honokōhau and Kealakehe meet one another) would now be written "Kahīhīa."

The narratives include the testimonies, surveys and proceedings for the ahupuaʻa cited at the top of this section—several of the ahupuaʻa were further identified by "nui" (big/large), "iki" (little or small), and by numbers such as "1, 2, 3," etc. The narratives also cover some details from the

adjoining lands which were not part of the Commission proceedings. We have used underlining and square brackets in selected narratives to emphasize references of importance—those which identify noted practices, resources and other interesting descriptions that identify valued cultural assets.

As a part of the certification of title and boundaries, surveyors produced a series of maps covering the ahupua‘a. Some of those maps have survived that passing of time, and help us place given locations and resources (natural and manmade). When available, reductions of the maps are cited as figures in their respective Boundary Commission proceedings.

Readers, please note that the date sequence of the applications, witness testimony and issuance of certificates are not always recorded in chronological sequence. Sometimes the testimony is cited (by date) previous to the title holder’s application of survey and certification.

Excerpts from the Boundary Commission for ahupuaʻa in and around study parcels – by Nohopapa Hawaiʻi

Kamehameha Schools Parcel Boundary Commission Testimony Discussion

Kahului Ahupuaʻa was the subject of a Boundary Certificate, it includes the Kamehameha Schools well site subject parcel (See Table 1 and Figure XX). The following disussion details the kanaka who lived in these ahupuaʻa and gave testimony, as well as excerpts from the testimony and certificate tied to places, practices and resources in the subject ahupuaʻa. Also see full Keauhou testimonies in Appendix D.

Keauhou Ahupuaʻa

Table 1. Select Ahupuaʻa with named localities and kamaʻāina cited in Boundary Commission proceedings in Keauhou Ahupuaʻa, location of the Kamehameha Schools subject parcel.

Ahupuaʻa	Place Names	Kamaʻāina Residents
Keauhou 1st	Halelaau Kamauae (Kamauai Heiau) Kanakaliikapu Kewa Nanunuakalupe [?] Napueuala Ohiki Paaniau (Paniau) Pohakunahaha Puainako Waikui Waikulukulu	Kakio Keakaikawai Kuluahi Lono
Keauhou 2nd	Aahuwela (Ahuwela) Ahua Um Anakolekolea Haalulu (Ana Halulu) Haliilaukoa (storied place of Umi) Hapukaa (Hapuukaa) Honuaula Hill (Puu Honuaula) Hopea Huaikaumauma [73] Hualalai Judd road (Boundary also called Nahuina) Ka Hale o Umi Kaalapuali (Kealapuali) Kaawa Kaekuakapuaa Kahooplu	Aalona Hukikee Kahilo Kahueai Kahulialo (w.) Kakio Kamakainai Kanahuna Kaoiwi Kapohakaimokumahe [?] Kauluahi (Kuluahi) Keaka (w.) Keakaokawai (Keakaikawai) Kealoha Maui

73 Huaikaumauma – "junction of Kaumalumalu, Kahaluu and Keauhou. it is an ahua in the koa woods, where the canoe makers used to have a heiau."

Ahupua‘a	Place Names	Kama‘āina Residents
	Kahulinanui Kaimuhapu (Kaimuhapuu) Kakai a lae Kalalakoukolo Kalalua Kaluamakani Kalulu Kamakaulaula Kamoike Kamomoku Kaneeneenui Kanekii Kanohoana o Umi Kanupa Kaonohi Waiau Kapapakauheana Kapukaiki Kauhi Kauhikahua Kaukahoku Kawahapele Keahialoa Keahou Keakui Kealaehu Keanaaipu Keanaakala (where canoe makers used to live) Keanakiha (Keana o Kiha) Keanaokalehuna Keanapaki Keikinanahu	Keeaumoku Kehepo Kekai Keliikanakaole Keohi Komaka Kupakoa Makaike Mauna Nauwe Niihoa (Nihoa) Palauolelo Palea Papa Puhi Uluhiwa

Keauhou is divided into two ahupua‘a, Keauhou 1 and Keauhou 2. Listed below in this section are selections from Boundary Commission testimonies recorded for Keauhou 1 and Keauhou 2 Ahupua‘a.

Kakio, kama‘āina of Keauhou, mentions **Ohiki**, an old cultivating site, **Waikulukulu** and **Waikui**, which are both caves with water inside.

> Kakio, K., Sworn
> I have lived on Keauhou until I am an old man and know the boundaries of the land. Kahaluu bounds Keauhou on the North side. The boundary at seashore is a pali called Paaniau [Paniau] and a long wall from Kewa to road; thence mauka to Puuainako, an oioina on old trail; said trail being made for the ohia trees, which in the time of Governor Adams were drawn down to Kailua for a church [Mokuaikaua]. Said church was burnt some years ago.
>
> From Puainako to Kanihinihula [Kahinihiniula], at the mauka Government road where there are two ahua pohaku, on the boundary; thence to the North side of Awapuhi, in the woods; thence to Ohiki, an old cultivating ground on the boundary; thence mauka to Napueuala, an oioina; the boundary being on the

North side of it and Keauhou in the middle of it; thence to Waikulukulu, a cave with water in it; thence to Halelaau; these places are all on the boundary of Keauhou, they're on Keauhou 1st; between [page 318] Napueuala and Nanunuakalupe [?]. I do not know the boundaries on the mountain of Mauka and of lands. Waikui is a large cave of water; the boundary half way between said cave and Ohiki.

I cannot point out boundaries in the woods. Keakaiwai is a kamaaina, and used to go into the mountain with his father, Kuluahi.

(Boundary Commission Testimony: Keauhou 2 Ahupua'a, Kakio 1873:v.A 1, p270, Folio 448)

Lono, kama'āina of Keauhou, mentions a fishing heiau named **Kamauai (Kamauae)** and expands upon Ohiki mentioning that it was a spring as well as an old mahi'ai place in the woods.

Lono, K., Sworn
I was born at Keauhou at the time of Kaoku [Mai Okuu, 1804-1805] and have lived here most of my life; Lived in Kau a few years; am a kamaaina of the boundaries of Keauhou as far mauka as the Government road. The boundary at the shore between Keauhou 1st and Keauhou 2nd is at Kamauae [Kamauai], a heiau for fishermen situated above the beach, on the hill where the houses stand; thence mauka to a breadfruit tree; thence to the head of Holua; thence mauka to Kanakaliikapu, an ahua pohaku at the Government road; this is as far as I know the boundaries. Have heard that the boundaries of the two Keauhous run through the woods to Palahinui, where koa trees grow on Keauhou 2nd. Keauhou is bounded by the sea and the land has ancient fishing rights extending out to sea.

Kahaluu bounds Keauhou 1st on the North side, the boundary at seashore is Paaniau, a large stone wall reaching from shore a short distance mauka. There is a pali at seashore by the same name; thence mauka to the Government road; thence straight mauka on aa to two piles of stones at government road. Kahinihiniula is on the high ground, just before you decend [sic] into the hollow; going from Kealakekua to Ohiki, a spring and old mahiai place in the woods. I do not know boundaries above this place. Have not heard where the land ends.

(Boundary Commission: Keauhou 1 Ahupua'a, Lono 1873:v.A1 P318-320)

Keakaokawai, a kama'āina of Kona, mentions a plethora of place names and mentions six different watering holes and also **Kalulu** and **Kilohana**, which were places that he and his father would catch birds.

Keakaokawai[74] K., Sworn
I was born at Kealakekua a few years before the death of Kamehameha 1st [in ca. 1810] (Note; this is the same witness that was on Kahuku boundaries). I moved at

[74] "Keakaokawai" is usually written as "Keakaikawai." He was a notable kama'āina witness across a number Kona lands.

time of Kaua o Kekuaokalani (1820) to Lehuula (was grown at that time); I now live at Hookukano [Hokukano], North Kona and am a kamaaina of Kona.

I used to go on the mountain with my Father collecting sandalwood and catching birds; his name was Kauluahi, and old bird catcher and kamaaina now dead; Honalo bounds Keauhou 2 at sea shore on South side; A pali aa called Lekeleke is the boundary at sea shore between these lands; thence the boundary runs mauka along lands on Honalo sold to different parties on Honalo, to a place called Nohomoanahoaiku, in the woods on the makai side of pali; Thence along the Government portion of Honalo to **Kapapakauheana, a round water hole** in the woods in the centre of Honalo. Thence the boundary runs mauka to **Kaimuhapu [Kaimuhapuu], a water hole**; thence to Kipukauki, most of this place is on Keauhou, and a small portion on Honalo [page 256]; said land being now overgrown in aa; thence to Komomoku, a pali which is the boundary between Keauhou and Honalo.

There Keauhou turns south and cuts Honalo off, nearly through the woods; thence to Kaukahoku, junction of Lehuula nui; said place is an Ahuapohaku, a small hill of pahoehoe covered with scrub ohia and mamani; thence along Lehuula nui to **Keanakiha, a small cave** where natives used to sleep; Thence to an ahu pohaku, mauka of the ana, built in olden times and now knocked down by the goats; this is an open spot with scrub ohia and mamani growing all around; thence along Lehuulanui to a place called Kepuhi at Governor Adams road through the woods, scrub koa and other trees growing there.

The land of Hookukano cuts of Lehuulanui at Governor Adams road; thence along the land of Hookukano. This land runs mauka. In olden times, Keaumokunui [Keeaumokunui], the Alii nui of Keauhou claimed all the **geese** on Hookukano, Kealakekua and other lands and used to divide the geese. The **uwao [uwau or ʻuao]** were left for konohiki of these lands. The land was not the property of the Keauhou chief when my Father and I divided the geese with the Keauhou konohiki; but the Uwau we had to divide with the Konohiki of Hookukano and not with the konohiki of Keauhou, unless we took the uwao on Keauhou; thence mauka from Kepulu to Kamoike along Hookukano, the aa on Keauhou, and from thence the boundary runs to Keanaakala, a small cave, thence to Kikikiaeae, a long hill (puu lepo) at mauka corner of Hookukano, trees of all kinds growing all around; thence South again to Kamakaulaula, pahoehoe along mauka end of Hookukano in woods; thence up aa called Kainapahoa; thence down on to pahoehoe to a **cave called Aahuwela**, corner of Kealakekua and Hookukano, said **cave used to have water** in it; thence along Kealakekua, running mauka about one half of a mile to Umi's road. Kanohoana o Umi; aa with mamani trees growing both sides of the road. When I used to go up with my father, these were only a few mamani trees growing makai of the road, now there are a great many, both sides of the road.

[Thence] turn south again across aa to **Haliilaukoa [page 257] (where Umi sat and they spread Koa leaves for him; old tradition)**. Few koa and ohia trees grow there; they are mostly mamani; thence the boundary runs up an Ahua to Kanekii, a small water hole which dries up in dry weather. Keauhou mauka and Kealakekua makai; thence to Kalulu; Keauhou mauka and Kealakekua makai (pahoehoe); which is where we used to catch birds in olden times; the Uwao [uawau] belonging to both lands. At Kanekii, the boundary leaves Umi's road and

goes makai of it; From Kalulu to a place called Kakai a lae Koa (Koa grove on Pahoehoe, the South East corner[)]; thence turn makai along Kealakekua, to a large mawae called Kawahapele; thence down along said mawae to Puuloa, a pali on the mauka corner of land of Honaunau. The woods extend there now; In olden times there were hardly any trees there. I have forgotten the names of the places beyond here on boundary of Keauhou and other lands along there. I have not been along there often. Kanupa is the place where Keauhou joins Kaulanamauna, a Kipapale ana, junction of Keauhou, Manuka and Kaulanamauna. All kinds of trees grow there, also small spots of pahoehoe in the aa. I have only been there once when I went with my father before I was fully grown. Do not know as I could find it now; thence mauka to Kilohana, on an aa flow where we used to catch birds and where Kahuku joins Keauhou.

Thence along Kahuku to Kulauala, on Umi's road; From Puuloa to Kanupa Keauhou used to take the pahoehoe above the woods and the Kona lands reached to the mauka edge of the woods from Kilohana along Kapapala to Pohakuhanalei, a hill on the top of the mountain [Mauna Loa]; thence the boundary runs down to Kolekole, a hill where Humuula joins Keauhou and cuts Kapapala off; thence down the side of the mountain to Kaaawa, along Humuula, there Puanahulu [Puu Anahulu] joins Keauhou and Humuula stops. Kaaawa is pahoehoe with small ohia trees, and also other kinds of trees growing there; thence the boundary runs to a hill called Kalalua, along the land of Puanahulu. A large hill can be seen from Ahua Umi, which is at Hualalai.

Thence the boundary runs down to pili land, to Palahinui, along Puanahulu; thence to Hapukaa, on Umi's road to Waimea [page 258] on the pahoehoe; thence Kanupa 2, a cave in pili land, now covered with the lava flow of 1859 to Kiholo; thence to Kanupa 3, a cave hear the base of Hualalai, where the land of Puuawaa [Puu Waawaa] joins Keauhou; thence the boundary runs up the mountain to a cave on the side of the mountain, above the woods called Waikulukulu, thence to Puuakawai, an old water hole now filed up by cattle tramping around it; this place is the junction of the land Kaopulehu [Kaupulehu] with Keauhou.

Thence the boundary runs to the mauka side of a hill called Haalulu in a hollow between the hill and an Ahua; Thence along to Kaluamakani, a large hole or crater; there Kapulehu [Kaupulehu] ends and Honuaula joins Keauhou; thence along this land to Puulalaau [Puu Laalaau], a hill where the land of Puuaa [Puaa 1st] is on the makai side, Honuaula is very narrow at the mauka end. The boundary of Keauhou runs along the mauka edge of woods above Puulalaau, and along to Mawae, there the land of Kaomalumalu [Kaumalumalu] joins Keauhou; thence along to Kamomoku to Judd road, on the mauka edge of the woods; thence along what used to be the edge of the woods (the trees are now all grown along Kaumalumalu) to aa where Kahaluu joins Keauhou.

I do not know the boundaries between the land of Kahaluu and Keauhou, or between the two Keauhous.

[citation]

Kahilo, is a kamaʻāina of Keauhou, mentions several important features including a crack in the rock that they would place the dead called Lekeleke, and a spring called Waio.

Kahilo K., Sworn
I was born at Keauhou at the time of the building of the first Kiholo [ca. 1810-1812], and have always lived there, in Kona, Hawaii.

Honalo bounds it on the South side, an awaawa and ilina kupapau (a crack in the rock where the natives used to put their dead) called Lekeleke is the boundary.

Thence the boundary between these lands runs mauka, the Kualapa on Honalo and Awaawa on Keauhou to Mawawae Nuuanu at the Government road mauka; thence follow up Kualapa an awaawa to Kamomoku, a pali surrounded by small trees, koa, ohia, mamani, naio, &c. The tall woods are makai of this place; there is an ancient pile of stones here at the mauka corner of Honalo. There the boundary turns towards Kau to lae aa, along Honalo, to another Ahu built in olden times, which is at the corner of Honalo and Lehuulanui, called Kukaiaina. The mamani mostly growing mauka of this place. Thence along Lehuulanui to Palihoomana on Honuainonui; thence along Honuaino (called Kamomona) (J. G. Hoapili says it is Makaike's land, Honuaino III); thence to a small pali, along Honuaino, in scraggy woods to Waio, Governor Adams road crossing the boundary at the Pali Hoomana [illegible] where Honuaino ends, and where Hookukano joins Keauhou. Thence along Hookukano to Waio, which place is on Hookukano and Kanauweuwe [Kanaueue]. I do not know which side of the spring the boundaries are; pili and trees are growing around there; the mamani trees extend makai of this point.

Thence along Kanauweuwe the boundary turning directly mauka to a hill called Kikikiaeae. I do not know the names of the lands that join Keauhou here. From Kikikiaeae, which place is on Keauhou, I do not know the boundaries beyond Waio. [page 261]

I have heard that Kealakekua joins Keauhou and other Kona lands run up to the mamani and to the poha; Pahoehoe that breaks through when trod upon. My Parents and Grandparents used to go bird catching for feathers as far as Waiea, and they said that there were only pu-keawe [pukiawe] trees on Keauhou. I have heard that Kahuku of Kau joins Keauhou on Mauna Loa, but I have not heard where. Kamauae [Kamauai], a cave at the sea shore is the boundary between Keauhou 1st and Keauhou 2nd; thence the boundary between these two lands runs mauka to the Poo Hoohia, above Keauhou; thence into groves of ohia trees, below the Government road, to a cave called Kaekuakapuaa; thence to a place called Kanokaliikapu [?], which is on the Government road. An Ahu used to stand at this place, but was knocked down when the road was built. Thence the boundary runs to Laaunui, a large ohia tree; said tree is in the woods about the end of where people work.

Running from the Government road mauka, there is a kualapa, and Keauhou 2d is on the low ground, this side, and Keauhou 1st on high ground. From Laaunui the boundary runs to a pali called Paakai; Keauhou 2d at the foot and Keauhou 1st on top of the pali. Thence along the pali till you come into koa woods and aa, there the pali ends. Thence out of the woods to Piipaa, a cave on Keauhou 1st; the boundary being on the Kau side of the cave. Thence turning toward Kohala the boundary runs to Kawaha o Pele, a hill with a crater; here Keauhou 1st ends and Kahaluu; There are a great many hills with craters there, tall woods on lands makai and

mamani on Keauhou; Thence to Kawaha; Pele 2d. I do not know what lands join Keauhou there; thence to the Government road; thence to Hoikekanaka.

(Kahua hoike kanaka o Umi); thence to Pohakuloa, a large rock by a water hole, on the Kau slope of Ahuaumi, above Hualalai. Thence along aa to Waiakapee, a small water hole on the aa; Keauhou does not extend to the top of Hualalai, but runs along the Kau slope of the mountain; Honualua [Honuaula] takes in the top of Hualalai, [page 262] and joins Keauhou at a hill called Kaumoku which is on Honuaula at Hoikekanaka. From Waiakapee, I have been told the boundary runs to Ka-amoku, but I have not been further than Waiakapee. Have heard that Waikoloa, Kaohe, and Humuula bound Keauhou on the further side.

[Citation]

Palea, a kamaʻāina of Kalahiki, mentions some information regarding bird catching in Keauhou as well as a spring named Lumia.

Palea K., Sworn
I was born at Kalahiki, South kona, Hawaii and have always lived there; was born at the time of Kuewai o ka Lae [Kui wai o Kalae, ca. 1782]. Know the land of Keauhou. Lekeleke is the boundary at sea shore between Honalo and Keauhou. I know the boundaries between Kalahiki and Keauhou. My Father, Kanahuna (now dead) was appointed by Keauhou konohiki to watch the bird catchers on our land and other lands, to see if they did not take the geese and uwao [uwau], which belonged to Keauhou and he told me the boundaries between these lands and Keauhou. He said that Kalahiki ran through the woods; small ohia trees, kapiopio, and mamani to the pahoehoe; then you come to Keauhou. I do not know where the boundary of Kauhako and Kalahiki on Keauhou is. Thence the boundary runs along the head of Kalahiki to lae aa, in lae aa Waiea joins Keauhou cutting off Kalahiki. Thence along above the mamani to Lumia, junction of Honokua (a punawai) water hole on a hill. I do not know the boundaries beyond this point; Have seen Umi's road, when we were on the mountain gathering sandalwood. Have heard that Kahuku joins Keauhou.

[Citation]

Kahulialo, a kamaʻāina of Kona who shares the same father as Keakaokawai, mentions similar localities as Keakaokawai as well as **Makaulaula**, a place they lived whilst bird catching, and Ahuwela, which is a cave with water in it.

Kahulialo W., Sworn
I was born at Honalo, North Kona, Hawaii on a place called Kealaehu, and at the time of the first Kiholo [1810-1812]. Know the land of Keauhou and part of its boundaries, mauka, in the woods and above the woods. My Father, Kuluahi, who was the kamaaina of Kona, on the mountain, showed them to me. Kaana o Kiha, a cave with a large pile of stones mauka of it, is the boundary between Keauhou and Lehuulanui and the corner of Honalo. I have not been with my Father along the boundary of Honalo and Keauhou. At that time this place was above the woods and you could see from Kiha to Waio, now the trees are all grown up. Thence the boundary of Keauhou runs along Lehuula to lae aa and to Kepulu, a spot where there is soil and no rocks mauka of Palihoomana; there Lehuulanui ends, and the

land of Hookukano joins Keauhou. The boundary between Hookukano and Lehuula is a small stream of aa on the South side of Kepulu; from thence the boundary runs along Hookukano to Kiikiaeae, an awaawa where by husband used to live. A large kualapa on the left side, as you face mauka, is the boundary. Thence to Makaulaula, where we used to live when bird catching. Thence to Kaonohi, a cave; thence to Ahuwela, a cave with water in it; there Hookukano ends and Kealakekua joins and bounds Keauhou; thence to Haliilaukoa (I do not remember the names of all the points along Kealakekua[)]. Keakaokawai K. is the one who knows them all. I have not seen the place called Haliilaukoa (An old tradition says Umi used to sit there because he liked [page 264] the koa). Thence to Kalulu. I have been there; there is a water hole there and it used to be a place for catching birds. Kolekole is an Ahua with koa on it in the middle of Kealakekua, and the boundary of Keauhou is just mauka of it. The place called Kukai is the further boundary of Kealakekua. I have been there with my Father and he told me it was on Kealakekua. Have heard Keauhou turns makai at this place. Honaunau ends in the mauka edge of the woods. I do not know the boundaries (perhaps Kawahapele is the boundary between Kealakekua and Keauhou going towards the woods.[)]

I have been to Pupuawai. It is on Keauhou. Honaunau does not reach there. [illegible side note] My Father also told me that Kapapala, Humuula and Kaohe reached Keauhou on the top of Mauna Loa.

Na Elemakule where the lava flow went that destroyed Kiholo [1859], is where Kaohe joins Keauhou at Uauakahoa [?] cave. Have not heard where Kahuku joins Keauhou. Uauakahoa cave is where the Kaohe Elemakule came to at the time of the settlement of lands. These are all the boundaries that I know.

Kakio, a kamaʻāina born in the time of Kamehameha I, mentions a few place names including Holua, which was an ancient sliding place.

Kakio K., Sworn
I was born at Keauhou at the time Kamehameha I came from Hilo to Kealakekua and from there to Honolulu, at the time of Oku [Mai Okuu, 1804-1805]. I have always lived here and know the land of Keauhou 2d and its boundaries. I used to go after sandalwood on the mountain, with Kapohakaimokumahe [?] (now dead). He was a kamaaina in the mountain and used to go across to Hilo. Lekeleke is the boundary between Honalo and Keauhou. at seashore is kualapa; Keauhou being at the [page 266] foot of the ridge on this side; thence the boundary runs mauka along Honalo to Kukuikomo on the makai side of the Government road; thence along the awaawa to the mauka side of the Government road; place called Leiohapu; thence along awaawa into the woods; I do not know the boundaries. Know a place called Palahinui, a cave where people used to live. Honalo ends makai of this cave at the mauka edge of the woods. The mamani and scrub koa being on Keauhou. Have heard that Kealakekua and other lands, only run through the tall koa; have never been there.

The boundary at shore between the two Keauhous is at a place called Kamauae [Kamauai] at the beach; Thence it runs mauka to the head of Holua (an old sliding place); thence to the South side of Keahialoa, the boundary running in a hollow; thence to Mauka of the Government road to a place called Kanaokeliikapu; thence mauka in the woods to Kualapa Kahoopulu; this is as far as I know the boundary

in the woods. On the mauka side of the tall koa trees at Nanunuakalupe [?], an oioina, Keauhou 1st ends; and the boundary runs towards Kohala.

Kahaluu ends at the mauka edge of the tall koa trees. They say in the days of Keauaumoku [Keeaumoku] the Akule used to belong to Keauhou 2d and the birds to Keauhou 1st, but the Chief of Keauhou 2 married a chief of Keauhou 1st and after that all the fish were given to Keauhou 1st and the birds and land mauka to Keauhou 2nd.

Mauna Loa is called the Kuaiwi of Kau. I have been told that Keauhou joins Hilo and Hamakua on Mauna Loa, at the edge of the aa flow from the summit of the mountain, the pili is on Keauhou and the aa on Kaohe. Have heard Kaupulehu joins Keauhou, but do not know where.

[Citation]

Papa, mentions a few names that have also been mentioned by other testimony.

Papa K., Sworn (a very old man)
I was born at Kahaluu at the time of Holuanui, and have always lived there. Kaumalumalu ends at Mawae, mauka of a hill called Hiinau; thence along Kaumalumalu. Kaupulehu joins Keauhou and takes in Hualalai. Keauhou on this side. Kahulinanee [?] is on Napu. Kau joins Keauhou at Kalulu near the top of the mountain, at grove of mamani and pukiawe. Keauhou on this side and Kau above to top of mountain. (I used to go to the mountains after sandal woos, but never went after birds.[)]

Have always heard that Kahuku cut all off. South Kona Lands, and takes the mountain. Keauhou ends at Puulehua, above Kainaliu, above the wood at the foot of the mountain. I heard this when I used to go after sandal wood. Do not remember the names of the Kamaainas, who are now all dead. Kau is on the other side of the mountain.

[Citation]

Waiau, a kamaʻāina from North Kona, mentions Kanekiʻi and Puʻulepo, as well as provides some information surrounding bird catching customs and places in which they used to fight with Kaʻū people.

Waiau K., Sworn
I was born at Kanauwaue [Kanaueue], North Kona, Hawaii at the time Kamehameha 1st returned from Honolulu; at the time of Papakee. Lived at Kainaliau [Kainaliu] until about eleven years ago when I moved to Kealia, South Kona [page 268].

Know the land of Keauhou, used to go after birds with my father, Nauwe, an old bird catcher and he pointed out the boundaries to me, as it was kapu to go after birds and not divide them with the konohiki; used to go frequently not vary far above here. Honalo bounds Keauhou 2 on the South side, as you go into the lower edge of the woods. I do not know the boundaries.

A place in Okolea, in the woods called Kaimuhapu, a water hole, is on the boundary between Honalo and Keauhou; Thence mauka to Kipupuike [Kipukaiki], a small spot of soil with scrub ohia in the toll woods; the tall ohia being on the aa each side of this place; thence mauka to Kamomoku, a small pali, at the upper edge of the woods, thence to Keikinanahu, close to scrub trees of various kinds; There Honalo ends. Thence along the head of Honalo to Kaukahoku, a large rock at the corner of the land Lehuulanui; thence along Lehuula to Keanakiha, an ahu pohaku mauka of a cave; thence to Kepulu where there is soil. When I was young there were no trees there but now the trees have grown up.

Governor Adam's road is at the end of Lehuulanui; thence along Hookukano; thence mauka along the Government road, between two aa flows to Kamoomoo; thence to Keanaakala, a cave; thence to Kikikiaeae, where we used to live. The canoe makers of Hookukano also lived there. There is a hill called Puulepo, with a crater on it. There is a water hole makai of said hill. Thence the boundary turns directly towards Kau to a place called Kamakaulaula, a pahoehoe kipuka in laau, mamani growing all around; thence to Aahuwela, a cave with water (I do not know the place called Kanapahoa) there Kealakekua cuts off Hookukano; from thence the boundary runs along Kealakekua to Haliilaukoa, a place near Umi's road; Kuluahi said it reached to Umi's road, but this place is only near it. It is on the soil across aa, where bird catchers used to live; thence to Kukai, along a grove of koa trees, small pahoehoe. I do not know the points between. We did not go beyond there in olden times. We used to fight with Kau people here. Kuluahi and Kalalahu's father were chased by Kau people a little above Pupuawai. [page 269]

I do not know boundaries above this point. Have heard that Waiakea, Humuula and Kaohe run up the mountain. Kaalaala had a road extending to the top of Mauna Loa. I do not know where Kahuku and Keauhou end. Have not heard whether Honaunau reaches to Pupuawai or not. I have not heard that they reach far above the woods. Do not know the boundaries of Keauhou and North Kona Lands.

[Citation]

Keliikanakaole, a kamaʻāina who also gave testimony on Holualoa, mentions various place names including the name of a road made by bird catchers named, Keakui.

Keliikanakaole K., Sworn
Niihoa [Nihoa], Uncle to my mother, is the one who went to look out boundaries of Keauhou. I saw him when I was young and heard him tell what the boundaries were on the North side.

A place called Keakui, a road across the aa made by bird catchers, a puu pahoehoe and a Mawae in the centre, is the place where Keauhou 2 turns North and cuts off Keauhou 1st. Niihoa and Kekai, the men who made the road which is the boundary between the two, told me thus. I went with Kekai after sandalwood. [page 270]

The road runs t the North at Hopea, where you come off of the aa; there Keauhou cuts across the head of Kahaluu; thence along Kahaluu through pili and mamani to an ana called Naohuleelua, North corner of Kahaluu. (I can point this place out.) Thence Keauhou turns makai along Kahaluu to Kepulu, the mauka corner of Kaumalumalu, a pulu lepo, at the edge of the forest, thence along the head of

Kaumalumalu to Kapukaike [Kapukaiki], makai of Walls house on Judd road (Nahuina is one name of this place).

Thence to Huaikaumauna, a lae koa on kualapa; thence along Holualoa to Apiipi; thence along the head of Holualoa to Puualalaau [Puu Laalaau]; thence along Honuaula to Hualalai, a hill on the North side[75] with a deep crater in it; said hill is the junction of Kaupulehu with Keauhou, and the mauka corner of Honuaula. The brow of the precipice is Honuaula and the land back is Keauhou. Kaupulehu comes to the pahoehoe at the base of Hualalai hill; Thence along the head of Kaupulehu to the hills called Napuumahoe, on makai side, the aa being on Kaupulehu, and pukeawe on Keauhou. Thence to makai side of a hill mauka of lae koa, where my makuakane lived; Kaupulehu ends at the koa grove.

I do not know whether Puawaa joins Keauhou or not. I do not know what lands join along here; thence the boundary of Keauhou runs to Kanupa, a cave near the new lava flow where the trees are dried up.

Thence mauka along the boundary of Napuu on this side of the lava flow to Kahulinanui [?], an ahua pohaku built by Hamakua men and now covered by the lava flow on boundary of Kaohe.

Thence mauka towards Mauna Loa to a place called Keanaokalehuna, where a Hamakua man was killed for stealing food at Keauhou; thence to Kolekole, a hill; a waha pele on the East side of Kolekole is the boundary; thence up pahoehoe eleele, this is as far as I have been.

CX'd.

I have heard Kahuku and Kapapala and Kaalaala join at the top of the mountain. Have not heard where Keauhou cuts off South [page 271] Kona Lands, and joins Kahuku. I know the place called Kaaawa, it is a grove of Naio and Alii [aalii], towards Kealakekua from Kolekole. Kalalua is a cave which was covered up by lava in the flow of 1859.

Know a place called Palahinui; it is a large cave on Keauhou. Hapukaa is mauka of Umi's road. Know a cave called Waikulukulu, at the base of Hualalai, towards Ahuaumi, the place called Kaluamakani or Kalalakaukolo is on the top of the mountain.

[Citation]

Kupakoa, a kamaʻāina from Holualoa, mentions that Keauhou ends where they used to cut koa for canoes, and also mentions Ohiapapaawai, a water hole among the ohiʻa trees, and that all the koa that they used to make canoes is all on makai lands and Keauhou is mauka.

Kupakoa K., Sworn

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75 This description identifies the crater near Hainoa at summit of Hualalai.

I was born at Holualoa, North Kona, Hawaii at the time of building Kiholo [1810-1812], lived at Kona until the year 1867, when I moved to Honolulu and I still reside here. Know the land of Keauhou and a part of its boundaries. Puhi, K., a cousin of Keakaokawai's now living at Kalihi, pointed out the boundaries to me. He was a kamaaina of the mountain having been born and brought up there. (S. K. Kaai says he is old and sick). I do not know the boundaries at shore, only on the mountain.

Keauhou 2d cuts off Keauhou 1st a little mauka of a place called Nakipapaakalehuna some koa trees in the woods. Keauhou 1st does not reach mauka of the koa, but ends where they used to cut canoes. Thence the boundary of Keauhou 2d runs across the head of Keauhou 1st to Keanaaipu (a cave) at the junction of Kahaluu.

Thence along Kahaluu (in the woods) to Kanoa, a point of koa and mamani trees, the place where the fire from Kau, on the mountain went out. Thence along the land of Kaumalumalu to Huaikaumauma, koa trees and mamani, on the Kohala side of Judd road. Keauhou taking the land mauka of the woods and Kaumalumalu the woods.

Thence the boundary runs towards the mountain along Holualoa 4th to Laenaia [Laenaio] (a grove of trees). Thence along Holualoa 2d (Laenaia being on that land) along the mauka edge of the woods to a gulch called Waiaha, an awaawa where water flows when it rains, thence along the land of Puaa to a hill called Puulalaau, to land of Honuaula; thence along this land to the top of Hualalai mountain to a hill called Honuaula. This hill is on the land of Honuaula, and the boundary [page 448] of Keauhou 2nd running along at the foot of the hill. Thence along this land to Kilohana, a resting place on the pali, where the mountain slopes towards Waimea; thence down to Keanapaki, a small cave where bird catchers used to live; the mauka corner of Honuaula and junction of Kaupulehu with Keauhou and with Puaawaa; thence the boundary runs along Puaawaa mauka to Kuhaalele, a cave; thence to Ohiapapaawai, a water hole in among ohia trees. Thence to Kahulinanui, a lae aa, where Puawaa ends and Kaohe and Kapapala corner on the boundary of Keauhou (this is a place where the bird catchers used to quarrel).

Thence along around land of Kaohe (the aa being on Keauhou 2nd) up Mauna Loa to the alohi pahoehoe; thence along the land of Kapapala (pahoehoe on Kapapala) to the Keanakalehuna Akako [?], a water hole in a cave on the side of the mountain; thence up the mountain to Puumau, a hill on Keauhou near the boundary; thence to where the snow covers the mountain, where Keauhou 2d ends, so my informant told me, as there was no waiwai there, and Keauhou 2d does not reach to Mokuweoweo; thence to Pohakuhanalei, a rock on the Southern slope of the mountain. Thence down to Puulonalona, a hill along Kahuku, where Kapua joins Keauhou. I have been there. Thence towards Kona along the mauka edge of the woods, cutting off South Kona lands, to Honaunau, to a place called Ohiakuapu, a grove of koa trees that runs mauka. Honaunau takes the koa; thence along mauka edge of woods, the grove of koa mauka being on Keauhou to Keahou, an old lava flow, junction of Kealakekua; thence along Kealakekua to a place I do not remember the name of; Thence along Onouli (it runs out on old aa flow); thence along Kanauaauwe [Kanaueue], along the mauka edge of the woods to Uwaukanipo, a kualapa mauka of Waio; thence to Kaneeneenui taking in Waio; thence to Anakolekolea, a cave mauka of the boundary of Honalo. I do not know where these lands join Keauhou. the koa from which we used to make canoes, is all

on makai lands and Keauhou is mauka. All that I know about [page 449] the boundaries, is what Puhi told me.

[Citation]

Puhi, an old kamaʻāina born in Kona, mentions Mawae, a water hole and burial cave and that Huaikaumana was a place where the canoe makers used to have a heiau.

Puhi K. Sworn (quite an old man)
I was born in Kona time of the Peleleu [ca. 1793-95], at Hokukano, Keakaokawai knows a part of the boundaries. His brother knew them. I have forgotten the names of the places on the boundary. The ones Kupakoa testified to are the right boundaries; he told me the points he testified to yesterday. I cannot remember the places.

Keauhou 1st ends in the koa woods. It is cut off by Keauhou 2d at a place called Mawae where there is a water hole, and a cave where my relations are buried. The boundary is way makai of this place. Keauhou 2d takes the land where they used to catch uwau, on the mauka side of the woods, cutting off Kahaluu and Kaumalumalu. Do not remember the names of the points Kaumalumalu reaches to Huaikaumauna, junction of Kaumalumalu, Kahaluu and Keauhou. it is an ahua in the koa woods, where the canoe makers used to have a heiau. Keauhou cuts off Holualoa 2 (do not remember names of places); thence Honuaula bounds Keauhou and runs up the mountain. I do not remember the name of the point where Honuaula joins Keauhou.

[Citation]

Chas. Hall, a kamaʻāina of Kona, mentions Puepuewai which is a spring in the pahoehoe and Ahuaumi.

Chas. Hall K., Sworn (same witness as on Kahuku)
I have lived in Kona thirty-seven years, and know the land of Keauhou 2d; am a kamaaina of Kona and know a part of the boundaries of Keauhou. Kahilo, Kuluahi; father of Keakaikawai and Kini pointed them out to me at different times. Kahilo is still living and I hear he gave his testimony on this land last year. The other two men are dead. I do not know the makai boundaries. Kahilo went with Captain Cummins and myself and pointed out the boundaries when Cummins leased this land. Kahilo and Kaluahi pointed out boundaries at the same place on the south side of Governor Adam's road, but Kini pointed them out as being further mauka but nearly the same place. Kini pointed out the boundary as being a short distance makai of Puulehua on Governor Adam's road and running straight to Waiio, Puulehu is a hill. There is a pali on Governor Adam's road, on the boundary of Keauhou, and near the pali there is a sandal wood tree; the only one I know of that grows so far down on the road, towards Kau. They did not show me boundaries as we went to Kau way above the woods on the pahoehoe. I cannot say anything about boundaries beyond Waiio. Kuluahi and Kahilo pointed out the boundaries as being about one mile [page 253] makai of Waiiu [Waiio]. Going to Kau with Kini we went from Waiiu to Hale o Umi, since destroyed by the lava flow. I cannot give the boundaries from Waiiu to Kukuiopae as I have not been along there in the woods.

Keauhou cuts Manukaa [Manuka] off to the westward of Halepohaha. I know the boundary as I used to drive goats there. I have always heard that Keauhou cuts all South Kona lands off at the mauka edge of the woods. On the North side Kahilo pointed out the boundary as running along the base of Hualalai, passing Kohala side of Huaumi (or Ahuaumi). He is the only one who pointed this out to me. I have always heard that Keauhou joins Kaohe of Hamakua; the boundary runs to the kipuka running past Keamoku, to a point among the hills mauka of these clinkers.

CX'd.

I cannot point out the boundaries from Puulehua to Waiio. I put more confidence in what Kuluahi showed me than in what Kini showed me, as he was a much older man and had been living longer in the mountain. I know a spring called Puepuewai. It is one the pahoehoe some distance mauka of the woods. I do not know that Kaupulehu reaches to Keauhou. I have never heard that Keauhou takes to the top of Hualalai.

Evidence taken on Kahuku March 13th 1873 for boundaries of Keauhou, adjoining Kahuku as Mr. Hall states that he will give his testimony just the same as at that time.
See Folio 143 and 144, Book A.

Know the land of Keauhou in Kona. I have often gone onto the plains above the woods and have come across from Kona to Kau twice; above the woods. It was a long time ago. Came up through the woods to Hale a Umi, and looked at it, it is about eight or ten miles above the woods, but was covered up by the lava flow of 1845 or thereabouts. From there I went to Ahuaumi up above there and slept there in a crack of the pahoehoe. [page 254]

The father of Keakaikawai was my kamaaina from there we went to the Bay. I think Hale o Umi is mauka of Kipahoehoe, the distance between this and Ahua Umi is about fifteen or eighteen miles. Hale o Umi is on Keauhou. Heard that Ahua Umi on the boundary of Kau and Kona, about nine or ten miles from here. Kini was my kamaaina the second time I came across. Keakaikawai's father piloted me all over Maunaloa and Maunakea. One Ahua Umi is near Hualalai (2d Ahu a Umi); he told me Kahuku and Keauhou ran straight up Maunaloa, following a ridge all the way.

I have heard Ahu a Umi, near Hualalai is on Keauhou. Keauhou runs over to Puanahululu and meets Kaohe and Humuula; thence runs up the mountain with Humuula, on the Hilo slope to Pohakuhanalei. Different kamaaina have pointed out these different places. Kuakini of Puako and others showed me these places. The father of Keiki and Kini showed me the boundaries on this side. Keakaikawai is the son of one of my kamaaina and he himself is a kamaaina on the mountain.

CX'd.

I could talk better native when I came across from Kona to Kau than at the present day. Came down here from Ahua Umi. I have been up from Kapua to Ahu a Umi and understood that Keauhou cuts off Kapua below Ahu a Umi. Also Kaulanamauna is cut off and from there the boundary of Kau and Kona runs direct to the top of the mountain. My opinion of the direction of the line of boundary

between the Districts is based on the direction at shore. There is no land in South Kohala running side by side with Kona lands, to the top of Mauna Loa, cut off by Hamakua. Kona and Kau run to the top of the mountain. Humuula runs up a long way but not to the top. There are two places on the mountain called Pohakuhanalei, one is a rock on the Northeast slope, the other is a crater on the South slope. The latter is not pointed out as a boundary. I have only crossed the boundary they pointed out to me; a ridge running up to the top of the mountain and to the other side. [page 255]; said ridge running between the craters of Mokuweoweo and Pohakuhanalei.

Pohakuhanalei is about south of Mokuweoweo and I think that is in Kau.

Have never heard what land Mokuweoweo is on. Have always heard that Kahuku joins Keauhou mauka and that Kahuku and Kapapala join at Pohakuhanalei, on the northeast slope of Mauna Loa, but I do not know how far this way they join. Have worked in the woods and above Kahuku mauka of Waiohinu, catching goats and heard that Waiohinu cuts off all the lands of Kapapala. I can show pretty nearly the place where Hale o Umi was. Hale o Umi was built of six stones and was so close to the mountain that I could not see far towards Kau or Kohala. At Ahu a Umi on the boundary of Kona there are four or five piles of stones in a mawae or crack; there are two red hills in an easterly direction from Ahu a Umi, and a water hole near one of them. From this point it is two or three miles directly towards the sea, before you come to the thick woods.

[Citation]

Kahueai mentions Umiwai, a place with water in the woods.

Kahueai K., Sworn (same as on Kaupulehu)
I know the land of Keauhou and the boundaries on this side and mauka. I do not know the boundaries between Keauhou and Kahalu [Kahaluu]. I know the boundary Kaumalumalu and Keauhou. It is at Palinui at the lae mamani beyond Hall's premises (Kekuakua ma told me boundaries.[)] Thence to a place called Kapunalei, thence [page 256] to a cave called Pihapono; thence across the head of Holualoa to the kahawai and thence to Kapukaiki, a cave. Boundary running across the head of Puuaa [Puaa]; it runs to a place where a dog that came from Waipio staid, Pupuaalenalena. Thence to Puulaalaau; thence to Umiwai, the boundary follows along mauka of Puulaalaau to mauka of Umiwai, water in the koa woods. Thence to a gulch called Pohakuloa; thence mauka along this gulch to the hill called Honuaula; thence to Hualalai, junction of Kaupulehu and Keauhou; thence along Kaupulehu to the aa, makai of Pualala.

Commencing at Hualalai, the junction of Kaupulehu with Keauhou, thence to Napuumahoe thence to Ihuano [Ihuanu]; thence to Puualala; thence to lae aa, where you see Mailihahei beyond aa. Thence along Puawaa to Keanapakii, a cave; thence to Kuhalele, a cave covered by the lava flow; thence to Ohiapapawai, in the lava flow; thence to Naohuleelua junction of Kaohe, Kapapala and Keauhou; there used to be three ahus there; perhaps they are now covered by the flow. This is as far as I know the boundaries.

