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August 27, 2021

Ms. Mary Alice Evans, Director
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Evans:

**Subject: Lālāmilo 10-MG Reservoir Project
Final Environmental Assessment and Finding of No Significant Impact**

The enclosed *Final Environmental Assessment for the Lālāmilo 10 MG Reservoir Project* (FEA) assesses the potential effects of constructing and operating the proposed facilities. Based on the information contained in this FEA, and the requirements of Hawai'i Revised Statutes, Chapter 343 and its implementing regulations contained in the Hawai'i Administrative Rules, Title 11, Chapter 200.1, the County of Hawai'i, Department of Water Supply has determined that an Environmental Impact Statement is not required and is issuing a Finding of No Significant Impact (FONSI). Please publish a notice of FEA and FONSI in the next edition of *The Environmental Notice*.

We have also provided the action summary, significance criteria, and other required information via the OEQC online submittal form.

Please contact our project consultant Mr. Ron Terry of Geometrician Associates, at (808) 969-7090, if you have any questions.

Sincerely yours,

Keith K. Okamoto., P.E.
Manager-Chief Engineer

SHU:dfg

Att.

copy – Mr. Ron Terry, Geometrician Associates (PDF via email)

22 - 025

... Water, Our Most Precious Resource ... Ka Wai A Kāne ...

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From: webmaster@hawaii.gov
To: [DBEDT OPSD Environmental Review Program](#)
Subject: New online submission for The Environmental Notice
Date: Monday, August 30, 2021 6:54:14 AM

Action Name

Lālāmilo 10 MG Tank Reservoir

Type of Document/Determination

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

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds

Judicial district

South Kohala, Hawai'i

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

(3) 6-8-001:001

Action type

Agency

Other required permits and approvals

- National Pollutant Discharge Elimination System Permit (NPDES) • County Building Permits • County Grading Permit • State Historic Preservation Division HRS Chapter 6E Approval

Proposing/determining agency

County of Hawai'i, Department of Water Supply

Agency contact name

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Hilo, HI 96720
United States
[Map It](#)

Was this submittal prepared by a consultant?

Yes

Consultant

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Hilo, HI 96720
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[Map It](#)

Action summary

The Hawai'i County DWS proposes to build a 10-million gallon , 36-ft high prestressed concrete water tank on property currently owned by Parker Ranch, to be subdivided to create a 3-acre lot. Also included are accessory waterlines and a gate, access road, security lighting and fence.

The project would provide more storage for reserve water and fire protection within the Lālāmilo Water System and energy-efficient critical redundancy. Filling may occur when wind power from the nearby Lālāmilo Windfarm Repowering Project was available, reducing pumping costs, fossil fuel use and greenhouse gas emissions. Only very minor construction-phase impacts mitigated by BMPs would occur at the isolated site, a goat and sheep pasture.

Reasons supporting determination

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

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

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

1. Irrevocably commit a natural, cultural, or historic resource. No valuable natural or cultural resource would be committed or lost. A few common native plants are present but native ecosystems would not be adversely affected, particularly given the disturbed nature of the flora and fauna. No adverse impact upon vegetation or endangered species should occur. An archaeological survey has properly documented historic properties, of which none are present, to ensure that there are no effects to significant historic sites. The archaeological survey has been submitted to the State Historic Preservation Division for review. There are no known or expected cultural uses on the specific project site, and the project does not affect the cultural values or resources of the area. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way.

2. Curtail the range of beneficial uses of the environment. No restriction of beneficial uses would occur by constructing the proposed tank reservoir within three acres of Parker Ranch pasture. In terms of Covid-19, the Department of Water Supply has a policy of continuing to advance projects through pre-construction regulatory review and approval processes and then, if determined safe and appropriate to do so, incorporate requirements for the safety of construction workers, County staff and the public that would allow construction to proceed in a responsible and safe manner, minimizing public health impacts.

3. Conflict with the State's environmental policies or long-term environmental goals established by law. The State's long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is environmentally beneficial and minor, and it is thus consistent with all elements of the State's long-term environmental policies.
4. Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State. The project would not have any substantial adverse effect on the economic or social welfare of the Big Island community or the State of Hawai'i. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way. The social and economic welfare of the area would be enhanced through addition of potable water storage.
5. Have a substantial adverse effect on public health. The project would not affect public health and safety in any adverse way, and would benefit public health by providing water storage for a public water system.
6. Involve adverse secondary impacts, such as population changes or effects on public facilities. Providing additional cost-effective and sustainable water storage would not produce any major secondary impacts, such as population changes or effects on public facilities.
7. Involve a substantial degradation of environmental quality. The project is minor and environmentally benign, and thus it would not contribute to environmental degradation.
8. Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions. Other than the precautions for preventing adverse effects of sedimentation during construction listed above, no special mitigation measures should be required to counteract the small adverse cumulative effect.
9. Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat. Thorough survey has determined that no endangered plant species are present. Other than the Hawaiian hoary bat, an island wide-ranging species that will experience no adverse impacts due to mitigation in the form of timing of vegetation removal, no rare, threatened or endangered species of fauna are known to exist on or near the project site, and none would be affected by any project activities.
10. Have a substantial adverse effect on air or water quality or ambient noise levels. No substantial effects to air, water, or ambient noise would occur. Brief, temporary effects would occur during construction and would be mitigated. The context of the project site's location, with no residences, parks, or other sensitive uses nearby, will help avoid noise impacts. Erosion and sedimentation impacts will be avoided by implementation of Best Management Practices during grading, which will occur in a limited area.
11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters. Although the project would be located in an area with minor volcanic and moderate seismic risk, the entire Island of Hawai'i shares this risk, and the project is not imprudent to construct, and employs design and construction standards appropriate to the seismic zone. The project site is not located in a flood zone or any other hazardous area, and it would not affect any such area. The project site is more than 1,000 feet above sea level and will not be affected directly by sea level rise. The project has adapted to climate change by accounting for the potential for larger storms, through minimizing hard surfaces that generate runoff in heavy rainfall.
12. Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies. No scenic views are located nearby or would be affected in any way. The security lighting that is expected to be installed will be designed to be shielded in conformance with the Hawai'i County Outdoor Lighting Ordinance (Hawai'i County Code, Article 9). Furthermore, it will consist blue-deficient lighting such as filtered LED lights or amber LED lights, with a Correlated Color Temperature (CCT) of 2700 Kelvin. This will reduce light pollution and also the risk that the threatened or endangered seabirds that may be attracted to and then disoriented by the lighting.
13. Require substantial energy consumption or emit substantial greenhouse gases. While non-negligible amounts of energy input and greenhouse gas emission would be required for construction and use of the facility, filling of the reservoir may occur when wind power from the nearby 3.3-megawatt Lā'āmilō Windfarm Repowering Project was available, not only reducing pumping costs but also taking advantage of renewable power and reducing fossil fuel