CX'd.

I have heard that Uwauliilii is on the boundary between Keauhou and Kaawa.

Have heard that Waiio is on the boundary of Keauhou. Have never been to Kau. I do not know where Kahuku is; have never heard of the land. I do not know whether Keauhou extends to Mokuweoweo or not.

[Citation]

Komaka, is listed as giving testimony prior, mentions Ulimau, a pūnāwai, and a water hole that Komaka found called Komakawai.

Balance of the testimony of Komaka

From Folio 259 of this book

From Ka Hale o Umi, junction of Keauhou and Kahuku I have always heard that Keauhou cuts off the Kona lands at the mauka edge of the woods. Do not know what lands run through woods. Heard Kaapuna ends at Ahinui; Opihale [Opihihale] 2d at Ulimau, a punawai about as far as [page 319] from here to Capt. Gates' house, above woods.

Thence along edge of koa along Opihale 1st; thence along Olelomoana 2d, along koa grove, thence along edge of woods along land of Kolo; thence along Kukuiopae, along koa grove. I pointed out the place to Keanapaakai. Thence to Kukuiopae 1st along hollow Kapai, mauka end of Kukuiopae 1st. Runs up as far as hollow extends. The Kau boundary is the Kona side of goat pen above the water hole where we got water the first night. Thence along Kaohe 5, 4, 3, 2, 1 along edge of woods. Kaohe of Kaopua ends mauka of Polewai at Kapualei, a short distance from where we ate. The lands this side of there end at the koa. Have heard Pahoehoe ends at Kamakaili, the lae mamani in awaawa; thence along Alae to Puuoluamanu; thence along Honokua 2 to Kaopapa, a cave near the koa; thence along Honokua 1st.

Have heard it ends at the koa at Puuikaiole, the goat pen mauka of Lumia, a hill. From there I do not know where Waiea ends. Have (not) (heard) from my makua that it runs to the Alohi; thence to water hole I found, named Komakawai, because I found it where we slept. Do not know what land it is on. I have always heard that Kealia and Hookena do not reach above woods. Have heard that Hookena reached to a few scattering koa trees on Kau side of Kealia trail, but not to Laemamani out on Pahoehoe. This is as far as I know the boundaries between Keauhou & shore lands. I have been around there chasing goats on this side.

Table 2. Keauhou Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices

Inoa ʻĀina	Wai Resource	Practices
Paaniau [Paniau]		
Puainako		
Kahinihiniula		
Ohiki	Spring (Lono, 1876 Boundary Commission Testimony, Keauhou 1)	Old cultivating ground, old mahi ʻai place in the woods.
Napueuala		
Waikulukulu	Cave with water in it. (Lono, 1876 Boundary Commission Testimony, Keauhou 1)	
Halelaau		
Waikui	Large cave of water. (Kakio, 1876 Boundary Commission Testimony, Keauhou 1)	
Kamauae [Kamauai]		Fishing heiau. (Lono, 1876 Boundary Commission Testimony, Keauhou 1)
Kanakaliikapu		
Palahinui		Koa tree forest
Lekeleke		
Nohomoanahoaiku		
Kapapakauheana	Round water hole (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)	
Kaimuhapuu (Kaimuhapu)	Water hole (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2) A water hole in Okolea that is on the boundary between Honalu and Keauhou. (Waiau, Boundary Commission Testimony, 1873, Keauhou 2)	
Kipukauki		
Kamomomoku		

Inoa ʻĀina	Wai Resource	Practices
Kaukahoku		
Keanakiha		Small cave where natives used to sleep. (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Lehuulanui		
Kepuhi		
Kepulu		
Kamoike		
Keanaakala		
Kikikiaeae		Place where canoe makers used to live (Waiea, Boundary Commission Testimony, 1873, Keauhou 2)
Aahuwela	Cave that used to have water in it (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)	
Kanohoana o Umi		ʻUmiʻs road (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Haliilaukoa		Place where ʻUmi sat and they spread koa leaves for him. (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2) An old tradition says Umi used to sit there because he liked the koa. (Kahulialo, Boundary Commission Testimony, 1873, Keauhou 2)
Kanekii	A small water hole that dries up in dry weather. (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2) A water hole on Kealakekua near the boundary. (Waiea, Boundary Commission Testimony, 1873, Keauhou 2)	

Inoa ʻĀina	Wai Resource	Practices
Kalulu	Water hole and place for catching birds. (Kahulialo, Boundary Commission Testimony, 1873, Keauhou 2)	Place where they would catch birds (Uawau) in olden times. (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Kakai a lae Koa		Koa grove (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Kanupa		
Kilohana		Place for bird-catching (Keakaokawai, Boundary Commission Testimony, 1874, Keauhou 2)
Kulauala		
Kapapala		
Pohakuhanalei		Hill on Mauna Loa (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Kolekole	An ahua with koa in the middle. (Kahulialo, Boundary Commission Testimony, 1873, Keauhou 2)	Hill where Humuula joins Keauhou (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)
Kaaawa		Pahoehoe with ohiʻa and other kinds of trees growing (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2) Grove of Naio and Aalii. (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2)
Hapukaa		
Puuakawai	Old water hole now filled up (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)	
Haalulu		
Kaluamakani		
Puulaalaau		

Inoa ʻĀina	Wai Resource	Practices
Kaumalumalu		
Pupuewai	Water hole (Keakaokawai, Boundary Commission Testimony, 1873, Keauhou 2)	
Lekeleke		A crack in the rock where natives used to put their dead. (Kahilo, Boundary Commission Testimony, 1873, Keauhou 2)
Kamomoku		
Waio		Spring. (Kahilo, Boundary Commission Testimony, 1873, Keauhou 2)
Kikikiaeae		
Waiea		Extent of which bird feathers were gathered. (Kahilo, Boundary Commission Testimony, 1873, Keauhou 2)
Poohoohia		
Laaunui		Name of large ohiʻa tree. (Kahilo, Boundary Commission Testimony, 1873, Keauhou 2)
Piipaa		
Kawaha o Pele		
Hoikekanaka		
Pohakuloa		Large rock near water hole. (Kahilo, Boundary Commission Testimony, 1873, Keauhou 2)
Kaumoku		
Lumia	Water hole & pūnāwai. (Palea, Boundary Commission Testimony, 1873, Keauhou 2)	
Makaulaula		Place to live while bird catching. (Kahulialo, Boundary Commission Testimony, 1873, Keauhou 2)
Kaonohi		

Inoa ʻĀina	Wai Resource	Practices
Ahuwela	Cave with water in it. (Kahulialo, Boundary Commission Testimony, 1873, Keauhou 2)	
Holua		Name of old (hōlua) sliding place. (Kakio, Boundary Commission Testimony, 1873, Keauhou 2)
Puulepo	Hill with a water hole below. (Waiea, Boundary Commission Testimony, 1873, Keauhou 2)	
Keakui		A road made by bird catchers. (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2)
Naohuleelua		
Huaikaumauna		A lae koa on the kualapa (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2) A junction of Kaumalumalu, Kahaluu and Keauhou, and an ahua in the koa forest where canoe makers used to have a heiau. (Puhi, Boundary Commission Testimony, 1873, Keauhou 2)
Kahulinanui		An ahua pohaku built by Hamakua men and now covered by lava. (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2) A place where the bird catchers used to quarrel. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Keanaokalehuna	A water hole in a cave on the side of the mountain. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)	Place where a Hamakua man was killed for stealing food at Keauhou. (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2)
Kaluamakani / Kalalakaukolo		Name of place at the top of Hualalai. (Keliikanakaole, Boundary Commission Testimony, 1873, Keauhou 2)

Inoa ʻĀina	Wai Resource	Practices
Kanoa		A point of koa and mamani trees, where a fire from Kaʻū went out. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Laenaio /Laenaia		A grove of trees. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Waiaha	A gulch where water flows when it rains. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)	
Keanapaki		A place where bird catchers used to live. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Ohiapapaawai	A water hole amongst the ohiʻa trees. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)	
Ohiakuapu		A grove of koa trees that runs mauka. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Keahou		An old lava flow. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Onouli		
Kanauaauwe		
Kaneeneenui		
Anakolekolea		A cave mauka of the boundary of Honalo. (Kupakoa, Boundary Commission Testimony, 1874, Keauhou 2)
Mawae	Water hole. (Puhi, Boundary Commission Testimony, 1874, Keauhou 2)	A burial cave. (Puhi, Boundary Commission Testimony, 1874, Keauhou 2)
Puepuewai	Spring on the pahoehoe. (Chas. Hall, Boundary Commission Testimony, 1874, Keauhou 2)	
Umiwai	Water in the koa woods. (Kahueai,	

Inoa ʻĀina	Wai Resource	Practices
	Boundary Commission Testimony, 1874, Keauhou 2)	
Ulimau	A pūnāwai. (Komaka ,Boundary Commission Testimony, 1874, Keauhou 2)	
Komakawai	A water hole. (Komaka ,Boundary Commission Testimony, 1874, Keauhou 2)	

Gianulias Parcel Boundary Commission Testimony Discussion

All of the ahupuaʻa that the Gianulias subject parcel spans were also included in the Boundary Commisison Certification Process. This includes the ahupuaʻa of Pua;a, Waiʻaha, Kahului, and Puapuaʻa (See Table 3 and Figure XX). The following disussion details the kanaka who lived in these ahupuaʻa and gave testimony, as well as excerpts from the testimony and certificate tied to places, practices and resources in the subject ahupuaʻa.

Table 3. Select Ahupuaʻa with Named Localities and Kamaʻāina cited in Boundary Commission proceedings in the area of the Gianulias Subject Parcel

Ahupuaʻa	Place Names	Kamaʻāina Residents
Gianulias Parcel		
Puaa	AianiniHilia (punawai) Hilio Holoke (Punawai) Honu (an upland punawai) Honuaula Kaalaeia Kahawai o Holualoa Kahuku Kainakelekele (olona growth) Kanakehipahoa (?) Kanuawa Kanenehu Kanoweana Kaopapa Kapapai Kawi Keahupuaa Kekawa (Kekapa) Kiai Kipukaiki Kolioaio Kuinakihei Liuike (Luaiki) Namahana (Olona growth – canoe making site) Nakakai Nuanulapalapa (Nuuanulapalapa) Pahuaukii Pali Kookoolau Palule (water source) Pohakuloa Poholua Puakauahi Puepuelenalena Puulalalaau (Puulaalaau) Puuokaloa Puuomaio (Puu o Naio?) Umiwai Waialala Wainakelekele	Kahaunele Kahio Kahueai Kamahiai Kapana Kauwa James Kole Makahiehie Naihe Napuwailuna Pupule

Ahupuaʻa	Place Names	Kamaʻāina Residents
Gianulias Parcel		
Waiaha	Maiahuna (banana grove) Makaihuliwaa Papalanui Pupuula Puuokaloa Waialipi (water hole)	Kapukui Makahiehie Peahi
Kahului	Kaaipaka Kakapa Kalalii Kealaehu (also Alau a koele) Palule Papalanui Pohakuhano Popoulu Puukehoi Puukohia Puuokaloa Puuokoheo Waiakalaho spring Waiakekua spring Waiahuna (Waihuna) spring Waikee	Kapae Makuakane Niniha
Puapuaa	Kaaiau Kahananuialewa Kahiaholo Kaluaele (water hole) Kaopapa (punawai) Kauhiapapa (water hole) Kaumupoalua Keawapuapua (Keawapuapuaa) Puapae Pahoa Poomaka Puapai Puapualoa Puhanoi Puhiuhiu (awaawa) Pukahano Puukiihoe Puuopelu	Kahaunele D. Alawa Kalimapaa Kawaihoa Keawe Mahalo Piki Simeona Ukumea

Puaʻa Ahupuaʻa

Listed below in this section are the boundary commission testimonies recorded for the ʻahupuaʻa of Puaʻa.

Kauwa, a kamaʻāina of Puaʻa, mentions Holoke, Palule, and Honu which were all sources of water. Also mentions many place important place names.

Kauwa W., Sworn

I was born at Puaa, North Kona, Hawaii, at time of Keoua [ca. 1792], and have always lived there, and am acquainted with the boundaries of the land. Kahio, my father (now dead), who was a kamaaina, and bird catcher told me the boundaries.

Puaa is bounded makai by the sea and the land has ancient fishing rights near the shore, but not extending out to sea. Thence commencing at a punawai by the seashore called Holoke, between the lands of Puaa and Auhaukeae and running mauka to Poholua, a huli pali near the shore and just above a house; thence along iwi aina, the boundary runs mauka to Kuinakihei, an oioina way above pa aina; or Governor Adam's wall; thence to Puukole, a breadfruit tree; thence to Nuanulapalapa [Nuuanulapalapa?], a kualapa; thence mauka to Keahupuaa, the [page 376] boundary follows the iwi aina, along all these places; thence to a kihapai by the mauka Government road; thence to an Ahupohaku; thence along the iwi aina to Kanoweana, an old kauhale, a [illegible] bushes and a Puuhala tree are at this place from thence to Kanakehipahoa [?], a banana grove at the edge of the woods, said grove is the mauka end of Ahuhaukeae. Thence the boundary runs towards Kohala; first cutting off the land of Hianaloli 1, 2, 3, 4, 5 & 6 and then Auhaukeae 1 & 2 to Luaike [Luaiki], junction with Honuaula. I have not seen this place. I have only heard about it being on the edge of the woods. Thence Puaa runs along the land of Honuaula to Mamahana wai olona [Mamahana a damp area of olona growth].

(I have only heard of the boundaries in the woods, have never seen them[)].

Thence mauka to Kainakelekele, wai olona, and where olona grows; thence the boundary runs mauka to the side of a gulch called Honuaula (said gulch comes out of woods on Hianaloli); thence mauka along the South side of the gulch to Kapapai, a place where two old roads used to meet on a pali above the woods, from thence the boundary turns toward Kau. Along Honuaula to Pulalalaau [Puu Laalaau], a hill; Keauhou 2d is mauka of the hill and Honualua [Honuaula] is on the North side, Puaa and Holualoa corner there.

Thence makai along Holualoa to kahawai – o – Holualoa, the boundary line passing to the North side of it; thence makai along the gulch to Palule, a pahihi and Wai aoao [auau?]; thence makai leaving the gulch and running to a place called Puuokaloa; passing along Kahului 2nd, through a lae mana (sharp ferns like uluhi [uluhe]); thence cutting across Kahului 1st, Kahului 2nd, Waiaha 1st and Waiaha 2d and Puaa 3d and running mauka to a punawai at the mauka corner of Puaa 2d called Honu; at the makai edge of the forest. Thence makai to Kanenehu, an old kauhale; thence makai along the iwi aina and through the fern to Pahuaukii, a kihapai at the Government road; and in the middle of the land; This is a mistake; I should have said to Palikookoolau, a small pali on the road and thence to Pahuaukii; Thence to a huli pali on the North side of some houses, and thence to banana trees growing on the huli pali; thence makai to Kawi, and thence to Pailima; thence makai to Hiilia, a punawai; thence to Kekawa, at the seashore. Hiilia is mauka of [page 377] Governor Adam's wall, and Kekapa [?] is the awaawa kai, with points each side. The boundary is between the two.

Puaa has ancient fishing rights extending to the squid grounds.

[Citation]

Kahueai, a kamaʻāina of Kona that lives in Puaa, mentions Namahana, a place where they used to make canoes, Aianini, which is a water hole and few other place names within Puaʻa.

> Kahueai K., Sworn (same witness as on Keauhou 2d)
> I now live on Puaa 2d. The boundary at shore on the Kau side is Nakakai, owned by Pupule, the mauka corner of Pupule's land on Puaa 2d is at Kaopapa. There it leaves the gulch and runs toward Kau to a place called Puuokaloa cutting of[f] Puaa 2d and Puaa 3d. Waiaha 1st and Waiaha 2d and two Kahuluis to the gulch. Adjoining Holualoa, thence along the kahawai to Kipukamana, a kipuka in the woods; Thence to Palule where koa grows; thence mauka along the kahawai to Namahana, where we used to make canoes; thence along the gulch to Aianini [?], a water hole in the gulch; thence up to Kipukaiki a cave; thence along Keauhou to Puepuelenalena; to Puulaalaau; thence to mauka of Umiwai; thence to Pohakuloa, a gulch the junction of Puaa 1st with Honuaula; Thence down the gulch to Kolioaio, a kauhale kalaiwaa; thence makai to Wainakelekele, crater in gulch; thence to Waialaala, a kauhale, thence to [page 244] the lower edge of the woods, to Kahuku, a banana grove; thence the boundary leaves the gulch, and runs across the heads of the Hianalolis and Auhaukeae to Kaalaeia (the koa is on all Puaa); thence to Kunuawa, a large banana grove, thence makai along Hauiio's land and thence along Ukumea's land and then along Kole to the sea shore. Bounded makai by the sea. Ancient fishing rights extending out to sea.
>
> CX'd.
>
> Note: J.G. Hoapili states that he can find no more kamaaina of this land. Copy testimony on Keauhou 2d and Holualoa adjoining Puaa 1st, as evidence on Puaa 1st.
>
> [Citation]

Table 4. Puaʻa Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices

Inoa ʻĀina	Wai Resource	Practices
Holoke	Punawai at the seashore. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)	
Poholua		A huli pali near the shore. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Kuinakihei		An oioina. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Puukole		Name of a breadfruit tree. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Nuanulapalapa		A kualapa. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Kanoweana		An old kauhale. (Kauwa, Boundary

Inoa ʻĀina	Wai Resource	Practices
		Commission Testimony, 1873, Puaʻa)
Kanakehiapahoa		A banana grove at the edge of the woods. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Ahuhaukeae		
Mamahana wai olona		
Kainakelekele	A place where olona grows. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)	
Kapapai		A place where two old roads used to meet. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Palule	A pahihi and wai auau. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)	
Honu	A punawai at the makai edge of the forest. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)	
Kanenehu		An old kauhale. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)
Pahuaukii		
Pailima		
Hiilia	A punawai. (Kauwa, Boundary Commission Testimony, 1873, Puaʻa)	
Kipukamana		A kipuka in the woods. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Namahana		A place where they used to make canoes. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Aianini	A water hole. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)	
Puepuelenalena		
Kolioaio		A kauhale kalaiwaa. (Kahueai, Boundary Commission Testimony,

Inoa ʻĀina	Wai Resource	Practices
		1873, Puaʻa)
Wainakelekele		A crater in the gulch. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Waialaala		A kauhale. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Kahuku		A banana grove. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Hianalolii		
Auhaukeae		
Kaalaeia		
Kunuawa		A large banana grove. (Kahueai, Boundary Commission Testimony, 1873, Puaʻa)
Kole		

Waiʻaha Ahupuaʻa

Peahi, a resident of Waiʻaha for 16 years, recounts a watering hole called Waialipi and a banana grove named Maiahuna.

> *[palapala original if had time]*
>
> Peahi K. Sworn
> I was born at Kohala at the time of Kiholo [XX 18 XX], when I was married I came here and have lived here ever since. Know the land of Waiaha. Lived there sixteen years. A water hole called Waialipi is on the boundary between the two Waiahas. Waiaha 2d is bounded by Waiaha 1st to a banana grove at the edge of the woods, called Maiahuna. Waiaha 2d is bounded on the South side by Kahului. The land is sold to Kapae K. from shore to the Government road. Thence along Kahului 2d to Puuokaloa, where I had heard it is cut off by Holualoa. Waiaha 1st was surveyed from shore to Maiahuna and I do not think it extends far beyond there.
>
> Waiaha 2d is bounded makai by the sea.
>
> Ancient fishing rights extending out to sea.
> [Peahi, 1874 Boundary Commission Testimony]

Makahiehie, mentions Pamakani and Makaihuliwaa, two resting places of ancient time.

> *[palapala original if had time]*

Makahiehie K., Sworn
I was born at Puaa, Kona, at the time of Kumoalii [XX Kaumualii ?], so my parents told me. I know the boundaries of Waiaha; have always lived on these lands. My father told me the boundaries. Waiaha 2d is bounded on the North side by Waiaha 1st. Saw Fuller survey Waiaha 1st from the shore to Maiahuna; the mauka end of it. Kahului 1st bounds Waiaha 2d on the South side. A place called Pamakani is the mauka corner of Kapae's land. It is a resting place; thence to Papalanui, between Kahului, Aupuni, and Waiaha 2d; thence to Makaihuliwaa, an old resting place; thence to Popoula, the mauka corner of Kahului 1st from thence the boundary turns and Waiaha is cut off by Puaa to Maiahuna.

[citation]

Table 5. Waiʻaha Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices from Boundary Commission testimonies.

Inoa ʻĀina	Wai Resource	Practices
Maiahuna: banagrove[76]	Waialipi: waterhole Described by Peahi as being on the boundary between the two Waiahas," (Peahi, 1874 Boundary Commission Testimony for Waiʻaha Ahupuaʻa).	"Ancient fishing rights extending out to sea," (Peahi, 1874 Boundary Commission Testimony for Waiʻaha, Kona).
Makaihuliwaa: old resting place[77]		
Pamakani: resting place[78]		
Papalanui[79]		
Popoula[80]		
Puuokaloa[81]		

[76] Peahi 1874 Boundary Commission Testimony for Waiʻaha, Kona
[77] Makahiehie 1874 Boundary Commission Testimony for Waiʻaha, Kona
[78] Makahiehie 1874 Boundary Commission Testimony for Waiʻaha, Kona
[79] Makahiehie 1874 Boundary Commission Testimony for Waiʻaha, Kona
[80] Makahiehie 1874 Boundary Commission Testimony for Waiʻaha, Kona
[81] Peahi 1874 Boundary Commission Testimony for Waiʻaha, Kona

Puapuaʻanui Ahupuaʻa

Ukumea, born in Puapuaʻa and kamaʻāina of Puapuaʻanui, mentions an iwi aina, Kaumupoalua which is a Neneleau grove, Kaluaele which is a watering hole, and Kaopapa, a pūnāwai.

> Ukumea K., Sworn
> I was born on Puapua [Puapuaa] at the time of Kauaokekuakalani [XX 18 XX]. I now live at Puapuanui [Puapuaanui]; have lived there most of my lifetime; am a kamaaina and know the boundaries. Kelinopa (now dead), my cousin, showed them to me. Bounded on the North side by Piki, the boundary at shore between these two lands is Keawapuapua [Ke-awa-Puapuaa] on the south side of the awa; thence to Puhano, aa above Governor Adams wall. There is an iwi aina from makai up. Kaumupoalua, a neneleau grove; thence along the iwi to the Government road, passing on the South side of Kaluaele, a water hole, thence mauka to Kaaiaua kihapai, the iwi is on the South side of the kihapai; thence to Kahananuialewa, a large rock at the mauka corner of the land, where Puapuanui is cut off by Holualoa. Thence turn towards the sea along Holualoa 1st to Kaopapa a punawai; thence along the iwi aina Uwaunui, an [page 260] old kauhale, the boundary runs through this place and to Puapualoa, a cave on the North side of the boundary; thence to Huloa, a resting place above Governor Adams wall; thence to seashore. I do not know the name of this makai point. Bounded makai by the sea.
>
> Ancient fishing rights extending out to sea.
>
> [citation]

Mahalo, got control of land for five years, mentions a water hole named Kauhipapa.

> Mahalo K., Sworn
> I was born at Holualoa. Do not know when. Have always lived there. I had charge of Puapuanui for five years, and looked at the boundaries. Keawe was the man who told them to me. Puapuaiki bounds it on the North side.
>
> Commencing at the seashore on the Kau side of the Awaawa Puhiuhiu, the awaawa being on the Kau side of the canoe landing; thence to Pakuhano, aa mauka of the wall. The boundary runs along the iwi aina to Kaumupoalua; thence to the South side of Kaluaele following up the Government road; thence to Kaaiau, and through this place to a big stone, the name I have forgotten; there Holualoa cuts Puapuanui off.
>
> Thence makai along his land to Puapualoa; thence to Kauhiapapa, a water hole; thence to the North side of Kauhiaholo; thence to Pahoa; thence makai to Ahuloa; thence to Puuopelu; thence to Kuapae at the seashore. Bounded makai by the sea.
>
> Ancient fishing rights extending out to sea.
>
> Testimony closed
> [page 261]

Table 6. Puapuaʻa Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices from Boundary Commission testimonies.

Inoa ʻĀina	Wai Resource	Practices
Keawapuapua[a]		
Kaumupoalua		Neneleau grove, Lennox mentions as being used to make "calabash and lomilomi sticks." (Lennox, C. 1967. Auwahi Forest Report; Appendix 6. Unpublished report, 3pp.)
Kaluaele	Water hole	
Puhano		
Kahananuialewa		
Kaopapa	Pūnāwai	
Uwaunui		Old kauhale
Puapualoa		
Huloa		Resting place
Kahiaholo		
Puuopelu		
Puapai		
Puhiuhiu		
Pakuhano		
Kaaiau		
Kauhiapapa	Water hole	

Kahului Ahupuaʻa

Kahului is divided into two ahupuaʻa, Kahului 1 (north) and Kahului 2 (south). In an initial overview of the boundary commission, no testimonies submitted for Kahului 1 Ahupuaʻa documented water resources, inoa ʻāina, or practices. Listed below in this section are the boundary commission testimonies recorded for Kahului 2 Ahupuaʻa.

Niniha, a kupa ʻāina of Kahului, Kona recounts the boundaries of Kahului and mentions several water holes referred to by the names Waiakalaho, and Waiakekua. Niniha testified the following:

Niniha, K., Sworn

I was born at Kahului, North Kona, Hawaii at the time of Kaoku [Mai Okuu, 1804-1805] and have always lived there. My parents (now dead) pointed out the boundaries to me.

Boundary at the seashore between Kahului 2 and Puapuaaiki is at the right hand side of Kakapa, a rocky point in the sea; thence mauka along an iwi aina to Governor Adam's wall; thence to Waiakalaho, a water hole; thence mauka to Waiakekua, a water hole near the iwi aina and a little above the Government road; thence to Kaaipaka, a kulana kauhale, ahua hulipali; thence mauka a short distance to where Puapuaaike ends; thence to Puuokoheo, a high hill outside of the woods; now overgrown with koa; there Holualoa corners at Pohakuhano; thence along Holualoa to Waikee, a [page 327] kahawai; thence across said gulch and follow the gulch up to Puuokaloa, a pali in the woods on the North side of the gulch; thence to Palule where Holualoa and Puaa cut off Kahului; said place is a puu pahoehoe and kahawai; thence makai along the boundary of Puaa to Popoulu, mauka corner of Kahului 1st near the lower edge of the woods; thence along Government portion of Kahului to Papalanui, a kihapai koele, below Puukohia; thence along iwi aina, makai to Alau in the fern above the Government road. There is a pile of stones set up there. I pointed out the boundaries of Kahului 1st when it was surveyed; thence along the land sold, to Kalalii, a pulu lepo a seashore.

Ancient fishing rights extending out to sea.

[citation]

Makuakane was a kanaka from Hāmākua who came to reside in Kahului during his younger years. He mentions the two springs of the area being Waiakalaho and Waiakekua:

Makuakane, Kane, Sworn (rather a young man)
I was born at Hamakua, Hawaii; came to Kahului when I was young and have resided here ever since; know the boundaries of said land; Kapee [Kapae?] (now dead) former konohiki of the land with whom I lived four years told me the boundaries, and also pointed them out to me.

Commencing at seashore between Kahului and Puapuaa at a rocky point called Kakapa; thence mauka along an iwi aina to Governor Adam's wall; thence mauka, the boundary still following the iwi aina to Waiakalaho, a water spring; said spring being about three kihapai to North of the boundary of Puapuaa; thence to Waiakekua, spring mauka of the road; said spring is on Kahului near the iwi aina; thence to Kaaipaka, an Ahuapuu, kauhale kahiko, boundary at the South side of it; thence to Waikee (I do not know where Puapuaaike ends; Holualoa joins Kahului at Waikee; thence to Popoula, a kahawai with koa growing in it; thence to Puuokaloa, a pali; thence to Palule where Puaa and Holualoa cut Kahului off; thence makai along Puaa to Puuokaloa; thence to Popoulu, the land is very narrow here; thence makai to Puukehoi [?], a hill in fern; thence makai along the iwi aina to Waihuna, a water hole on the boundary between Kahului 1st [page 328] and Kahului 2nd. Kahului 1st reaches to Puuokaloa at the foot of the pali; makai of the Government road you come to Waiahuna which is the boundary of Kapai's [Kapae's] land. The mauka corner of Kapai's land is at Kealaehu, sometimes called Alau a koele. Thence the boundary runs along land sold, to the sea, and the land has ancient fishing rights extending out to sea.

[citation]

Table 7. Kahului Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices from Boundary Commission testimonies.

Inoa ʻĀina	Wai Resource	Practices
Kakapa	Waiakalaho: waterhole	"Ancient fishing practices extending out to sea," (Niniha, K. 1873, Boundary Commission Testimony for Kahului, Kona)
Kaaipaka	Waiakekua: waterhole	
Kalaii	kahawai: "along Holualoa to Waikee"	
Kealaehu (also Alau a koele)	Kahawai: at Palule where "Holualoa and Puaa cut off Kahului,"	
Palule	Kahawai with koa growing in it	
Papalanui	Waterhole "on the boundary of Kahului 1st and Kahului 2nd,"	
Pohakukuhano		
Popoulu		
Puukehoi		
Puukohia		
Puuokaloa		
Puuokoheo		
Waiakalaho: waterhole		
Waoakekua: waterhole		
Waihuna (Waihuna)		
Waikee		

DHHL Kona Parcels Boundary Commission Testimony Discussion

The Department of Hawaiian Homelands has parcels in the ahupuaʻa of Kealakehe and Keahuolū. Although not the subject parcel of the proposed undertaking these lands serve to benefit from water resource development in the subject parcels, and are included here as such.

Table 8. Ahupuaʻa of Keahuolū with named localities and kamaʻāina cited in Boundary Commission proceedings in Keauhou Ahupuaʻa, location of the Kamehameha Schools subject parcel.

Ahupuaʻa	Place Names	Kamaʻāina Residents
Keauholū	Halelaau Kamauae (Kamauai Heiau) Kanakaliikapu Kewa Nanunuakalupe [?] Napueuala Ohiki Paaniau (Paniau) Pohakunahaha Puainako Waikui Waikulukulu	Kakio Keakaikawai Kuluahi Lono

Keahuolū Ahupuaʻa

Below are excerpts from the Boundary Commission Testimony for Keahuolū Ahupuaʻa. The ahupuaʻa of Keahuolū describes the southern boundary of Kealakehe Ahupuaʻa

J.Z. Waiau, a kamaʻāina from Honuaula, mentions a few water holes including, Keanawai and Waiakamalama. Also mentions a heiau named, Kalualapauila and a place called Kawauhooni, where people would rest on the way to taking their dead to rest in the crater of Hualalai.

> J. Z. Waiau K., Sworn
> I was born at Honuaula, Kona, Hawaii at the time of the fight of Keakuaokalani [Kekuaokalani in 1819]. I now live at Lanihauiki. Know the land of Keahuolu and its boundaries, have seen a part, and have heard where a part of them are from my parents and kamaaina on the land. I leased the land in former times. Kealakehe bounds it on the North side and Lanihaunui on the South side. A round rock on the sea shore called Pohakuloa is on the boundary between Lanihaunui and Keahuolu; thence the boundary between these two lands run mauka about one hundred fathoms and then turns South, to the North side of an old village, on Lanihau, called Makaeo. Thence the boundary runs straight mauka to Hoenui, a pile of stones makai of the wall of Governor Adams. If you look maikai [makai] from mauka near the Government road, it looks like a wall or iwi aina on the pahoehoe, but you cannot see it from makai. From Hoenui to Maili along [page 354] the boundary runs along an iwi aina, a wall or iwi aina from some way above Adams wall. Maili is an old village at Puuokaliu, a pali, pali ahua, where houses used to stand; thence to the mauka Government road at Kahuoli; an old kihapai koele, there are two kuleanas there, on Lanihau, adjoining Keahuolu. Said kuleanas belong to Kaawa and Luhei.

Thence mauka along the iwi aina to Puukoai, a very small ahua, of dirt and stones; thence to Keanawai, a water hole where there used to be a great many houses. Thence to Kaopapa, a place in the woods in Akolea fern a punawai, where Lanihauiki cuts of Lanihaunui. This place is a grove of young koa trees about the distance of a mile from the edge of the woods. I have heard Sleeper surveyed the line from Piilani down, that is mauka of Keanawai, on the boundary between Lanihaunui and Lanihauiki; from Kaopapa to Puulepo, a kualapa; this is above the young koa trees, in the ohia. From Puulepo the boundary runs direct mauka to Waiakamalama, a water hole where the natives get water when it fails below the woods. You have to dig to get it; have been to this place once.

Thence to Kawauhooni, a kupapau, a place where the natives used to sleep when on their way with dead bodies to throw into the crater on Hualalai; the koa woods are on Lanihauiki, and ohia on Keohuolu [Keahuolu]; thence turn North to kahawai Opilopilo, the mauka corner of Kealakehe. I do not know the boundaries in the woods between Keahuolu and Kealakehe; know where the mauka corner of Kaahui's land is, it is at a pile of stones on Kealakehe, at the junction of Kaahui's land of Kealakehe and Keahuolu; thence to an ahu pohaku called Laeaniau, at the Government road; thence makai along an iwi aina to a few fathoms on the North side of a heiau called Kalualapauila; thence to Puunahaha, a large red hill on the mauka side of the makai Government road, thence to Puuokaloa, an oioina or small hill; thence to Kaiwi a lae pohaku on the middle of point. Ancient fishing rights extending out to sea.

CX'd.
I saw the haole survey the line down the road, between the lands of Lanihau nui and Lanihauike [page 355], said road runs down an iwi between these two lands. I do not know whether he surveyed to the boundaries of Keahuolu or not.

[Citation]

Kealakai, a kamaʻāina of Keahuolu, mentions a few inoa ʻāina including Piilani, a mahina ʻai and Kalioniau which is an ʻahu.

Kealakai K., Sworn
I was born at Keahuolu, North Kona, Hawaii at the time of [name illegible] & saw building Kiholo 2nd. Have always lived there, and know the makai boundaries. My parents; makuakane hanai Kaohimahi [name is Kauhimahi] (now dead) told them to me.

The boundary at sea shore between Lanihaunui and this land is at Pohakuloa; thence towards Kailua; the sand on Lanihau and the pahoehoe on Keahuolu; Thence mauka along raised lava (flat lava being on Lanihau) passing some distance on the North side of Puuopalena; thence mauka to Hoenui, a good ways makai of Governor Adams wall; thence mauka along an iwi aina to the mauka Government road; thence mauka to Puukoae, a puuolepo; thence mauka to Piilani, a mahina ai; the boundary passing to the North side of it; thence to Puulepo. I do not know where Lanihaunui ends; as I have never been there; have only heard of these boundaries. The mauka corner of Keahuolu is an ahua called Kaohiamoekanaka; thence makai along Kealakehe, but I do not know the points on the line.

At Government road there is an ahu, called Kalaioniau, a puu makai of said road which can be seen from the road. Thence makai along an iwi aina to Kalualapauila, a heiau; thence makai to the North side of a hill called Puuouliuli; thence to Puunahaha; the boundary passing on the North side; from thence to Puuokaloa; thence makai to Kaiwi, the kula in middle of point and lae pohaku on the point at sea shore.

Ancient fishing rights extending out to sea and claiming the opelu.

[Citation]

Kahuanui, a kamaʻāina of Kealakehe, mentions Puulaula, Puunahaha, Kaenaena and Kaeeku, all hills within Keahuolū. He also mentions Pukalua which is a water hole above in the young koa.

Kahuanui K., Sworn
I live at Kealakehe, and have always lived there, know the boundaries between Keahuolu and Kealakehe. I have bought a piece of the latter land, but have not received the Patent. Have seen the boundaries of adjoining. Kaiwi is the boundary at the shore between Kealakehe and Keahuolu; thence mauka to Puukaloa, thence [page 356] to Puulaula, mauka side of the Government road, thence to Puunahaha; thence to Kaenaena, a hill; thence to Kaeeku, a hill; thence to Kalualapauwila; thence to Lainiau, the iwi or the South side; thence to Keahupuaa, an ahua pohaku at the mauka Government road; thence along the iwi aina (the land below the road was surveyed by Wiltse for me); thence mauka to Ohiakaukanaka;[82] a pali in the woods where you can look down to the sea shore. It is the long pali that runs across all the lands.

This is the mauka end of Keahuolu and is here cut off by Lanihauiki (in koa) and by Kaloko; thence makai along Lanihauiki to Puulepo; thence makai to Piilani, in woods, at which place Lanihaunui ends and Lanihauiki leaves Lanihaunui and Keahuolu boundary. Lanihaunui ends at Pukalua, a water hole above the young koa. Piilani is way below the woods.

[Citation]

Kapea, a resident of Moeauoa, Kona, mentions Kaopapa which is a pūnāwai.

Kapea K., Sworn
I live on Moeauoa, Kona, Hawaii, have lived there several years, know the land of Keahuolu, and have been up the road to the woods, after water. The mauka corner is on a pali at Koohiahoomoekanaka. The koa is on Lanihau and Kaloko; thence makai along Lanihauiki, to Puulepo; thence to Nohonoa, the mauka corner of Lanihaunui, where there is an ahua; thence down the pali to Kaopapa, a punawai; thence to Piilani outside of the woods. There is young koa growing at Kaopapa. I

[82] Also cited as Kaohiahoomoekanaka.

have been there with the kamaaina after water. I do not know the boundaries on the other side.

[Citation]

Mahu, a kamaʻāina of Keahuolū, mentions Ohiawela which is a spring, an Kauwau, a grove of large trees where they used to lay dead bodies.

Mahu K., Sworn
I was born on the land of Keahuolu at the time of the birth of Kamehameha II [ca. 1797], and my parents who were kamaainas of the land told me its boundaries. Kealakehe bounds it on the North side, the boundary at shore between the two lands is at Kaiwi; thence it runs mauka to Puuokaloa; thence to Puunahaha; thence to Kaunauhila [?], a puu aa. Thence to Kalualapapauaia [Kalualapauwila]; thence mauka to Kalaeoniau; thence to Keahupuaa at the Government road; thence to Kahuaakaulei in the woods (I have not been there) then into Ohiawela (I have not been there, but have heard that there is a spring there). Thence to Kahihiia [Kahihia], the mauka corner of Keahuolu where Lanihauiki cuts it off. I do not know whether Kaupulehu or Kaloko cuts if off on the North side.

Thence makai along Lanihauiki, all the koa except what is just on the lower edge of the woods being above the boundary of Keahuolu. Thence makai to Kauwau, a grove of large trees where they used to lay dead bodies; from thence makai to Ohiapiipa; thence to Waiakamalama. (I have been up to the mauka corner of the land on the road between Keahuolu and Lanihauiki but I have not been on the North side.)

Thence makai to Kapulehu, an oioina; thence to Nohoana o maa, an oioina, at the mauka corner of Lanihaunui, near the lower edge of the woods. My father's name was Kamaha and my mother's name was Loma.

[Citation]

Table 9. Keahuolū Ahupuaʻa Inventory of Inoa ʻĀina, Wai Resource, and Practices from Boundary Commission testimonies.

Inoa ʻĀina	Wai Resource	Practices
Pohakuloa		
Makaeo		Name of old village in Lanihau. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Hoenui		Pile of stones. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Maili		An old village at Puuokaliu, where houses used to stand. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Puuokaliu		A pali ahua. (Waiau, Boundary

Inoa ʻĀina	Wai Resource	Practices
		Commission Testimony, 1873, Keahuolū)
Kahuoli		An old kihapai koele with two kuleana belonging to Kaawa and Luhei. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Puukoai		
Keanawai	A water hole where there used to be a great many houses. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)	
Kaopapa	A pūnāwai in the woods amongst the Akolea fern. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)	
Waiakamalama	A water hole where natives get water when it fails below the woods. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)	
Kawauhooni		A place where natives used to sleep when on their way with dead bodies to throw into the crater of Hualalai. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Opilopilo	Kahawai. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)	
Laeaniau		Ahu pohaku. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Kalualapauila		A heiau. (Waiau, Boundary Commission Testimony, 1873, Keahuolū), (Kealakai, Boundary Commission Testimony, 1873, Keahuolū)
Puunahaha		Large red hill. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Puuokaloa		An oioina. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)
Kaiwi		A lae pohaku. (Waiau, Boundary Commission Testimony, 1873, Keahuolū)

Inoa ʻĀina	Wai Resource	Practices
Puuopalena		
Hoenui		
Piilani		A mahina ai. (Kealakai, Boundary Commission Testimony, 1873, Keahuolū)
Kaohiamoekanaka		
Kalaioniau		An ahu. (Kealakai, Boundary Commission Testimony, 1873, Keahuolū)
Puuouliuli		A hill. (Kealakai, Boundary Commission Testimony, 1873, Keahuolū)
Puunahaha		
Ohiakaukanaka		Same as Kaohiamoekanaka. (Kahuanui, Boundary Commission Testimony, 1873, Keahuolū)
Lanihauiki		
Pukalua	A water hole above the young koa. (Kahuanui, Boundary Commission Testimony, 1873, Keahuolū)	
Ohiawela	A spring. (Mahu, Boundary Commission Testimony, 1873, Keahuolū)	
Kahihiia (Kahihia)		
Kauwau		A grove of large trees where they used to lay dead bodies. (Mahu, Boundary Commission Testimony, 1873, Keahuolū)
Ohiapiipa		
Nohoana o Maa		An oioina. (Mahu, Boundary Commission Testimony, 1873, Keahuolū)

The Māhele ʻĀina and Issuance Of Kuleana To Hoa ʻĀina - By Kumu Pono Associates

In pre-western contact Hawai'i, all land and natural resources were held in trust by the high chiefs (aliʻi ʻai ahupua'a or aliʻi ʻai moku). The use of lands and resources were given to the hoa'āina (native tenants), at the prerogative of the ali'i and their representatives or land agents (konohiki), who were generally chiefs of some standing as well. In 1848, the Hawaiian system of land tenure was radically altered by the Māhele ʻĀina. This change in land tenure was promoted by the missionaries, the growing Western population, and business interests in the island kingdom. Foreigners were hesitant to enter business deals on lease-hold lands.

The Māhele (division) defined the land interests of Kamehameha III (the King), the high-ranking chiefs, and the konohiki. As a result of the Māhele, all land in the Kingdom of Hawaiʻi came to be placed in one of three categories: (1) ʻĀina Lei Aliʻi (Crown Lands) for the occupant of the throne, (2) ʻĀina Aupuni (Government Lands); and (3) Konohiki Lands.

1848-1855: The Māhele ʻĀina (Land Division)

Disposition of the ʻāina between Keauhou 2nd to Kaloko was largely settled between the King, Kamehameha III, some 250 chiefs and a few foreigners in the 1848 "Buke Mahele" (*Land Division Book*). Most of the awardees were either closely related to the Kamehameha line and supported the rise and rule of the Kamehamehas, or had been given tracts of land in payment for services to the King. As part of the process of reaching agreements with each of the participants in the Māhele, the applicants released selected ahupuaʻa or land areas from their larger claims as a means of paying fees for processing their claims. These relinquished ʻāina were then retained by the King as ʻĀina Lei Aliʻi or given by the King to the ʻĀina Aupuni inventory. Title to the awarded lands was subsequently confirmed and assigned for ahupuaʻa under the provisions of the Kuleana Act. *Table 1* identifies the original disposition the ʻāina—north to south—from Kaloko to Keauhou 2nd.

Table 10. Kaloko to Keauhou 2nd: Disposition of ʻĀina in the Māhele — ʻĀina Lei Aliʻi (Crown Lands), Konohiki Lands, and ʻĀina Aupuni (Government Lands)

Inoa ʻĀina North to South	Helu (Land Commission Award Number & Royal Patent)	Awardee and Acreage
Kaloko	7715:11 – R.P. 8214 Buke Mahele 1848:8	Kapuaiwa Lot Kamehameha V Son of Kinau and Mataio Kekuanaoa. (4230.00 Acs.)
Honokōhau Nui (1)	11216:36 – R.P. 7587 Buke Mahele 1848:28	Mikahela Kekuniahi Kekauonohi Daughter of Kinau kane and Wahinepio. (2653.00 Acs.)
Honokōhau Iki (2)	9971:9 – R.P. 6855	Wm. P. Leleiohoku Son of Kalanimoku (Paalua) and Kiliwehi. He was first married to Nahienaena, then to Ruta Keelikolani Following Nahienaena's death. (480.00 Acs.)
Kealakehe	—	Government Land Not cited in Buke Mahele. Transferred

		to Government Land Inventory by Kamehameha III.
Keahuolū	8452:12 – R.P. 6851 Buke Mahele 1848:10	Ane Keohokalole, daughter of Aikanaka and Kamaeokalani; mother of David Kalakaua and Lydia Liliuokalani mā (4071.00 Acs.)
Lanihau Nui (1)	8559 B:11 – R.P.7456	Wm. C. Lunalilo (302.00 Acs.)
Lanihau Iki (2)	— Buke Mahele 1848:157, 181	Government Land. Relinquished by Kaopua
Moeauoa	107474:3 – R.P. — Buke Mahele 1848:175	Nueku Namauu (— Acs.)
Moeauoa 2nd	9971:27 – R.P. 8126	Wm. P. Leleiohoku (130.00 Acs.)
Keōpū 1	11216:39 – R.P. 7874 Buke Mahele 1848:28	Mikahela Keahikuni Kekauonohi (7120.00 ac.)
Keōpū 2	—	Government Land
Keōpū 3	7713:5 – R.P. 4475 M. Kekuanaoa and Kinau. Sister of Moses Kekuaiwa, Lot Kapuaiwa and Alexander Liholiho. On of the grandchildren of Kamehameha I	Victoria Kamamalu, daughter of (Ahp. — Acs.)
Keōpū House Lots	9971:36 – R.P. 6690 9971:37 – R.P. 6694 9971:38 – R.P. 6690	Wm. P. Leleiohoku Wm. P. Leleiohoku Wm. P. Leleiohoku
Niumalu House Lot	9971:39 – R.P. 6690	Wm. P. Leleiohoku
Kailua House Lots	9971:41 – R.P. 6694 9971:42 – R.P. 6694 9971:45 – R.P. 6693 9971:46 – R.P. 6693 9971:47 – R.P. 6693 9971:68 – R.P. 6693	Wm. P. Leleiohoku Wm. P. Leleiohoku Wm. P. Leleiohoku Wm. P. Leleiohoku Wm. P. Leleiohoku Wm. P. Leleiohoku
Honua‘ula 1st	— Buke Mahele 1848:181	Government Land. Relinquished by Kamehameha III.
Honua‘ula		XX (Ahp. — Acs.)
Hienaloli 1	— Not cited in the Buke Mahele	Government Land
Hienaloli 2	7716:5 – R.P. —	Ruta (Ruth) Keelikolani, daughter of Pauahi-nui and M. Kekuanaoa. She was the half sister of Kamehameha IV and V, and Victoria Kamamalu. She was also married to Kuakini’s hanai, Leleiohoku. (Ahp. — Acs.)

Hienaloli 3	—	Government Land
Hienaloli 4th	387 Part 4, Section 2 No. 1	A.B.C.F.M. (Church lands)
Hienaloli 5th	8524 B:3 – R.P. — Buke Mahele 1848:167	Peke (Ahp. — Acs.)
Hienaloli 6th	—	Government Land
Auhaukeaʻe 1st	11216:37 – R.P. 7580 Buke Mahele 1848:28	Mikahela Keahikuni Kekauonohi (334.00 Acs.)
Auhaukeaʻe XX 2nd	Buke Mahele 1848:8, 179 —	Relinquished by Kapuaiwa Lot Kamehameha. Relinquished by Kamehameha III to Government Land Inventory.
Puaʻa 1st	7715:13 – R.P. 7845 Buke Mahele 1848:8	Kapuaiwa Lot Kamehameha (859.00 Acs.)
Puaʻa 2nd	—	Check Crown / Government Land
Puaʻa 3rd	Buke Mahele 1848:14, 179	Government Land. Relinquished by Moses Kekuaiwa.
Waiʻaha 1st	387 Part 4, Section 2, No. 3	A.B.C.F.M. (Mission Station land) (— Acs.)
Waiʻaha 2nd	Crown Land Crown Land	(1890, pursuant to "Act to Declare Certain lands to be a part of the Crown Lands and Royal Domain)
Kahului 1st Buke Mahele 1848:163	8516-B:3 – R.P. 1669 Kaoanaeha and John Young Sr., one of Kamehameha I's haole advisors. Sister of Kekelaokalani, Keoni Ana and Lahilahi. Kamaikui adopted her niece Emma (daughter of Kakelaokalani), who was born at Kahului 2nd, and later the wife of Alexander Liholiho, and known as Queen Emma.	Grace Kamaikui, the daughter of (Ahp. — Acs.)
Kahului 2nd	—	Government Land. (846 Acs.)
Puapuaʻa iki (1st)	4887:2 received land in return for services to	Thomas Sam, a foreigner who the Kamehameha line.
Puapuaʻa nui (2nd) Not cited in Buke Mahele	8559-B:8 – R.P. 7819 grandson of Kaleimamahu, half brother of Kamehameha I.	William C. Lunalilo, the son of Kekauluohi and Kanaina, and
Hōlualoa 1st & 2nd Buke Mahele 1848:4	7713:43 – R.P. 4475 (Ahp. 7330 Acs.)	Victoria Kamamalu
Hōlualoa 3rd	—	Government Land
Hōlualoa 4th	7228 – R.P. —	Loe, daughter of Kapiiwi and

Buke Mahele 1848:131	Kahikoloa of Holualoa and sister of Kinimaka. (638 Acs.)	
Kaumalumalu Not cited in Buke Mahele	9971:28 – R.P. — (Ahp. — Acs.)	William Pitt Leleiohoku.
Pāhoehoe 1st & 2nd Buke Mahele 1848:5	— Relinquished by Victoria Kamamalu.	Government Land.
Pāhoehoe 2nd Buke Mahele 1848:28	11216:35 (1190 ac.)	Mikahela Keahikuni Kekauonohi.
Pāhoehoe 3rd Buke Mahele 1848:163	8520-B:3 – R.P. 1668 Kaoanaeha, and John Young Sr. Mother of Queen Emma. (Ahp. — Acs.)	Gini Lahilahi. Daughter of
Pāhoehoe 4th	—	Government Land
Laʻaloa 1st Buke Mahele 1848:16	7716:4 – R.P. — (Ahp. — Acs.)	Ruth Keelikolani
Laʻaloa 2nd	Buke Mahele 1848:91, 183	Relinquished by Kaunuohua, Relinquished by Kamehameha III to Government Land Inventory.
Kāpalaʻalaea 1st Buke Mahele 1848:147	4452:2 – R.P. — Naihekukui and Kepooku. Wife of Kamehameha III. (— Acs.)	Hazaleleponi Kalama, daughter of
Kāpalaʻalaea 2nd	Buke Mahele 1848:181	Government Land
Kahaluʻu Buke Mahele 1848:6	7713:6 – R.P. 6856 (5443.00 Acs.)	Victoria Kamamalu
Keauhou 1st Buke Mahele 1848:6	7713:7 – R.P. 4475 (Ahp. 5146 Acs.)	Victoria Kamamalu
Keauhou 2nd (kahi i hanau ai o Kauikeaouli– birth place of Kamehameha III) Buke Mahele 1848:8	7715:12 – R.P. 7844	Kapuaiwa Lot Kamehameha. (109,600 Acs.)

ʻĀina of the Crown and Government

At the time of recording the "Buke Mahele," issues with the completeness of the records were already evident. On July 14, 1848, "*Ka Elele Hawaii*" the Kingdom newspaper published a list of lands which King Kamehameha III transferred to the ʻĀina Aupuni (Government Land) as a mean of providing hoaʻāina with access to lands more suited to their needs, and as a means of developing revenue for the government. The list also includes those ʻāina which the King retained for the benefit of the use and Crown. *Ka Elele Hawaii* identified the following ʻāina between Keauhou to Kaloko:

Puaa (Crown)
Kealakehe (Government)
Honuaula (Government)
Auhaukeae (Government)
Kahului (Government)
Elepaio Ili no Honokohau (Government)
Lanihau 2 (Government)
Hienaloli 1 & 2 (Government)
Puaa 2 & 3 (Government)
Laula Ili i Holualoa (Government)

Kooai Ili o Holualoa 3 (Government)
Kamakaolohe Ili i Pahoehoe (Government)
Laaloa (Government)
Kaulehua Ili (Government)
Pahoehoe (Government)
Kapalaaea 2 (Government)...
[*Ka Elele Hawaii*, Iulai 14, 1848:1]

Hoa'āina (Native Tenants) Allowed To Make Claims For 'Āina They Resided on and Actively Cultivated

As the Māhele between the King and his chiefs was underway, provisions were also being established for the hoa'āina. This was manifest in the "Enabling" or "Kuleana Act" (December 21,1849) laid out the framework by which native tenants could apply for, and be granted fee-simple interest in "Kuleana" or property rights, and also confirmed their rights of access to collection of resources necessary to their life upon the land in their given ahupua'a. The Act reads:

> August 6, 1850
> An Act confirming certain resolutions of the King and Privy Council passed on the 21st day of December 1849, granting to the common people allodial titles for their own lands and house lots, and certain other privileges.
>
> Be it enacted by the Nobles and Representatives of the People of the Hawaiian Islands in Legislative Council assembled;
>
> That the following parcels which were passed by the King in Privy Council on the 21st day of December A.D. 1849 when the Legislature was not in session, be, and are hereby confirmed, and that certain other provisions be inserted, as follows:
>
> **Section 1**. Resolved. That fee simple titles, free of commutation, be and are hereby granted to all native tenants, who occupy and improve any portion of any Government land, for the land they so occupy and improve, and whose claims to said lands shall be recognized as genuine by the Land Commission; Provided, however, that the Resolution shall not extend to Konohikis or other persons having the care of Government lands or to the house lots and other lands, in which the Government have an interest, in the Districts of Honolulu, Lahaina and Hilo.
>
> **Section 2**. By and with the consent of the King and Chiefs in Privy Council assembled, it is hereby resolved, that fee simple titles free of commutation, be and are hereby granted to all native tenants who occupy and improve any lands other than those mentioned in the preceding Resolution, held by the King or any chief or Konohiki for the land they so occupy and improve. Provided however, this Resolution shall not extend to house lots or other lands situated in the Districts of Honolulu, Lahaina and Hilo.
>
> **Section 3**. Resolved that the Board of Commissioners to quiet Land titles be, and is hereby empowered to award fee simple titles in accordance with the foregoing Resolutions; to define and separate the portions belonging to different individuals; and to provide for an equitable exchange of such different portions where it can be done, so that each man's land may be by itself.
>
> **Section 4**. Resolved that a certain portion of the Government lands in each Island shall be set apart, and placed in the hands of special agents to be disposed of in lots of from one to fifty acres in fee simple to such natives as may not be otherwise

furnished with sufficient lands at a minimum price of fifty cents per acre.

Section 5. In granting to the People, their House lots in fee simple, such as are separate and distinct from their cultivated lands, the amount of land in each of said House lots shall not exceed one quarter of an acre.

Section 6. In granting to the people their cultivated grounds, or *Kalo* lands, they shall only be entitled to what they have really cultivated, and which lie in the form of cultivated lands; and not such as the people may have cultivated in different spots, with the seeming intention of enlarging their lots; nor shall they be entitled to the waste lands.

Section 7. When the Landlords have taken allodial titles to their lands the people on each of their lands shall not be deprived of the right to take firewood, *aho* cord, thatch, or ti leaf from the land on which they live, for their own private use, should they need them, but they shall not have a right to take such articles to sell for profit. They shall also inform the Landlord or his agent, and proceed with his consent. The people shall also have a right to drinking water, and running water, and the right of way. The springs of water, and running water, and roads shall be free to all should they need them, on all lands granted in fee simple. Provided that this shall not be applicable to wells and water courses which individuals have made for their own use.

Done and passed at the Council House, Honolulu this 6th day of August 1850. [copied from original hand written "Enabling Act"[83] – DLNR 2-4]

The lands awarded to the hoa'āina (*native tenants*) became known as "*Kuleana* Lands." All of the claims and awards (the Land Commission Awards or L.C.A.) were given a "Helu" or number, generally referred to as Land Commission Awards. These Helu (L.C.A.) remain in use today to identify the original owners of lands in Hawai'i.[84]

The work of the Land Commission was brought to a close on March 31, 1855. The program, directed by principles adopted on August 20, 1846, met with mixed results. In its' statement to the King, the Commissioners to Quiet Land Titles (George M. Robertson, March 31, 1855) summarized events that had transpired during the life of the Commission:

> …The first award made by the Commission was that of John Voss on the 31st March 1847… …The time originally granted to the Board for the hearing and settlement of all the land claims in the kingdom was two years, ending the fourteenth day of February, 1848.
>
> Before the expiration of that term it became evident that a longer time would be required to perform a work… Accordingly, the Legislature on the 26th day of August

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83 See also Kanawai Hoopai Karaima no ko Hawaii Pae Aina (Penal Code) 1850.

84 While on the surface, this statement is correct, over the last 175-years, layers of transposition have been added to maps and records. Thus the Real Property Tax Maps (TMK), are often erroneous, with Helu and the names of original awardees are inacurrate.

1847, passed an Act to extend the duration of the Board to the 14th of February, 1849, adding one year to the term first prescribed, not however, for the purpose of admitting fresh claims, but for the purposes of hearing, adjudicating and surveying those claims that should be presented by the 14th February, 1848. It became apparent to the Legislature of 1848 that the labors of the Land Commission had never been fully understood, nor the magnitude of the work assigned to them properly appreciated, and that it was necessary again to extend the duration of the Board. An act was accordingly passed, wisely extending the powers of the Commissioners "for such a period of time from the 14th day of February 1849, as shall be necessary for the full and faithful examination, settlement and award upon all such claims as may have been presented to said Board." ...[T]he Board appointed a number of Sub-Commissioners in various parts of the kingdom, chiefly gentlemen connected with the American Mission, who from their intelligence, knowledge of the Hawaiian language, and well-known desire to forward any work which they believed to be for the good of the people, were better calculated than any other class of men on the islands to be useful auxiliaries to the Board at Honolulu...

...During the ten months that elapsed between the constitution of the Board and the end of the year 1846, only 371 claims were received at the office; during the year 1847 only 2,460, while 8,478 came in after the first day of January 1848. To these are to be added 2,100 claims, bearing supplementary numbers, chiefly consisting of claims which had been forwarded to the Board, but lost or destroyed on the way. In the year 1851, 105 new claims were admitted, for Kuleanas in the Fort Lands of Honolulu, by order of the Legislature. The total number of claims, therefore, amounts to 13,514, of which 209 belonged to foreigners and their descendants. The original papers, as they were received at the office, were numbered and copied into the Registers of the Commission, which highly necessary part of the work entailed no small amount of labor...

...The whole number of Awards perfected by the Board up to its dissolution is 9,337, leaving an apparent balance of claims not awarded of say 4,200. Of these, at least 1,500 may be ranked as duplicates, and of the remaining 2,700 perhaps 1,500 have been rejected as bad, while of the balance some have not been prosecuted by the parties interested; many have been relinquished and given up to the Konohikis, even after surveys were procured by the Board, and hundreds of claimants have died, leaving no legal representatives. It is probable also that on account of the dilatoriness of some claimants in prosecuting their rights before the Commission, there are even now, after the great length of time which has been afforded, some perfectly good claims on the Registers of the Board, the owners of which have never taken the trouble to prove them. If there are any such, they deserve no commiseration, for every pains has been taken by the Commissioners and their agents, by means of oft repeated public notices and renewed visits to the different districts of the Islands, to afford all and every of the claimants an opportunity of securing their rights... [Minister of Interior Report, 1856:10-17]

ʻĀina Kuleana: Summary of Claims For Kuleana Made by the Hoaʻāina

One of the requirements of the Māhele for hoaʻāina was that they produce proof of their use of the lands being claimed. A careful review of claims made by native residents of the lands between Keauhou 2nd to Kaloko reveals that in the time preceding, and during the time of

registering claims, Hawaiian use of the land was ongoing in a wider area than reflected on historic and TMK maps. Indeed, of particular importance to this current study is that the number of claims for land on the kula (open lands behind the shore in reaching to the forested zone) was greater than the number of claims for other agricultural zones of Kona.

A number of hoa'āina made verbal claims which were transcribed as spoken, and others forwarded written claims to the Land Commission in order to register their claims for land. This process created the volumes of the Native and Foreign Register of Claims. The next phase of documentation was the presentation of supporting "Testimony" by individuals who were family with the applicants and the lay of their kuleana. The record of the witnesses was recorded in the volumes of the Native or Foreign Testimony. This was followed by conducting of surveys, recorded in the "Mahele Award Books," and in many cases, further confirmed by issuance of a Palapala Sila Nui (Royal Patent on Kuleana Claims).

As a part of the present study, we reviewed thousands of records from the hoa'āina which include lands between Keauhou 2nd to Kaloko to identify residency, land use, agricultural zones and crops, and access to resources claimed by applicants. *Table 2* is a summary of information recorded from the Keauhou-Kaloko region.

Table 11. Summary of Crops Identified in Māhele/Kuleana Claims

Food Plants	**Number of Citations**	**Other Plants**	**Number of Citations**
Kalo (taro)	54	Loulu (Pritchardia palms)	15
Uala/Uwala (sweet potatoes)	45	Kou (Cordia) trees	6
Niu (coconut trees)	15	Hala (pandanus)	5
Ipu (gourds)	3	Noni (Indian mulberry)	1
Maia (bananas or plantains)	3	Hau (hibiscus)	1
		Olonā (Touchardia latifolia)	2
Uhi (yams)	1		
Ulu (breadfruit)	3		

Introduced Crops	**Number of Citations**
Kope (coffee)	12
Alani (orange trees)	14
Hala kahiki (pineapple)	2
Momona (Cherimoya)	1
Pu (squash/pumpkin)	2

It should be remembered that the Māhele records are incomplete because native tenants who were living upon and working on the land were often hesitant to make personal claims for kuleana. The Hawaiian commoners had difficulty—spiritually and in practice—with the foreign notion of being able to "own" land. This naturally limited the number of tenants who came forward to apply for kuleana. Of those who did come forward, many reported that their mākua (parents) and kūpuna (grandparents or elders) had used the lands prior to their inheritance of the parcels.

Some Hoa'āina Were Reluctant to Register Claims for Kuleana

Reviewing the results of the Māhele and awarding of Kuleana, some readers might wonder, "why?" The cultural-social context in which private land title was a foreign concept was in itself a

predominant issue, but other concerns also contributed to the low response. In Kona, John Fuller was appointed land agent, and served as one of the primary surveyors of the kuleana claims. In 1853, Fuller wrote a number of letters to Land Commissioners describing difficulties he encountered in having applicants come forward. Among the problems was that some of the aliʻi, konohiki and their representatives used fear tactics to intimidate their hoaʻāina. This had implications across the region and all the Hawaiian Islands. Among the letters are the following:

The Kingdoms' policy of providing land grants to native tenants was further clarified in a communication from Interior Department Clerk, A. G. Thurston, on behalf of Keoni Ana (John Young), Minister of the Interior; to J. Fuller, Government Land Agent-Kona:

February 23, 1852

> …His Highness the Minister of the Interior instructs me to inform you that he has and does hereby appoint you to be Land Agent for the District of Kona, Hawaii.
>
> You will entertain no application for the purchase of any lands, without first receiving some part, say a fourth or fifth of the price; then the terms of sale being agreed upon between yourself and the applicant you will survey the land, and send the survey, with your report upon the same to this office, for the Approval of the Board of Finance, when your sales have been approved you will collect the balance due of the price; upon the receipt of which at this office, the Patent will be forwarded to you.
>
> Natives who have no claims before the Land Commission have no Legal rights in the soil. They are therefore to be allowed the first chance to purchase their homesteads. Those who neglect or refuse to do this, must remain dependent upon the mercy of whoever purchases the land: as those natives now are who having no kuleanas are living on lands already Patented, or belonging to Konohikis.
>
> Where lands have been granted, but not yet Patented, the natives living on the land are to have the option of buying their homesteads, and then the grant be located, provided this can be done so as not to interfere with them.
>
> No Fish Ponds are to be sold, neither any landing places.
>
> As a general thing you will charge the natives but 50 cents pr. acre, not exceeding 50 acres to any one individual.
>
> Whenever about to survey land adjoining that of private individuals, notice must be given them or their agents to be present and point out their boundaries… [Interior Department Letter Book 3:210-211]

On October 11, 1852, Fuller wrote to J. Smith (Secretary, Board of the Land Commission); Describing extent of survey work completed—including the consolidation of multiple ʻāpana into

a single parcel[85]— and also reported that Naheana or Kaheana, Konohiki of several lands in vicinity of Kailua has been "abusive." Fuller wrote:

> …He [Naheana] says his chiefs have given orders not to allow any Kuleana on their lands… …But I should like to know how to proceed with such a villain… …He has prevented quite a number from showing their Kuleanas and I leave them until Mr. Robertson or some other of the Commission come up…
>
> …Most of the claimants here have taken all their land in one piece, besides their pahale – and I must say their claims are very moderate, generally not more than from 1 to 3 acres, according to what they have planted… [DLNR s-1- Box 1]

J. Fuller, Kona Land Agent, Surveyor, to
J. H. Smith, Secretary to Board of Land Commissioners
August 5, 1853, Kona, Hawai'i

> … I am happy to inform you that I have completed the surveys of Kuleanas in this District so far as I have been able to find them. There are, however, quite a number scattered through the District which have not been pointed out to me, and a few in the neighborhood of Kailua which the Konohiki, Kaheana, prevented the people showing me. I am now making a tour through the whole district as Land Agent, and shall survey all the scattering claims which are pointed out to me… [HSA – Interior Department Land Files]
>
> It should be noted here that several Native Hawaiians in the Kona District, also submitted letters regarding the character of Fuller, claiming that he was rude and impatient with them—even asking that he be replaced as the land agent.[86]

Native Terms Found in Cited Kuleana Claims

In the translated texts that follow, native terms are used. The glossary in *Table 3*, below, provides readers with translations of various words and terms used in the Māhele claims; and that describe plants cultivated, and garden features in the study area.

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[85] This action resulted from the massive job of surveying claims for the Land Commission. Today, it provides us with some background in the difference between Register and Testimony claims with multiple 'āpana across several "wao" (environmental zones) which traditionally had been an important aspect of hoa'āina residency. The multiple 'āpana enabled residents to access lands and sustain themselves through the varying seasons of weather and the availability of wai (water) resources.

[86] See Kahookaumaha to Keoni Ana, Augate 21, 1854 (HSA-Int. Dept. Misc. Box 146).

Table 12. Glossary of Selected Hawaiian Terms Cited in Kuleana Claims

Ahupuaa Ahupuaʻa

An important sub-division of land (usually extending from a fishery to an area on the mountains), generally containing varied environmental zones and resources necessary to sustain a community. Such zones and resources were managed in smaller land parcels—among which are ʻili, kīhāpai, kula, lele, māla, moʻo and paukū— which were delineated within given ahupuaa.

Aina (ʻĀina)

General term for land, earth – that which sustains.

Aina waiho wale (ʻĀina waiho wale)

Idle land (that which was being rested or untended; also an unclaimed parcel.

Alaloa Long trail.

The main ancient trail used to provide access through the district and around the island, generally the trail situated near the shoreline (near the present day Aliʻi Drive). Sometimes, the mauka trail Ke-ala-ehu was also referred to as the ala loa.

Alani Orange trees.

Alanui A trail; in the early system of trails, one that was larger than the ala hele (local paths and accesses), yet smaller than the alaloa Alanui Aupuni – Government Road.

Alanui Aupuni

Government Road System established by law in 1848 and protected in the "Highways Act of 1892." In the context of the claims below, use of :Alanui Aupuni" might refer to both the coastal and mauka roads around the island. In many places, overlaid on the Alaloa and Kealaehu.

Alanui pii Ascending trail (i.e., trail leading to the uplands, the mauka-makai trail system which occurred in all ahupuaʻa.).

Amau (ʻAmaʼu or ʻĀmaʻumaʻu)

The Sadleria fern forest zone, a region of upland agricultural fields.

Anana A unit of measurement extending from tip of longest finger to longest finger, with arms stretched out.

Apaa (ʻĀpaʻa)

An arid area of dry land cultivation.

Apana (ʻĀpana)

Parcels or lots within given kuleana (i.e. Apana 1, Apana 2…). In texts below, ʻāpana identified on historical maps as being within the primary study area are identified by "Ap." followed by the number of the specific ʻāpana.

Eamaia (Eʻa maiʻa)

A variety of mountain banana tree.

Ili (ʻIli) Small units of land within an ahupuaʻa, often described as long narrow parcels of land that run mauka-makai, and cross several agricultural zones.

Ipu (Gourds)

Used as containers for storing valuable items, for the collection of water, for food, in ceremonial observance (particularly those associated with Lono), and as musical instruments.

Iwi aina (Iwi ʻāina)

A boundary wall, identifying any one of several features, as an ahupuaʻa boundary wall, a boundary wall of a planting area and/or the boundary between two separately held ʻāpana of land.

Iwilei A unit of measure with arm extended out from Collar bone to tip of mid-finger.

Kahakai Beach, shoreline.

Kahuahale House site.

Kalo (Taro)

Kalo served as one of the major starch foods of Hawaiians around the islands. Kalo is used in ceremonies, is a part of the Hawaiian stories of creation and birth of kānaka, and was developed into many varieties, some of which were particularly valued in the Kona district. While often thought of as being grown in loʻi Kalo (irrigated taro pond fields), the cultural record reveals that there was more kula (dryland) Kalo grown in the islands than that grown in loʻi Kalo..

Kaluulu (Kanu-ʻulu & Ka-ulu-ʻulu)

The region of ʻulu cultivation and growth. Providing an important starch food source, wood valued in making canoes and various tools; in some accounts young ʻulu branches were harvested and used in making kama (bark cloth). The canopy of ʻulu provided shade and helped retain moisture from important under-story cultigens.

Kealaehu (Ala Ehu)

The ancient upland trail that passed through the ʻāmaʻumaʻu (fern forest agricultural zone) in the vicinity of the present day Māmalahoa (Belt) Highway. It's development is associated with the reigns of Ehu and ʻUmi,

Kealakowaa (Kealakōwaʻa)

The trail on which canoes were dragged from the uplands to the shore; crosses several ahupuaʻa including Kahului to Hōlualoa.

Kihapai (Kīhāpai)

A dry land garden; cultivated areas, or patch; generally written in cited texts as "kihapai ua mahiia" (planted garden). "Kīhāpai Kalo" and "kīhāpai ʻuala (dry land taro and sweet potato fields). in the larger Kona Field System, the planting areas are often marked by walls, clearings, stone mounds, and planting pits, etc...

Ko (Kō) Sugar cane.

Koele (Kōʻele)

A parcel of land cultivated in support of the King. These parcels were held under title of the Crown or in the Kingdom Land Inventory

Konohiki Land overseer, chief or owner of the larger land division.

Kope Coffee trees.

Kou The Cordia subcordata tree.

Kula Plain or grassy flat land; generally, an area between the shoreline and lower forest zone. In the early usage, the term describes lowland agricultural fields. In the later 1800s, usage of "kula" in describing land areas was used to describe pasture land. This usage postdates claims of the Māhele, and if taken in the latter meaning changes actual forms of land use. This is particularly problematic when a Kuleana claim text reads something like "1 kula Kalo" and the later translations state, for example, "1 one taro pasture," which is leads to inaccurate or misleading descriptions of lands use.

Kuleana In the context of the Māhele, kuleana are property rights. In larger context there are several meanings, but "responsibility" is one of the important uses of the word.

Kumu In this context, Tree as in "kumu loulu."

Kupuna Ancestor, Elder. Kūpuna (Ancestors, Elders).

Lele (and ʻili lele)

A separate or detached section of an ʻili (e.g., pieces of a land parcel separated by environmental zones, but carrying the same name); may also even be a parcel of land associated with a different ahupuaʻa, and extends across various "wao" elevational zones.

Lihi A narrow strip of arable land.

Loulu Pritchardia palm.

Maia– Bananas.

Makai– Towards the sea (shoreward).

Makua Parent(s), elders.

Mala (Māla)

A dryland garden, planted field, or patch; e.g., "mala uala" (sweet potato field), "mala Kalo" (taro field).

Mau or Amau (Maʻu; cf. ʻAmaʻu above)

A damp fern region of the uplands in which cultivation occurred.

Mauka Towards the mountain (upland).

Mea ana aina (Mea ana ʻāina) Surveyor.

Niu Coconut trees.

Olona (Olonā)

An endemic Hawaiian shrub (*Touchardia latifolia*), which was used to produce extremely strong fiber for cordage and ceremonial kapa.

Pa (Pā) depending on context of documentation, use of "pa" indicates a fence, wall, enclosure, lot/parcel of land, or house lot (see "Pahale").

Paahao (Paʻahao)

Prison/Jail. Parcels of land work by convicts in public service. Paʻahao parcels were held under title of the Kingdom Land Inventory.

Pa aina (Pā ʻāina)

Land division wall (see discussion about the history of the Pā Kuakini or Great Wall in this study).

Paakai (Paʻakai)

Salt (literally, hard ocean water) sometimes identified in claims/

Pahale (Pāhale)

A house lot (also hale, kahuahale, kauhale).

Pahee (Paheʻe)

A moist (shaded) area of dry land agricultural fields.

Pahulu Land that is worn out, lying fallow to restore its productivity.

Pali A cliff.

Papipi (Pā pipi)

Cattle wall or enclosure, depending on context (see the section that discusses history of the Pā Kuakini or Great Wall). Depending on context, and written "pa pipi" it describes a cattle enclosure.

Pauku (Paukū)

A segment of land, generally a long narrow cultivated section of land, described "pauku ua mahiia" (a cultivated trip of land).

Poaha (Pōʻahā)

Thursday parcel of land worked in lieu of paying taxes. These parcels were held under title of the Kingdom Land Inventory.

Poalima (Pōʻalima)

Friday parcel of land worked in support of the chiefs. These parcels were held under title of the chiefs or in the Kingdom Land Inventory.

Pu (Pū) Squash or pumpkin.

Puhala (Pūhala)

Growth of hala (pandanus) trees.

Punawai (Pūnāwai)

A freshwater spring.

Uala (ʻUala or ʻUwala)

General name of Hawaiian sweet potatoes, one of the major crops of the Kona district and associated with the ritual of Lono. Later, "ʻuala kahiki" was the native name give ton introduced Irish potatoes.

Uhi Yams.

Ulu (ʻUlu) Breadfruit trees.

Wahi waiho wale Unused or untended land.

Excerpts from Kuleana Claims in the Ahupua‘a of Keauhou 1 & 2, Kahalu‘u, Wai‘aha-Kahului, Keahuolū-Kealakehe – by Kumu Pono Associates

Background

The claim and award narratives below are generally cited in order from South (Keauhou) to North (Kealakehe and adjoining lands). Some of the claims cite kuleana (property rights) across more than one ahupua‘a—particularly those of Ali‘i and foreign claimants. The claims also span a wide cross section of “wao” (traditional environmental zones), ranging from kai and kahakai” (ocean and shore lands) to the “ulu lā‘au,” or “mauka loa” (forest or distant uplands). The extensive use of lands across several wao as cultivating fields, residences, water resources and collection of natural resources such stone, birds and plants/trees—was integral to the long-term wellbeing and sustainability of hoa‘āina. This practice allowed the native tenants, to adjust their cultivation and residency practices based on weather and environmental conditions. As noted earlier in this section on development of the Māhele/Kuleana rights limited claimants’ ability to claim ‘āina, as the act required that they were actively living on their house lots (approximately one quarter acre), and the agricultural land claims were limited the ‘āina that were actively under cultivation (“Enabling Act”[87] – DLNR 2-4, August 6, 1850).

Because of the scope of this project spans multiple ahupua‘a, we focused on land use claims identified on historic maps within a portion of most ahupua‘a within the study area, generally in the region from the shore to c. 2,000-foot elevation. Kepā Maly, then prepared verbatim translations—in some instances excerpts of larger claims—of the identified Native/Foreign Register claim documents. We then looked through the Native/Foreign Testimony documents, preparing excerpts of the documents.[88] Also included in the “Testimony” documents are cited the boundary references/adjoining parcels as those provided documentation of neighboring residents, features and adjoining land uses, which demonstrate the extent of land use across the region at the time..

It is important to remember that additional documentation of kuleana claims exists in the notes of survey documented in the “Mahele Award Books” and in “Royal Patents” issued upon confirmation of the claims.[89] Where the cited claims include parcels identified on maps as being within the primary study zone—shore to c. 2,000-foot elevation. The ‘āpana (parcels) identified as “Ap.” (followed by a number), indicate those ‘āpana which are in the upper region of the project area. Also, the writing is at times illegible, and because the spelling of place and people names is

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87 See also Kanawai Hoopai Karaima no ko Hawaii Pae Aina (Penal Code) 1850.

88 Typically, the Register and Testimony volumes recorded the application and initial description of the kuleana claims, followed by refined descriptions and witness support of the application. Between 1848 to 1855, many of the initial applications and supporting documentation were lost in transit. As a result, some of the Kuleana cited below include only one record prior to accepting or denying the claim.

89 While it was the original intention of the Commission to issue Palapala Sila Nui (Royal Patents) on awarded claims, the monumental task of recording the Māhele and Kuleana, proved to be too much, and also extended beyond the allotted time frame for completing the commission’s work. As a result, many awards were confirmed without issuance of the Royal Patent.

inconsistent, the correct spelling may be unclear. In such cases we have used the "[?]" following the word where it is uncertain.

Regardless, a review of the claim documentation provides us with a rich and varied collection of inoa ʻāina (place names) across the landscape. *Table 4.* Is a list of names across various ahupuaʻa which we could identify through the cited documents. Some of the names occur in multiple ahupuaʻa

Table 13. Inoa ʻĀina (Place Names)

Ahupuaʻa, ʻIli, Paukū, Moʻo, Kīhāpai Found in Cited Kuleana Claims

Inoa ʻĀina	Ahupuaʻa
Ahualoa	Honokohau
Alanaio	Lanihau
Auliilii	Lanihau
Elepaio	Honokohau
Haleamahuka	Honokohau
Haleape	Keauhou
Haleokane	Keauhou
Haleokaupaku	Keauhou
Haleolai	Keauhou
Haleolono	Moeauoa, Honokohau
Halewaawaa	Kahului
Haliipalala	Keauhou, Kahaluu
Hanamauloa	Waiaha
Hanapouli	Honokohau
Hapaipapa	Kahului
Helekamahina	Kahaluu
Hokio	Kahaluu
Hopeloa	Lanihau
Hulihee	Keopu
Hulihuli	Kealakehe
Hulilau	Kahului
Ililoa	Kahaluu, Keauhou, Puapuaa
Inaimoa	Kahului
Kaaipuaa	Kahului
Kaaipuhi	Keopu
Kaaki	Kealakehe
Kaeamaia	Kealakehe
Kaeo	Honokohau
Kahea	Moeauoa
Kahuamoa	Kahaluu
Kahuki	Kahului
Kaiakeakua	Lanihau
Kaimuloa	Kahaluu
Kalamaunu	(Kailua Vicinity)
Kaloaulu	Kahaluu
Kaluaaina	Keauhou
Kaluaolena	Kahului
Kaluaoliloa	Keopu

Kaluapaa	Keopu
Kamakahonu	Lanihau
Kamuku	Kahaluu, Lanihau
Kamumu	Kahului
Kaniohale	Kealakehe
Kanuaawa	Moeauoa
Kaohia	Keauhou, Moeauoa
Kapio	Kahaluu
Kauailoa	Kahului, Waiaha
Kaulukauheana	Keauhou
Kealaehu (Alaehu)	An ancient trail attributed to Umi-a-Liloa that crosses all of the ahupuaa in the Kona District.
Kealakowaa (Alakowaa)	Kahului
Kealakupou (Kaalakupou)	Keauhou
Kealaloa (Alaloa)	A part of the ancient trail system that crosses through Kona, encircling the island.
Kihikihi	Kahaluu
Kikiaiole	Kahului
Kionalua	Keauhou
Koaie	Kahaluu
Kohekaua	Lanihau
Kohelemu	Keauhou
Koheloa	Lanihau
Kuekaa	Keauhou
Kukuihaa	Kahaluu
Kukuiokahinu	Kahaluu
Kukuimino (Kukuiomino)	Kealakehe
Kukuiominoiki	Kealakehe
Kukuiominonui	Kealakehe
Kukuipuloa	Kahului
Kumuhawane	Kahaluu, Keauhou
Kumuniu	Keauhou
Lapalua	Kahului
Lauekieleele	Keauhou
Lauhulu	Puapuaa
Laulaulahili	Keauhou
Lehuakona	Kahaluu
Luaoiliki	Kahaluu, Lanihau
Maalo	Keauhou
Maili	Keauhou, Keahuolu
Makaihuliwaa	Waiaha
Makakaualii	Keauhou
Makakiloia	Kahaluu, Kealakehe
Makolea	Kahaluu
Malaiula	Keauhou
Moelaepuni	Lanihau 2
Mokuaikaua	Keauhou
Naalapa	Kahului
Niukini	Kahului
Niukukahi	Lanihau
Niumalu	Keopu

Nuuhiwa	Honokohau
Ohiki	Kahului, Puaa
Ohuahale	Kahului
Opukaha or Opuokaha	Keauhou
Pahauopu	Kahaluu
Pahoa	Kahaluu
Pahukauila	Waiaha
Pakii (Paki)	Keauhou, Kahaluu
Pakohe	Keauhou
Pamaki	Kahaluu
Papaakoko	Honokohau
Papaawela	Lanihau
Papala	Keauhou
Papalanui	Keauhou
Papiha	Kahului
Papipi	Localities identified as the “Great Wall” in various ahupuaa, and as cattle enclosures.
Papuaa	Kahaluu, Kahului, Moeauoa, Lanihau
Papuaaiki	Kealakehe
Papuaanui	Kealakehe
Paulu	Kahaluu
Pawaalae (wahi pana)	Puaa
Pohakupalahalaha	Honokohau
Poolani	Keopu
Puakahi	Kahaluu
Punaio	Waiaha
Puuhinahina	Kahaluu
Puukehoe	Kahului
Puuki	(not named)
Puukou	Honokohau
Puukukaeke	Waiaha
Puuloa	Keauhou, Lanihau
Puunoni	Keauhou
Puohe	Kealakehe
Puuokaa	Keauhou
Puuokaliu	Lanihau, Keahuolu
Ukakoni	Honokohau
Ulumoe	Kahaluu
Umiwai (Punawai)	Kahului
Waiapuko	Kahului
Waiha	Honokohau
Waipio	Keauhou, Kahaluu

Māhele Discussion: Land Use Model in Kona

This section highlights select excerpts from the Māhele Awards Books, including Native Testimony, Native Register, and Land Commission Awards. Transcriptions and translations from original Awards Books were completed by Kumu Pono Associates; The discussions featured below were completed by Nohopapa Hawai‘i.

Kamehameha School Parcel - Keauhou Ahupua‘a

This section highlights select excerpts from the Māhele Awards Books, including Native Testimony, Native Register and Land Commission Awards. Transcriptions and translations from original Awards Books by Kumu Pono Associates. Discussions by Nohopapa Hawai‘i.

Keauhou 2 Ahupua‘a and Environs

Multiple ‘āpana under cultivation, predominantly with taro and uala, although foreign-introduced oranges and even coffee were also cultivated, and one or more walled pāhale at the shoreline typify Keauhou 2 land claims. Many claims reference lands as ancestral places traditionally occupied by members of one ‘ohana across multiple generations. A cluster of helu within the land division sit north of the Kamehameha Schools well site, at a similar 1,500 amsl elevation, and are described below:

Kukahi, Helu 7366

Kukahi issued a Native Register claim for “…a land claim and a a pahale claim on the shore,” and 20 kihapai in the ‘ili ‘āinā of Puunoni (Kukahi was awarded 2 ‘āpana in Keauhou 2 (MA: v5, p578). Native testimony issued by Kapela on behalf of Kukahi (NT v4, p653, 654) describes mauka lands in the ‘ili ‘āinā of Maili containing oranges and olonā[90] tended by Kukahi as well as “very old land” in the ‘ili ‘āinā of Kohelemu inherited from his parents and planted by his wife. Kapela goes on to describe Kukahi’s residence in Keauhou 2: “1 Apana Pahale, Mauka and all surrounding boundaries idle land. It was enclosed with a wall by him. 1 hale is his, and he resides there,” (NT v4, p653, 654). Notably, Kapela also describes the oranges and olonā as “with Kane” on February 21, 1849, evincing continuation of Hawaiian cultural beliefs and practices in Keauhou 2 during the mid-nineteenth century.

Helu 7366 (Ap. 1), Kukahi. January 23, 1848
Native Register Volume 8:430

> …Here is this, there are some planted trees, an orange tree and olona which is in another Ili aina.
>
> The Land Commissioners: Here am I, with a land claim and a pahale claim on the shore. I hereby tell you of the size of my land claim and the pahale claim. Here is the length of my land 810 long, 262 wide, from the kula to the distant uplands. Here is the length of by pahale claim,

[90] *Touchardia latifolia* – a bush with many uses cultivated primarily in wet mauka locations whose fibers were frequently crafted into cordage (Kraus 1993:27, 28).

40 long by 20 wide; Here is the name of the ili aina, Puunoni. Here is the number of my kihapai, 20.
Done by Kukahi and Kinimaka 2.
Keauhou, Kona, Hawaii.

Feb. 21, 1849
Native Testimony Volume 4:653-654

...In the ili aina of Puunoni, Keauhou 2 ahupuaa. 2 Apana aina. There in Kohelemu, 1 Apana. The boundaries are not known to me [Kapela. He [Kukahi] will make them known when the surveyor comes. They are cultivated.

Planted Apana in the ili aina of Maili. There Kukahi planted olona and oranges. He does not have them at this time, they are with Kane. I believe that he has submitted his petition for the claim, but I do not know who planted. I have seen that Kukahi is the one who cares for the oranges.

There in the ili aina of Kohelemu, 1 kumu alani, planted by his wife. This is very old land [right] from the parents in the time of Kamehameha I, and they are his at this time. No one has objected to him. There is one who opposes the planted things.

1 Apana Pahale, Mauka and all surrounding boundaries idle land. It was enclosed with a wall by him. 1 hale is his, and he resides there...[91]

13, Feby. 1852
Foreign Testimony Volume 5:89-91
Kue Konohiki (In opposition to the Konohiki)
[Note: This document is largely illegible.]

Konohiki Petition of Kukahi to the Land Commissioners for the remainder, an orange tree outside of the claim. That orange tree was spoken of in his petition. (Kapela, Witness for Kukahi)

G.L. Kapeau: Do you swear publicly and before God concerning the truth of Kukahi's claim to the orange tree in the Ili named Maili in the Ahupuaa of Keauhou, Kona, Hawaii?

Kapela, yes; Kalona, yes; Naholowaa, yes. Kapela: Maheha[?] is the konohiki...

Paiki, Helu 10734

Mahele records indicate Paiki made five Native Register claims and two were awarded, including Helu 10734 in the ʻili ʻāinā of Maili, Keauhou 2, in 1848. Native testimony issued by Kauhiahiwa W. (NT v4, p653) describes Paiki's land as cultivated, and that Paiki's kuleana tract of land served as his residence.

Feb. 21, 1849
Helu 5903 & 10734
Native Testimony Volume 4:653

[91] Helu 7366; Keauhou 2 N. Kona. 1 Ap. 0.14 Ac., Royal Patent 7044; Keauhou 2 Kona. 2 Ap. 2.37 Acs.

...In the ili aina of Maili, Keauhou 2 Ahupuaa. 5 Apana aina; 1 Apana kahuahale; also 1 Apana pahale in the ili aina of Waipio 4, Keauhou 1 Ahupuaa. 3 Apana. The boundaries are not known to me [Kauhiahiwa W.], he will show them accurately to the surveyor when he comes. The land is cultivated.
The pahale is enclosed with a wall made by him [Paiki], with 1 hale. The house is for Hoapili, and Paiki lives there. His kuleana is as a residence for him. He received the ili aina of Maili in the Yr. 1847. His interest in the ili aina of Waipio 4 was from Kanehoa in the Yr. 1848. No one has objected to him...[92]

Naholowaa, Helu 7319

In Native Register claims, Naholowaa describes their ancestral land and house lot, occupied by their kupuna and makua [parents] before them during the time of Kamehameha I in the eighteenth century (NRv8, p408). Naholowaa also claimed 11 kīhāpai (NR v8, p421). In addition to their Native Register claims (NRv8, p421), Mahele records show Naholowaa issued Native Testimony for his associates (NT v4, pp661, 662).

Jan. 10, 1848
Kahaluu, Hawaii.
Helu 6029 (Ap. 2), Nakea
& 6030, Naholowaa
Native Register Volume 8:408

Aloha to you the Land Commissioners. We hereby tell of our house lots, and old lot from olden, in the time of Kamehameha I. Our kupuna and makua have occupied it until ourselves at present. Therefore we state the size of our lot. On two sides, the length is 360 feet; on the other two sides the width is 183 feet. The circumference of four sides is 443. That is it for you to hear.

Nakea
Naholowaa

Helu 7319 (Ap. 1), Naholowaa. Keauhou. January 22, 1848
Native Register Volume 8:421

Aloha to you Land Commissioners. See my kihapai which I am thinking of taking in Alodial title. Those which are mode know below. Showing the length and width

Kihapai 1. Anana, length 100, width 16

Kihapai 2. Anana, length 33, width 11

Kihapai 3. Anana, length 34, width 14

Kihapai 4. Anana, length 73, width 23

---

[92] Helu 5903; Royal Patent 6842; Keauhou 2 Kona. 3 Ap. 5.53 Acs. (see also Helu 10734).

Kihapai 5. Anana, length 49, width 32

Kihapai 6. Anana, length 63, width 11

Kihapai 7. Anana, length 60, width 17

Kihapai 8. Anana, length 21, width 14

Kihapai 9. Anana, length 40, width 30

Kihapai 10. Anana, length 80, width 21

Kihapai 11. Anana, length 37, width 10

590 99

The combined length and width is 780. Here also is this, my house lot is 63 long by 40 wide, combined being 103.

Done by me, Naholowaa

Kahualaaumoku, Helu 5561E

In 1848, Kahualaaumoku filed Native Register claim for their house lot (NR v8, p400). Native testimony supporting Kahualaaumoku's claim was issued by Kahilo in 1849 (NT v4, p662). Kahilo describes Kahualaaumoku's house lot in the 'ili 'āinā of Pakohe as cultivated lands consisting of "2 Apana aina, and 2 Apana Pahale," which host Kahualaaumoku's residence and is planted with "…1 Niu and I Kou…" (NT v4, p662). Kahilo notes the presence of four additional trees in another lot.

January 17, 1848
Helu 5785, Kahualaaumoku. Keauhou 2
Native Register Volume 8:400

Aloha to you Z. Kaauwai and all the esteemed Land Commissioners. Here is my claim the lot and my hale. That is my claim.

By Kahualaaumoku

Feb. 22, 1849
Keahualaaumoku
Native Testimony Volume 4:662

…In the ili aina of Pakohe, Keauhou 2 Ahupuaa. 2 Apana aina, and 2 Apana Pahale. The boundaries are not known to me [Kahilo]. He [Keahualaaumoku] will accurately make them known to the surveyor when he comes. They are cultivated.

The pahale in enclosed with a wall. 1 hale is for him, also 4 kumu are in another lot. 1 Niu, also 1 Kou planted by him. It is and old land right from the time of Kamehameha I. No one has objected...[93]

At least twenty additional helu cluster ma kai of the Kamehameha Schools well site, at an elevation of between 750 and 1400 amsl, and are discussed below:

Keao, Helu 7484

Keao issued a land claim for

January 22, 1848 Helu 7484, Keao. Kona, Hawaii
Native Register Volume 8:443-444

Hear ye, o Land Commissioners: I hereby explain to you size of my Kihapai, there are 15, here is the length 1061,that I have a total of 15 kihapai. The length is 1061, the combined width is 168. Finished. Aloha to all you Commissioners.

By Keao
Keauhou 2

Kapahu, Helu 7485

Kapahau issued a land claim for an entire ili in Keauhou 2.

January 23, 1848
Helu 7485, Kapahu. Kona, Hawaii
Native Register Volume 8:444

Hear ye, o Land Commissioners. I hereby explain my land claim for an entire ili. The head (top) of the land is from Kaneaa to Ulalena, which is the tail (bottom) of the land. Finished. Aloha to all of you.

Done by me, Kapahu
Keauhou 2

Ki, Helu 5561 I

Native testimony issued in favor of Ki's claim (NT v8, p641) describes their ʻāpana parcel in the ʻili ʻāinā of Puuloa, and also states the land was given to them the year prior by Kalalakoa.

Helu 5561I, Ki
Native Testimony Volume 8:641

[93] Helu 5785: Keauhou 2 N. Kona. 2 Ap. 4.42 Acs.

An Apana parcel with 4 kihapai Kalo and uala in the ili of Puuloa, Keauhou. Given to him by Kalalakoa in the Yr. 1846. No one objected to him.[94]

Kahilo, Helu 5561 H

Mahele records show that Kahilo's pāhale, located in the ʻili ʻāinā of Pakohe, Keauhou 2, was given to them by their parents in 1819. They cultivated kalo and sweet potatoes on their ʻāpana parcels also located in Keauhou 2.

Helu 5561H (Ap. 1), Kahilo
Native Testimony Volume 8:641

...Apana 1., Ili of Haleolai, Keauhou 2 Ahup. Given by Kaikuahine in the Yr. 1846.

Apana 2. 8 Kihapai Kalo & uala, at Ililoa, Keauhou 2. Gotten from Kaikuahine in Yr. 1846.

Apana 3. Pahale in the ili of Pakohe, Keauhou 2. Gotten from his parents the Yr. 1819. No one has objected.[95]

Kauihana, Helu 5561 K

Kauihana claimed 5 kīhāpai growing taro and sweet potatoes located in the ʻili ʻāinā of Haleokaupaku, Keauhou 2. They note they received the lands from Kaikuahine in 1839.

Helu 5561K (Ap. 1, 2), Kalalakoa
Native Testimony Volume 8:641

...5 Kihapai Kalo & uala in the ili of Haleokaupaku, Keauhou 2 Ahupuaa.

It was from Kaikuahine in the Yr. 1839. No one objected.[96]

Kapela, Helu 5786

Kapela issued a claim for their house lot in Keauhou 2. Testimony supporting their claim (NT v4, p662) indicates their pāhale and additional cultivated lands were located in the ʻili ʻāinā of Puuloa, Keauhou 2.

Helu 5786 (Ap. 1), Kapela. Keauhou
Native Register Volume 8:400

Hear year ye, Kaauwai and Keoni Ii. I hereby petition you two, the Ministers of the King, for my house lot.

By Kapela

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94 Helu 5516I; Keauhou 2 N. Kona; 1 Ap. 0.5 Ac.; Keauhou 2. 1 Ap. 4.85 Acs.
95 Helu 5561H; Royal Patent 7757; Keauhou Kona. 2 Ap. 3.07 Acs.
96 Helu 5561K; Royal Patent 3741; Keauhou N. Kona. 2 Ap. 4.86 Acs.

Feb. 22, 1849
Helu 5786 & 7482
Native Testimony Volume 4:662

> ...In the ili aina of Puuloa, Keauhou 2 Ahupuaa. 3 Apana. In the ili aina of Pakohe, 1 Apana is a lele. 1 Apana pahale. The boundaries are not known to me [Kahilo]. He [Kapela] will show the correct boundaries to the surveyor when he comes. The are cultivated.

Keohoaeae, Helu 7365

Keohoaeae's land claim describes a land division extending "from the kula to the distant uplands," (NR v8, p429-430) as well as a coastal pāhale and a land claim in a flat place called "Nuuanu" in Ililoa, Keauhou 2.

September 23, 1847
Helu 7365 (Ap. 1, 3), Keohoaeae
Native Register Volume 8:429-430

> Here is my land claim. The length is 910 from the kula to the distant uplands. Here is the width, one is 5 one is 7, one is 9 one is 10, , and the width is 5 in part, 7 in another part, 9 in another part, 10, 6 different places. Some are less in width. Here also is this, my pahale claim on the shore. It is 35 long, by 23 wide There is also a land claim on this papa [flat area], named Nuuanu. The moo aina is Ililoa.
>
> Done by me, Keohoaeae
> Keauhou 2, Kona, Hawaii

Kapela, Helu 9698

Land claim records indicate Kapela grew taro and oranges on their lands in Keauhou 2.

January 18, 1848
Helu 9698 (Ap. 2), Kapela, Keauhou
Native Register Volume 8:467

> Greetings to the Esteemed Land Commissioners. 3 kihapai Kalo, 3 kumu alani.
>
> By Kapela

Moa, Helu 10260

Moa issued land claims for their coastal pāhale as well as mauka lands "from the kula to the distant uplands," (NR v8, p476) as well as 22 kīhāpai in the ʻili ʻāinā of Kumuniu.

Jan. 24, 1848
Helu 10260, Moa. Keauhou 2, Kona, Hawaii
Native Register Volume 8:476

> Here is my land claim and my pahale claims. I tell you the size of my land, a claimant of land and a house lot at the seashore, hereby state the size of my land. The length is 100.008 [?], 263 from the kula to the distant uplands. Here is the number of my kihapai, 22. Also, the

pahale. Here is the size of the pahale, 30 long, 21 wide. Here is the name of the ili aina, Kumuniu.

Done by Moa.

Keahualaaumoku, Helu 5785

Kahualaaumoku claimed 2 pāhale, at least one of which was walled, and 2 additional ʻāpana in the ʻili ʻāinā of Pakohe, Keauhou 2. Niu and Kou trees grew on an additional ʻāpana.

January 17, 1848
Helu 5785, Kahualaaumoku. Keauhou 2
Native Register Volume 8:400

Aloha to you Z. Kaauwai and all the esteemed Land Commissioners. Here is my claim the lot and my hale. That is my claim.

By Kahualaaumoku

Feb. 22, 1849
Keahualaaumoku
Native Testimony Volume 4:662

…In the ili aina of Pakohe, Keauhou 2 Ahupuaa. 2 Apana aina, and 2 Apana Pahale. The boundaries are not known to me [Kahilo]. He [Keahualaaumoku] will accurately make them known to the surveyor when he comes. They are cultivated.

The pahale in enclosed with a wall. 1 hale is for him, also 4 kumu are in another lot. 1 Niu, also 1 Kou planted by him. It is and old land right from the time of Kamehameha I. No one has objected…[97]

Kahililoa, Helu 7320

Kahililoa claimed six kīhāpai as well as one pāhale in Keauhou 2.

January 20, 1848
Helu 7320, Kahililoa
Native Register Volume 8:421-422

Hear ye, o Land Commissioners. That you may know about my kihapai, which I desire to have Alodial title to. They are known below, showing the length and the width

Kihapai 1. Anana length, 47, width 10

Kihapai 2. Anana length, 36, width 12

---

97 Helu 5785: Keauhou 2 N. Kona. 2 Ap. 4.42 Acs.

Kihapai 3. Anana length, 50, width 16

Kihapai 4. Anana length, 54, width 12

Kihapai 5. Anana length, 84, width 12

Kihapai 6. Anana length, 74, width 16

Here also is my pahale, 28 long by 8 wide, a total of 36 anana.

By Kahililoa

Summary in Brief

Hawaiian primary source historical records contained in the Native Testimony, Native Register, and Buke Mahele mention or are indicative of cultural resources and practices associated with the ahupuaʻa of Keauhou 2, site of the Kamehameha Schools well acquisition, Keauhou 1, and Keauhou (Table 14 through Table 19). Keauhou 2 contained pāhale and kīhāpai used to cultivate unspecified crops as well as kalo and uala. Alongside kalo and ʻuala, Hawaiians cultivate niu, olona, Loulu, Kou, Alani, and Kope in Keauhou 2. Significantly less cultural resources are mentioned in the neighboring land division of Keauhou 1, which seemed to predominantly host kīhāpai kalo and ʻuala. Of the land divisions surveyed, the richest array of cultural resources and practices is recorded for Keauhou. Kalo, uala, and foreign-introduced kope were prevalent cultivars, alongside uhi and ipu. Flowers and forest resources are also referenced.

Table 14. Cultural Resources Recorded in Mahele Records for Keauhou 2 Ahupuaʻa*

Cultural Resource	Use	Number of Citations**
Canoe Plants (Indigenous)		
Kalo (taro)	Food, medicine, spiritual	4
Uala/Uwala (sweet potatoes)	Food, medicine	5
Niu (coconut trees)	Food, medicine, utensils, cordage (see Krauss 1993:27)	1
Olonā (*Touchardia latifolia*)	Food, medicine, cordage (see Krauss 1993:27)	1
Other Plants (Indigenous and Endemic)		
Loulu (*Pritchardia spp.* palm trees)	Cordage (see Krauss 1993:27)	2
Kou (*Cordia subcordata*) trees	A dry land garden; cultivated areas, or patch	4
Foreign-introduced Crops		
Kope (coffee)	Food	1
Alani (orange trees)	Food	3

*Includes Native Testimony, Native Register, and Buke Mahele
**Denotes the mention of a resource or practice *not* amounts recorded

Table 15. Cultural Practices Recorded in Mahele Records for Keauhou 2 Ahupuaʻa*

Cultural Practice	Definition	Number of Citations**
Mala (Māla) kalo	A dryland garden, planted field, or patch of taro	1
Mala (Māla) uala	A dryland garden, planted field, or patch of sweet potatoes	1
Pahale (Pāhale)	House lot	9
Kihapai (Kīhāpai)	A dry land garden; cultivated areas, or patch; crop unspecified	4
Kihapai (Kīhāpai) kalo	A dry land garden; cultivated areas, or patch of taro	5
Kihapai (Kīhāpai) uala	A dry land garden; cultivated areas, or patch of sweet potatoes	6
ʻĀpana ʻĀinā	Parcels or lots within given kuleana tract of land	11

*Includes Native Testimony, Native Register, and Buke Mahele
**Denotes the mention of a resource or practice *not* amounts recorded

Table 16. Cultural Resources Recorded in Mahele Records for Keauhou 1 Ahupuaʻa*

Cultural Resource	Use	Number of Citations**
Canoe Plants (Indigenous)		
Kalo (taro)	Food, medicine, spiritual	1
Uala/Uwala (sweet potatoes)	Food, medicine	1
Other Plants (Indigenous and Endemic) - none		
Foreign-introduced Crops - none		

*Includes Native Testimony, Native Register, and Buke Mahele
**Denotes the mention of a resource or practice *not* amounts recorded

Table 17. Cultural Practices Recorded in Mahele Records for Keauhou 1 Ahupuaʻa

Cultural Practice	Definition	Number of Citations*
Mala (Māla) kalo	A dryland garden, planted field, or patch of taro	1
Mala (Māla) uala	A dryland garden, planted field, or patch of sweet potatoes	1
Pahale (Pāhale)	House lot	13
Kihapai (Kīhāpai)	A dry land garden; cultivated areas, or patch; crop unspecified	8
Kihapai (Kīhāpai) kalo	A dry land garden; cultivated areas, or patch of taro	1
ʻĀpana ʻĀinā	Parcels or lots within given kuleana tract of land	37

* Includes Native Testimony, Native Register, and Buke Mahele

**Denotes the mention of a resource or practice *not* amounts recorded

Table 18. Cultural Resources Recorded in Mahele Records for Keauhou Ahupua'a*

Cultural Resource	Use	Number of Citations**
Canoe Plants (Indigenous)		
Kalo (taro)	Food, medicine, spiritual	8
Uala/Uwala (sweet potatoes)	Food, medicine	8
Uhi (yams)	Food, medicine	1
Ipu (gourds)	Food, medicine, utensils	1
Niu (coconut trees)	Food, medicine, utensils, cordage (see Krauss 1993:27)	3
Noni (Indian mulberry)	Medicine	1
Lauhala	Arts and crafts; charcoal; sails	1
Other Plants (Indigenous and Endemic)		
Loulu (*Pritchardia spp.* palm trees)	Cordage (see Krauss 1993:27)	2
Kou (*Cordia subcordata*) trees	A dry land garden; cultivated areas, or patch	4
Pu	Squash or pumpkin	2
Puhala (hala)	Crafts, cordage (see Krauss 1993:27)	1
Flowers, generally	Arts and crafts, medicine	1
Forest zone	Array of associated cultural uses	1
Foreign-introduced Crops		
Kope (coffee)	Food	5
Alani (orange trees)	Food	4
Hala kahiki (pineapple)	Food	2

* Includes Native Testimony, Native Register, and Buke Mahele
**Denotes the mention of a resource or practice *not* amounts recorded

Table 19. Cultural Practices Recorded in Mahele Records for Keauhou Ahupua'a*

Cultural Practice	Definition	Number of Citations**
Mala (Māla) uala	A dryland garden, planted field, or patch of sweet potatoes	8
Mala (Māla) kope	A dryland garden, planted field, or patch of coffee	5
Mala (Māla) kalo	A dryland garden, planted field, or patch of taro	6
Mauka kalo	Mountain kalo – mauka cultivation area	4
Mala (Māla) ipu	A dryland garden, planted field, or patch of gourds	1
Mala (Māla) uhi	A dryland garden, planted field, or patch of yams	1
Mala (Māla) pu	A dryland garden, planted field, or patch of squash or pumpkin	3

Pahale (Pāhale)	House lot	17
Kihapai (Kīhāpai)	A dry land garden; cultivated areas, or patch; crop unspecified	13
Kihapai (Kīhāpai) kalo	A dry land garden; cultivated areas, or patch of taro	1
ʻĀpana ʻĀinā	Parcels or lots within given kuleana tract of land	23
Forest zone	Array of associated cultural practices, including gathering and access, affiliated with this place	1

* Includes Native Testimony, Native Register, and Buke Mahele
**Denotes the mention of a resource or practice *not* amounts recorded

The Gianulias Parcel – Ahupua‘a of Puaa, Wai‘aha, Kahului, and Puapua‘a

This section highlights select excerpts from the Māhele Awards Books, including Native Testimony, Native Register and Land Commission Awards. Transcriptions and translations from original Awards Books by Kumu Pono Associates. Discussions by Nohopapa Hawai‘i. Awards are discussed from north to south across the ahupua‘a of Pua, Wai‘aha 1 and 2, Kahului 1 and 2, and Puapuaa

Puaa 3 Ahupua‘a

Kahuakailoa, Helu 7077 (Ap. 1)
makai

Kaiwikui, Helu 7081 (Ap.1)
makai

Makai, Helu 10266 (Ap. 1)
makai

Kalae, Helu 7481 (Ap. 1)
makai

Kanakamakua, Helu 6241 (Ap.1)

Kanakamakua claimed 2 parcels, a pahale that was taken by the konohiki, at the coast, and an upland cultivated parcel. He was awarded just the one ‘āpana in the uplands, a pauku aina. It is in the ‘ili of Kamuku, an upland ‘ili that spans some distance across many cultivated kuleana.

According to the Native Testimony (NT / FT: v8, p675) Kanakamakua did **not** live on his upland kuleana award, it is noted that the Konohiki Makai too his land because of a fence built on the Labor Days. Labor days were also mentioned in Kapae‘s claim in Kahului 2 Ahupua‘a (Helu 7073) where he managed labor days at the behest of the konohiki, probably Makai.

Native Register Volume 5:266, January 25, 1848, Kailua

> Aloha to you the Land Commissioners. I have a little ili at Puaa, the land of Makai, adjoins on the North by the ili aina of Kanakaloa, and on the South it adjoins the ili aina of Nakipi.
>
> Here also is this, I have a Pahale, which taken by the konohiki and he has built his house there. That pahale is in Puaa. I lived on that lot from olden times, and my house destroyed by fire. Then the konohiki took my lot.
>
> By Kanakamakua

Native/Foreign Testimony Volume 8:675

> ...It is an Ili called Kamuku in the Ahupuaa of Puaa 3, Kona. Clt does not live on it at present. His house lot was taken from him by Makai, a konohiki in 1849. Claimant has not cultivated any of this land since. The House Lot was taken away

because the fence was built on the Labor Days.[98]

Laumaawe, Helu 6699 (Ap. 1, 2)

Laumaawe claims two parcels (NR: v8, p413-414and is awarded two parcels; Ap.1 in uplands and Ap.2 pahale at coast.

Iwaiwa, Helu 6181 (Ap. 1)

Iwaiwa claims a pāhale and cultivated lands in the uplands in the ʻili ʻāina of Kamuku (VR: v8, p188-189). His claim is supported in testimony that it was inherited through his parents, in 1819 (NT: v8, p649).

Native Register Volume 8:188-189, January 26, 1848, Kailua

> Aloha to you the Land Commissioners. I hereby state my claims, in accordance with your directions. They are in the Ahupuaa of Puaa, 3 ili aina, of Kamuku and Waiaha Ahupuaa, Kamuku I and Kamuku II. The length of the right of the Kamuku, and Waiaha is from A. Bishop, Preacher, and then it was left to Dr. Andrews and I was the man who lived here. The length of this right at Kamuku Ili in Puaa Ahupuaa , it was from the time of Kahahana, mother of Kahonu.
>
> There is also a pahale claim there, which is 13 anana long by 7 anana wide.
>
> By Iwaiwa w.
> Kauka k.

Native Testimony Volume 8:649, January 12, 1850

> ...His Apana is in the Ili of Kamuku in Puaa 3. It was from his parents in 1819, and long before then. No one has objected to him.99

Kaholo, Helu 4070 B (Ap. 1)

Kaholo claimed and was awarded 1 ʻāpana, a cultivated upland (BM: v8, p644)

Native Testimony Volume 8: 651

> Kaiwikuia, Sworn... .... His apa is in the Ili of Kamuku, Puaa 3 Ahupuaa. It was I who gave it to him in the Yr. 1840. No one objected to him.
>
> Boundaries of the land are surrounded by the land of the Konohiki.[100]

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98 Helu 6241; Royal Patent 8071; Puaa 3 N. Kona. 1 Ap. 1.35 Acs.
99 Helu 6181; Royal Patent 8031 & 8034 Puaa 3 Kona. 1 Ap. 1.56 Acs.
100 Helu 4070B; Royal Patent 3742, XX Royal Patent 5503, Kamuku in Puaa 3 N. Kona. 1 Ap. .75 Acs.

Wai‘aha 1 Ahupua‘a

Kalama, Helu 7241 B (Ap.1)

Kalama was only awarded a single ‘āpana, although he claimed pauku aina abutting the papipi in the uplands. Most claimants who only received one ‘āpana but claimed two, generally were granted their upland claim. Kalama‘s case is unusual in that he was only awarded his makai pahale claim and not his cultivated upland claim. The name of the ‘ili ‘āina is given in the Native Testimony (NT: v4, p514) but we could not make it out.

Wai‘aha 2 Ahupua‘a

Kanahele, Helu 6402 (Ap. 1, 2)

Kanahele claims land that is in and mauka of the current Gianulias subject parcel. His pahale, per Native Testimony (NT 1849: v4, p555), below, is mauka, as are two pauku aina he cultivated. He claimed and was awarded these two ‘āpana. Based on Māhele claims, testimony, and awards Kanahele did not have any makai parcels and he lived and farmed mauka of the ala nui and the pā pipi.

According to Kalama, Kanahele‘s ‘āpana was bounded to the west by Waikii spring, south by Kahului I, north by Waiahanui and east by mountain banana (Ea maia). Kalama also testified for Kaulua and described one of his mauka parcels as also being bounded makai by Waikii Spring (Awards Books-Native Testimony: v4, p514).

Native Register Volume 8:413

> Aloha to you the Land Commissioners. I have a pauku land far mauka, which is occupied at present, a firmly established right of residency. There is no kula, nor any middle parcel. My pauku land is only mauka. It is 400 long on the north, and the same on the south, to the east it is 40, and on the west, 40. On the north is Waiahanui, on the south is Kahului, This claim is for you to hear.
>
> Done by Kanahele
> Kona, Kailua, Waiaha.

Native Testimony Volume 4:555, January 9, 1849

> Kalama Sworn… There in the Ahupuaa of Waiaha, 1 pauku aina.
>
> Mauka by Maiahuna, Ea maia (mountain banana), Kau by Kahului I aina, Makai by Waikii punawai, Kohala by Waiaha nui. 1 cultivated pauku aina. 2 hale for him and he resides there.
>
> Land from Kaanehe in the Yr. 1846. No objections to him.[101]

[101] Helu 6402; Royal Patent 5214; Waiaha 2 N. Kona. 2 Ap. 1.7 Acs.

Liawahine, Helu 7912C (Ap.1 of 1)

Liawahine only claimed one ʻāpana, mauka of the uka ala nui and papipi, next to Kaanehe‘s Ap.1 and Kaniu‘s Ap.1. He also did not specify what the land use was. However, in Kekipi's testimony for Kaanehe‘s makai pahale claim (NT: v4, p533-534), Kekipi indicates that there are three houses on Kaanehe‘s pahale (LCA 7913 Ap.4), and one of them is Kaliawahine‘s. So, we know Kaliawahine lived at the coast and likely the claimed parcel awarded as LCA 7912C was a cultivated pauku aina, as was Kaanehe‘s adjoining mauka lot.

Two of Liawahine‘s neighbors testified (Native Register) that their lands were given to them by Liawahine (also Kaliawahine); including one of the houses in Kaanehe‘s pahale claim at the coast and one of his pauku ʻāina that is mauka in the ʻili ʻāina of Kamuku 2 (NT: v4, p533-534) given to him in the time of Kuakini; and Kaniu‘s only ʻāpana (LCA 7912) given to him in 1839 (Awards Book, NT v8, p649).

Native Testimony Volume 8:649

> Kaniu and Lumaawe, sworn… …His Apana is in the Ili of Hanamauloa, Waiaha 2 Ahp.
>
> Kaaea gave it to him on the Yr. 1824. No one objected to him. The boundaries are surrounded by the land of the Konohiki.102

Kaanehe, Helu 7913

At Kaanehe‘s makai parcel he identified 3 houses, one belonging to himself, one to Kaliawahine (Liawahine) who only claimed a mauka pauku and one house to Kaaweha. In the Native Register Kaanehe claims entire ʻili ʻāina, which are explained as portions of ʻili ʻāina in the Native Testimony. Kaanehe has significant land holdings mauka and makai in a wai abundant area of Kona, including a pahale at the coast that neighbors a pūnāwai. Kaanehe also gave mauka lands in Waiaha to Kanahele (LCA 6402), in 1846 (Native Testimony by Kalama for Kanahele, NT:1849: v4, p555). It is likely given his claims, awards, and gifting of lands to Kanahele that Kaanehe was an aliʻi, although not *the* named konohiki of the area.

Native Register Volume 8:453, Kailua, January 31, 1848

> Aloha to you the land commissioner. I hereby tell you about by pahale claim, it is there makai in Waiaha 2, Ahupuaa; the length and with is 91 anana. My lands claim is also in this ahupuaa mentioned above. Two ili aina, Pahukauila is one, and Kamuku a is the other. The ili lands are not fully cultivated. The boundaries of this ili are Hanamauloa on the north, Kamuku 2 on the south, Paupuhi on the west and Makaihuliwaa on the east.
>
> Kaanehe.

Native Testimony Volume 4:533-534, 29, Dec. 1848

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102 Helu 7912C; Waiaha 2, N. Kona. 1 Ap. 1.3 Acs.

Kekipi Sworn… There in the ili aina of Pahukauila, Waiaha ahupuaa (There was an error by including the whole ili in claim), the place he cultivated is correct.

1. Mauka by Konohiki, Kau by ili aina of Kauailoa, Makai by the pa pipi, Kohala by the ili aina of Hanamauloa. 1 pauku aina.

2. Mauka by Konohiki, Kau by ili aina of Kamuku, Makai by Konohiki, Kohala by ili aina of Hanamauloa. 1 cultivated pauku aina

3. At Kaluulu. Mauka by konohiki, Kau by ili aina of Kamuku 1, Makai by Konohiki, Kohala by ili aina of Hanamauloa. 1 cultivated pauku aina.

4. Mauka by konohiki, Kau by Kamuku 2, Makai by konohiki, Kohala by ili aina of Hanamauloa. 1 cultivated pauku aina.

5. Mauka by konohiki, Kau by Kauailoa ili Makai by konohiki, Kohala by ili aina of Hanamauloa. 1 cultivated pauku aina.

6. In the ili aina of Kamuku 2. Mauka by konohiki, Kau by ili aina of Kauailoa, Makai by konohiki, Kohala by Kamuku 1. One cultivated pauku aina. His interest was from Kaliawahine in the time of Kuakini on Hawaii. NO one has objected to him.

7. Pahale. Mauka by the Alanui Aupuni, Kau by Kaulua's lot, Makai by kahakai, Kohala by a punawai (spring). He has enclosed it with a wall. There are 3 houses. 1 hale for Kaanehe. One house is from Kaliawahine. One hale is from Kaaweha. It is only a house claim for Kaaweha and Kaliawahine. It is a true claim for Kaanehe…[103]

Kaniu Helu 7912 (Ap. 1 of 1)

Kaniu's claim and Land Commission Award do not give any clues to land use. Like his mauka neighbor Kanahele, Kaniu only has mauka lands in his claim. He was given his lands in 1839 by his neighbor to the north (LCA 7912C) Liawahine.

Native Register Volume 8:514, January 31, 1848, Kailua

Aloha to you the Land Commissioners. I hereby state my land claim there in the ahupuaa of Waiaha 2. Kauwiloa is the name of the ili aina. The boundaries of this ili aina are, Pahukauila on the north; Halewaawaa on the south; Punaio on the west; and Makaihuliwaa on the east.

By Kaniu

[103] Helu 7913; Royal Patent 5221; Waiaha 2 N. Kona. 1 Ap. 2.1 Acs; Royal Patent 7815; Waiaha 2 N. Kona. 3 Ap. 1.02 Acs; Waiaha 2 N. Kona.1 Ap. 565 anana. (Note: this Kuleana includes a portion of the Waiaha, Kona Inn Water Tank parcels.)

> Liawahine & Lumaawe, Sworn… His Apana is in the Ili of Kauailoa in Waiaha 2 Ahupuaa.
>
> It was given to him by Liawahine in the Yr. 1839.[104]

Kahului 1 Ahupuaʻa

Unlike Waiaha, most of the kuleana LCA awarded in Kahului are single ʻāpana that consist, per the Native Register claims, of cultivated lands, but not pahale. It is likely some mahiʻai lived in the uplands, and more likely many of these makaʻāināna also had houses at the coast, but were unclaimed. In several pahale coastal claims, descriptions in the Testimonies support the kuleana pahale claim, while describing multiple houses on the claim, and sometimes naming the people who lived in those hale. The same is true in Waiʻaha Ahupuaʻa claims. It is clear there is a strong connection mauka to makai and across ahupuaʻa in the uplands.

Kaulua, Helu 7083 (Ap. 1 of 1)

Kaulua claims in the Native Register (NR: v8, p418) a pahale at the coast in the ahupuaʻa of Kahului 1 which is the sole ʻāpana he was awarded in LCA 7083 (MA: v7, p324). However, Kaulua also claims at least seven kihapai in the uplands, like many claims in neighboring Waiaha, he describe them as being bounded on the maikai side by the pa pipi, which ran just north of the ala loa, or modern day Mamalahoa Hwy. Kalama testified on behalf of Kauluaʻs claim, and elaborated on the claim. Kalama confirms that in 1848 Kaulua received his pahale, just makai of the coastal ala nui in Kahului (NT: v4, p513-514). Kalama goes on to describe at least six kihapai in the uplands of Kahului that were cultivated by kaulua (NT: v4, p514)

Kalama describes the pūnāwai if Waikii as being makai of Kauluaʻs mauka claim (NT: v4, p514). Kalama also testified for an awarded claim for Kanahele (NT: v4, p555), describing Waikii spring as being to the west. It was likely at least one kihapai of Kauluaʻs was near the Waiaha border beside LCA6402 Ap.1; unawarded, it was subsumed by the konohiki LCA 8516 B to Kamaikui (MA: v3, p63-66, Part 2)

Nalawaia, Helu 10374 (Ap. 1, 2)

Nalawaia was awarded both of the ʻāpana he claimed (NR: v8, p479-480). He was awarded a pahale at the coast, makai of the "Alanui Kohala" and a large pauku aina cultivated mauka of the "Kealakowaa", or Mamalahoa Hwy today. However, Nalawaia had claimed more cultivated lands un the uplands he was not awarded, at least 2 additional ʻāpana.

Maliu, gave a sworn account for the Native Testimony of Nalawaiaʻs claim. He names the ʻili ʻāina of the makai parcel (Ap.2) as Halewaawaa (NT: v4, p529-530) he also named the mauka ala loa "Kealakowaa" which speaks to waʻa, from tree to coast as a practice impressed on the naming of the wahi of Kahului. He supports Nalawaia's mauka and makai claims in some detail. Maliu

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[104] Helu 7912; Royal Patent 7923; Waiaha 2 Kona. 1 Ap. 1.2 Acs.

explains that, like other makai parcels, Nalawaia's pahale has two houses on it, one for Nalawaia himself and one for Kalou.

> *Native Register Volume 8:479-480, January 24, 1848, Kailua*
>
> Aloha to you the Land Commissioners. I hereby tell you of pahale claim. It is makai in the ahupuaa of Kahului 1. It is 30 anana long by 28 anana wide, and it was given me in the entirety by the one who had the lot in 1848. My land claim is in the ahupuaa as above. The pauku lands are as follows: Mauka of the Papipi, 400 anana long, and the width is 20 anana. A Pauku of land above the Kaluulu,, the length being 220 anana, and the width 15 anana. A Pauku of land mauka of Kealaloa, the length is 280 anana and the width is 17 anana. The boundaries of these pauku lands are Kauailoa on the North Naalapa on the South, the Papipi on the west, and Kaalapahu on the east.
>
> By Nalawaia
>
> *Native Testimony Volume 4:529-530, December 29, 1848*
>
> ...There in the ili aina of Halewaawaa, Kahului ahupuaa.
>
> 1. Mauka by Hapaipapa, Kau by Naalapa ili aina, Makai by the pa aina, Kohala by Kauailoa ili aina. 1 cultivated pauku.
>
> 2. Kaluulu [upland agricultural field]. Mauka by the Alanui of Kealakowaa, Kau by Naalapa ili aina, Makai by Ahuakahewa land, Kohala by Kauailoa land. 1 partially cultivated pauku aina. No hale.
>
> 3. Mauka by Kaalapahee [?] land, Kau by Naalapa ili aina, Makai by the alaloa, highway Kohala by Kauailoa. 1 cultivated pauku aina.
>
> 4. Pahale. Mauka by wahi waiho wale (idle land), Kau by Kalawa's lot, Makai by the Alanui, Kohala by wahi waiho wale. It is enclosed with a wall made by Maliu. 2 hale, 1 hale for Nalawaia, and 1 hale for Kalou, It is a true kuleana for Nalawaia, and he resided there.
>
> It is and old land (right) received from Kamehameha by Nalawaia to this time. His hale was from Maliu in the Year 1848. No one has objected.
>
> Maliu, Sworn, He has given his kulana lot interest by me in 1848. In the nature as a younger sibling [or male cousin]... I have no intentions to object...[105]

Kialoa, 7350 (Ap. 1)

Kialoa claimed a contiguous parcel of cultivated kihapai that extended from below Mamalahoa Hwy across the Mamalahoa, mauka and beyond the "Great Wall" which was likely the pa pipi.

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[105] Helu 10374; Kahului 1 N. Kona. 2 Ap. 2.97 Acs.

However, Kialoa was only awarded his lands below the ala loa. The mauka unawarded portion of Kialoa's lands are part of the study area. Ipunui gave testimony describing
15 patches partly in cultivation" (NT: v8, p671)

Native Register Volume 8:262, January 24, 1848

> For the Land Commissioners. Here is my claim for land at Kahului akahi (1st), a kihapai. On the East, 20 anana, on the West 20 anana, on the South 130 anana, on the North 130 anana.
>
> A kihapai in Kaapaa [the apaa zone]. East 6 anana, West and 6, the Southern boundary 60 anana, the Northern boundary, 60 anana
>
> A kihapai in Kauluulu. East, 12 anana, West, 12 anana, Southern boundary 60 anana, Northern boundary 60 anana.
>
> Kihapai on Kula. East, 15 anana, West, 15 anana, Southern boundary 180 anana, Northern boundary 180 anana.
>
> Those are my kihapai that are applied for.
>
> By Kialoa
> Niumalu, Kailua, Kona, Hawaii

Native/Foreign Testimony Volume 8:671

> Ipunui, sworn says, he knows the claim of Kialoa in Kahului, Kona. It consists of 15 patches partly in cultivation. They all lie together in one piece. Claimant derived the land from the Konohiki in 1844 and has held it ever since without dispute. This piece is intersected by the Road.
>
> Clt has also 14 patches in another piece makai of the first piece. It is bounded On Kohala side by Niniha's land. On Kau side by Nalima's land. Mauka by a road.
>
> He has also a piece of Kula land near the Great Wall. It is bounded makai by the Great Wall. Kohala side by Niniha's land On Kau side by Nalima's land.[106]

Nalima (Lima), 9944 (Ap. 1)

Ipunui describes two ʻāpana held by Nalima, one in the ʻili ʻāina of Niukini, which sounds like a coastal parcel based on its name, and a pauku aina in the ʻili ʻāina Kukuipuloa (NT: v4, p517); it appears Nalima was only awarded the mauka parcel.

Native Register Volume 8:472, January 25, 1848, Kailua

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[106] Helu 7350; Royal Patent 7059; Kahului 1 N. Kona. 1 Ap. 1.65 Acs.

Aloha to all of your the Land Commissioners: A kihapai at ke alaloa, E. 8, W. 20, south side 300, north side 300. A kihapai in apaa. E. 8, W. 13, south side 130, north side 130.
Done by Nalima

Native Testimony Volume 4:517, December 22, 1848

Ipunui (Konohiki), Sworn… There in the ili aina of Niukini, Ahupuaa of Kahului I. 2 Apana and a Pauku aina at Kukuipuloa 1. The boundaries are not known to not well known to me, the length by anana or the width. When the surveyor comes he [Lima] will accurately describe the boundaries when he comes.

He received these lands in the time of Kuakini, and in this time they are from me [Ipunui[. No one has objected to him (Nalima).[107]

Maliu, Helu 10252 (Ap. 1)

Maliu only claims his cultivated lands (NR: v8, p475), he is unique in other claims in that he describes his land like a mahiʻai, describing the wao of his 3 land claims: one is in the maʻū (moist wet area, probably the upland most claim), one in the ʻāpaʻa (dry arid area, maybe one with soil, but it could be rocky) and one in the kula (connotating openness or a plain, kula is often described as pasture, dryland, or a fallow field.

Note that Maliu gives the Native Testimony for Nalawaiaʻs claim for LCA 10374 (NT: v4, p529-530), where he also tells that he build the wall enclosing Nalawaiaʻs pahale (Ap.2).

Native Register Volume 8:475, January 26, 1848

Aloha to you the Land Commissioners. I hereby explain to you about my land claim in Kahului 1. My claim is from Kekupuohi. Here is the length of my kihapai, 58 long by 18 wide. At the head of one, the width is 6 anana. Another is far mauka in the mau, it is 8 long by 20 wide. On the kula, one is 80 long by 14 wide, at its head it is 13. I also have 3 puhala.

I have three land claims far mauka. 1 is in the mau, 1 in the apaa, and 1 on the kula. There are three kuleana of mine. That is it, for you to hear, and to see if it is right or in error.

Done by Maliu

Native Testimony Volume 4:538, December 29, 1848

There in the ili aina of Kamuku Kahului I ahupuaa.

1. Kula. Mauka, Kaluapahu punawai (spring of Kaluapahu), Kau by ili aina of Ililoa, Makai by Makai, Ohuahale a kihapai, Kohala Niukini. 1 cultivated pauku aina.

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[107] Helu 9944; Royal Patent 6278; Kahului 1 N. Kona. XX Ap., XX Acs.

2.: Mauka, Laie kihapai, Kau by ili aina of Ililoa, Makai by the Alakowaa, Kohala, Niukini ili aina.

3. Mauka is Umiwai punawai (Umiwai spring), Kau, Lapalua ili aina, Makai by Puukehoe a puu (hill), Kohala, Papalanui land. 1 cultivated kihapai.

4. In the ili of Halewaawaa. Mauka, the Alaloa, Kau, by Naalapa ili aina, Makai, Kealakowaa, Kohala by Ahupuaa of Waiaha. 1 cultivated parcel land.

5. At Kamuku 2. Mauka by Alapai's land, Kau by Kukuipuloa ili aina, Makai by Kealaloa, Kohala by ili aina of Ililoa. 1 cultivated kihapai.

6. Kahuahale. Mauka by the alanui, Kau by Ililoa ili land, Makai by konohiki, Kohala by ili aina of Ohiki. It is not enclosed, there is one house and 3 cultivated kihapai.

It is an old land (right) for him from the time of Kamehameha II, and the from Ipunui at the present time. No one has objected...[108]

Kaiakaola, Helu 9126 (Ap. 1)

Kaiakaola claims several moo aina, he says he has had it from the time of Kekupuohu, and Kalama, who gives testimony says Kaiakaola's 'ohana has had it since the time of Kiwalao, before 1782, which is an unusually deep genealogy to present for land. Kalama also describes in detail what Kaiakaola cultivates in his claim: kalo, coffee, and 'uala (FT: v8, p677).

It is unclear if Kaiakaola's house was in the same area as his cultivated lands, one is not inclined to think so because although Kalama describes his house lot as in a separate place, it also has 3 patches of kalo, which could be in the uplands. It is possible Kaiakaola was not awarded all the lands he claimed, or that he was awarded them in a long contiguous parcel; considering the inequity of the Māhele, it was unfortunately likely the former.

Native Register Volume 8:541, January 26, 1848

Aloha to you, Z. Kaauwai and the Land Commissioners. I hereby petition for kuleana moo land there in Kahului 1. Kukuipuloa is the name of the moo aina. It has been my land from the time of Kekupuohi, from then to the present time. Naheana is the one over Kahului 1.

Here I am on my little moo aina. Here are the places that I desire. At another place it is 103 long by 12 wide, Another place is 112 long, by 12 wide. At another place 74 long by 12 wide; at another place, 210 long by 44 wide; and at another place 430 long by 20 wide. These are the places I desire. The witnesses are Maliu and Nalawaia.

[108] Helu 10252; Royal Patent 6742, Kahului Kona. 1 Ap. 1.4 Acs.

By Kaiakaola

Foreign Testimony Volume 8:677, Helu 9126 & 9255

Kalama, sworn says, he knows the kuleana of Clt. in Kahului 1, Kona. It consists of several pieces of cultivated land scattered over the ahupuaa, viz. 3 Kalo patches, 3 patches of coffee, 2 patches of potatoes.

He has a house lot also and 3 patches of Kalo in another place. The house site is not enclosed.

Clt. derived the land from his ancestors, who got it in the days of Kiwalao [prior to 1782], and holds it without dispute.[109]

Keaweehu, Helu 7496 B (Ap. 1)

No land mauka of Mamalahoa Hwy, and the Kealakowaa, was awarded in Kahului 1 ahupuaa, although many maka'āināna claimed land in the kula area below the Hwy and above the papipi. Keaweehu, was one such, who claimed land in this kula region above the Kealakowaa. Instead, he was only awarded his mauka lands that lay just seaward of the Kealakowaa.

Native Register Volume 8:444-445, January 26, 1848, Kailua

Aloha to all of you the Land Commissioners. Pertaining to some kihapai in the mau [zone]. On the east it is 8 long; west, 9 wide; south side 350 long; north side, 350 long. Kihapai in the Kaluulu, 8 wide; west 6 wide; south side 150 long; north side, 150 long. Kihapai on the kula, east 10 wide; west 9 wide; on the east, 9; west side 400 long; north side 400 long
Done by me, Keaweehu

Native Testimony Volume 4:515-516, December 22, 1848

There in the ili aina of Lapalua, Ahupuaa of Kahului . 3 Apana Aina.

1. Kula [open dryland field]. Mauka by konohiki, Kau by Ililoa land, Makai a pa pipi, Kohala by Ohiki ili aina. 1 cultivated pauku aina. [unawarded]

2. Kaluulu [upland agricultural field]. Mauka by the Alanui, Kau by Kahului 2 land, Makai by Kuaulu (Kaulana [a resting place]), and Kohala by Kukuipuloa ili aina. 1 partially cultivated pauku aina.

3. Mauka by Papuaa, land of konohiki , Kau by Kahului 2 land, Makai by Kaluaolena land, Kohala by Kukuipuloa ili aina. 1 cultivated pauku aina.

His interest was from Ipunui (Konohiki) in the Yr. 1845. No one had objected to

[109] Helu 9126; Royal Patent 8059; Kahului N. Kona. 1 Ap. 1.5 Acs.

him...[110]

Kahului 2 Ahupua‘a

Neniha, Helu 10373 (Ap. 1)

Interestingly, Neniha is one of the only awardees not to claim a cultivated upland parcel; his only claim is for his pahale at the coast (NR: v8, p479), which he was awarded. Kalama gave sworn testimony for Neniha‘s claim (NT: v4, p533) which was based on the family of Neniha‘s wife, who received the lands from Kamehameha I.

Kapae, Helu 7073 (Ap. 8)

(NR: v8, p414-415)
(NT: v4, p501-502)
Kapae claimed a good amount of land, of those relevant to the study area he claimed one makai parcel and four mauka; he received one of each. Kapae‘s makai makai parcel at Kahului 2 included his house and cultivated land, he received it in 1846 when the Puna game him “administration of the konohiki labor days for the konohiki on this land” (NR: v8, p414-415).

If Kapae’s makai lot was claimed because of his hana, the mauka claims were on behalf of his wife‘s connections, through her parents and kupunakane, for portions of the upland ili of Inaimoa and Kamuku. It is unclear how many of the his four pauku claims are included in his extensive mauka award, Kapae was awarded the parcel above the pa pipi, an extensive upland award just below Mamalahoa Hwy.

Kapae claims residence at the coast where he administers konohiki labor days, but he also testifies that he farms the upland parcels with his wife’s family “from 1838 until today (1848, or ten-years). Here we see a clear connection between the uplands and the coast that can trace more than one generation, even for people that might have had higher status.

Native Register Volume 8:414-415, January 24, 1848, Kailua

> Aloha to you the Land Commissioners. I hereby state my pahale, which is there makai in Auhaukeae 1, Ahupuaa, in Kona, Hawaii. It was given to me in its entirety by Unualoha and Kaikainalii. It was given me absolutely by Ulualoha and Kaikainalii at the time I became a teacher for the children, in the Year 1838.
>
> There are some other places beside this lot which I worked again on the west and the northeast. I and some others purchased a mans house, selling his lot for $4.50 in 1846. [For which] I asked Kamanawa. On the east side is my place. it was given to me and was combined into one lot with a circumference of 196 3/6 anana; some of the border of the lot enters into Hianaloli 6.
>
> Here is the, a pahale in the Ahupuaa of Kahului 2. It was received in this way. Puna, husband of Kaoanaeha, gave me the administration of the konohiki labor days for

110 Helu 7496B; Royal Patent 6277A; Kahului 1. 1 Ap. 1.9 Acs.

the konohiki on this land. The konohiki was living on that land, and the lot was from ancient times until the present. There is a pahale on the side of this lot, and cultivated place on the other side and the other in from former times. The length and width is 345 anana. This lot was gotten by me in 1846.

Here is the, the land claims as stated by Limaikaika, for us to apply to you the land Commissioners, describing the nature of our claims as explained below.

Pauku Aina 1, mauka of the papipi, the length is 187 3/6 anana, the width is 13 anana.
Pauku aina 2, in the mid kula [region], the length is 117 3/6 anana by 17 3/6 anana.
Pauku lands 3, within the Kaluulu, reaching maki to Inaimoa. The length is 362 anana by 44 3/6 anana, being the same in some places and more in other places.
Pauku 4, mauka of Kealaloa to makai of Hulilau. The length is 73 anana by 13 anana

The boundaries of these pauku aina described above are Lapalua on the north, Kahuku 1 on the south, the papipi on the West, and Hulilau on the east.

These land claims are in Kahului 2, that is the ahupuaa. There are three ili are in this claim, Inaimoa and 2 Kamuku. These land claims are from my wife's parents, and an ili from her kupunakane. This was their land which they cultivated, from the time they occupied the land, until the present. But they gave the property to my wife and I. It is there that we have farmed t with them from 1838 until today. All the things I have planted are there now.

Here is a kihapai at Kahuku 1, acquired by me as follows. The annual tax of this ili had not been fully paid to the tax collector and I paid the remaining quarter, and I asked for some of kihapai from the one who had the ili and it was given (to me). The total of these kihapai is 61 3/6 anana long by 14 anana wide. The boundaries of the pauku aina are Kamumu 2 on the North, Kahuki 2 on the South, the Uluniu (Coconut grove) on the west, and Kaohia on the east.

I am with aloha,
Kapae.

Native Testimony, Volume 4:501-502, December 20, 848
[See also Helu 2415B]

There in the ahupuaa of Auhaukeae.

1. Pahale. Mauka by idle land, Kau by Kealoha folks lot, Makai kahakai (shore), Kohala by Kaiamakini's lot. Kapu enclosed with a wall in 1829. 1 house for Kapae, he is living there. It was given to him by Kealoha in 1838. He has lived there to the present day.

2. Pahale in Ahupuaa of Kahului. Mauka by Alanui Aupuni, Kau by idle kula land, Makai by kahakai, Kohala by idle land. It is enclosed with a wall. 1 house for Kapae. Kapae lives there. His interest was from Puna in the Yr. 1846.

3. Pauku aina. Above the pa pipi, the ili aina of Kahului. Mauka by idle land, Kau by Kahuki I, Makai by Papipi, Kohala by Lapalua ili aina. 1 pauku partially

cultivated in various areas.

4. Pauku Aina on the Kula. Mauka by idle land, Kau by Kahuki ili aina, Makai by idle land, Kohala ili aina. It is cultivated.

5. At the Kaluulu. Mauka by Konohiki, Kau by Kahuki I ili aina, Makai by idle land, Kohala by Lapalua ili aina. 1 cultivated pauku aina., 1 hale for him.

6. Pauku aina. Above Kealaloa. Mauka, Hulilau a kihapai for the Konohiki, Kau by Kahuki 1 land, Makai by the Alanui, Kohala by Lapalua. Cultivated land.

7. Ili aina at Kahuki 1. Mauka by idle land, Kau by Kahuki 2, Makai by idle land, Kohala by Kamuku 2 land.

Kihapai gotten from Kalou[?] in the Yr. 1844. Apana 1 from Kealoha, Apana 2 from Puna, The Apana Aina are old lands [rights] from the kupuna of his wife. No one has objected...

Native Testimony, Volume 8:646, January 10, 1850
Helu 2415 B, Kapae

...Kalama and Kaili, Sworn. We know his apana, Ili of Lapalua in Kahului 2 Ahupuaa, from Kaoanaeha in the Yr. 1846. No one has objected to him. It is surrounded on all side by the land of the Konohiki, they have seen his parcel in Lapalua ili of Kahului 2 ahupuaa from Kaoanaeha in 1846. No one objected to him. Boundaries are surrounded by the land of the konohiki.[111]

Kulou, Helu 7690 (Ap. 1)

Kulou, through the claim of his wife's ʻohana claimed six pauku of mauka lands. He describes them at the end of his claim (NR: v8, p445-446) as contiguous. The papipi is a western boundary, and must run between the makai and mauka ala loa, rather than being above Mamalahoa Hwy. It is likely his claim was awarded in a single parcel.

Native Register Volume 8:445-446, January 24, 1848, Kailua

Aloha to you the Land Commissioners. I hereby state to you my land claim which is in Kahului 2 Ahupuaa. Thus, it is for your understanding of my places of cultivation, pursuant to the words of Limaikaika (Armstrong), I petition to you for my land claims, the cultivated places.

A pauku of land, mauka of the papipi. 500 anana long by 5 anana wide.
A pauku of land in the mid kula region 500 anana long by 5 anana wide
A pauku of land mauka there is 300 anana long by 7 anana wide.
A pauku mauka of Kaluulu is 90 anana long by 5 anana wide.

[111] Helu 7073; Royal Patent 8072; Kahului 2 N. Kona. 1 Ap. 3.4 Acs. Kahului 2 N. Kona. 6 Ap. 7.72 Acs. Royal Patent 8073; Kahului 2 N. Kona. 1 Ap. 2.19 Acs.; Auhaukeae 2 Kona. 2 Ap. 1.92 Acs.

A pauku o land above there that is 82 anana long by 5 anana wide. A pauku of lands that is mauka of the alaloa, 240 anana long by 6 anana wide.

The boundary of this land is Kamuku 2 on the north, Kahuku 3[?] on the south, the papipi on the west and by , by Hulilau on the east.

This land claim was from my wife, and her keiki, Kapeleaumoku, in 1843 when I /began to/ cultivate this land, until the present.

By Kulou

Native Testimony Volume 4:516, December 22, 1848

Kekipi (konohiki), Sworn… There in the ili aina of Kahuki, Ahupuaa of Kahului 2.

It is just as it was described by him [Kulou] in his claim document, that is what I know. however, I [Kekipi] do not know the length of the boundaries. It is my thought that when the surveyor comes, he will establish the boundaries. 6 Pauku aina

His interest was from Kapae, to this time, but it is an old [right] for his wife, in the time of Kamehameha 1. No one has objected to him…[112]

Kuapuu, Helu 7336 (Ap. 1, 2)

Kuapuu claimed six to seven ʻāpana and was awarded two, one makai pahale at the coast and partially cultivated kihapai in the uplands. It is likely his mauka award Ap.1, included several of his claimed pauku that were contiguous.

Native Register Volume 8:424, January 26, 1848, Kailua

Aloha to you the Land Commissioners. I hereby state my pahale claim, there makai, Kahului 2, Ahupuaa. The length and width are 43 anana.

My land claim is in Kahului 2, and known as follows, 500 anana long by 5 anana wide.
A pauku of land mauka of this, reaching the Kaluulu, 300 anana long by 5 anana wide.
A Pauku of land from Kealakowaa to Manuwa, 400 anana long by 5 anana wide.
A pauku of land mauka of Kealaloa is 100 anana long by 5 anana wide.
These pauku are bounded by Kahuki 1 on the north, by Kikiaiole on the south, by the Papipi on the west, and by Kaaipuaa on the East.

A pauku of land at Kikiaiole 2, 500 anana long by 6 anana wide

Pauku of land that is above Pahanui to Kamakahalau, 300 anana long, by 5 anana

[112] Helu 7690; Kahului 2 N. Kona. 1 Ap. 1.75 Acs.

wide. The boundaries of these lands are Kikiaiole 1 on the north, Ohia on the south, the Papipi on the west, and Kamakahalau on the east.

By Kuapuu

Native Testimony Volume 4:500, December 20, 1848

...There in the ili aina o Kahuki, Kahului 2 Ahupuaa. 7 Apana.

1. Pahale. Mauka by idle land, Kau by Niniha's lot, Makai by an Alanui Aupuni, Kohala by Kalawa's lot. Enclosed. 1 house for Kuapuu, he is living there.

2. Mauka of Papipi. Mauka by idle land. Kau by Kikiaiole land, Makai by a papipi, Kohala by Kahuki land. 1 cultivated kihapai.

3. Kaluulu [Inland agricultural zone]. Mauka by idle land. Kau by Kikiaiole, Makai by idle land, Kohala by Kahuki land.

4. At Kealakowaa. Mauka by konohiki, Kau by Kikiaiole, Makai by Konohiki, Kohala by Kahuki land.

5. The Alaloa. Mauka by idle land, Kau by Kikiaiole land, Makai by Konohiki, Kohala by Kahuki land.

6. There in Kikiaiole ili aina. Mauka by Konohiki, Kau by Ohia land, Makai by Konohiki, Kohala by Kikiaiole 2. 1 partially cultivated kihapai.

7. Mauka by Konohiki, Kau by Ohia land, Makai a papipi, Kohala by Kikiaiole 2 land. 1 partially cultivated kihapai.

It is and old land (right) belonging to Kuapuu's wife, given to her by her parents in the time of Kamehameha I. No one has objected...[113]

Kaanaana, Helu 7335 (Ap. 1)

Kaanaana only claimed his cultivated lands in the uplands, as instructed by Limaikaika (NR: v8, p423). He claimed no house lot.

Native Register Volume 8:423, January 24, 1848, Kailua

Aloha to you the Land Commissioners. I hereby tell you of my land claim in the ahupuaa of Kahului 2.

It is described as follows. My cultivated place, as I understand it having heard from Limaikaika, "You are to petition for your land claims to the Commissioners.

[113] Helu 7336; Royal Patent 3740; Kahului N. Kona. 2 Ap. 1.35 Acs.

A pauku of land mauka of the pa pipi, 700 anana long by 9 anana wide.

A pauku mauka of the kula, 30 anana long by 10 anana wide.

A pauku of lands above there is 46 anana long, by 12 anana wide.

A pauku of lands mauka of the Kaluulu to makai of Manuwa is 290 anana long by 9 anana wide. This boundaries of the land above described, are Kahuki 2 on the north, the papipi on the west, and Manuwa on the east.

These place have all been cultivated from the time I received these ili aina. That is in the year 1840, up to this time. It is for you to hear.
I am Kaanaana 2

Native Testimony Volume 4:499, December 20, 1848

...There in the ili aina of Kikiaiole, 1 Apana, Kahului 2 Ahupuaa. 3 Apana Aina.

1. Mauka idle land for the Konohiki, Kau by Kikiaiole 2, Makai a pa pipi, Kohala by Kahuku [Kahuki] Aina. 1 uncultivated kihapai.

2. Kula (land). Mauka by idle land, Kau by Kikiaiole land, Makai by Konohiki, Kohala by Kahuki aina. 1 cultivated kihapai.

3. Kaluulu [regions extending to) Manuwa. Mauka by Konohiki, Kau by Kikiaiole, Makai by Konohiki, Kohala by Kahuki aina. 1 cultivated pauku.

It is an old land (right) from Kaanaana's parents to him. His parents received it in the time of Kamehameha I. No objections...[114]

Kekipi, Helu 7914 (Ap. 1)

Kekipi claimed one pauku aina on the Kealakowaa, with a wahi called Waiapuka to the east.

Aikane (Aekane), Helu 11073 (Ap. 1)

Aikane claimed cultivated lands in Kahului and a pahale in the ahupuaʻa of Hinaloli to the north. He was only awarded the pauku aina in the uplands.

Native Register Volume 8:610, Feb. 7, 1848, Kailua

Aloha to you're the Land Commissioners. I hereby describe my claim for land, a house lot and kula. The land claim is in the Ahupuaa of Kahului in Kona, Kailua. The size of the land is 296 anana long, and 31 anana wide. That is the size of the pauku of land. And my kula is 100 anana long by 20 anana wide. There is a pahale claim also, in the Ahupuaa of Hianaloli at Kailua. It is 15 anana long by 7 anana wide. They were given me by Malo and Kaohao. Those are my claims which are

[114] Helu 7335; Royal Patent 7066; Kahului 2 N. Kona. 1 Ap. 1.2 Acs.

stated to you.
By Aekane [Aikane]

Native Testimony Volume 8:651, January 12, 1850

Kekipi, sworn… …His Apana is in the Ili of Ohia & Papiha, Kahului Ahupuaa. From Iino in the Yr. 1839. No one objected to him.
Boundaries of the land are surrounded by the land of the Konohiki.[115]

Kalaua (also Kalawa), Helu 7086 (Ap. 1, 2)

According to the Native Testimony (NT:v4, p557)and Native Register (NR: v8, p419) Kuapuu claimed 3 ʻāpana, two pauku aina, in the uplands and a pahale at the coast. Kalaua was awarded 2 ʻāpana, his house site at the shore and one in the uplands, it is unclear if one of his mauka cultivated claims was unawarded, or they were awarded as one large ʻāpana.

Kaili, a wahine, gave testimony (NT: v4, p557). She also described the makai pahale parcel as having two houses, one, which belonged to Kalaua and another which was her house, both were enclosed by a wall.

Native Register Volume 8: 419, January 26, 1848, Kailua

Aloha to you the Land Commissioners. I hereby tell you of my land claim as follows. A pauku land from the papipi to Kahului-loa, being 500 anana ling by 5 anana wide.

A pauku of lands Ke Alakowaa [Kealakowaa] to Waiapuko, being 500 anana long by 5 anana wide.

Pahale claim the makai of Kahului 1, Ahupuaa. The length and width are 42 anana.

The Pauku of land explained above are in the Ahupuaa of Kahului 2. The boundaries of these lands are Kikiaiole on the north, Papiha on the south, the Papipi on the West, and Waiapuko on the east.

By Kalawa

Native Testimony Volume 4 : 557January 10, 1849

…There in the ili aina of Puki, Ahupuaa of Kahului 2. 3 Apana.

1. Mauka by konohiki, Kau by Papiha ili aina, Makai by pa pipi, Kohala by Ohia ili aina. 1 kihapai not cultivated.

2. Mauka by konohiki, Kau by Papiha ili aina, Makai by Ohia ili aina, Kohala by Kikiaiole. 1 cultivated kihapai.

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115 Helu 11073; Royal Patent 7058, Kahului 2 N. Kona. 1 Ap. 1.8 Acs.

3. Pahale. Mauka by idle land, Kau by Kuapuu's lot, Makai by the Alanui Aupuni, Kohala by Nalawaia's lot. It is enclosed with a wall. 2 hale. 1 hale for Kalawa, and 1 for me (Kaili W.). It is a kuleana hale Kalawa. They are residents since Kamehameha I, to this day. No one has objected.[116]

Puapuaa 1 Ahupua'a

Nika, Helu 10365 (Ap. 1)
Mauka

Kaiewe, Helu 7353 (Ap. 1, 2)

Kaiewe claims nine parcels, a kīhāpai 'ai (kalo garden) in the kula, in the Kaluulu (kaluulu?), in the apaa, and in the amaumau. These are in the 'ili ' of Ililoa, Haliiipalala and Lauhulu.
Kaiewe was ultimately awarded two 'āpana, one long parcel in the uplands, that includes at least his apaa claim, as well as one at the coast beside Kawainui's LCA 7353 Ap.2. Nowhere does Kaiewe claim a make a claim for a pāhale, but the only 'āpana he claims beside Kawainui is his kihapai ai (kalo garden) in the kula; this is also likely the site of his pāhale.

Native Register Volume 8:427-428, January 20, 1848

Hear ye, o Land Commissioners. I, Kaiewe, hereby state my claims to you by length and width.

On the N. 10 anana ; to the E., adjoining the lot of Kawainui, 11 anana , and on the So. 11 anana. To the W. adjoining the lot of Nahau, 12 anana. The length is on the E. and the W. The width is on the N. and the S. There is nothing planted. This lot is finished.

-Here is the claim for a kihapai ai (Kalo garden) on the kula. The length of that place worked by my own hands i s107 anana long on the E., adjoining the kihapai of Ku; that is the length on the W.; adjoining the kihapai of Kawainui it is 42 anana wide; on the N. it adjoins the kihapai of Nahau. The N. and S. are the same.

Mauka of this, it is 120 long on the E, and the same on the W. The width of this to the N. is 15 anana, at the place adjoining the Kihapai of Kalua. The N. and S. are the same. This claim is finished. It is Kula land.

-Here also is this claim in the Kaluulu. To the N., 6. To the E. adjoining the kihapai of Ainoa, it is 27 anana. To the S. it is 6. To the W. adjoining kihapai of Ikeole it is 27 anana, there to the S. it is 6. to the E. adjoining the kihapai of Ainoa it is 27 anana. The length is on the W. and the with is to the N. and S. This claims is finished. Kaluulu

-Here is another claim, mauka in the Apaa, there are growing various plants. The length on the E. is 18 anana, also on the W., and to the N. adjoining Kaukali, it is 6 anana wide, and the same on S.

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[116] Helu 7086; Royal Patent 5225; Kahului 1 Kona. 1 Ap. .270 Ac. Kahului 2 Kona. 1 Ap. 1.3 Acs.

There on the N. W. to N. of the Kihapai is 5 anana, and the same on the E. On the E. it adjoins the kihapai of Kamahiai, 25 anana, and the same on the W.

Another is to the S. N. and E. it is 14 anana long, at the place where it bounds Kaukali's kihapai. It is the on the W. where it bounds Kauila's kihapai. N. 15 anana , to the place where it bounds the Kihapai of Nahau. On the N. and the S. the width is the same as the above anana

Other kihapai are to the N. the length is 47 anana; also the length on the E., at the place bounding Kaihu's kihapai, and being 20 anana wide, That is also on the N. and the S.; the W. is it 47 anana. This claim on the Apaa is finished.

-Here is this claim in the Amaumau [zone]. This claim is in the distant uplands, being 34 anana long, to the E. and the same on the W. The width is 15 , the same on the N. and S.

By me I. Kaiewe
Puapua [Puapuaa] 1, District a. Kona, Hawaii.

Native Testimony Volume 4:565-566, February 2, 1849

(Nahau, Konohiki, Sworn) ...There in the ili aina of Ililoa, Puapuaa 2 Ahupuaa; in the ili aina of Haliiipalala and Lauhulu. Puapuaa 2 Ahupuaa.

1. Pahale. Mauka by Idle land, Kau by Kawainui's land, Makai by shore; Kohala my [Nahau's] lot. It has been enclosed by a wall. 2 hale with for him, and he resides there.

2. Kihapai in ili aina of Haliipalala. Mauka by my land, Kau by Ku's land, Makai by the pa aina (land boundary wall), Kohala by Kahookano's land. 2 cultivated kihapai.

3: Mauka by Kalua's land, Kau by my land, Makai by Kawainui's land Kohala by my land. 2 cultivated kihapai.

4. At the Apaa [upland agricultural zone]. Mauka by Konohiki, Kau by Kaihu's land, Makai by my land, Kohala by Konohiki. 4 cultivated kihapai. 1 house for him.

3. Ili aina of Lauhulu. Mauka by Konohiki, Kau by Kamahiai's land, Makai Konohiki, and the same towards Kohala. 1 cultivated kihapai.

6 - At ili aina in Waipio. Mauka by my land, Kau by Ainoa's land, Makai by Konohiki, Kohala by Ainoa's land. 1 cultivated kihapai.

7. In the ili aina of Ililoa. Mauka by Keliikanakaole's land, Kau by Ainoa's land, Makai by Konohiki, Kohala by Ikeole's land. 2 cultivated kihapai.

8. Mauka by Kaihu's land, Kau by Ikeole's land, Makai by Kauhi's land, Kohala by Konohiki. 1 cultivated kihapai.

9. Mauka, Konohiki, the same towards Kau and Makai, Kohala by Ahupuaa of Kahului. 1 cultivated kihapai.

His interest was from me (Nahau) in the Yr. 1844. No one has objected.[117]

Kawainui, Helu 7355 (Ap. 1)
Makai

Ikeole, Helu 8221 (Ap. 1)

Ikeole only claimed one ʻāpana in the ʻili ʻāina Ililoa; it was the location of his pāhale, which consisted of one house enclosed by a wall, according to Nahau (NT: v4, p569), and where he cultivated at least 6 kīhāpai in the apaa (upland dryland agricultural zone). Nahauʻs pāhale and goat pen was nearby.

Native Register Volume 8:460, January 29, 1848

Aloha to you Excellencies. I hereby tell you of my kihapai which I made with my own hands and are cultivated by me. It is 110 long by 18 wide.
Ikeole

Native Testimony Volume 4:569, February 2, 1849

There in the ili aina of Ililoa, Ahupuaa of Puapuaa 1. 5 Apana.

1. At the Apaa [upland dry ag. zone]. Mauka by Konohiki, Kau by Puapuaa 2. Makai by Konohiki, Kohala by Kaihu's land. 6 cultivated kihapai.

2. Mauka by Konohiki, Kau by Puapuaa 2, Makai by Konohiki, Kohala by Kaiewe's land. 13 cultivated kihapai.

3. Mauka by Konohiki, Kau by Puapuaa 2, Makai by Konohiki, Kohala by my [Nahau's] land. 3 cultivated kihapai.

4. Mauka by Konohiki, Kau by Puapuaa 2, Makai by Konohiki, Kohala by my [Nahau's] land. 2 cultivated kihapai.

5. Pahale. Mauka by my [Nahau's] pa kao goat enclosure, Kau by my [Nahau's] lot, Makai by kahakai, Kohala by wahi waiho wale (Idle land). It is enclosed with a wall. 1 hale for him.

The are old residents from the time of Kamehameha, No one has objected...[118]

Ku, Helu 7356 (Ap. 1
mauka

Helu 7356, Ku
Native Register Volume 8:428

He ye o Land Commissioners. Here I am, Ku, making known to you my land claims. There are some kihapai there on the Kula lands, 120 long on the East, and the same on the West 120

[117] Helu 7353; Royal Patent 4304; Puapuaa 1 Kona. 2 Ap. 1.2 Acs.
[118] Helu 8221; Royal Patent 4263; Puapuaa 1 N. Kona. 2 Ap. 1.762 Acs.

anana. It is at the place adjoining Kaiewe's kihapai, being 18 wide. There to northwest one is 40 anana long on the east at the place adjoining the kihapai of Nahau. The length that place made known is 40 anana long and the 4 wide. Towards the East is another, that is 30 anana long, 11 wide; on the north of the kihapai that is 40 anana long by 14, wide.

Done by me, Ku
Puapua [Puapuaa] 1, Kona, Hawaii. January 20, 1848.

2, Feb. 1849
Native Testimony Volume 4:563

...There in the ili aina of Lauhulu, Ahupuaa of Puapuaa 1, Hawaii. 4 Apana

1. Mauka by Nahau's land, Kau by my [Kawainui's] and Kaiewe's land, Makai by Kaiewe's land Kohala by Hookano's land. 1 cultivated kihapai.

2. In the ili aina of Waipio. Mauka by Konohiki, the same towards Kau, Makai by pa aina, Kohala by Kaiewe's land. 1 cultivated kihapai.

3. In the ili aina of Ililoa. Mauka by konohiki, and the same towards Kaua and all around. 2 cultivated kihapai.

4. In the ili aina of Haliipalala. Mauka by Konohiki, the same towards Kau, Makai by Kalua's land, Kohala by Kamahiai's land 2 cultivated kihapai.

His interest was from Nahau [Konohiki] in the year 1843. No one has objected to him..[119]

Kalua, Helu 7354 (Ap. 1)
Mauka

Kaukali, Helu 9253 (Ap. 1)
Mauka

Kamahiai, Helu 7461 (Ap. 1)
Mauka

Kaihu, Helu 7462 (Ap. 1)
Mauka

Hookano, Helu 8154 (Ap. 1)
mauka

Nahau, Helu 10407 (Ap.)
Mauka

[119] Helu 7356; Royal Patent 4356; Puapuaa 1 Kona. 1 Ap. 2 Acs.

Puapuaa 2 Ahupua‘a

Keliikanakaole, Helu 7486 (Ap. 1
mauka

Kauila, Helu 6177 (Ap. 1, 2, 3)
Ap. 1 mauka
Ap. 2, 3 makai (BM: v5, p606-607)

Kala, Helu 7947 (Ap. 1, 2)
Ap. 1 mauka, Ap.2 makai

Kalimapaa, Helu 7743 (Ap. 2
makai

Keawe, Helu 5849 (Ap. 1
makai

Community Consultation

Introduction

Prior to Nohopapa's individual consultation efforts, the Department of Hawaiian Home Lands (DHHL) with support from Nohopapa, held a kick-off meeting at the Kamehameha Schools Kahaluʻu Manowai (Ma Kai) site on April 18, 2024 (Figure 10) to share information about the DHHL Kona Ka Paʻakai Framework Analysis project for water source development related to the proposed water improvement sites at Waiʻaha and Keauhou and larger project area (Kaloko to Keauhou) Kona, Hawaiʻi. Twenty-fine individuals attended the public meeting and shared their contact information with DHHL and Nohopapa to follow-up about future project updates.

Individual community consultation efforts were conducted from July to October 2024. As a multi-phase study, the consultation process consisted of identifying appropriate and knowledgeable individuals, reaching out to them to participate (Appendix A: Community Consultation Letter), conducting in-person, phone, or online interviews (Appendix B: Consultation Questionnaire), summarizing the community manaʻo, analyzing the data, and preparing a summary of findings for the Analysis. In particular, information was gathered relating to the many manifestations of Kāne and the resources, traditional customary practices, and rights that rely on them. Thirty-four individuals were contacted to participate in this study. Of the thirty-four individuals, twenty-four responded, and thirteen committed to an interview. Eleven individuals were unable to participate for various reasons.

Figure 10. April 18, 2024 DHHL and Nohopapa kick-off meeting at Kamehameha Schools Kahaluʻu Manowai site (Photo: Nohopapa 2024).

Community Manaʻo Summary

Ola i ka wai, water is life. Water is the most important resource, and Kānaka ʻōiwi certainly hold their connection to wai in high regard. This is no different to kupa (natives) of Kona. Water in Kona manifests in many ways; the famous billowing clouds found over the ocean, the gushing springs and anchialine ponds speckled across the lava fields, and rare perennial streams, to name

a few. The way that kupa of Kona interact with their wai is reflective of the relationship they have kept to their resources for generations.

There is no doubt that the water resources in Kona are different from other places throughout the pae ʻāina. Kona is often described as arid, dry, and waterless. The lands of Kekaha, Kona, are considered to be wai ʻole (waterless), but only to the eye of the malihini. This is why understanding how people interact with the land is extremely important to understanding the role and function of water in Kona, and to know where to find this water. The largest amounts of freshwater in Kona are mostly huna (hidden) underground and stored in large aquifers. The aquifers dictate the boundaries of Kona ahupuaʻa, which sheds light as to why those who have lived in their ahupuaʻa for generations know how water affects their ʻāina so intimately.

Water dictates the way that communities move, and the way that they interact with the lands they come from. In the past, water has dictated traditional and customary practices in Kona, and influenced how people lived. The ability of those in Kona to grow and catch food, to read the winds and rains, and understand the hidden nature of the water below taught them how to look for and utilize water in unique ways. Even today, this still remains relevant. The phenomenon of clouds swollen with water traveling from ma uka in the dense nāhele, down to the kai still occurs. People of Kona understand how to utilize the hours of sunlight based on the movement of these clouds; they know when is best to fish, when one should plant certain lāʻau, and when to enjoy leisurely activities.

He Mele No Kāne (Emerson 1909:257-259) outlines the many forms of the akua Kāne. Each of these formations are a different aspect of the water cycle, and where water can be found throughout the pae ʻāina of Hawaiʻi. Through the use of ʻōlelo Hawaiʻi, this mele depicts the many forms of our natural environment and how kānaka relate to them. By framing the cultural resources within this mele, we incorporate the lens of our kūpuna through an indigenous framework and acknowledge the connection between the kupaʻāina of Kona and their wai resources.

He Mele No Kāne

He ui, he nīnau:	*A query, a question,*
E ui aku ana au iā ʻoe,	*I put to you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ka hikina a ka Lā,	*At the Eastern Gate*
Puka i Haʻehaʻe,	*Where the Sun comes in at Haʻehaʻe,*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i Kaulana a ka lā,	*Out there with the floating Sun,*
I ka pae ʻōpua i ke kai,	*Where the cloud-forms rest on Ocean's breast,*
Ea mai ana ma Nihoa,	*Uplifting their forms of Nihoa,*
Ma ka mole mai o Lehua;	*This side the base of Lehua;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ke kuahiwi, i ke kualono,	*Yonder on mountain peak, on the ridges steep,*
I ke awāwa, i ke kahawai;	*In the valleys deep, where the rivers sweep;*

Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i kai, i ka moana,	*Yonder at the sea, on the ocean,*
I ke kualau, i ke ānuenue,	*In the driving rain, in the heavenly bow,*
I ka pūnohu, i ka uakoko,	*In the piled-up mist wraith, in the blood-red rainfall,*
I ka ʻālewalewa;	*In the ghost-place cloud from;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i luna ka Wai a Kāne,	*Up on high is the water of Kāne,*
I ke ao uli, i ke ao ʻelʻele,	*In the heavenly blue, in the black piled cloud,*
I ke ao panopano,	*In the black black cloud,*
I ke ao pōpolo hua mea a Kāne lā, ē!	*In the black mottled sacred cloud of the gods;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*
E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i lalo, i ka honua, i ka wai hū,	*Deep in the ground, in the gushing spring,*
I ka wai kau a Kāne me Kanaloa	*In the ducts of Kāne and Kanaloa,*
He wai puna, he wai e inu,	*A well spring of water, to quaff,*
He wai e mana, he wai e ola.	*A water of magic power - the water of life!*
E ola nō ʻeā!	*Life! O give us this life!*

Found in Emersons *Unwritten Literature of Hawaii: The Sacred Songs of the Hula* (1909:257-259). Collected from Kauaʻi, Author Unknown.

Valued Cultural, Historical, and Natural Resources and Traditional and Customary Native Hawaiian Rights

Cultural Resources

He Mele No Kāne: Paukū 3

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i ke kuahiwi, i ke kualono,	*Yonder on mountain peak, on the ridges steep,*
I ke awāwa, i ke kahawai;	*In the valleys deep, where the rivers sweep;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

...Aia i ke kuahiwi, i ke kualono, i ke awāwa, i ke kahawai...Aia i laila ka wai a Kāne

- A Kona Community Member talked about Waiʻaha Stream, "During heavy rains, Waiʻaha Stream flows and flooding occurs in Hōlualoa Village."
- A Kona Community Advocate shared the importance of wai, "To me, water is more than a subsistence item. Wai creates a community and facilitates skilled resource managers to

assure societal well-being and thereby ensuring Mauka-Makai reciprocity. This water aligned north-south, to the makai-mauka trade relationships."

He Mele No Kāne: Paukū 4

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i kai, i ka moana,	*Yonder at the sea, on the ocean,*
I ke kualau, i ke ānuenue,	*In the driving rain, in the heavenly bow,*
I ka pūnohu, i ka uakoko,	*In the piled-up mist wraith, in the blood-red rainfall,*
I ka ʻālewalewa;	*In the ghost-place cloud from;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

…Aia i kai, i ka moana…Aia i laila ka wai a Kāne

- A Cultural Descendant, Lawaiʻa And Heiau Practitioner, and DHHL Beneficiary talked about the broader Kona coast, Honokōhau surviving on brackish water, and gathering limu ʻeleʻele, "And we knew places where we can get–is not as fresh, but it's good that you can at least survive on the brackish water but it depend on the limu; limu ʻeleʻele and limu ʻeleʻele for us is our bait for go make nenue."
- A Kona Community Member mentioned the prevalent areas of freshwater springs were Keauhou Bay and Kailua Bay, "I noticed on the ocean, regulate water movements on the top, but then you come up on smooth areas. And those were the areas indicative of freshwater springs coming up."
- A DHHL Kealakehe Beneficiary mentioned how the ocean is impacted greatly by the amount of freshwater in it, and how limu is a bioindicator of this, "The reef system is different here compared to where I'm from. You can tell when you go out and the limu, it's brown. I don't know the name of it but it's brown, get plenty of that, where I'm from, more on the hot side, so get limu kohu, limu ʻeleʻele all that over here you rarely find. So, water has a big impact on the ecosystem."

He Mele No Kāne: Paukū 5

E ui aku ana au iā ʻoe,	*A question I ask of you*
Aia i hea ka Wai a Kāne?	*Where is the water of Kāne?*
Aia i luna ka Wai a Kāne,	*Up on high is the water of Kāne,*
I ke ao uli, i ke ao ʻeleʻele,	*In the heavenly blue, in the black piled cloud,*
I ke ao panopano,	*In the black black cloud,*
I ke ao pōpolo hua mea a Kāne lā, ē!	*In the black mottled sacred cloud of the gods;*
Aia i laila ka Wai a Kāne.	*There is the water of Kāne.*

…Aia i luna ka wai a Kāne…Aia i laila ka wai a Kāne

- A Kona Community Member shared, "Daily clouds blanket Hualālai in the late morning into the late afternoon. Late afternoon, these clouds move makai/down to Māmalahoa Highway and produce rain until the evening."
- A Kahaluʻu Lineal Descendant talked about Kahaluʻu mauka, "We were taught how to listen for the rain to come because where we live, it's just in the valley."
- Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary mentioned how clouds are indicators, "We going fishing. So we get up 4 o'clock. We gotta make the palu, get ready, go out on the canoe. We look the mountain. We look the mountain for the cloud. Certain clouds we look for. Okay, we get one window. We can go outside when that

window open. Okay? We go in, when you see certain clouds come by Hualālai, better head in because Kona winds coming."

He Mele No Kāne: Paukū 6

E ui aku ana au iā ʻoe,	*I put to you*
Aia i hea ka Wai a Kāne	*Where is the water of Kāne?*
Aia i lalo, i ka honua, i ka wai hū,	*Deep in the ground, in the gushing spring,*
I ka wai kau a Kāne me Kanaloa	*In the ducts of Kāne and Kanaloa,*
He wai puna, he wai e inu,	*A well spring of water, to quaff,*
He wai e mana, he wai e ola.	*A water of magic power - the water of life!*
E ola nō ʻeā!	*Life! O give us this life!*

…Aia i lalo, i ka honua, i ka wai hū, i ka wai kau a Kāne me Kanaloa

- JK referred to Niumalu Ahupuaʻa, Puhi Spring, "Flowed underground from Keōpū Forest Reserve, into caves, to finally puka out at Hulihe‘e Palace. Still get, still get fresh. There's two springs. One right there. One in the center, and one down by the front ocean view. We used to ʻauʻau in the water, was so fresh. The water, we used to go surfing. So we come in, jump in the freshwater. ʻAuʻau and then we go home."
    - They continued to share about the deep sea and freshwaters from Keauhou to Honokōhau, and Keāhole, "From Kailua down to Keauhou, and Honokōhau where Laʻiʻōpua stay, one mile away. Deep sea water."
- Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary talked about the ahupuaʻa of Honokōhau and Kealakehe, "Honokōhau, Kealakehe, what we call ilinawai. Ilinawai is like underground river, underground stream."
    - They continued to share about other ahupuaʻa, "Maluaka is an area in the Keauhou Ahupuaʻa with loko wai in the ma uka region."
        - "That water on that side [Kaloko] is Waihā. Water in Kahaluʻu is Waikū."
        - "Kealakehe, Keahuolū, and Lanihau [points to a map] so over here, get all ʻōpae pond, all next to the fish pond. Kealakehe get, Keahuolū and Lanihau. So we, this where we fish, we get all ʻōpelu koʻa's. So we call it a white ʻōpae. We catch the ʻōpae for catching ʻōpelu. We catch the ʻōpelu to catch deep sea fish, ahi, marlin, any kind."

…Aia i lalo, i ka honua, i ka wai hū, i ka wai kau a Kāne me Kanaloa, He wai puna, he wai e inu…

- A Kahaluʻu Lineal Descendant shared about the wells at Kahului, "I was raised next to a well [in Kahului], have to use the pakini to throw ʻum in the well and pull up the pakini, and put ʻem in another container. And that stream, that water probably came from Waiʻaha."
    - They continued, "Could hear the water rumbling underground going down to the ponds and wells ma kai during dry season to do laundry and use the wells of other family members. Grandfather had a well in Kahaluʻu ma uka that everyone was able to use."
        - "At night, we could hear the water rumble. That's how much water Kahaluʻu ma uka has."
        - "We got some water down from Kahaluʻu because that's where the freshwater was, some of the ponds that was available. And that was grandma's house. She also had a well that was freshwater and that you

could drink. And so we would come ma kai and, you do fishing and all the necessary stuff."
        - "But he had his own water well that also came out of this cave. And he had a water well that supported his taro, and anybody in that area could come and utilize the water."
- A Kahaluʻu Lineal Descendant shared about a well being kept within the family at Kahaluʻu ma kai, and still in use today by family, "Lots of water in Kahaluʻu/Keauhou, at the beach and up mauka, my tūtū, Grandma Kahulamū, she lives along Aliʻi Drive, but on the upper part of it where the small blue church is she resides up above that. She also has a well still today, which my cousin and his family lives in the home now. I believe they still use that well, I'm not sure, but she still has it there."
- A DHHL Kealakehe Beneficiary talked about the various ponds from ʻOʻoma to Kaloko, "…he came across over 500 of ponds, brackish ponds all within the lava field from Queen K [Queen Kaʻahumanu Highway], from ʻOʻoma to Kaloko ponds in between there. So he did one whole assessment and when he came down he said had over 500 something ponds."

…He wai e mana, he wai e ola. E ola nō ʻeā!

- A Kona Community Advocate shared that the water sources from Keauhou to Kaloko are the same, "And because of the same water source, all the people inclusive of that area and exclusive of that area has the right to use it or to request use of it. But the people within that specific ahupuaʻa are the stewards and managers and recognize and giving credit as being stewards and managers of the resource in this case, water."
    - They continued, "I'll describe two forms of extended Wai reciprocity, one, the freshwater percolation and that mix creates an anchialine environment - a brackish mix unique to West Hawaiʻi. The second kaona of wai reciprocity is the cultivation of lāʻau/medicinal herbs with its related disciplines of diagnosis/treatment, preparation/production, prayers/rituals/ceremonies, etc. essential to physical and mental health."
        - "Aha Mana, I describe it as an esoteric/spiritual/intangible 'wai form,' that is the 'energy/mana,' the emotional melding and bonding of people, nature, and spirit."
        - "Respectful and fair exchange supports the fabric of society. So, with respect, reason, and correct stewardship, there are no boundaries in water and natural resources. Just as there are no boundaries in sun, wind, and freedom to travel."
        - "Water creates a community of people. This community of people, they become the resource managers, the konohiki, they care for and manage the water and the habitat. They understood the relationship of water to plants and plants to people; and plants as trade items for economic development amongst and between families and ahupuaʻa. Resources when exchanged or traded, are specific to their own ahupuaʻa/ʻāina. They were complimentary to each other, but each was unique and specific onto themselves."

Cultural Practices and Values

Broader Area of Kona ʻĀkau

- A Kona Community Member commented on the value of conserving water in Kona, "You gotta go outside when it's raining. Import buckets to make sure you have water. We farmed coffee farm, mac nut farm, and avocado farm. So we knew plants and everything. We knew, wash the rice. The first one you can throw, but the next one keep 'em because that's what's gonna water your vegetables. Because when we had drought, you know how precious water is."
- A Kona Community Advocate explained the importance of anchialine water in maintaining the cycle of everyday life from Kaloko to ʻAnaehoʻomalu
    - "For example one unique 'type' of wai in this dry coastal area is that freshwater mixed with salt water, anchialine water, a mix of brackish and fresh. We are at the Kaloko/Kohanaiki, all the way to ʻAnaehoʻomalu is this anchialine system. We at the southern extreme of that anchialine system. This water aligned north-south, to the makai- mauka trade relationship, this anchialine system is so unique; it grows ʻōpae. And the ʻōpae, in this case, ʻōpaeʻula, or ʻōpae lōlō, was used as bait for ʻōpelu fishing. It was used to maintain the fishing koʻa to acquire ʻōpelu and akule. And this dried fish that we live on was traded with the mauka people, the mauka ahupuaʻa, and the mauka belt is 800 feet above us. There we traded for kalo and ʻulu and ʻuala. So we traded our fish and we got back in exchange ʻulu, ʻuala, and those kinds of crops that were in the mauka areas."
    - "That's how the trade and the reciprocal society operated in the mountain or mauka and the makai trade systems. And that maintained a social order, that there needs to be cooperation, there needs to be support, and there needs to be respect for this continuous system of reciprocity and help to continue. So water was one of the elemental requirements for this trade to continue. And few people look at water in that sense where it would feed bait for us, and we will acquire ocean products and that would inquire social interchange and interface, and thereby maintain our social and economic well-being."
    - "Social spinoffs are important in this because it allows the different family units to interface with each other, reinforcing the quality of life in our community. Our families become much stronger, much more sensitive and much better people for this interaction. This is a learning center; because it was a learning center in traditional times, we choose to reapply that practice. Made a contemporary model as an example. We always remember our pre-contact values and traditional laws that were in place before contact. And my court cases have proven two supreme court cases proves that that contemporary laws and adjudication are on fair and even keel with traditional and customary laws. Because those laws existed before the imposition of Western jurisprudence. Our laws were prevalent and were paramount at the time of the overthrow. New laws come in, but it does not diminish, nor does it take away or destroy our history of traditional and customary uses and practice and the rules and laws that applied to them in that case. So by stating that position that way, the American courts finally verified that. Western laws do not supersede traditional and customer Hawaiian laws, but they are in fact proven to be on equal footing."
- A Kahaluʻu Lineal Descendant spoke about their father knowing all of the water holes on the ranches in Kona, "They worked along here on Aliʻi Drive, Keauhou, all the way to town in Kailua-Kona. He knows all the water wells because they work on a ranch. They're not only one area. They're up at Puʻuanahulu, up at Hōlualoa, south side."
- A number of Kona community members spoke about practices relating to resources in Kona ʻĀkau:
    - Kohanaiki, Honokōhau, and Kaloko have loko iʻa that rely on the freshwater sources along with other iʻa, limu along the Kona coast.

- Kaloko to Honokōhau, Makaʻeo, Kamakahonu Bay, Kailua, Keauhou, and Kahaluʻu all have freshwater springs entering under the sand/ocean at many beaches along the Kona coast.
- Mauka, remnants of the Kona field system including systems for water to support the agricultural uses in the mauka areas in times past.
- Local families have generational ties and mauka-makai relationships to the ʻāina i.e. certain times of the year when the fishing was good, families inhabited makai; other times of the year agricultural cultivation took place mauka.

Kahaluʻu

- A Kahaluʻu Lineal Descendant spoke to the abundance of water resources up ma uka, "We were taught how to listen for the rain to come because where we live, it's just in the valley. Papa had all his kalo planted and ʻuala, and ʻawa other things planted up there. But he had his own water well that also came out of this cave. And he had a water well that supported his taro, and anybody in that area could come and utilize the water."

Niumalu

- JK speaks to the practices ma kai
  - Fishing either by fishing pole, throw net, diving, "Mullet, ʻawa, weke, and ʻoama. Manini, pākukui, yellow tang by Kona Inn. White limu come from fresh and saltwater, fish would eat it. A lot of freshwater in town [Kailua-Kona]."

Kaloko

- A Kona Community Advocate commented on the cultural practices in the Kaloko area, "At Kaloko, a Leaning Center was established for native gardening projects, healing/communion, star compass and navigation projects including monitoring and maintaining the anchialine ponds, reef and fish monitor/restoration, mālama the surf site."
  - They continued, "We grow, harvest and share food crops. We harvest, process/produce medicine plants. We protect the reef and fish/limu nurseries from damage to maintain the food chain, We surf, canoe, sail. We share ʻāina with kuleana, knowledge, history, stories, hope, future."
    - "At the northern edge of Kaloko fishpond, we made a Learning Center. With a native garden, a navigation star compass, a halau for meetings. Learning, teaching, sharing. Here's a Kona story about sharing. Kona has always been an arid and dry place. So have to be successful in harvesting, storing, and sharing water. We learned and used unique and special skills to acquire wai, water. One way was to access small caves and natural lava tubes and collect the drops of water in ipu containers and/or natural drip basins. Another way was to collect from fresh-water plumes that percolated and discharged along certain places on our shoreline. Freshwater springs and the other one was rain."
  - Regarding daily routine, mundane tasks, the Kona Community Advocate reminded, "We need to always blend regular things with spiritual/emotional tasks for pono/balance. Here, Kohanaiki, we have another place and time for communion, connection, meditation with natural forces/mana. Look at the navigator's skill for wide peripheral vision. She/he is one in nature, sensing/internalizing natural phenomena and creating survival decisions. Seeing over the horizon. Seeing tomorrow. Moku ʻO Hawaiʻi is our waʻa/canoe. We need to mālama our resources, which includes ourselves, for our safe/successful

journey. We remind ourselves the Earthmother is our waʻa in our cosmological sea. When diligent and responsible we survive."

- "Our site here [Kaloko] is how we envision this place. To help the cosmological order. This is our contribution to the belief of who and what we are. That proves our belief and values and our hope and optimism for the future. But Kaloko right next door to us does the same thing, even though it contributes a different type of resource, unique to that area. And together, all along the coast, they were always unique in different things. But all the resources need to be shared, like different elements and facets of personality living entities in order to make a complete and healthy entity itself. In this case, we're talking about the community of Hawaiʻi. So on the canoe, which is often used as our model for sustainable living on limited spaces and limited resources. That model in the Hawaiian frame of mind is also here. Hawaiʻi Island is our waʻa and everything on this island is shared amongst our crew. And the thing that keeps us glued together is our belief in shared resources and respect, reciprocal respect for each other. So if we able to teach that in our Hawaiian cosmological view, we see our island as a waʻa with its resources limited and its space limited. And we extrapolate that to the world order. We see that our earth mother is a canoe moving through a cosmological universal sea. We are all canoe. And we all share the same resources. And we all are resource managers and we all have to love and care for each other in order for the canoe to live. So there are no boundaries on the canoe. Everything is respected, reciprocally."

- JK commented on how as kids, they cleaned Kaloko Pond mākāhā, "All the mākāhā, I cleaned the mākāhā when I was a kid. Everybody from Kailua, kids, go on my father's truck and everybody used to go down there clean the makahā. We used to go inside clean all the rubbish in that pond."

Kohanaiki

- A Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary commented on gathering ʻōpaeʻula to catch ʻōpelu which will catch deep sea fish i.e. ʻahi, marlin, etc., "My tūtū folks live ma uka. But they come ma kai. But during the lowest low tide during the whole year, they go to Kohanaiki to make ʻōpae ʻula. That's the only place that is the deepest of all the ʻōpae ponds that going get, we can make ʻōpae."
- A Kona Community Advocate spoke about the cultural practices within Kohanaiki area, their importance, and why and how they should be protected, "In pre-western contact genealogy this specific ʻāina-Kohanaiki was a learning center for youth and young adults to learn lāʻau/medicines and related disciplines for mental and physical health, lua, martial arts skills and strategies, and resource management practices etc. I've described some traditional skills and techniques for acquiring and sharing water for subsistence, agriculture, politics and economy. The physical/tangible 'form' of wai-water weaves the fabric for subsistence well-being. This societal view motivates us to have a contemporary learning center to give us the experience of our traditional practices. We can say that wai in its various forms energized our work and gave us hope for the future."
    - "In my studies for things important to perpetuation of traditional cultural practices, I teamed the value of gathering rights, and how it applies to traditional usage for water and mineral resources, etc. so I applied Kalipi v. Hawaiian Trust Co. about kalo farming on Molokai; McBride riparian water rights case Maui; Pele Defense Fund/Waokele o Puna, and other cases. Using these precedents we were successful with legal cases we talked about earlier [fought and won the 'Pash and Angel Pilago v. Nansay and the County of Hawaiʻi' Supreme Court Decision for this place Kohanaiki; and the 'Kapaʻakai 'O Ka 'Āina v. Hawaiʻi State Land Use

Commission' Supreme Court decision for Kaʻūpūlehu/4 seasons]. Knowledge of traditional wai/resource uses gave me the foundation to successfully fight legal cases in American courts that qualify and verify our right to protect our ʻāina so to enable cultural-native practices."

Potential Impacts of the Proposed Project

The following comments are concerns and questions by community members relating to the potential impacts of the proposed project:

Concerns expressed by community members pertaining to potential impacts of this project include:

- A Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary commented on how drilling the proposed water source development in Kona without fully understanding culture and the environment would have various impacts. "NELHA (Natural Energy Lab of Hawaiʻi Authority), they're taking water. They're drilling water. They're like Kohanaiki, taking plenty of water for make golf courses, water features. That has an impact on everything."
- A Kona Community Member commented, "Impacts will be in establishing the distribution system so be very sensitive to the cultural resources that are in and around that area. Increased population and development have negative demands on the environment."
- A Kahaluʻu Lineal Descendant commented, "So that cycle, we are not doing a good job. We destroying ourselves. We try but not many understand the depths of being a Hawaiian, one. Secondly, is what already is in place that our kupuna's taught us to continue to preserve. Thirdly is for our own physical, mental and spiritual use that we need. And how are we gonna survive in 2024? Okay. Oh yeah, all the native plants, Kaloko, the hāpuʻu is slowly going. I don't see too much hāpuʻu up there anymore. And then what about the food plants for the birds? The animals, but we get a lot of wild cats and wild chickens. The pigs are going out, the goats are coming in and once in a while they see a deer running around."
- A Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary added that the change in the amount of water in wells are apparent, especially in Kaloko/Honokōhau where water is leaking out into the harbor, "So I think that this whole topic of wai is what make us ʻeha or sore is that, like I was saying, we had one well, and then during my mom's time, they seen the well, but now you look at the well. No more water inside the well. What happened? Oh you go look next door, what happened? It's the biggest freshwater coming out from the harbor [Honokōhau]."
- A Kona Community Member shared, "There's not as much fish as had before. But no one really can pinpoint what is the cause of it. Is it development? Some people point to the runoff over here. If I'm talking just about this place because of the golf course, it's because of the houses. Because of the cesspools and I'm sure that's all contributing factors. And those should be monitored, measured, and mitigated. But nobody's really looked at the freshwater. And I think that's an important issue to look at.
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Questions posed by community members pertaining to the impacts of this project include:

- Kahaluʻu Lineal Descendants, a DHHL Kealakehe beneficiary, and a Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary questioned:
    - What will happen to the water of Keauhou if DHHL drills a water well?
- A Kona Community Member questioned water costs:

    - "How much would it cost the community to streamline water from different places, as well as the amount of water that would potentially be used for agricultural use. How expensive is this water?
    - "'Cause it's gotta travel that far. And who's gonna pay for all that. When you're making all that pipe, somebody's gotta pay for all of that. Right? So, but if you close to the source, it's not gonna be that expensive, right? Like how much more are we gonna take from each person?"
- A Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary questioned the use of private wells:
    - "What about the private wells permitted by the County? You got private wells, you have to get them permitted by the County. The County has the credit. What about the water shortage for the community use?"
- JK questioned about politics between DHHL and other entities, and preserving resources for future generations:
    - "Why steal water from over here, and take it down Laʻi ʻŌpua? Because they don't want to get involved with NELHA (Natural Energy Lab of Hawaiʻi Authority)?""We going steal water from over here, and take it down Laʻi ʻŌpua? Because they don't want to get involved with NELHA? If it was flip flop, if NELHA got 25% and Hawaiian Homes got 48%, they'd be all right. Right. Wasn't it? That is how it would have been, but they got 25%. NELHA got 48%."
    - "So, how do we make it plentiful for our kids down the road? When you get kids and grandkids where they grow up, they no more water what they gonna do…water catchment again? By then climate change basically screwed us all out."
    - "Why don't they just do work together hand in hand. Sit down like common people. Say okay, you know, percentage wise, maybe we could take less. You can have more or whatever. How we help the community not help themselves."
- A Kona Community Member questioned about impacts to ahupuaʻa, the ocean, and aquifer:
    - "How does this project affect the ahupuaʻa and where it's being taken to?"
    - "But, also what's the reality in terms of what we're doing cumulatively to the entire aquifer and its impact on all people, not just native Hawaiians, but on all people."
    - "What's the level of the health of the freshwater coming out of the ocean?"

Mitigations and Recommendations

The following comments are **mitigations** relative to the impacts by the proposed project:

- A Cultural Lineal Descendant of the Kekaha Region talked about kuleana, "We got to share our manaʻo, our moʻolelo. If we don't, shame on us. Once we share it, it becomes their kuleana to take care."
    - They continued, "Pay more attention in caring for Waiʻaha Stream. Clean it up. It used to service Kona Inn and Huihui Ranch."
- A Kona Community Member shared, "To minimize impacts, the cultural resources that are in and around the project area are handled very sensitively."
    - "Look inside our own local community to their needs as opposed to encouraging more immigration of outsiders/development."
    - "Starting to measure a baseline for monitoring the impact of taking water from ma uka is having ma kai."
        - "From the ʻAha Moku perspective, we don't know what the impacts are because nobody's measuring what impact grabbing water from mauka is doing to the shore ʻcause nobody's bothered to do it. And that's where, from

ʻAha Moku standpoint, we don't have sort of a secret key or something we can open up all this information because it's not really recorded per se, it's just that we know it's important. So our position has been–my position has been, when people do develop water, can we develop the baseline for the area the water is coming from?"
        - "We asked the developer to look at the shoreline and start a baseline for monitoring what's going into the ocean."
    - "Let's start, trying to measure where the water, freshwater is exiting. What's the level of that and what's the level of the health in the areas that they come out and what's the level of health and where they don't."
- A Kahaluʻu Lineal Descendant commented, "It is important to protect our water resources from impending development and threats of a changing climate."
    - "Talk with more ʻohana of the area, especially the Gomes ʻOhana of Waiʻaha."
    - "Stay within the ahupuaʻa or find some way to not give up the water that DHHL would be drilling in Keauhou."
- A DHHL Kealakehe Beneficiary mentioned, "Kealakehe, stay in this area and no run a water line across a large area."
    - They inquired about if there was a possibility of temporarily tapping into the County water credits initially, then later developing the well in Keauhou. They proposed a short term to give DHHL more time to develop a line that "will extend out to keep it independent."
- A Kona Community Advocate shared, "The success and accomplishment of the proposed water source development help make the DHHL commission more confident and embolden to its mission, where it makes them stronger and feel more assertive, even aggressive in their mandate to provide quality, safe and healthy living spaces for our people. I do not see a change in resources. I foresee a change in strategy and thinking and assertiveness by our administrative powers, in this case, Hawaiian Homes, to know that they are on the correct and right course. And the ʻihe, the points of the spear, maka ʻihe, are already in place. People have already set the foundation and basics for Hawaiian Homes to spring forward as a new warrior to fight for native Hawaiian rights, more so than they have been in the past. And what we are doing today is helping them."
    - "In order to succeed, we need to secure our water and we need to feel confident that we are doing this to perpetuate our people's quality of life. And there's nothing extra that the commission has to do because all the administrative requirements and laws are already in place. They just need to get their staff to put it together in a comprehensive, logical, legal statement and articulate that assertively."
- Regarding Native Hawaiian mineral rights, a Kona Community Advocate commented, "The rights of native Hawaiians in a logical and complete and accepted the legal way using cultural and western laws and rules and contexts. And what we did with water use in this case is a water use change, again, from subsistence into maintaining the anchialine ponds, maintaining the quality of the coastline. So this water blooms would continue in the future. So if it's used for access for portable water in the future, they could identify where it was and how to acquire it. And that is part of what my experience with the traditional water sites are in addition to current contemporary uses."
    - "All the resources need to be shared, like different elements and facets of personality living entities in order to make a complete and healthy entity itself. In this case, we're talking about the community of Hawaiʻi. So on the canoe, which is often used as our model for sustainable living on limited spaces and limited resources. That model in the Hawaiian frame of mind is also here. Hawaiʻi Island is our waʻa and everything on this island is shared amongst our crew. And the thing that keeps us glued together is our belief in shared resources and respect,

reciprocal respect for each other. So if we are able to teach that in our Hawaiian cosmological view, we see our island as a waʻa with its resources limited and its space limited. And we extrapolate that to the world order. We see that our earth mother is a canoe moving through a cosmological universal sea. We are all canoe and we all share the same resources."

- "We all are resource managers and we all have to love and care for each other in order for the canoe to live. So there are no boundaries on the canoe. Everything is respected, reciprocally."

Recommendations

- A Kona Community Member commented, "Perpetuating canoe paddling is critical for our culture which reminds us of where we came from."
- A Cultural Descendant, Lawaiʻa and Heiau Practitioner, and DHHL Beneficiary recommended to prioritize the water in Honokōhau Harbor before going somewhere else, "The well is right here. So as Hawaiian, I'm saying this harbor was made back in 1970 and all these water credits over 50 years of water credits. So like people sticking their heads in the sand, and you gotta go huakaʻi some other place for get water. When the water stay right in the backyard, only pohō. Fix that. My point is that you no like huakaʻi and mess somebody other place. It belongs to other families. You no like ʻaihue, steal from there and bring all the way back this way. But you like. Fix what you can and the sooner you can fix ʻem, the more better."
- A DHHL Beneficiary and Lineal Descendant of Kona recommended a cost analysis across the board for this proposed project, "To look intimately at the pros and cons of the development of the DHHL water well in Keauhou and keeping it versus relinquishing it to the County. Maybe in the forefront it might take a lot of money to maintain and create that system to extend out the wai, but in the long run, how many dollars DHHL is going to save from appointing the County to manage it and take care of it. We already considered they mismanaged, why we lost water. That we're in this crisis. It's because of mismanagement of the existing entity that we are gonna hand the water over to after we establish it. It makes no sense to me."
- A Kona Community Advocate recommended cultural practices can be integrated into resource management and stewardship, "We need to recognize that resources that are under stewardship and management because they relate to traditional and customer customary practices, and more importantly the perpetuation of customary and traditional practice. In order for that belief to survive, you must apply. Every land use decision must apply western ideas of fee simple ownership. So even though they may be, it appears contradictory, it is not. Just because a person has one place the person is not separate from responsibilities to the general community. So we need to base it on land use laws on the contemporary feasible ownership."
    - "The land use laws one and number two is the application of comprehensive and inclusive and complete analysis from different contractors to include that type of model thinking into their analysis."
    - "Native Hawaiian customary and traditional practice, especially as it applies to perpetuation of practices as protected and relevant in contemporary American adjudication. And it already exists in laws. It's already embedded in their rules and their administrative rulings and laws. Pre-contact traditional Hawaiian land use laws are on equal legal footing with western fee-simple land use laws. One does not supersede the other. American and English jurisprudence does not extinguish Hawaiian existence or history at imposition of western laws because Hawaiian laws and practices exists long before western contact. This is an opinion of the Hawaiʻi State Supreme Court."

    - "But the people who advocate such thoughts need to see is not a bifurcation. It's not a division of customary traditional practice versus contemporary land use. No. It's contemporary and traditional practices in a modern sense, contemporary sense is a value and belief system. It gives us our emotional investment in the future. But by applying correctly, Western adjudication and English jurisprudence, we guarantee the fair and proper use of resources as relevant and as inclusive to land use decisions. Administrative agencies must incorporate the belief systems/values/practices of the old ones when deciding contemporary land use. If not, they practice genocide and ethnic cleansing. And of course they'll not admit to that."
- A Kona Community Advocate shared, "We need to change the institutional mentality of Western teaching to complement itself and thereby become stronger than you are. By integrating field projects and natural projects that are, and have always been arts and sciences in practice. We recognize the theoretical places for discourse and discussion, and we acknowledge the places for models of experimentation and application. And that makes a complete student who is more competent and that person is better able to be a stronger member of his or her family."
    - They continued, "To us this place [Kaloko] is a puʻuhonua. It provides a sanctuary where projects are conducted and undertaken that are valued and believed through cultural practices. Powered by cultural practices. And these learning centers need to be placed up and down the coast. So the modern ways of teaching the charter schools, for example, participate in these kinds of learning activities. So their learning activities become formal classroom, arts and sciences that includes field project work, also arts and sciences, but in different modalities. That way the students who are parts of this dual learning become more for and complete and competent in the education. There needs to be integrated in contemporary learning where students would come out of a formal institution and be part of a more natural field-based institution. And a field-based institution is thereby recognized as on equal footing, just as valuable as a building up on a hill. One is not better than the other. Both are complementary to each other. Therein, again, the model of the canoe, the right hull and the left hull. But the interaction and the place for stability, for peace is a pō lā. And pō lā is where this interchange of pō, light, pō, dark and lā light intermingles and interfaces. But the people who successfully experience this experience of pono balance on the canoe to the mana of the pō lā, they become better people."
- A Kona Community Advocate would like DHHL's commitment that they will uphold their mandates prescribed by law, "We need to be confident in our role in management of resources and contribute towards a social structure that build good community, healthy, strong, educated, sensitive, and respectful. These are our responsibilities that we need to perpetuate. And that is why Hawaiian Homes brought their mandate down to a very basic level. That if we are able to provide the nuclear family with a living space that they can fulfill their dreams and goals and quality of life. That family will be a contributing member to the community. And as we build these healthy and strong and sensitive and respectful communities, our island canoe becomes much more diverse. Interestingly, in its diversity, lies its power. The monarch comes from the inclusiveness of diverse thoughts and personalities. That is the makeup of the crew of the canoe. That is a makeup of the families who crew our island canoe. And Hawaiian Homes is one small part that keeps a family healthy so it can become contributing members to our island canoe crew."

Ka Paʻakai Framework Analysis Application

Ka Paʻakai Framework Analysis Questions:

1) What are the valued cultural, historical, or natural resources in the project area and the extent to which traditional and customary native Hawaiian rights are exercised in the area?
2) What is the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action?
3) What feasible action(s), if any, to be taken to reasonably protect any identified cultural, historical, or natural resources, and exercise of traditional and customary native Hawaiian rights in the affected area?[120]

1) What are the valued cultural, historical, or natural resources in the project area and the extent to which traditional and customary native Hawaiian rights are exercised in the area?

It is unreasonable to assume it is possible to inventory all the traditional and customary native Hawaiian rights being exercised in a single area. Firstly, because it is a well-known truth, embodied in an ʻŌlelo Noeʻau, that "'Aʻohe pau ʻike i ka hālau hoʻokāhi. All knowledge is not taught in the same school" (Pukui 1989:24, #203). This can be taken to mean that one can, and should, learn from many sources and that one cannot at the same time hold all the sources of knowledge. Secondly, to place the burden on practitioners to come forward in a timeline subject to an undertaking such as this one is unreasonable and impossible for many reasons. The most important to acknowledge, is that many kumu, practitioners, and ʻohana have Native Hawaiian traditions and customs that are not for frivolous sharing. As in many hālau, knowledge must be earned and entrusted.

To address the challenges of assembling an inventory of customs and valued resources in an area, and to relieve the burden from the community to come forward in a tight timeframe and under the assumption of un-requited knowledge sharing, this study approaches the inventory through:

1) early and meaningful consultation
2) primary source research
3) the understanding that if a resource exists or can be restored then the right or practice exists
4) consultation is an ongoing process that agencies compiling with Ka Paʻakai will continue to engage in.

[120] Ka Paʻakai o Ka ʻĀina v. State of Hawaiʻi Land Use Com'n [*Ka Paʻakai*], 94 Haw. 31, 47, 7 P.3d 1068, 1084 (2000).

Traditional and Customary Native Hawaiian rights are exercised through practice, whether one that is continued or restored. Practice relies on resources. If a resource exists, a practice exists. If a resource existed historically and has the potential to be restored, then the practice exists. These are the premises on which Nohopapa bases its inventory of valued cultural and historical or natural resources in the project area. To fulfill the requirements of Ka Paʻakai, this inventory includes what we are calling **resources**, or cultural resources, which refer to "valued cultural, historical, or natural resources…" that stand alone or are part of a practice. For the purposes of this inventory, we will refer to "traditional and customary Native Hawaiian rights" as **practices**. Practices often require resources to be exercised, and the two go hand in hand.

Inventory of Practices & Resources

This section presents an inventory of **practices** and **resources** tied to the project area that have been collected from consultation and primary source historical and archival materials that include moʻolelo, oli, mele, ʻōlelo noʻeau, Māhele records and testimonies, Boundary Commission Certificates and testimonies. These practices emphasize the generations of kupa ʻāina (native of the land) in Kona Akau who maintained a deep pilina with the vast natural and cultural resources of this ʻāina. The cultivation of the land and sea, and the gathering and utilization of freshwater resources that originate from the storied places of this ʻāina, have and continue to feed Kona's community physically and spiritually. These practices are a testament to the enduring legacy of Kona Akau and reaffirm the right for Kānaka ʻŌiwi to actively maintain traditional and customary practices in these spaces today.

Bird Catching

Table 20. Table of Practices and associated resources in and around the study area tied to **Bird Catching**

Practice	Resource	Location	Information	Source
Bird catching	Manu	Kahului Ahupuaʻa	Several manu were referenced as living in upland Kahului, these species were important enough to mention and would have been resources tied to cultural, religious and subsistence practices. They are also biological indicators of a healthy forest system and watershed. Included area: ʻelepaio, pueo, ʻIo, and ʻamakihi	In He *Kaao no ka Manu Elepaio,* found in the nūpepa "Ka Hoku o ka Pakipika" (S.W.K.: 1862)
Bird catching	**Huaikaumauma** (Huaikamauna)	Keauhou 2 Ahupuaʻa Hōlualoa Ahupuaʻa	Ihihi testified for the Hōlualua Boundary Commission hearings, "Know the place in the woods called Kahiihiie; it is the junction of Kaumalumalu and Holualoa 1st; thence the boundary runs mauka along old trail to Kalokau; a grove of banana trees on a pali; thence to Kanoa, an old kauhale kawilimanu; thence to Kalaemaia, an ahua and kualapa; thence to Huaikaumauma, a kualapa; thence to Apiipii, where Keauhou 2 cuts these lands off, from there the boundary turns North to Puulalaau [Puulaalaau]." "Keauhou cuts Kaumalumalu off at Pukaiki and Huaikaumauma and boundary of this & Keauhou runs up in the middle to Hiinau. This is what the bird catchers say, as I hear now. Kaumalumalu runs to Pukaiki and Huaikaumauma."	Boundary Commission Testimony: Hōlualoa Ahupuaʻa, Ihihi K. 1874:v.A 1, p336-339.
Bird catching	**Keakui**	Keauhou 2 Ahupuaʻa	Mentioned by Keliikanakaole K. in his sworn testimony, "A place called Keakui, a road across the aa made by bird catchers, a puu pahoehoe and a Mawae in the center, is the place where Keauhou 2 turns North and cuts off Keauhou 1st. Niihoa and Kekai, the men who made the road which is the boundary between the two, told me thus. I went with Kekai after sandalwood."	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Kakio 1873:v.A 1, p270, Folio 448
Bird catching	**Kilohana**	Keauhou 2 Ahupuaʻa	In BC testimony for Keauhou 2, Keakaokawai (Keakaikawai), a noted kamaʻāina witness in Kona, he identifies a bird catching place, notably on an ʻaʻā flow. "...thence mauka to Kilohana, on an aa flow where we used to catch birds and where Kahuku joins Keauhou. Thence along Kahuku to Kulauala, on Umi's road; From Puuloa to Kanupa Keauhou used to take the pahoehoe above the woods and the Kona lands reached to the mauka edge of the woods from Kilohana along Kapapala to Pohakuhanalei, a hill on the top of the mountain [Mauna Loa]"	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Keakaokawai (Keakaikawai) 1874:v.A1, p256-260.

Practice	Resource	Location	Information	Source
Bird catching	**Makaulaula**	Keahou 2 Ahupuaʻa	According to Kahulialo, a dwelling for bird catchers, "Thence to Makaulaula, where we used to live when bird catching. Thence to Kaonohi, a cave; thence to Ahuwela, a cave with water in it; there Hookukano ends and Kealakekua joins and bounds Keauhou..."	Boundary Commission Testimony: Keauhou 2, Kahulialo W. 1873: v.A1 p261-265
Bird catching	ʻAmakihi as a pūpū with ʻawa	Kahului Ahupuaʻa	Specifically identified as a practice occurring in the ahupuaʻa of Kahului; "broiled" ʻamakihi as "a condiment to go with ʻawa" in a chant from ʻElepaio to ʻAmakihi in *He Kaao no ka Manu Elepaio*	Mentioned in *He Kaao no ka Manu Elepaio* in the nūpepa Ka Hoku o ka Pakipika (S.W.K.: 1862).
Bird catching, konohiki	Manu	Keauhou 2 Ahupuaʻa Hōnalo Ahupuaʻa	Waiau testified for Bdry Commission of Keauhou 2, he was born at Kanaueue during Kamehameha I's reign and talked about bird catching and the konohiki take. "Know the land of Keauhou, used to go after birds with my father, Nauwe, an old bird catcher and he pointed out the boundaries to me, as it was kapu to go after birds and not divide them with the konohiki; used to go frequently not vary far above here. Honalo bounds Keauhou 2 on the South side, as you go into the lower edge of the woods. I do not know the boundaries."	Boundary Commission Testimony: Keauhou 2, Waiau K., 1873: v.A1 P268-272
Bird catching	Manu	Keauhou Ahupuaʻa Hōnalo Ahupuaʻa	"I used to go on the mountain with my Father collecting sandalwood and catching birds; his name was Kauluahi, and old bird catcher and kamaaina now dead..."	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Keakaokawai (Keakaikawai) 1874:v.A1, p256-260.

Table 21. Table of Practices and associated resources in and around the study area tied to **Forestry and Hana Wa‘a.**

Practice	Resource	Location	Information	Source
Forestry Canoe Making	**Huaikaumauna** Lae Koa Koa Forest Koa and Mamani trees **Mawae**	Keauhou 2 Ahupua‘a Hōlualoa Ahupua‘a Kahalu‘u Ahupua‘a Kaumalumalu Ahupua‘a	Mentioned by Keliikanakaole K. In his sworn testimony, "Thence to Huaikaumauna, a lae koa on kualapa."	Boundary Commission Testimony: Keauhou 2 Ahupua‘a, Keliikankaole 1873:v.A 1, p270, Folio 448
			Mentioned by Kupakoa K. In his testimony, "Thence along the land of Kaumalumalu to **Huaikaumauma**, koa trees and mamani, on the Kohala side of Judd road. Keauhou taking the land mauka of the woods and Kaumalumalu the woods.”	Boundary Commission Testimony: Keauhou 2 Ahupua‘a, Kupakoa 1874:v.A 1:448-450
			Described as a "quite an old man", Puhi gives his sworn testimony and describes Huaikaumauna as more than just a koa forest, but a sacred place, where a heiau not far from a water hole and a burial cave, "Keauhou 1st ends in the koa woods. It is cut off by Keauhou 2d at a place called Mawae where there is a water hole, and a cave where my relations are buried. The boundary is way makai of this place. Keauhou 2d takes the land where they used to catch uwau, on the mauka side of the woods, cutting off Kahaluu and Kaumalumalu. Do not remember the names of the points Kaumalumalu reaches to Huaikaumauna, junction of Kaumalumalu, Kahaluu and Keauhou. it is an ahua in the koa woods, where the canoe makers used to have a heiau."	Boundary Commission Testimony: Keauhou2 Ahupua‘a, Puhi K. 1874:v.A 1, p450-451.
Forestry	**Kanoa** Koa Forest Koa and Mamani trees	Keauhou 2 Ahupua‘a Kahalu‘u Ahupua‘a	Mentioned by Kupakoa K. In his testimony, "Thence along Kahaluu (in the woods) to **Kanoa**, a point of koa and mamani trees, the place where the fire from Kau [Ka‘ū], on the mountain went out.”	Boundary Commission Testimony: Keauhou 2 Ahupua‘a, Kupakoa 1874:v.A 1:448-450
Canoe Making	**Keanaakala**	Keauhou 2 Ahupua‘a	where canoe makers used to live	
Forestry Canoe Making	**Huaikaumauna**	Keauhou 2 Ahupua‘a Hōlualoa Ahupua‘a	Keliikanakaole in his sworn testimony for Hōlualoa 1 mentions Huaikaumauna in Keauhou 2, remembering the felling of a tree. "Thence mauka along old trail to Kalaenaio where Naio trees are growing, in Koa woods; thence to Huaikaumauna, a kualapa, from which a big tree was taken, where Kaumalumalu is cut off by Keauhou 2."	Boundary Commission Testimony: Hōlualoa Ahupua‘a, Keliikanakaole K. 1874:v.A 1, p336-339.

Practice	Resource	Location	Information	Source
Forestry	**Waikulukulu** (a forest)	Keauhou 2 Ahupuaʻa	Waikulukulu is the name of a woods or forest near Puuakawai water hold, "thence the boundary runs up the mountain to a cave on the side of the mountain, above the woods called Waikulukulu, thence to Puuakawai, an old water hole now filed up by cattle tramping around it; this place is the junction of the land Kaopulehu [Kaupulehu] with Keauhou."	Boundary Commission Testimony: Keauhou 2, Keakaokawai, K. 1873:v.A1, p256-260
Forestry Historical	**Haliilaukoa**	Keauhou 2 Ahupuaʻa	A storied place of Umi, "Haliilaukoa (where Umi sat and they spread Koa leaves for him; old tradition)"	Boundary Commission Testimony: Keauhou 2, Keakaokawai K. 1873: v.A1 p257.
Canoe Making Trails	**Kealakōwaʻa** (Kealakowaa) (Alakowaa)	Kahului Ahupuaʻa	Listed as the name of a heiau said to have been built by ʻumi for the dedication of canoes. The canoes were felled and brought here for dedication and then launch by the shoreline at Puʻu spring and the surf of Puʻu. Was misnamed Hale-hau in recent times. (n.d. Kekahuna) Ties to families of ʻumi as well as canoe carving and dedication practices. *Lit*. The path to drag the canoe, (translation Kawika Aspili, Nohopapa Hawaiʻi)	Henry E.P. Kekahuna Collection, MS Group 312, Map: 50-HA-D8.
		Kahului Ahupuaʻa ʻIli ʻāina of Puki ʻIli ʻāina of Kahuki ʻIli ʻāina of Kamuku ʻIli ʻāina of Halewaawaa	A place where logs destined to become canoes, travelled to on their journey down from the uplands to the shore Several Māhele land claims reference Kealakōwaʻa as bounding their pauku ʻāina.	LCA 7086 (NR:v8p419) LCA 7336 (NR:v8p424, NT:v4p500) LCA 10252 (NT:v4p538) LCA 10374 (NT:v4p529-530)
		Kahului Ahupuaʻa to Hōlualoa Ahupuaʻa	The trail on which canoes were dragged from the uplands to the shore; crosses several ahupuaʻa including Kahului to Hōlualoa.	From Buke Māhele records, Kumu Pono Associates in Māhele Section, Table 12 Glossary

Practice	Resource	Location	Information	Source
Forestry Canoe Making	**Kikikiaeae** (canoe making place)	Keauhou 2 Ahupuaʻa	In Waiau's testimony for the Keauhou 2 Boundary Commission he described **Kikikiaeae** as a canoe maker place. "Governor Adam's road is at the end of Lehuulanui; thence along Hookukano; thence mauka along the Government road, between two aa flows to Kamoomoo; thence to Keanaakala, a cave; thence to Kikikiaeae, where we used to live. The canoe makers of Hookukano also lived there. There is a hill called Puulepo, with a crater on it. There is a water hole makai of said hill. "	Boundary Commission Testimony: Keauhou 2, Waiau K., 1873: v.A1 P268-272
Forestry	Kaimuhapu (a forest)	Keauhou 2 Ahupuaʻa At Okolea	The KS study area is in Keahou 2 near its boundary with Hōnalo. Waiau testified of a forest and a waterhole at the border in a place called Okolea. "A place in Okolea, in the woods called Kaimuhapu, a water hole, is on the boundary between Honalo and Keauhou..."	Boundary Commission Testimony: Keauhou 2, Waiau K., 1873: v.A1 P268-272.

Mahi ʻai ʻana – Cultivation

Table 22. Table of Practices and associated resources in and around the study area tied to **Mahi ʻai ʻana - Cultivation.**

Practice	Resource	Location	Information	Source
Mahi ʻai ʻana (Cultivation)	Farmable soils, wai, upland fields	Kona Study Area	Kona field system including the water systems to support it.	Consultation
	Pūnāwai, springs, cultivated upland fields		ʻUala, kalo, ʻulu and other cultivated crops fed by the rain and water wells.	Consultation
	Alani (orange tree), Hala, Hala Kahiki (pineapple), Hau, Ipu (gourd), Kalo, Kope (coffee), Kou, Loulu, Maia, Momona (Cherimoya), Niu Nonu (Indian mulberry), Olonā, Pu (squash), ʻuala (sweet potato), Uhi (yam), ʻulu (breadfruit)	Just north of Puaʻa Ahupuaʻa down to the south of Keauhou Ahupuaʻa	Crops mentioned in Māhele records as being cultivated in and around the project area as resources for the people who lived and exercised their traditional rights in this region of Kona	Māhele Awards Books, Native Testimony and Native Register
Mahi ʻai **Makawela**, a ʻuala farming practice Nānā Ao (cloud observation)	**Kanoenoe** (a plain) (a misty rain)	Kealakehe Ahupuaʻa Keahuolū Ahupuaʻa	Indicator, when mist sat upon Puʻuokaloa (Puukaloa) it was a sign rain would come and to prep the ʻuala fields of Kanoenoe plain. A rain fed plain that was under ʻuala cultivation. Rains could be seen coming from afar. Practiced **Makawela style of ʻuala cultivation** here.	Ka Hoku o Hawaiʻi 10/25/1917, as translated by Maly 1994:A-4. In Wise and Kihe 1914-1917 in Simonson 2010:8
			Makawela cultivation. A slash and burn agricultural practice, but predicated on actual kilo of predicting the iminent onset of rain	Pukui & Elbert 1986: 228, Bennet & Nogelmeier 2017
Puʻupuʻe a kalo farming practice hale building thatching water collection	**Wai-a-Kekea** a spring loulu	Waiʻaha Ahupuaʻa Kahului Ahupuaʻa	"There too, you see — ka luawai ua kīpapa ʻia i ka pōhaku ʻalā e ulu pōhai ʻia e nā lāʻau loulu, o ka punawai i ka oʻioʻina pali o Waiakekea — a spring paved with dense [ʻalā] stones and surrounded by loulu palms, this is the spring of **Wai-a-Kekea**, which was near the trail side resting place..." Located near **puʻepuʻe kalo cultivation** in the uplands at the boundary of Waiʻaha and Kahului.	Wise and Kihe 1914-1917, in the series *Ka Hōkū o Hawaiʻi* (in Maly 1998:3).
Mahi ʻai ʻana (cultivation)	**Waiʻaha Stream** Upland taro mounds	Puaʻa Ahupuaʻa Waiʻaha Ahupuaʻa Kahului Ahupuaʻa Puapuaʻa Ahupuaʻa Hōlualoa Ahupuaʻa	"...the stream of Waiʻaha joins with the lands of Kahului. The waters filled the upland taro mounds of the sacred prostration chiefs Kaleiʻeha, Kapahu (or Kapahu-a-Loʻi), and Kaʻalaea, who possessed the kapu (restrictions) of Lono-Makahiki..."	Wise and Kihe 1914-1917, translation by Kumupono Associates, (in Maly 1998:3)

Practice	Resource	Location	Information	Source
Water collection Mahi ʻai ʻana (cultivation)	Pūnāwai offshore springs cave water collection rain anchialine ponds	Kona Study Area	Kona is an arid and dry place. There were only certain ways to get water for customary use. Four ways of acquiring water for sharing: 1) Collect water with ipu from the plumes of freshwater emissions in the ocean. 2) Collect water with ipu from drips/condensation in caves. 3) Freshwater springs bubbling up i.e. Kaloko. 4) Rain. 5) Brackish water collection from ponds/wells for consumption and everyday use.	Consultation
Mahi ʻai ʻana (cultivation)	Mala ʻuala	Puapuaʻa Ahupuaʻa At the coast at **Niumalu**	there is a māla ʻuala, or a sweet potato garden that stretches between Niumalu and Puapuaʻa Ahupuaʻa (Wise and Kihe 1914-1917 in Maly 1999:12). This māla ʻuala is described as the place where the opponents of Ka-Miki go to recover and sleep after being defeated by the young boy (Wise and Kihe 1914-1917 in Maly 1999:12).	Wise and Kihe 1914-1917, translation by Kumu Pono Associates, (in Maly 1998:3)
Mahi ʻai ʻana	Banana plantation	Kahaluʻu Ahupuaʻa	located in the uplands of Kahaluʻu "Once in Kona, Kepakaʻiliʻula waited in the uplands of Kahaluʻu at the great banana plantation of the chief Kahoʻoaliʻi, which extended from Kaumalumalu-Kāpalaʻalaea to Keʻei" -Malo 1919-1920.	Discussed by Maly (1996: 24-25) and mentioned in the moʻolelo of Kepakaʻiliʻula, by David Malo, appearing in series in the nūpepa *Ka Hoku o Hawaii* (1919-1920)
Mahi ʻai ʻana Palena	**Pā pipi** (pa pipi) (papipi)	Kona Moku At and below Mamalahoa Hwy	Cattle wall or enclosure, depending on context (see the section that discusses history of the Pā Kuakini or Great Wall). Depending on context, and written “pa pipi” it describes a cattle enclosure.	Māhele Awards Books Kumu Pono Associates, Mahele Section, Table 12 Glossary
Mahi ʻai ʻana	ʻUlu	Puapuaʻa Ahupuaʻa	Famous bounty of the ʻulu from Puapuaʻa Ahupuaʻa. “*Ke kumu ʻulu-pū-loa o noe ʻokana ʻāina o Puapuaʻa.* (The well-formed, oval-fruited breadfruit of the lands of Puapuaʻa [said in praise of strength and handsome features])”	Maly 1999:12, from *Kaʻao Hoʻoniua Puʻuwai no Ka-Miki* (Wise and Kihe, 1914-1917)
Mahi ʻai ʻana	Upland fields	Kona	"Kona, poʻo kuʻi. Kona of the added head. Said of farmers of Kona, Hawaiʻi, returning from the fields with a load on the shoulders and a child sitting atop the load."	Pukui 1983:199, ʻŌlelo Noʻeau #1847

Practice	Resource	Location	Information	Source
Upland cultivation zone	Kula	Upland Kona	Plain or grassy flat land. Generally, an area between the shoreline and lower forest zone. In the early usage, the term describes lowland agricultural fields. In the later 1800s, usage of "kula" in describing land areas was used to describe pasture land. "This usage postdates claims of the Māhele, and if taken in the latter meaning changes actual forms of land use. This is particularly problematic when a Kuleana claim text reads something like "1 kula Kalo" and the later translations state, for example, "1 one taro pasture," which is leads to inaccurate or misleading descriptions of lands use."	From Buke Māhele records, Kumu Pono Associates in Māhele Section, Table 3. Glossary
Upland cultivation zone	**Kaluulu** (Kanu-ʻulu) (Ka-ulu-ʻulu)	Upland Kona	"The region of ʻulu cultivation and growth. Providing an important starch food source, wood valued in making canoes and various tools; in some accounts young ʻulu branches were harvested and used in making kama (bark cloth). The canopy of ʻulu provided shade and helped retain moisture from important under-story cultigens."	From Buke Māhele records, Kumu Pono Associates in Māhele Section, Table 12 Glossary
Upland cultivation zone	**Amaumau** (Amau, ʻAmaʼu) ʻĀmaʻumaʻu)	Upland Kona Kona Kuahewa	The Sadleria fern forest zone, a region of upland agricultural fields.	From Buke Māhele records, Kumu Pono Associates in Māhele Section, Table 12 Glossary
Coastal cultivation	**Hiʻiaka-noho-lae** blowhole	Keahuolū Ahupuaʻa, Kailua	Dwelling place of Hi'iaka and a blowhole at Kailua that would cover fields and dry them out (salt). Kaleikini grids a cover of kauila he uses to cap this blowhole, and others, so crops can grow close to the sea.	From Kihe 1923:2, translated by The Institute of Hawaiian Language Research Team, ʻIke Wai
Mālama ʻĀina cultivation Connectivity	Laʻau	Kona study area	Relationship of water to plants and plants to people and plants as trade items and economic development amongst and between families and across ahupuaʻa.	Consultation
Cultivation Hana Noʻeau Maʻawe	Hala hala groves	Coastal and upland Kona Moku	Growth of hala (pandanus) trees.	Kumu Pono Associates in Mahele Section, Table 12 Glossary

Practice	Resource	Location	Information	Source
Mahi ʻai ʻana	**Ohiki** A spring A cultivation place	Uplands of Hienaloli Ahupuaʻa Keauhou Ahupuaʻa	Lono describes Ohiki, as an old cultivating site, that is also a spring, "Kahaluu bounds Keauhou 1st on the North side, the boundary at seashore is Paaniau, a large stone wall reaching from shore a short distance mauka. There is a pali at seashore by the same name; thence mauka to the Government road; thence straight mauka on aa to two piles of stones at government road. Kahinihiniula is on the high ground, just before you decend [sic] into the hollow; going from Kealakekua to Ohiki, a spring and old mahiai place in the woods. I do not know boundaries above this place. Have not heard where the land ends."	Boundary Commission Testimony: Hianaloli 1 & 2 Ahupuaʻa, Kakio 1873:v.A 1, p318, Folio 448 and Lono, K.
Mahi ʻai ʻana	Kalo wai kula lands	Kona Moku	Kalo served as one of the major starch foods of Hawaiians around the islands. Kalo is used in ceremonies, is a part of the Hawaiian stories of creation and birth of kānaka, and was developed into many varieties, some of which were particularly valued in the Kona district. While often thought of as being grown in loʻi Kalo (irrigated taro pond fields), the cultural record reveals that there was more kula (dryland) Kalo grown in the islands than that grown in loʻi kalo.	Kumu Pono Associates, Mahele Section, Table 12 Glossary.

Trails and Connectivity

Table 23. Table of Practices and associated resources in and around the study area tied to **Trails and Connectivity**

Practice	Resource(s)	Location	Information	Source
Connectivity	Trails Trade Reciprocity	Kona Study Area	Trade and reciprocity ma uka and ma kai, allowing different family units to interface with each other ensuring quality of life.	Consultation
Connectivity Travel	**Ke Alaehu** (Kealaehu) (Alaehu)	Kona Moku	An ancient trail attributed to Umi-a-Liloa that crosses all of the ahupuaʻa in the Kona District. Mentioned in *Na Hunahuna no Ka Moolelo Hawaii* as, "...a hui pu me ke ala mauka, i kapaia ke Alaehu, mawaena konu o ke amaumau mai Kona Hema mai... A ua manaoia, ma keia ala no paha o Kauhiakama o ka holo kaapuni ana ia Hawaii, a puni ai i na la pokole."(Iʻi 1870) "...and connects with the upland trail, called Ke Alaehu, right between the ʻāmaʻumaʻu ferns from South Kona... and it is thought, that on this trail perhaps that Kauhiakama encircled the Hawaiʻi, and encircled in a short amount of days"	Iʻi 1870, Translated by Kawika Aspili (Nohopapa Hawaiʻi).
		Kahaluu Ahupuaʻa ʻIli ʻāina of Kamuku ʻIli ʻāina of Kukuihaa ʻIli ʻāina of Haliipalala ʻIli ʻāina of Kahuamoa ʻIli ʻāina of Paulu ʻIli ʻāina of Kukuiohaa	The ancient upland trail that passed through the ʻāmaʻumaʻu (fern forest agricultural zone) in the vicinity of the present day Māmalahoa (Belt) Highway. It's development is associated with the reigns of Ehu and ʻUmi (Kepa & Onaona Maly, Kumu Pono Associates).	LCA 3447 (NT: v4p640-641. LCA 5773 B (NT: v4p615-616 LCA 5673 B & 5673 (NT: v4p615-616). LCA 5677 (NT: v4p621) LCA 5689 (NT: v8p396) LCA 5695 (NT:v4p624-625) LCA5831B (NT: v4p637) LCA 6029 (NT:v4p627) LCA6128 (NR:v8p410-411, NT:v4p621)
		Puaʻa 2 Ahupuaʻa ʻIli ʻāina of Ohiki		LCA 7076 (NR: v8p416, NT: v4p512)
		Honokohau 1 ʻIli Haleamahuka		LCA10521 (NR:v8p596, NT:v8p602
Connectivity Trails Travel	Alanui Pii	Kona Moku	Ascending trail that connected the coast to the uplands (i.e., trail leading to the uplands, the mauka-makai trail system which occurred in all ahupuaʻa). Not always a public road.	Kepa Maly, Mahele Section, Table 12 Glossary

Practice	Resource(s)	Location	Information	Source
	Ala	Keauhou 2	Mauka-makai trail used for transporting ʻōhiʻa down from the uplands, "...trail being made for ohia trees..." - Kakio.	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Kakio 1873:v.A 1, p270, Folio 448
Connectivity Hana waʻa	**Kealakōwaʻa** (Kealakowaa)	Kahului Ahupuaʻa to Hōlualoa Ahupuaʻa	The trail on which canoes were dragged from the uplands to the shore; crosses several ahupuaʻa including Kahului to Hōlualoa.	Kumu Pono Associates in Mahele Section, Table 12 Glossary
Connectivity Messengers Communication Trails	**ʻEleʻele** (messengers)	Kona	Ka-Miki ordered Pili's ʻeleʻele or messengers to spread the word of his victories to Kalamaʻula (Wise and Kihe 1914-1917 in Maly 1999:13). Pili sent other messengers throughout all the districts of Kona to inform the people and chiefs that Ka-Miki possessed the rights of the aliʻi over these lands(Wise and Kihe 1914-1917 in Maly 1999:13).	Wise & Kihe (1914-1917), in *Kaʻao Hoʻoniua Puʻuwai no Ka-Miki*, translated by Kumu Pono Associates.
Connectivity Mālama ʻĀina	**Wai kaiaulu**	Kona Study Area	What keeps us [Hawaiians] together is our shared belief in cooperation, support, respect, and a continuous system of reciprocity when it comes to water resources.	Consultation

Table 24. Table of Practices and associated resources in and around the study area tied to **Lawaiʻa and Waʻa**

Practice	Resource(s)	Location	Information	Source
Lawaiʻa Mālama ʻĀina (stewardship) Community Managed Fisheries	ʻAnae, ʻawa, weke, ʻoama, manini, pākukui yellow tang White limu brackish water	Kona Study Area	Care and knowledge of white limu, that grows in brackish water as food for important fish species, Mullet, ʻawa, weke, ʻoama, manini, pākukui, yellow tang.	Consultation
	Fishery Squid (heʻe) grounds	Puaʻa Ahupuaʻa	"Puaa is bounded makai by the sea and the land has ancient fishing rights near the shore, but not extending out to sea." > "Puaa has ancient fishing rights extending to the squid grounds."	Boundary Commission Testimony: Puaa 1 Ahupuaʻa, Kauwa 1873: v.A1 p376-378
	Limu ʻeleʻele Nenue	Kona Study Area	Limu ʻeleʻele for bait for nenue.	Consultation
	Fishery ocean iʻa	Keahuolū Puaa Waiaha Kahului Puapuaa Kahaluʻu Keauhou Hōlualoa 1 and 4 Kaumalumalu	"Ancient fishing rights extending out to sea." Is a phrase seen again and again in the Boundary Commission by multiple Testifiers across Kona; only a select few in and around the study area are cited here.	Boundary Commission Testimony: Keahuolū Ahupuaʻa, J. Z. Waiau, 1873: v.A1 p354-357. Puaa 1 Ahupuaʻa, Kahueai 1873: v.B p244-245. Waiʻaha Ahupuaʻa, Peahi 1873: v.B p269-270 and Mahalo 1873: v.B p260-262. Puapuaa nui Ahupuaʻa, Ukumea 1873: v.B p260-262. Keauhou 2, Makuakane, 1873: v.A1 P327-329 and Niniha, 1873: v.A1 P327-329. Kahaluu, Papa, 1873: v.A1 p321-323. Keauhou, Lono, 1873: v.A1 p318-320 and Papa, 1873: v.A1 p321-323. Kaumalumalu Ahupuaʻa, Kamakahoohia, 1873: v.A1 p324-326
Lawaiʻa Waʻa ʻōpelu traditions	Ocean ʻōpelu	Kona Study Area	Waʻa, sailing and paddling for lawaiʻa, specifically ʻōpelu.	Consultation

Practice	Resource(s)	Location	Information	Source
Limu cultivation Koʻa traditions ʻŌpelu traditions	ʻŌpaeʻula ʻōpae lōlō ʻŌpelu Akule Koʻa	Kona Study Area	ʻŌpaeʻula, or ʻōpae lōlō, propagated to be used as bait for ʻōpelu fishing. Used to maintain the **fishing koʻa** to acquire ʻōpelu and akule.	Consultation
Lawaiʻa Stewardship	ʻŌpaeʻula Anchialine ponds Brackish water	Kealakehe Ahupuaʻa Lanihau Ahupuaʻa	ʻŌpaeʻula ponds present in Kealakehe, Keahuolū, and Lanihau. Part of anchialine system.	Consultation
		Kaloko to ʻAnaehoʻomalu	Anchialine system from Kaloko to ʻAnaehoʻomalu.	
ʻŌpelu traditions Community Managed Fisheries	Ahi ʻōpelu	Māʻihi Ahupuaʻa Keauhou Ahupuaʻa	"Ancient fishing rights extending out to sea, the Opelu belonged to Maihi and the Ahi to Keauhou; bounded makai by the sea."	Boundary Commission Testimony: Maihi Ahupuaʻa, Ehu 1873: v.A1 p311-312
	ʻŌpelu	Keahuolū Ahupuaʻa	"Ancient fishing rights extending out to sea and claiming the opelu."	Boundary Commission Testimony: Keahuolū Ahupuaʻa, J. Z. Waiau, 1873: v.A1 p354-357
Lawaiʻa lūheʻe Waʻa Community Managed Fisheries	Lobster heʻe grounds waʻa	Puaʻa Ahupuaʻa, at Ōneo	"Now this leho (octopus lure) was a favorite of Pili's, and filled his eyes with pleasure. Pili's canoes were prepared to go octopus fishing – lawaiʻa lūheʻe as Pili wanted to see how the lure worked. The lure was made by securing the kākala (hook), and a sinker stone (ʻōahi) near the cowrie (on a wooden shaft) with three ply olonā (Touchardia latifolia) rope. When Pili mā arrived at the octopus fishing site, he removed the lure from a gourd container and set it in the water. The chief and all those with him were startled to see unlimited numbers of heʻe (octopus) rise up to the lure, and even lobsters were attached to some of the octopus (July 26, 1917)..."	Wise and Kihe 1914-1917, the series *Kaʻao Hoʻoniua Puʻuwai no Ka-Miki*, in the nūpepa, "Ka Hoku o Hawaii." Translated by Kumu Pono Associates (Maly 1999: 22, and 11-13).
	HeʻeLeho (cowrie)		In the moʻolelo of Ka-Miki, there was a competition between ʻōlohe at Ōneo in Puʻa Ahupuaʻa, and a renowned and favored lū heʻe was the prize.	
Lawaiʻa	Marine species springs Brackish water	Kona Study Area	Fishing by pole, throw net, diving for fish that relied on fresh/brackish water	Consultation
Lawaiʻa Beliefs & Ceremony	**Kamauai Heiau** (Kamauae) a heiau a sea cave	Keauhou 1 & 2	Lono, a kupaʻāina born at Keauhou talks about a fishing heiau near the coast at the border of Keahou 1 and 2. "The boundary at the shore between Keauhou 1st and Keauhou 2nd is at Kamauae [Kamauai], a heiau for fishermen situated above the beach, on the hill where the houses stand..."	Boundary Commission: Keauhou 1 Ahupuaʻa, Lono 1873:v.A1 P318-320

Practice	Resource(s)	Location	Information	Source
			Kakio, Like Lono speaks of Kamauae (Kamauai) on the border of Keauhou 1 and 2, but unlike Lono, he doesnt mention a heiau, he speaks of a sea cave or shoreline cave. "The boundary at shore between the two Keauhous is at a place called Kamauae [Kamauai] at the beach; Thence it runs mauka to the head of Holua (an old sliding place)..."	Boundary Commission: Keauhou 2 Ahupuaʻa, Kakio K. 1873:v.A1 p265-268.
Voyaging Waʻa	Various (for canoe making)	Kahaluʻu Ahupuaʻa	Fleets of canoe were known to set sail from Kahaluʻu Ahupuaʻa as recorded in the moʻolelo of Kepakaʻiliʻula.	In *Kepakaʻiliʻula*, (Malo 1919-1920). Translated in Maly 1996:25)
Waʻa Canoe making	**Namahana**	Puaʻa 2 Ahupuaʻa In the uplands	Kahueai testifies for BC of a koa tree growing a waʻa place, mauka long Waiʻaha stream, this would be at the same elevation, possible within the Gianulias study area. We pick up his boundary description of the south (Kaʻū) side of Puaa, bounding Waiʻaha, heading upland. "Thence to Palule where koa grows; thence mauka along the kahawai to **Namahana**, where we used to make canoes; thence along the gulch to Aianini [?], a water hole in the gulch; thence up to Kipukaiki a cave..."	Boundary Commission Testimony: Puaa 2 Ahupuaʻa, Kahueai, 1873: v.B:244-245. *also gives testimony for Keahou 2. > Olonā growth (Kumu Pono Associates BC notes)
Voyaging Waʻa kilo	Calm seas	Kona Moku	"Ke kai malino o Kona. The calm sea of Kona. Refers to Kona, Hawaiʻi." Including this one, there are four ʻŌlelo Noʻeau that talk about the calm seas of Kona Moku 1842, 1844, 1731	Pukui 1983:186, ʻŌlelo Noʻeau #1731, 1842, 1844, 1731
	Kona sailing winds **ʻEka** (a makani)		Three ʻŌlelo Noʻeau speak of winds and conditions that tell it is time to launch sailing canoes for fishing in Kona. One references ʻEka, a particular wind associated with the moku of Kona whose presence is telling of signs optimal for fishing. Another talks about filling big sails, and the last calls canoe men to sally forth.	Pukui 1983:159, ʻŌlelo Noʻeau #1467 and #182, #1690
Kilo Nānā Ao Lawaiʻa	Clouds Rain Calm seas	Kona Study Area	Clouds would carry water from mountains to the ocean, bringing rain from ma uka to ma kai. Understanding cloud patterns to know when it was safe to fish, etc.	Consultation

Kilo and Weather – Environmental Indicators

Table 25. Table of Practices and associated resources in and around the study area tied to environmental indicators through **Kilo – Keen Observation.**

Practice	Resource(s)	Location	Information	Source
Kilo	Ua	Kona Study Area	Learned to listen for the rain.	Consultation
Kilo Weather & Ocean Observation	**ʻEka** (a wind)	Kahaluʻu Ahupuaʻa at Helani	From a chant from Mākoleʻā as a message to Kepakaʻiliʻula, she asked her uncle Kukuipahu to convey; remembering her time with him at Kahaluʻu. “Kuʻu hoa i ka peʻa huli luna e Kona e He ʻEka ka makani o kāua e ʻolu ai...: You are my companion of the upper reaches of Kona Where the ʻEka breezes refresh us two...”	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)
	Hau (a wind)	Kainaliu to Keauhou Ahupuaʻa	"Ka Hau o Maʻihi. The Hau [breeze] of Maʻihi. Refers to Maʻihi, Kona, Hawaiʻi. Because of this locality was named for Maʻihi-ala-kapu-o-Lono, daughter of the god Lono-a-ipu, this wind was regarded as sacred and did not blow beyond Kainaliu and Keauhou." Hau, a wind belonging to Maʻihi, described as a breeze that does not reach beyond the boundaries of Kainaliu and Keauhou	Pukui 1983:142, ʻŌlelo Noʻeau #1303
	Kāwili (wind & current)	Kona Moku to Kaʻū Moku	"Ka ʻōwili makani ʻino o Kāwili. The stormy wind of Kāwili. (Kāwili is the current that comes from Kona and goes out to sea at Kalae, Kaʻū)."	Pukui 1983:164, ʻŌlelo Noʻeau #1519
Kilo Rain & Weather Observation	**ʻAwaʻawa** **ʻAwa** (a rain)	Keauhou Ahupuaʻa	A “bitter, cold, dark rain, vog, or smoke of the mountains; acidic rain;” and is noted as being the same as the ʻAwa rain and also the name of a wind . Per Pukui, a cold mountain rain	Malo 1951:14 in Akana and Gonzales 2015:15
	Kēhau (a rain)	Kona Moku	A dew and mist and is noted as both the name of specific rain and wind	Akana & Gonzales 2015:73
	Kualau (a rain)	Keauhou Ahupuaʻa	A rain that showers over the seas and is accompanied by wind	Akana & Gonzales 2015:121
	Nahunahu (a rain)	Keauhou Ahupuaʻa	A “pelting rain associated with Hawaiʻi,” and translated to mean “to bite,”	Akana & Gonzales 2015:184
Kilo Rain & Weather Observation	**Noe** (a rain)	Keauhou Ahupuaʻa	Described as a fog and a mist that is “lighter than the uhiwai [heavy fog], but heavier than ʻohu [mist, fog, vapor], ʻehu [spray, foam, mist], and ʻehuʻehu [reduplication of ʻehu];” and is noted as both a rain and wind.	Akana & Gonzales 2015:208
	Palahī Puaʻa (a rain)	Kona Moku	“Ka ua palahī puaʻa–falls, stops, falls, stops, etc.,” Intermittent rain. Exclusively associated w/ Kona	Akana & Gonzales 2015:219

Practice	Resource(s)	Location	Information	Source
Kilo Rain & Weather Observation	**Nāulu** a rain	Puapuaʻa Ahupuaʻa	A sudden shower and is noted as being also the name of a rain cloud and a wind	Akana & Gonzales 2015:187
			Published in the Hawaiian language newspaper, Ke Au Okoa in 1869, Kamakau shared an account regarding traditional cultivation methods of ʻuala (Ipomoea batatas or sweet potato) in which he acknowledged the Nāulu rain: He ua Nāulu ka ua e loaʻa i ka Makaliʻi, he ua kūhewa ia, aia ma kona wahi e hāʻule ai, ua ulu ka laulele, ka pōpolo, a ua ola ia wahi i ka lau nāhelehele. [Kamakau 1869:1] Sudden showers (ua Nāulu) fall during the Makaliʻi season. These are rains accompanied by wind gusts, and where they fall, laulele and pōpolo plants spring up, and that place comes to life with wild growth. According to Kamakau, Nāulu is again referred to here as a shower that arrives suddenly–he ua kūhewa, (Kamakau 1869:1). What is also detailed in this account is that this particular rain is often joined by wind; and with it, entices the ʻāina the rain falls upon to sprout with vegetation such as laulele (Asclepias curassavica or butterfly weed), pōpolo (Solanum nigrum), and other wild growing flora.	From Kamakau 1869:1 (Akana & Gonzales 2015:206)
		Kahaluʻu Ahupuaʻa	Mentioned in a chant for the uplands of Kahaluʻu	from the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)
Kilo Nānā Ao Weather observation	**ʻŌpua** (cumulus), **ao ʻōpiopio** (young clouds), ua	Kona Moku	Recounted in several ʻōlelo noʻeau, the presence and formation of ʻōpua, or "cumulus clouds," and ao ʻōpiopio or "young clouds," are indicators unique to Kona relaying that rain is expected to occur in the area	Pukui 1983:9,27,2134; ʻŌlelo Noʻeau #55, #232, #2134

Mea Wai - Water Resources and Collection

Table 26. Table of Practices and associated resources in and around the study area tied to **Wai**

Practice	Resource(s)	Location	Information	Source
Water collection	Wai pūnāwai	Kahului Ahupuaʻa	In upland Kahului, a freshwater spring journeyed to to gather wai in huewai for daily use. "It was at Kahului, in Kona, Hawaiʻi. Indeed, all around this place of Kona, the water in the lowlands was salty, it was brackish and bitter to drink. **The cool sweet water for drinking came from the uplands on the mountain. It is still the same to this day, the fresh water is fetched from the mountain**."	Mentioned in *He Kaao no ka Manu Elepaio* (S.W.K.: 1862, in the nūpepa Ka Hoku o ka Pakipika)
Water collection	Pūnāwai offshore springs cave water collection rain anchialine ponds	Kona Study Area	Kona is an arid and dry place. There were only certain ways to get water for customary use. Four ways of acquiring water for sharing: 1) Collect water with ipu from the plumes of freshwater emissions in the ocean. 2) Collect water with ipu from drips/condensation in caves. 3) Freshwater springs bubbling up i.e. Kaloko. 4) Rain. 5) Brackish water collection from ponds/wells for consumption and everyday use.	Consultation
Water collection kilo	Pūnāwai Subsurface flowing water Brackish habitat	Kailua to Keauhou	Deep sea fresh water present from Keauhou to Keāhole. Smooth areas on the ocean are indicative of fresh water springs.	Consultation
		Kailua to Keauhou	Keauhou to Kailua has springs in the sand that enter into the water at many beaches along the Kona coast. Smooth areas on the ocean are indicative of fresh water springs.	Consultation
		Kona makai	Water wells in caves or down by the ocean.	Consultation
Kiaʻi loko Water collection	**Puhi Spring** Anchialine ponds	Hulihe'e, at Niumalu	Puhi Spring flowed underground from Keōpū Forest Reserve down to ponds at Hulihe'e, Niumalu.	Consultation
	ʻIlinawai Anchialine ponds	Kona Study Area	ʻIlinawai; an underground river/stream. Brackish water.	Consultation
Kilo	**Waikū**	Kona Study Area	Water in Kahaluʻu is Waikū.	Consultation

Practice	Resource(s)	Location	Information	Source
Water collection	**Waikuʻi** a spring	Kahaluʻu	a favored Kahaluʻu, Kona spring where aliʻi relaxed and played kōnane, at the coast.	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)
Water collection	**Waikuʻi** a spring & a Cave **Waikulukulu** a spring	Keauhou 1 & 2 Ahupuaʻa	Kakio, kamaʻāina of Keauhou 2, mentions Ohiki, an old cultivating site, **Waikulukulu** and **Waikui**, which are both caves with water inside. "From Puainako to Kanihinihula [Kahinihiniula], at the mauka Government road where there are two ahua pohaku, on the boundary; thence to the North side of Awapuhi, in the woods; thence to Ohiki, an old cultivating ground on the boundary; thence mauka to Napueuala, an oioina; the boundary being on the North side of it and Keauhou in the middle of it; thence to **Waikulukulu**, a cave with water in it; thence to Halelaau; these places are all on the boundary of Keauhou ...I do not know the boundaries on the mountain of Mauka and of lands. Waikui is a large cave of water; the boundary half way between said cave and Ohiki." In Kakioʻs testimony for Keahou 1 he again mentions Waikui, "**Waikui is a large cave of water**; the boundary half way between said cave and Ohiki."	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Kakio 1873:v.A1, p318-320
	Waikulukulu a cave		Keliikanakaole in his sworn testimony for Keauhou 2 describes Waikulukulu as large cave, but mentions no water. " Know a cave called Waikulukulu, at the base of Hualalai, towards Ahuaumi, the place called Kaluamakani or Kalalakaukolo is on the top of the mountain."	Boundary Commission Testimony: Keauhou 2 Ahupuaʻa, Keliikanakaole 1873:v.A1, p268-272.
Water Collection	Ke ana (caves)	Kona Study Area	Water collection in caves	Consultation
Water collection	**Keanaakala** a cave	Keauhou 2 Ahupuaʻa	According to Kahulialoʻs Boundary Commission testimony "Keanaakala is on Hookukano, mauka of Waio."	Boundary Commission Testimony: Keauhou 2, Kahulialo W. 1873: v.A1 P261-265
Water collection	**Ohiki** a spring	Hianaloli Ahupuaʻa	Haleokoane, K. Says that Ohiki is "a punawai, at the corner of Kaupa's land"	Boundary Commission Testimony: Hienaloli 1 & 2 Ahupuaʻa, Haleokane 1873:v.B p281-282.

Practice	Resource(s)	Location	Information	Source
Water Collection	**Mawae** a spring	Keauhou 2 Ahupuaʻa	Described as "quite an old man", Puhi K. Gives his sworn testimony describing a water hole in the, "Keauhou 1st ends in the koa woods. It is cut off by Keauhou 2d at a place called Mawae where there is a water hole, and a cave where my relations are buried."	Boundary Commission Testimony: Keauhou2 Ahupuaʻa, Puhi K. 1874:v.A 1, p450-451.
Water collection mahiʻai ʻana	**Kaluapahu** a spring	Kahului 1 Ahupuaʻa kula zone	In Kahului 1, Maliu was awarded 1 upland ʻāpana, LCA 10252. In the testimony supporting his claim (NT: v4, p538) two springs were described as bordering his claim. Umiwai and Kaluapahu. "1. Kula. Mauka, **Kaluapahu punawai** (spring of Kaluapahu), Kau by ili aina of Ililoa, Makai by Makai, Ohuahale a kihapai, Kohala Niukini. 1 cultivated pauku aina." Kaluapahu spring bounds his kula claim on the mauka side.	LCA 10252 to Maliu, NT: v4, p538.
Water collection mahiʻai ʻana	**Umiwai** a spring	Kahului uplands	In Kahului 1, Maliu was awarded 1 upland ʻāpana, LCA 10252. In the testimony supporting his claim (NT: v4, p538) two springs were described as bordering his claim. Umiwai and Kaluapahu. "3. Mauka is Umiwai punawai (Umiwai spring), Kau, Lapalua ili aina, Makai by Puukehoe a puu (hill), Kohala, Papalanui land. 1 cultivated kihapai." Umiwai spring is located mauka of this cultivated kihapai.	LCA 10252 to Maliu, NT: v4, p538.
	Waikii a spring	Waiʻaha 2 Ahupuaʻa Kahului 1 ahupuaʻa	According to Kalama, Kanaheleʻs ʻāpana was bounded to the west by Waikii spring, south by Kahului I, north by Waiahanui and east by mountain banana (Ea maia). Kalama also testified for Kaulua and described one of his mauka parcels as also being bounded makai by Waikii Spring	LCA 6402 to Kanahele, NT: v4, p514, Waiaha 2.
		Waiaha 2	Kekipi, who gives native testimony (NT: v4,p533-534) for Kaanaheʻs pahale in Waiaha 2 (LCA 7913, Ap. At the coast) describes the houselot as being bounded on the Kohala side by a punawai. "7. Pahale. Mauka by the Alanui Aupuni, Kau by Kaulua's lot, Makai by kahakai, Kohala by a punawai (spring). He has enclosed it with a wall. There are 3 houses. 1 hale for Kaanehe. One house is from Kaliawahine. One hale is from Kaaweha. It is only a house claim for Kaaweha and Kaliawahine. It is a true claim for Kaanehe... " The spring is named as Waikii in NT: v4, p514, for LCA 6402 to Kanahele, in Waiaha 2.	LCA 7913 to Kaanehe, NT: v4,p533-534.

Practice	Resource(s)	Location	Information	Source
Kilo	Ua	Kona Moku	ʻŌlelo Noʻeau #213, “Māmā Kona i ka wai kau mai i ka maka o ka ʻōpua. Kona is lightened in having water in the face of the clouds. Kona is relieved, knowing that there will be no drought, when the clouds promise rain.”	Pukui 1983:232, #213
Kilo	Ua	Kona Moku	ʻŌlelo Noʻeau #2154, “Me he makamaka la ka ua no Kona, ke hele la a kipa i Hanakahi. The rain is like a friend from Kona–it goes and calls on Hanakahi. These are two lines from an old chant used to express a friendly visit with one who dwells in a distant place.”	Pukui 1983: 234-235, #2154
Mālama ʻĀina	Wai balanced ecosystem	Kona Study Area	Understanding that water has a big impact on the ecosystem.	Consultation
Mālama ʻĀina Mauli ola	Wai balanced ecosystem	Kona Study Area	The physical/tangible form of wai weaves the fabric for subsistence well-being.	Consultation
Water Collection	**Pūnāwai** wai	Kahului Ahupuaʻa Uplands	A drinking water pūnāwai in upland Kahului identified in moʻolelo. It was an upland spring one would travel to daily from the coast or lowlands to collect drinking water for the ʻohana. Whether a real spring or a representative of many the moʻolelo carries a moral of the waiwai, the value, of wai and daily travel and long term care of the resource people exerted to get it..	Mentioned in *He Kaao no ka Manu Elepaio* (S.W.K.: 1862, in the nūpepa “Ka Hoku o ka Pakipika”)
Mālama ʻĀina Ahupuaʻa Management	**Wai**	Kona Study Area	Conservation of water.	Consultation
Water collection	**Holoke** a spring	Puaʻa Ahupuaʻa at the coast	"Puaa is bounded makai by the sea and the land has ancient fishing rights near the shore, but not extending out to sea. Thence commencing at a punawai by the seashore called **Holoke**, between the lands of Puaa and Auhaukeae and running mauka to Poholua, a huli pali near the shore and just above a house..."	Boundary Commission Testimony: Puaa 1 Ahupuaʻa, Kauwa 1873: v.A1 p376-378

Practice	Resource(s)	Location	Information	Source
Water collection	**Waiakalaho** a spring	Kahului 2 Ahupuaʻa	"Thence to **Waiakalaho**, a water hole; thence mauka to **Waiakekua**, a water hole near the iwi aina and a little above the Government road; thence to Kaaipaka, a kulana kauhale, ahua hulipali..." "Commencing at seashore between Kahului and Puapuaa at a rocky point called Kakapa; thence mauka along an iwi aina to Governor Adam's wall; thence mauka, the boundary still following the iwi aina to **Waiakalaho**, a water spring; said spring being about three kihapai to North of the boundary of Puapuaa; thence to **Waiakekua**, spring mauka of the road; said spring is on Kahului near the iwi aina..."	Boundary Commission Testimony: Kahului 2 Ahupuaʻa, Niniha 1873: v.A1 P327-329 Boundary Commission Testimony: Kahului 2 Ahupuaʻa, Makuakane 1873: v.A1 P327-329
	Waiakekua a spring			
Mālama ʻĀina masonry water collection	**Pūnāwai ʻalā stones loulu**	Waiʻaha Ahupuaʻa Kahului Ahupuaʻa	"There too, you see — ka luawai ua kīpapa ʻia i ka pōhaku ʻalā e ulu pōhai ʻia e nā lāʻau loulu, o ka punawai i ka oʻioʻina pali o Waiakekea — a spring paved with dense [ʻalā] stones and surrounded by loulu palms, this is the spring of Wai-a-Kekea, which was near the trail side resting place..."	Wise & Kihe 1914-1917, in the nūpepa "Ka Hōkū o Hawaiʻi," translated by and in Maly 1998:3.
Water collection	**Waihuna (Waiahuna)** a spring	Kahului 2 Ahupuaʻa	"...thence makai along the iwi aina to **Waihuna**, a water hole on the boundary between Kahului 1st [page 328] and Kahului 2nd. Kahului 1st reaches to Puuokaloa at the foot of the pali; makai of the Government road you come to **Waiahuna** which is the boundary of Kapai's [Kapae's] land."	Boundary Commission Testimony: Kahului 2 Ahupuaʻa, Makuakane 1873: v.A1 P327-329
Water collection	**Helani** a niu grove	Kahaluu, at Helani	From a chant from Mākoleʻā as a message to Kepakaʻiliʻula, she asked her uncle Kukuipahu to convey; remembering her time w/ him at Kahaluʻu. "Kuʻu hoa o ka malu niu o Helani: My companion sheltered there by the coconut palms of Helani"	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)
			Another water resource associated with Kona acknowledges a thriving coconut grove in an area named Helani where water is retained by gathering and drinking from coconuts	Pukui 1983:179, ʻŌlelo Noʻeau #1661
	Niu coconuts wai niu	Kona Moku from Puaa to Keauhou	15 mentions of niu trees or groves are made in Māhele records for area spanning just north of Puaʻa to south of Keauhou.	Awards Books: Native Register and Native Testimony
	Ka wai puka iki o Helani a spring	Kahaluʻu Ahupuaʻa	Kahaluʻu, a chiefess from Kahaluʻu was referred to as "...Kahaluʻu the chiefess—i ka ʻāina kaulana i ka wai puka iki o Helani (of the land famous for the small flowing spring of Helani)" identifying a pūnāwai in Kahaluu.	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)

Other Practices, including Hana Noʻeau, Beliefs, and Spirituality (not already included above)

Table 27. Table of Practices and associated resources in and around the study area tied to **Other Practices**

Practice	Resource(s)	Location	Information	Source
Hoʻokupu water collection Spirituality Beliefs	Wai halau wai (source waters) pūnāwai	Kona Study Area	Religious/ceremonial significance and uses of freshwater (wai as a hoʻokupu, given from the place you are from or a special source of water is always an appropriate and valued form of hoʻokupu, arguably the most noa).	Consultation
Beliefs Spirituality Mālamaʻāina	Balanced ecosystem traditional cultural practices exercised	Kona Study Area	Cultural familial and religious practices of respect and an interrelationship with nature.	Consultation
Mauliola	Beliefs var. resources (integral to practices)	Kona Study Area	Need to blend regular routines with spiritual/emotional tasks for pono/balance.	Consultation
Contest site for games Makahiki grounds Beliefs Spirituality Kaiaulu Hana Noʻeau Lawaiʻa	**Hinakahua**	Puapuaʻa Ahupuaʻa the Kahelo plains at Niumalu at the coast	A kahua mokomoko leʻaleʻa, game site for competitions, Visited by La-Miki and Maka-iʻole. Games played at Hinakahua: maika (bowling), mokomoko (wrestling and boxing), leʻaleʻa (pleasurable pastimes), and hoʻopāpā (contest of wit and strength), (Maly 1999:11). Pili-nui-kapu-kuʻi-a-ka-lani-kua-liholiho-i-ke-kapu is the aliʻi at the time of Ka-Miki and presided over these ʻōlohe grounds.	(Wise & Kihe 1914-1917) *Kaʻao Hoʻoniua Puʻuwai no Ka-Miki*, in the nūpepa, "*Ka Hoku o Hawaii*." Translated by Kumu Pono Associates (Maly 1999"10, 11, 12, 13)
	Kahua mokomoko leʻaleʻa	Lanihau Ahupuaʻa	A famous kahua site for competitions (ʻōlohe) was at Ahuʻena, in Lanihau Ahupuaʻa. Visited by La-Miki and Maka-iʻole	
	Kauakahiakahaola a heiau	Puapuaʻa Ahupuaʻa	Kauakahiakahaola is a famous ʻōlohe of Puapuaʻa and Keiki-puʻi-puʻi is noted as the champion of Kailua. Also, the name of a heiau in Puapuaʻa	
	Heʻe leho (cowrie)	Puaʻa Ahupuaʻa at Ōneo	A kaulana and favored lū heʻe was an ʻōlohe prize	
Beliefs Spirituality	**Kāʻili** an akua of Kona	Kahaluʻu Ahupuaʻa	Akua invoked by the Kahaluʻu aliʻi Kepakaʻiliʻula in battle before unifying Kona Moku	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)
	Kālaipāhoa an akua of Kona	Hōlualoa Ahupuaʻa	Akua invoked by the aliʻi Hōlualoa in battle	From the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)

Practice	Resource(s)	Location	Information	Source
Beliefs Spirituality Ahupuaʻa Management	Kapu laws	Keauhou Ahupuaʻa	"**Keauhou i ka ʻihi kapu.Keauhou**, where strict kapu were observed. Keauhou, Kona. This was the place where many of the highest chiefs resided and where Kamehameha III was born."	Pukui 1983:181, ʻŌlelo Noʻeau #1682
Beliefs Hana noʻeau Forestry	Kauila	Kona Moku Kailua	In a moʻolelo discussed, Keleikini uses a cap of lashed kauila wood to plug a blowhole at the coast that is salting out valuable and scarce coastal fields and causing them to "dry out". Kauila, a Hawaiian hardwood that is difficult to cut through because of its density must have been a somewhat common resource in the uplands if Keleikini was able to use it at the coast to plug a blowhole. It is rare now.	From Kihe 1923:2, translated by The Institute of Hawaiian Language Research Team, ʻIke Wai
Hoʻokupu Wahi pana Ahupuaʻa Management	Puʻu	Kahaluʻu Ahupuaʻa	"All of the offerings of the wealth of the land were gathered at one site and presented to Kepakaʻiliʻula. The mound of offerings was so great that it looked as if a hill had been formed. To this day, the site where the offerings were gathered is called Puʻu which is above the place named for Keolonāhihi."	from the moʻolelo of Kepakaʻiliʻula, (Malo 1919-1920, translated in Maly 1996:25)

Mālama ʻĀina – Care for Resources and Place-based Stewardship (Ahupuaʻa Management)

Table 28. Table of Practices and associated resources in and around the study area tied to **Mālama ʻĀina and the long-term care and stewardship of people, resources, and place.**

Practice	Resource(s)	Location	Information	Source
Mālama ʻĀina Connectivity Kilo Ahupuaʻa Management Mahiʻaiʻana (cultivation)	Wai healthy environment laʻau	Kona Study Area	Mālama ahupuaʻa specific resources. Relationship of water to plants and plants to people and plants as trade items and economic development amongst and between families and ahupuaʻa. Wai creates a community that facilitates skilled resource managers. Malama i ka wai	Consultation
			Mālama our resources, including ourselves. People within each ahupuaʻa have a kuleana to take care of their specific resources. When diligent and responsible, we survive.	
	Wai		Conservation of water.	
	Crops wai pūnāwai ua	Kona Study Area Uplands	ʻUala, kalo, ʻulu and other cultivated crops fed by the rain and water wells. (As mentioned in previous tables above, the importance of water wells for cultivation and their re-injection of water whether from the ground or the heavens)	
Mālama iwi kūpuna	**Burial caves** **Mawae**	Keauhou 2 Ahupuaʻa	Described as "quite an old man", Puhi K., a cousin of Keakaokawai who lived at Kalihi at the time (BC) gives his sworn testimony describing a family burial cave in the uplands, "Keauhou 1st ends in the koa woods. It is cut off by Keauhou 2d at a place called Mawae where there is a water hole, and a cave where my relations are buried. The boundary is way makai of this place."	Boundary Commission Testimony: Keauhou2 Ahupuaʻa, Puhi K. 1874:v.A 1, p450-451.
Connectivity Ahupuaʻa Management Mālama ʻĀina	**Puhi spring** subsurface waterflow	Niumalu, ponds at Hulihe‘e Keōpū Reserve	Puhi Spring flowed underground from Keōpū Forest Reserve down to ponds at Hulihe‘e Palace, Niumalu.	Consultation
	var.	Kona Study Area	Responsible and accountable place based resource stewardship/management	

2) What is the extent to which those resources – including traditional and customary native Hawaiian rights – will be affected or impaired by the proposed action?

Consultation Manaʻo:

- Kona's freshwater aquifer will be impacted/exhausted with the opening of new water wells servicing other neighborhoods, new development, resorts, golf courses, cesspools, and more.
- Impacts in establishing the distribution system so need to be very sensitive to the cultural resources that are in and around that area.
- Drilling in Kona without fully understanding the culture and the environment would have various impacts to ahupuaʻa, the ocean, and aquifer.
- The change in the amount of water in wells are apparent, especially in Kaloko-Honokōhau where water is leaking out into the Honokōhau Harbor.
- Native plants, animals, and fish are not as abundant.
- The County of Hawaiʻi continues to mismanage water resources.

Nohopapa Manaʻo:

- Aia i hea ka wai a kane?
    - If DHHL cannot answer this question how can it fulfill its obligations to mitigate impacts to cultural practices and resources?
- Unknown impacts: people need to understand more about impacts of midzone well build up as basal wells are salting.
    - current water take is for a huge region and not place specific
    - are impacts different around Gianulias where rare Kona surface flowing streams exist
    - what are impacts to mauka, coastal and off shore springs?
    - if wells exist and takes increase in the future or more wells are drilled, what is the cumulative effect and impact to traditional customary practices? slow accession worries people, especially now that county water policy is to focus on southern portion of North Kona, South Kona, and the midland region.
- Potential impacts to springs from the uplands to the coast and off shore.
- Potential water table impacts
- Increased development in the uplands, reducing forest in the amaumau zone
- DHHL water development affect peopleʻs ability to mālama their resources, especially if water wells are turned over to County.
    - Where is long term commitment to mitigate impacts to the communities in the well development areas if wells will change hands?
- Potential impacts to punawai and water holes impact religious and cermonial wai gathering, restoration of traditional subsistence agricultural fields in the kuahewa that have been growing and gaining traction (i,e. Kahaluʻu Kuahewa)
- Possible increased water development at the Kealaehu (Mamalahoa Hwy area) could impact surface water in Waiʻaha or Hinaloli, the only two flowing surface streams in north Kona
- Possible reduction of surface and subsurface freshwater flow into the ocean that created important brackish water habitats supporting many resources and practices:
    - limu (var species), heʻe, lobsters, opelu, many others listed above.
    - loss of loko iʻa in other Hawaiʻi communities (loss of brackish habitat) has reduced a key set of species from algae blooms to pua that sustain the larger marine ecosystem tied to lawaiʻa and traditional practice. Although less formal, the well

known freshwater injections along the Kona coast are critical to that same key habitat and set of species

- The Gianulias parcel sits in the area identified in research as **Kealakowaa**, it was a staging place for Koa and other laʻau brought down from the uplands above the study area. In archival records this place, specific to Kahului Ahupuaʻa and the region of the study area was where ceremonies were held, a heiau and spring was located specifically for the process of harvesting koa, transporting them, and crafting them into waʻa. In our research from Kealakehe to Keauhou, this was the *only* area in all of Kona identified for this use. It is extremely significant. [map to come]
    - Impacts physically in the project area could impact this space.
    - although not now actively practices, hana waʻa and voyaging is having a resurgence, the treatment of this parcel for purposes other than as a part of Kealakowaa is an impact. Perhaps the last opportunity to preserve part of this area.
    - Traditional forestry included ohia, koa and kauila (all named in this report in archival records). Recent carving traditions are being restored across the pae aina and the importance of the gathering of woods for carving, whether waʻa or kii for religious use could very well be impacted by development in the Kealakowaa. To date at least 3 formal carving huis have been convened in Kona.
- Bird catching was extensively referenced in and above the study areas, caves, trails, springs and even specific forests, woods, and aʻa areas were discussed. Bird catching was for food and for hulu used in many hana noʻeau. Although bird catching is not viable now as a practice because of the scarcity of native bird species, the practice of Mālama ʻĀina so that resources are there when needed could be impacted.
- Water collection. Many many springs, waterholes, and caves were referenced in consultation, and many were named in archival research through land testimonies and some moʻolelo. We included selections in the inventory tables above, however, there are more. It is very likely some of these important resources are located in the study areas. it is even more likely that any water development in the study areas could impacts these nearby water features. It is also likely water development could impact the downslope water features identified near the coast or in the waters offshore.
    - Impacts could include access for kanaka to gather wai from the study area or the uplands above for hoʻokupu and other traditional uses.
- One testifier in the Boundary Commission identified his familyʻs burial cave in the uplands. If one was named there are more. Impacts to burial caves, or access to caves above the study area are potential impacts.
    - It is a traditional practice not to speak of one's ancestors with strangers and many burial locations have been forgotten in ʻohana or intentionally un-shared.
    - This is a valued cultural tradition that should not be overlooked because of the scarcity in the oral record.
- Cultivation across Kona switched from a diversified agricultural system in the 19th century to a mono-crop, coffee focused, industry in the time since. acidification from volcanic eruptions and the globalization of the world coffee market have put pressures on that model. The study areas are part of the cultivation area most heavily claimed during the 1850 Māhele, they are in the rainfed and spring fed agricultural belt of the renowned traditional Kona field system, uses other than cultivation impact this tradition, especially since so much of the region is now developed. Restoration to this field system is actively ongoing in neighboring Kahaluu (Kahaluu Kuahewa)
    - Impacts to this field system archaeologically should be weighed
    - Impacts to the practice of cultivation, very specific to Kona and this upland area should be carefully weighed.

    - Many surface and subsurface water features feed the health of this resource and the many practices (Kona specific, and even more regionally specific see table of practices) tied to the area.
- Mauka Makai Connectivity of wai was a thread across almost all consultation, it appears in the land use patterns of mahele (people living at the shore w/ fresh water and cultivated fields in the uplands), it appears in moolelo, and in the Mahele claims Boundary Commission testimonies.
    - What impacts to connectivity of traditions and place will study have? It was really unclear to consultees
    - Impacts to coastal resources, springs above and below the study area, and to the forests (many named) above the study area? and impacts to all the many traditional customary practices tied to those areas

3) What feasible action(s), if any, should be taken to reasonably protect any identified cultural, historical, or natural resources, and exercise of traditional and customary native Hawaiian rights in the affected area

In-progress

Closing Manaʻo

In-progress

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Appendix A: Community Consultation Letter

NOHOPAPA HAWAI'I

July 2024

Welina mai me ke aloha,

On behalf of the Department of Hawaiian Homelands (DHHL), Nohopapa Hawai'i, LLC, is completing a Ka Pa'akai Framework Analysis for a proposed DHHL water development project in Kahului and Wai'aha Ahupua'a at the Gianulias property (TMK: [3] 7-5-014:001) and Keauhou Ahupua'a at a Kamehameha Schools well site (TMK: [3] 7-8-004:013 and -015) (see Figure 1 and the DHHL Project Webpage for more information).

Once construction on La'i 'Ōpua Village 4 Hema is completed, DHHL will have exhausted all of its water credits for homestead and community development in Kona. DHHL will need to seek additional water credits from the County in order to continue with the planned development of its homestead and community lands in Kealakehe. The County of Hawai'i Department of Water Supply (DWS) has asked that in order for DHHL to gain additional water credits, DHHL must add new water sources to the County system in Kona. This means the development of well sites and transmission lines to connect each well site to the nearest existing water lines in the DWS system. No long-distance transmission pipelines from the proposed groundwater well sites to DHHL lands in Kealakehe are being proposed by this project, just the water transmission lines from the well sites to the nearest DWS interconnection point in their existing system.

The purpose of the Ka Pa'akai Framework Analysis is to ensure the DHHL is in compliance with Article VII, Section 7 of Hawai'i's Constitution, which "places an affirmative duty on the State and its agencies to preserve and protect traditional and customary native Hawaiian rights and confers upon the State and its agencies the power to protect these rights and to prevent any interference with the exercise of these rights."[1] In order to fulfill its constitutional obligations agencies, like the DHHL, must consider the following three considerations regarding possible impacts of their proposed actions

> (1) the identity and scope of 'valued cultural, historical, or natural resources' in the petition area, including the extent to which traditional and customary native Hawaiian rights are exercised in the petition area;
>
> (2) the extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed action; and
>
> (3) the feasible action, if any, to be taken ... by the [State and/or its political subdivisions] to reasonably protect native Hawaiian rights if they are found to exist.[2]

Nohopapa Hawai'i is currently conducting research and outreach to identify 'valued cultural, historical, or natural resources' to better understand how traditional customary Native Hawaiian practices and rights may be impacted by groundwater development in the area of North Kona spanning from the ahupua'a of Kāloko to Keauhou. Additionally, the Ka Pa'akai Framework Analysis requires the identification of appropriate mitigation measures (feasible action) that can be implemented to protect identified impacted resources and Native Hawaiian rights and practices associated with those resources.

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[1] Ka Pa'akai o Ka 'Āina v. State of Hawai'i Land Use Com'n [*Ka Pa'akai*], 94 Haw. 31, 47, 7 P.3d 1068, 1084 (2000).
[2] Ibid

NOHOPAPA HAWAI'I

We would like to engage with individuals, 'ohana, and/or organizations with relationships to this area. In particular, we would like to gather information relating to the many manifestations of Kāne and the resources, traditional customary practices, and rights that rely on them. We are interested in the following as related to the proposed water improvement sites (at Wai'aha and Keauhou) and larger project area (Kāloko to Keauhou):

- Biocultural forms of water in the study area, including, rainfall, fog, mist, seeps, catches, springs, flowing water, where water enters the sea, algae blooms, anchialine ponds, loko, clouds, storm patterns, etc.
- Observation of *changes* over time to the area's water resources, as well as to the birds, plants, and animals, marine or terrestrial, that rely on those waters.
- Mo'olelo, ka'ao, inoa 'āina, mele, oli, 'ōlelo no'eau, and hula and other stories related to the knowledge of wahi pana, wahi kapu, and wahi kūpuna and cultural practices and resources associated with these wahi
- Traditional and historical land use and specific use or larger area models relate to water
- Coastal to upland traditional and local relationships, especially regarding water
- Recommended traditional & local strategies for resource management and conservation in Kona
- Traditional practices you or those you know engage with or have engaged with in the past
- Potential short and long-term impacts of the proposed project on Hawaiian cultural resources, rights, and traditional customary practices
- Recommended mitigations for the proposed project
- Referrals of kūpuna and kama'āina who are knowledgeable of the project area and might be willing to participate in this study

Please let us know if you are interested and available to participate in consultation for this important project. You may participate virtually or in person, as an individual or group, named or anonymously.

You can also fill out a google form questionnaire (link here) or respond to our consultation questions via the word document attached.

Mahalo for your time and consideration. We look forward to collaborating with you to document your mana'o and recommendations.

Me ka ha'aha'a,

Momi Wheeler - momi@nohopapa.com
Kelley Uyeoka - kelley@nohopapa.com
www.nohopapa.com

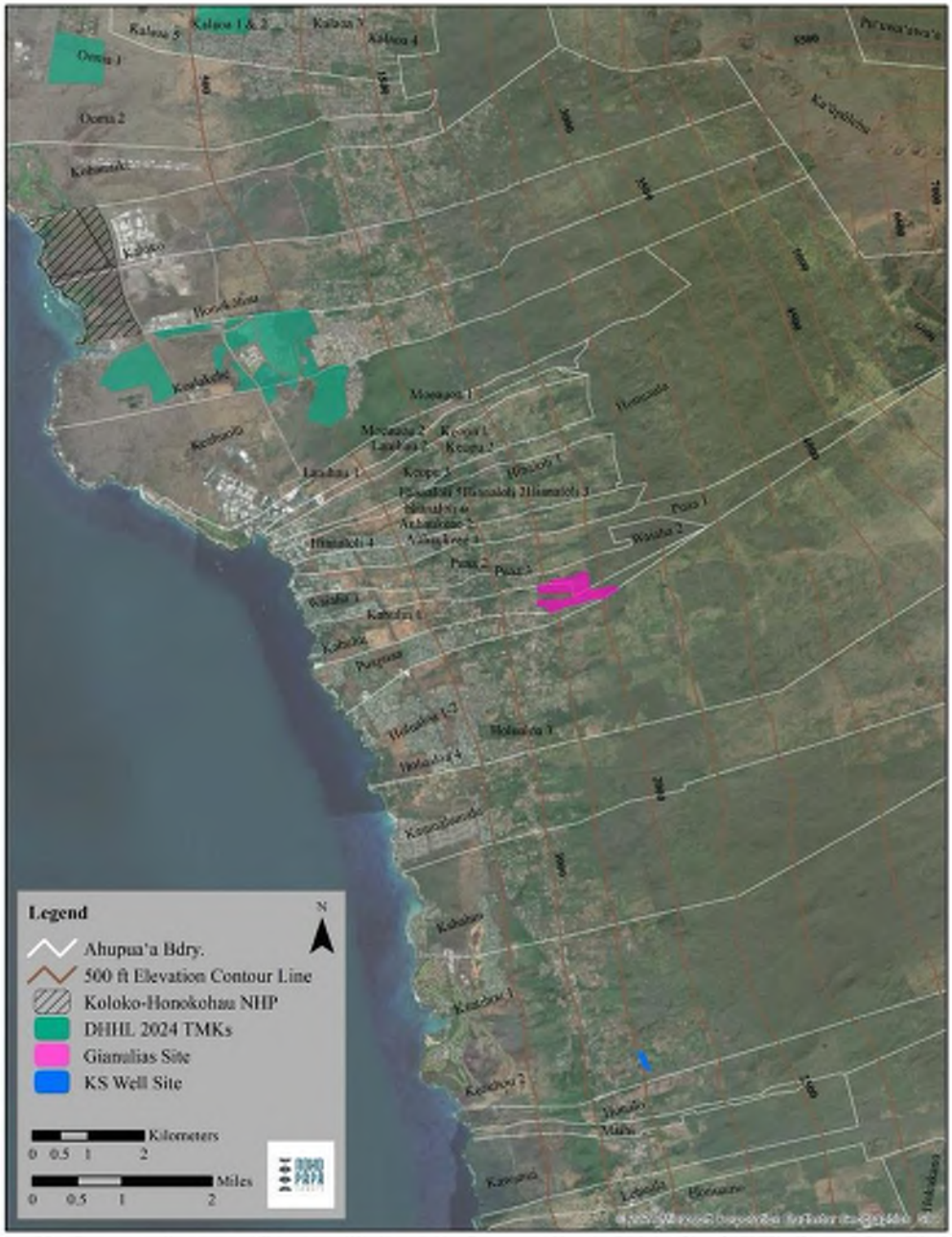

Figure 1. Showing a portion of North Kona, with the DHHL homestead at Kealakehe identified in the north in relation to proposed ground water development sites to the south in pink (Gianalias) and blue (Kamehameha Schools).

Appendix B: Consultation Questionnaire

NOHOPAPA HAWAI'I

Ka Pa'akai Framework Analysis Consultation Questionnaire
Kaloko to Keauhou, Kona Moku, Hawai'i Island

Interview Participant: _____ **Date:** _____ **Location:** _____

Note, all questions are optional

Mo'okū'auhau:

Where did you grow up? Where do you live today?

How are you connected to the project area (ahupua'a spanning from Kaloko to Keauhou, see map)

Do you/your 'ohana mālama places in the project area or any locations nearby? If so, how?

Cultural, Historical, and Natural Resources:

Ka Pa'akai Analysis Question #1: What traditional and customary Native Hawaiian Rights are exercised in the project area?

Do you have knowledge of traditional and historical land uses regarding wai?

Do you have knowledge of mauka-makai relationships in the project area, especially regarding wai?

Do you know of any ocean and freshwater resources, springs, and streams? Or other paths or forms of wai?

If so, what are the cultural significance and/or uses of these resources? For community, your 'ohana, you?

Did/does/do you or your 'ohana gather or use wai or kai resources from the project area? If so, what kind?

Do you or your 'ohana engage in activities or cultural practices in/across the project area? If so, what kind?

Can these cultural practices be integrated into resource management and stewardship today? If so, how?

1

NOHOPAPA HAWAI'I

Impacts & Concerns:

Ka Pa'akai Analysis Question #2: How might resources, rights, and practices be impacted by the proposal?

Any concerns regarding how this project might impact wai, and traditional customary resources or practices within or around the project area?

Do you foresee any adverse impacts to cultural resources or practices resulting from the proposed project?

Mitigations & Recommendations:

Ka Pa'akai Analysis Question #3: What feasible action, if any, to be taken by State to reasonably protect Native Hawaiian Rights if they are found to exist?

Do you have any preferred alternatives to the proposed project?

Do you have any preferred mitigation* measures relative to the impacts proposed by the proposed project? *Mitigation = actions that avoid, minimize, rectify, monitor, understand or reduce the impacts of a project

Are there any special conditions related to cultural resources, practices, and wai, you would like included in the permit and other project-related materials?

Contact Info and Referrals:

Would you like to be named or anonymous in the report?

Are there any parts of this interview you do not want publicly disclosed?

Can you refer us to other individuals or organizations we should talk to? Or any references or resources?

Please provide your mailing address so we can send a mahalo makana for sharing your valued mana'o & 'ike

Appendix C: Informed Consent Form

NOHOPAPA HAWAI'I

INFORMED CONSENT FORM

Aloha mai, Nohopapa Hawai'i appreciates your generosity and willingness to share your knowledge of the project area spanning from Kaloko to Keauhou Ahupua'a. This mana'o will be included in the Ka Pa'akai Framework Analysis for a proposed Department of Hawaiian Homelands (DHHL) water source development project at the Gianulias Site (TMK: [3] 7-5-014:001) and the Keauhou Well Site (TMKs: [3] 7-8-004:013, -015).

Nohopapa Hawai'i understands our responsibility to respect the wishes and concerns of the interviewees participating in this study. Here are the procedures we promise to follow:

1. The interview will not be recorded without your knowledge and explicit permission.
2. You will have the opportunity to review the written transcript and summary of your interview to make any additions, deletions, or corrections you wish.
3. You will be given a copy of the interview transcript and/or summary for your records.
4. You will be given a copy of this release form for your records.
5. You will be given a copy of any photographs taken of you during the interview.

It is internal Nohopapa Hawai'i policy and professional best practices to maintain consultee confidentiality. We are committed to and will strive to maintain consultees' anonymity and right to agency and authority over their intellectual property to the extent permitted by law.

For your protection, we need your written confirmation that (circle yes or no):

1. You consent to use the complete transcript and/or interview quotes for this study.
   Yes No
2. If a photograph is taken during the interview, you consent to the photograph being included in this study. Yes No

I, _____, agree to the procedures outlined above and,
(Please print your name here)
by my signature, give my consent and release of this interview and/or photograph to be used as specified.

_____
(Signature)

_____
(Date)

Nohopapa Hawai'i, LLC * info@nohopapa.com

Appendix D: Boundary Commission Excerpts


NOHO
PAPA
HAWAI'I
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APPENDIX F

Pre-Assessment Consultation

BOWERS + KUBOTA CONSULTING

Project Management • Planning • Architectural/Engineering Design • Construction Management

January 7, 2020
2018.70.0500 / 21P-102

ADDRESSEE
AGENCY
ADDRESS
CITY STATE ZIP

Pre-Consultation for an Environmental Assessment
Proposed DHHL Kona Wells Project – Gianulias Property
Tax Map Key: TMK: [3] 7-5-014:001
Hōlualoa, Hawai'i Island, Hawai'i

On behalf of the Department of Hawaiian Homelands (DHHL) we wish to inform you that DHHL is proposing to develop a new potable water source on a privately-owned site in Hōlualoa, Hawai'i Island. The purpose of this project is to provide a sufficient water source for future homestead development and community uses on DHHL's lands in the Kealakehe-La'i' Ōpua region located approximately six miles to the north on DHHL land in Kealakehe. The project site will be located on an approximately three-acre portion of a larger 129-acre site (TMK: [3] 7-5-014:001) mauka of Māmalahoa Highway currently used for growing coffee trees.

The project is proposed to be constructed in two phases. In the first phase, DHHL will drill an exploratory water well at the project site. If the testing of water quality and quantity are satisfactory, DHHL will proceed to the second phase to develop two permanent wells, a two-million-gallon storage tank, a control building and new 16- transmission line that would connect the well facilities to the County DWS pipeline. DHHL may also widen the private access road within project site to facilitate the construction and operation of this new facility.

DHHL may seek funding from the United States Department of Agriculture (USDA) for the development of this production facility. As such, DHHL will also coordinate with USDA to perform a concurrent environmental review pursuant to the National Environmental Policy Act (NEPA).

Pursuant to Chapter 343, Hawai'i Revised Statutes, an Environmental Assessment (EA) will be prepared for this project and subsequently made available for public review. If you wish to provide preliminary input on the project at this time or be a consulted party while the EA is being prepared, please review the attached maps and submit your written comments to the address below by November 19, 2021. Comments received during this period will be considered in the preparation of the Draft EA. When the Draft EA is complete, a copy will be sent to you for further review and input.

We thank you for your interest and participation in this project. If you have any questions, please contact the undersigned at 521-5361 or by email at mkodama@bowersandkubota.com

Sincerely yours,

BOWERS + KUBOTA CONSULTING

Matthew Kodama
Project Manager

MK/RA:kc

Enclosures:

1. Figure 1: Location Map
2. Figure 2: Example Site Plan

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON

BRUCE S. ANDERSON, PH.D.
KAMANA BEAMER, PH.D.
MICHAEL G. BUCK
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

March 2, 2020

REF: RFD.5309.8

TO: Mr. Allen Kam, Senior Project Manager
Belt Collins Hawaii LLC

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

SUBJECT: Pre-Consultation for an Environmental Assessment Proposed DHHL Kona Wells Project - Gianulias Property

FILE NO.: RFD.5309.8
TMK NO.: (3) 7-5-014:001

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.

[X] 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.

[X] 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/

[X] 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: Planning - On August 17, 2015, the Commission approved a reservation of water for the Department of Hawaiian Home Lands (DHHL) for 3.398 million gallons per day of ground water from the Keauhou Aquifer System Area, based on DHHL land holdings totaling 1,510 acres. The proposed well is located in the Keauhou Aquifer System Area and is one of four new proposed water supply wells to meet the foreseeable future development of DHHL lands.

The State Water Code provides water reservations pursuant to Section 174C-49(d) HRS. The water reservation will be documented in the Water Resource Protection Plan (WRPP) and is consistent with the State's long-range Hawaii Water Plan.

The proposed well is approximately 1,500 feet south of the Hawa'ii Department of Water Supply's high-level Waiaha Well 3857-004, which has a water level of approximately 60 ft above mean sea level and extremely freshwater (6-10 mg/l chlorides). If the opportunity presents itself, 3857-004 should be used as a monitor well during pump tests for this new DHHL well.

Also, this new well source is located south of the Keahuolu Queen Liliokalani Trust Well 4057-001 that makes it consistent with the draft Keauhou Water Use and Development Plan.

If you have any questions, please contact Lenore Ohye of the Planning Branch at 587-0216 or W. Roy Hardy of the Regulation Branch at 587-0225.

BELT COLLINS

January 7, 2020
2018-70-0500 / 19P-068

Mr. M. Manuel
Deputy Director
Department of Land and Natural Resources
Commission on Water Resource Management
1151 Punchbowl Street, Room 227
Honolulu, HI 96813

Dear Mr. Manuel,

Pre-Consultation for an Environmental Assessment
Proposed DHHL Kona Wells Project – Gianulias Property
Tax Map Key: TMK: [3] 7-5-014:001
Hōlualoa, Hawai'i Island, Hawai'i

On behalf of the Department of Hawaiian Homelands (DHHL) we wish to inform you that DHHL is proposing to develop a new potable water source on a privately-owned site in Hōlualoa, Hawai'i Island. The purpose of this project is to provide a sufficient water source for future homestead development and community uses on DHHL's lands in the Kealakehe-La'i'Ōpua region located approximately six miles to the north on DHHL land in Kealakehe. The project site is located on an approximately three-acre portion of a larger 129-acre site (TMK: [3] 7-5-014:001) mauka of Māmalahoa Highway currently used for growing coffee trees.

The project is proposed to be constructed in two phases. In the first phase, DHHL will drill an exploratory water well at the project site. If the testing of water quality and quantity are satisfactory, DHHL will proceed to the second phase to develop a well field and associated production facilities to agreed upon standards with the County and dedicate the improvements to the County for long-term operation and maintenance. In addition to well construction, DHHL also anticipates construction of an on-site storage tank possibly up to two-million gallons in size, a control building, and 16-inch transmission line that would connect the well field facilities to the County DWS pipeline. DHHL may also widen the access road off of Māmalahoa Highway to facilitate the construction and operation of this new facility.

DHHL may seek funding from the United States Department of Agriculture (USDA) for the development of this production facility. As such, DHHL will also coordinate with USDA to perform a concurrent environmental review pursuant to the National Environmental Policy Act (NEPA).

Belt Collins Hawaii LLC | 2153 North King Street, Suite 200 | Honolulu, HI 96819-4554 USA
Tel: 808.521.5361 | Fax: 808.538.7819 | www.bchdesign.com | honolulu@bchdesign.com

Pursuant to Chapter 343, Hawai'i Revised Statutes, an Environmental Assessment (EA) will be prepared for this project and subsequently made available for public review. If you wish to provide preliminary input on the project at this time or be a consulted party while the EA is being prepared, please review the attached maps and submit your written comments to the address below by March 9, 2020. Comments received during this period will be considered in the preparation of the Draft EA. When the Draft EA is complete, a copy will be sent to you for further review and input.

We thank you for your interest and participation in this project. If you have any questions, please contact the undersigned at 521-5361 or by email at akam@bchdesign.com.

Sincerely yours,

BELT COLLINS HAWAII LLC

Allen Kam
Senior Project Manager

AK:hp

Enclosures:
1. Figure 1: Location Map
2. Figure 2: Preliminary Site Plan

cc: Mr. Andrew Choy – DHHL

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2020-TA-0134

January 27, 2020

Mr. Allen Kam
Senior Project Manager
Belt Collings Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Subject: Technical Assistance for the Pre-Consultation for an Environmental Assessment for the Proposed Department of Hawaiian Homelands (DHHL) Kona Wells Project in Holualoa, Island and County of Hawaii

Dear Mr. Allen Kam:

The U.S. Fish and Wildlife Service (Service) received your correspondence on January 9, 2020, requesting technical assistance for the Pre-Consultation for an Environmental Assessment for the proposed DHHL Kona Wells Project located in Holualoa. The Service offers the following comments to assist you in your planning process so that impacts to trust resources can be avoided through site preparation, construction, and operation. Our comments are provided under the authorities of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*).

Project Description

The DHHL is proposing to develop a new potable water source on a privately-owned site (Gianulias Property) in Holualoa. The purpose of the project is to provide a sufficient water source for future homestead development and community uses on DHHL lands in Kealakehe-Laiopua region. The site is on an approximately three-acre portion of a larger 129-acre site mauka of Mamalahoa highway that is currently used for growing coffee trees.

There are two phases to the project. In the first phase, DHHL will drill and exploratory water well at the site, if the testing of water quality and quantity are satisfactory, DHHL will proceed with phase two. In phase two, a well field will be developed and associated production facilities to agreed upon standards with the County as well as improvements for long-term operation and maintenance. DHHL anticipates the construction of an on-site covered storage tank, possibly up to two-million gallons in size, a control building, and a 16-inche transmission line that would connect the well field to the County's Department of Water Supply pipeline. DHHL may also widen the access road off of Mamalahoa highway to facilitate the construction of this project. Based on information you provided in the Use Permit Application and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Project, there are

four listed animal species in the immediate vicinity of the project area: the federally endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwichensis*), band-rumped storm-petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*). The State-listed Hawaiian hawk (*Buteo solitarius*) may also occur within the project area.

The Service recommends the following measures to avoid and minimize project impacts to the following listed species:

Hawaiian hoary bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation across all islands and will leave young unattended in trees and shrubs when they forage. If trees or shrubs 15 feet or taller are cleared during the pupping season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. Additionally, Hawaiian hoary bats forage for insects from as low as 3 feet to higher than 500 feet above the ground and can become entangled in barbed wire used for fencing.

To avoid and minimize impacts to the endangered Hawaiian hoary bat we recommend you incorporate the following applicable measures into your project description:

- Do not disturb, remove, or trim woody plants greater than 15 feet tall during the bat birthing and pup rearing season (June 1 through September 15).
- Do not use barbed wire for fencing.

Hawaiian petrel, Newell's shearwater, and band-rumped storm petrel

Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following applicable measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

Hawaiian hawk

The Hawaiian hawk, which was recently removed from the federal list of threatened and endangered species, continues to be State-listed as endangered under HRS 195-D. The Hawaiian

hawk is known to occur across a broad range of forest habitats throughout the Island of Hawaii. Loud, irregular and unpredictable activities, such as using heavy equipment or building a structure, near an endangered Hawaiian hawk nest may cause nest failure. Harassment of Hawaiian hawk nesting sites can alter feeding and breeding patterns or result in nest or chick abandonment. Nest disturbance can also increase exposure of chicks and juveniles to inclement weather or predators.

To avoid and minimize impacts to Hawaiian hawks we recommend you incorporate the following applicable measures into your project description:

- If work must be conducted during the March 1 through September 30 Hawaiian hawk breeding season, have a biologist familiar with the species conduct a nest search of the project footprint and surrounding areas immediately prior to the start of construction activities.
    - Pre-disturbance surveys for Hawaiian hawks are only valid for 14 days. If disturbance for the specific location does not occur within 14 days of the survey, conduct another survey.
- No clearing of vegetation or construction activities should occur within 1,600 feet of any active Hawaiian hawk nest during the breeding season until the young have fledged.
- Regardless of the time of year, no trimming or cutting trees containing a hawk nest, as nests may be re-used during consecutive breeding seasons.

Biosecurity and Invasive Species

Please see the attached Biosecurity Protocols to prevent the introduction and spread of harmful invasive species on the island of Hawaii. We encourage you to incorporate these measures into your project plans to avoid impacts to listed species.

If this potential project should receive federal funding, federal permits, or any federal authorization, it will require a Section 7 consultation with the Service. The Service only conducts Section 7 consultations with the federal action agency or their designated representative.

Thank you for participating with us in the protection of our endangered species. If you have any further questions or concerns regarding this consultation, please contact Eldridge Naboa, Fish and Wildlife Biologist, 808-933-6964, e-mail: eldridge_naboa@fws.gov. When referring to this project, please include this reference numbers: ***01EPIF00-2020-TA-0134***.

Sincerely,

Michelle Bogardus
Island Team Manager
Maui Nui and Hawaii Island

BIOSECURTY PROTOCOL – HAWAII ISLAND (JULY 2018)

The following biosecurity protocol (based on National Park Service, State of Hawaii, U.S. Fish and Wildlife, U.S. Geological Survey, and the DOI Office of Native Hawaiian Relations guidance) should be followed when operating on Hawaii Island to prevent the introduction of harmful invasive species including frogs, ants, weeds, and fungi into local natural areas (e.g., Hawaii Volcanoes National Park, Hakalau Forest National Wildlife Refuge, State of Hawaii "Natural Areas") and areas with native habitat (habitat that is primarily composed of native vegetation), other islands in Hawaiian archipelago, or the U.S. mainland. The protocol also includes suggestions for keeping field staff safe from certain invasive species.

1. All work vehicles, machinery, and equipment should be cleaned, inspected by its user, and found free of mud, dirt, debris and invasive species prior to entry into the natural areas or native habitat.

a. Vehicles, machinery, and equipment must be thoroughly pressure washed in a designated cleaning area and visibly free of mud, dirt, plant debris, insects, frogs (including frog eggs) and other vertebrate species such as rats, mice and non-vegetative debris. A hot water wash is preferred. Areas of particular concern include bumpers, grills, hood compartments, areas under the battery, wheel wells, undercarriage, cabs, and truck beds (truck beds with accumulated material (intentionally placed or fallen from trees) are prime sites for hitchhikers).

b. The interior and exterior of vehicles, machinery, and equipment must be free of rubbish and food. The interiors of vehicles and the cabs of machinery must be vacuumed clean. Floor mats shall be sanitized with a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.

c. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter natural areas or native habitat. Treatment is the responsibility of the equipment or vehicle owner and operator.

2. Little Fire Ants – All work vehicles, machinery, and equipment should be inspected for invasive ants prior to entering the natural areas or native habitat.

a. A visual inspection for little fire ants should be conducted prior to entry into natural areas or native habitat.

b. Hygiene is paramount but even the cleanest vehicle can pick up a little fire ant. Place MaxForce Complete Brand Granular Insect Bait (1.0% Hydramethylnon; http://littlefireants.com/Maxforce%20Complete.pdf) into refillable tamper resistant bait stations. An example of a commercially available refillable tamper resistant bait station is the Ant Café Pro (https://www.antcafe.com/). Place a bait station (or stations) in vehicle. Note larger vehicles, such as trucks, may require multiple stations. Monitor bait stations frequently (every week at a minimum) and replace bait as needed. If the station does not have a sticker to identify the contents, apply a sticker listing contents to the station.

c. Any machinery, vehicles, equipment, or other supplies found to be infested with ants (or other invasive species) must not enter natural areas or native habitat until it is sanitized and re-tested following a resting period. Infested vehicles must be sanitized following recommendations by the Hawaii Ant Lab (http://www.littlefireants.com/) or other ant control expert and in accordance

with all State and Federal laws. Treatment is the responsibility of the equipment or vehicle owner.

d. Gravel, building materials, or other equipment such as portable buildings should be baited using MaxForce Complete Brand Granular Insect Bait (1.0% Hydramethylnon; http://littlefireants.com/Maxforce%20Complete.pdf) or AmdroPro (0.73% Hydramethylnon; http://littlefireants.com/Amdro%20Pro.pdf) following label guidance.

e. Storage areas that hold field tools, especially tents, tarps, and clothing should be baited using MaxForce Complete Brand Granular Insect Bait (1.0% Hydramethylnon; http://littlefireants.com/Maxforce%20Complete.pdf) or AmdroPro (0.73% Hydramethylnon; http://littlefireants.com/Amdro%20Pro.pdf) following label guidance.

3. Base yards and staging areas inside and outside areas must be kept free of invasive species.
a. Base yards and staging areas should be inspected at least weekly for invasive species and any found invasive removed immediately. Pay particular attention to where vehicles are parked overnight, keeping areas within 10-meters of vehicles free of debris. Parking on pavement and not under trees, while not always practical is best.

b. Project vehicles or equipment stored outside of a base yard or staging area, such as a private residence, should be kept in a pest free area.

4. All cutting tools must be sanitized to prevent the Rapid Ohia Death (ROD) fungus.
a. Avoid wounding ohia trees and roots with mowers, chainsaws, weed eaters, and other tools. Cut only the minimum amount of trees and branches as approved for the project.

b. All cutting tools, including machetes, chainsaws, and loppers must be sanitized to remove visible dirt and other contaminants prior to entry into natural areas or areas with native habitat, and when moving to a new project area within the native habitat area. Tools may be sanitized using a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution. One minute after sanitizing, you may apply an oil based lubricant to chainsaw chains or other metallic parts to prevent corrosion.

c. Only dedicated tools and chainsaws should be used to sample known or suspected ROD infected trees.

d. Vehicles, machinery, and equipment must be cleaned as described in (1) above.

5. Imported firewood, logs, and ohia parts:
a. Ohia firewood, ohia logs, and ohia parts should not be transported.

6. For individuals working in the field:
a. **Before going into the field**, visually inspect and clean your clothes, boots, pack, radio harness, tools and other personal gear and equipment, for seeds, soil, plant parts, insects, and other debris. A small brush is handy for cleaning boots, equipment and gear. Soles of shoes should be sanitized using a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.

b. **Immediately before leaving the field,** visually inspect and clean your clothes, boots, pack, radio harness, tools, and other personnel gear and equipment, for seeds, soil, plant parts, insects, and other debris. Soles of shoes should be sanitized using a solution of >70% isopropyl alcohol or a freshly mixed 10% bleach solution.

c. **Little fire ants nest in trees.** If you are under a tree and that tree is bumped or somehow stressed, the threat response of the ants is to fall from the leaves and sting the person under the tree. If you are subject to an ant attack, do not panic. The ants are extremely small but their stings are painful so make sure you remove all ants from your body and clothing. The stings cause inch long welts that are itchy and painful, and can last for weeks. Treat stings as you would other insect stings. In some persons stings can produce life threatening reactions. Stocking antihistamine in the first aid kit is a reasonable precaution.

d. **Rat Lungworm disease** is caused by a parasite that can infect humans who consume raw or undercooked infected snails or slugs or consume raw produce that contains a small infected snail or slug. Infection is rare but can be serious. Symptoms can include severe headache, neck stiffness, low grade fever, nausea, and vomiting anywhere from 1-6 weeks after exposure. The disease is not spread person to person. Anyone who handles snails or slugs should wear gloves and/or wash hands. Eating unwashed produce is discouraged.

DAVID Y. IGE
GOVERNOR

JADE T. BUTAY
DIRECTOR

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

IN REPLY REFER TO:
DIR 0025
STP 8.2834

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

January 21, 2020

Mr. Allen Kam
Senior Project Manager
Belt Collins Hawaii LLC
2153 North King Street, Suite 200
Honolulu, Hawaii 96819

Dear Mr. Kam:

Subject: Pre-Consultation for an Environmental Assessment
Proposed Department of Hawaiian Homelands (DHHL) Kona Wells Project – Gianulias Property
Holualoa, Hawaii
Tax Map Key: (3) 7-5-014:001

The Hawaii Department of Transportation (HDOT) understands that DHHL is proposing to develop a new potable water source in Holualoa, Hawaii Island. The proposed project is to provide a sufficient water source for future homestead development and community uses on DHHL lands in the Kealakehe-LaiOpua region.

Based on the project description and location, the project does not appear to have any significant impacts to State highway facilities. HDOT has no comments to provide at this time.

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

Sincerely,

JADE T. BUTAY
Director of Transportation

CUST 3-3-1
H-W/G

January 24, 2020

Mr. Allen Kam
Senior Project Manager
Belt Collins Hawai'i LLC
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

Gentlemen:

Subject: Pre-Consultation for an Environmental Assessment
Proposed DHHL Kona Wells Project – Gianulias Property
Hōlualoa, North Kona, Hawai'i Island, Hawai'i
Tax Map Key: 3-7-5-014:001

Thank you for the opportunity to comment on the subject's Pre-Consultation Environmental Assessment (EA). Hawaiian Electric will be able to provide electrical service to the proposed development in North Kona. A detailed analysis will be performed after the receipt of the consultant's detailed design drawings and estimated load. The following is a summary of our comments:

1. Generation capacity – As of January 2020, Hawaiian Electric's current system peak load is 192.1MW and our total generation system capability is 242.2MW. Our firm generating reserve margin is 26.1% and may have adequate generation to serve the above.

2. Electrical Substation - The area is served by our existing Keahuolu Substation and a 12,470 volt overhead distribution along Mamalahoa Highway. The capacity of our existing substation may be adequate to serve the anticipated load.

3. Off-Site Electrical Distribution System – The existing off-site 12,470 volt distribution system along Mamalahoa Highway is adequate to serve the proposed project. A new 12,470 volt overhead distribution system will be required between the existing electrical system to the proposed development.

4. On-Site Electrical Distribution System – On-site distribution line extensions and easements may be required on the developer's property to serve the anticipated load.

After the development's detailed loading and civil plans are submitted, Hawaiian Electric will prepare a firm cost to provide electrical power to this development.

Hawaiian Electric recommends energy efficient and conservation measures to reduce the maximum electrical demand and energy consumption. The developer may call Hawaiian Electric's Customer Field Services division at (808) 935-1171 for questions or details on available programs.

It is encouraged that the developer's electrical consultant open a service request with Hawaiian Electric Engineering division as soon as practicable to ensure timely electrical facility installation. If you have any questions, please email me at shelley.doctor@hawaiianelectric.com.

Sincerely,

Shelley Doctor
Electrical Engineer
Transmission and Distribution Engineering

cc: M. Mather via email

Harry Kim
Mayor

Paul K. Ferreira
Police Chief

Kenneth Bugado, Jr.
Deputy Police Chief

County of Hawai'i

POLICE DEPARTMENT
349 Kapi'olani Street • Hilo, Hawai'i 96720-3998
(808) 935-3311 • Fax (808) 961-2389

January 30, 2020

Mr. Allen Kam
Senior Project Manager
Belt Collins Hawaii LLC
2153 N. King Street, Suite 200
Honolulu, HI 96819

Dear Mr. Kam:

RE: PRE-CONSULTATION FOR AN EVIRONMENTAL ASSESSMENT
PROPOSED DHHL KONA WELLS PROJECT - GIANULIAS PROPERTY
TAX MAP KEY: TMK: [3] 7-5-014:001
HOLUALOA, HAWAI'I ISLAND, HAWAI'I

This is in response to your letter dated January 7, 2020, requesting comments related to your project.

Thank you for allowing the Hawai'i Police Department the opportunity to participate. At this time, the Hawai'i Police Department has no comments.

Should you have any questions, please contact Captain Gilbert Gaspar Jr., Commander of the Kona District, at (808) 326-4646, extension 299.

Sincerely,

PAUL K. FERREIRA
POLICE CHIEF

ROBERT WAGNER
ASSISTANT POLICE CHIEF
AREA II OPERATIONS

GG/jaj
20HQ0028

Allen Kam

From: Zimpfer, Jeff <jeff_zimpfer@nps.gov>
Sent: Friday, January 24, 2020 3:01 PM
To: Allen Kam
Subject: NPS comments on a proposed DHHL Kona Well

Aloha Mr. Kam,

Thank for the opportunity to comment for the pre-consultation for an Environmental Assessment for a proposed Department of Hawaiian Home Lands Kona Well Project - Gianulias Property Tax Map Key: TMK: [3] 7-5-014:001, Holualoa, on Hawai'i Island.

Based on the most recent USGS model, we do not believe that withdrawals from the proposed well will impair cultural and natural resources in Kaloko-Honokōhau National Historical Park. The proposed location for the well is within the area identified by the County of Hawai'i Department of Water Supply for future well development. Thus, the proposed location is consistent with our understanding of the intent of the Keauhou update to the Hawai'i County Water Use and Development Plan. This plan is awaiting approval from Hawai'i County Council and the State of Hawai'i Commission on Water Resource Management.

We have no further comments at this time.

Sincerely,

~Jeff

Jeff Zimpfer, Ph.D.
National Park Service
Environmental Protection Specialist
Kaloko-Honokōhau National Historical Park
73-4786 Kanalani St., #14
Kailua Kona, HI 96740
ph: 808-329-6881 x1500
fax: 808-329-2597
jeff_zimpfer@nps.gov
http://www.nps.gov/kaho/index.htm

The National Park Service cares for special places saved by the American people so that all may experience our heritage