use and greenhouse gas emissions.

Attached documents (signed agency letter & EA/EIS)

- [FINAL-EA-Lalamilo-10-MG-Tank-Reservoir.pdf](#)
- [FONSI-Lalamilo-10-MG-Reservoir.pdf](#)

Shapefile

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

Action location map

- [Lalamilo-Reservoir-Project-Area.zip](#)

Authorized individual

Ron Terry

Authorization

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

Final Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

DWS JOB NO. 2019-1107

TMK: (3) 6-8-001:001 (por.)

South Kohala District, Hawai‘i Island, State of Hawai‘i

September 2021

**County of Hawai‘i
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, Hawai‘i 96720**

Final Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

DWS JOB NO. 2019-1107

TMK: (3) 6-8-001:001 (por.)

South Kohala District, Hawai‘i Island, State of Hawai‘i

PROPOSING/
DETERMINING AGENCY:

County of Hawai‘i
Department of Water Supply
345 Kekuaaoa Street, Suite 20
Hilo, Hawai‘i 96720

CONSULTANT:

Geometrician Associates LLC
PO Box 396
Hilo HI 96721

CLASS OF ACTION:

Use of County Land
Use of County Funds

This document is prepared pursuant to:

The Hawai‘i Environmental Policy Act,
Chapter 343, Hawai‘i Revised Statutes (HRS), and
Title 11, Chapter 200.1, Hawai‘i Department of Health Administrative Rules (HAR).

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SUMMARY

The County of Hawai‘i, Department of Water Supply (DWS) proposes to construct a 10-million gallon (MG) circular, 36-foot high Prestressed Concrete Tank on property currently owned by Parker Ranch and designated by TMK 6-8-001:001. The property would be subdivided to create an approximately 3.0-acre lot for the proposed facility. The project will also include influent and effluent waterlines to other DWS facilities nearby, a gate, a 20-foot wide access road and 12-foot wide perimeter road, security lighting and a six-foot chain link fence painted black machinery enamel. The purpose and need of the project are to provide added storage for adequate reserve water within the Lālāmilo Water System and provide energy efficient critical redundancy and additional water for fire protection. Filling of the reservoir may occur when wind power from the nearby 3.3-megawatt Lālāmilo Windfarm Repowering Project was available, not only reducing pumping costs but also taking advantage of renewable power and reducing fossil fuel use and greenhouse gas emissions.

The proposed work may produce minor, localized construction equipment noise, emissions and fugitive dust. However, because of the isolated location and planned mitigation, these effects would be minimal and would be unlikely to affect the public. The contractor will obtain a National Pollutant Discharge Elimination System permit with Best Management Practices that will minimize the potential impact of sediment, storm water runoff and construction materials on receiving waters. The project site has long been in use as cattle, goat and sheep pasture. Botanical surveys found mainly non-natives and no rare, threatened or endangered plant species. Vegetation removal restrictions will minimize impacts to endangered Hawaiian hoary bats. The area is part of a large military training site and unexploded ordnance will be surveyed and removed. An archaeological survey documented no historic sites. No cultural uses such as gathering occur on the project site, and the cultural resources and practices of Kohala will not be affected directly or indirectly.

PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Description, Location and Property Ownership

The County of Hawai‘i, Department of Water Supply (DWS) proposes to construct a 10-million gallon (MG) American Water Works Association (AWWA) D110 Type I circular Prestressed Concrete Tank on property currently owned by a division of Parker Ranch [PR Puu Pa LLC] and designated by TMK 6-8-001:001 (Figures 1-2). The site is located just *mauka* of the Lālāmilo Parker Access Road between Parker Well No. 3 and Parker Well No. 2, and is readily accessible to DWS personnel.

Filling of the reservoir from Parker Wells No. 1 to 4 may occur when wind power from the nearby 3.3-megawatt Lālāmilo Windfarm Repowering Project is available. This project would reduce pumping costs to DWS customers and also take advantage of renewable power, reducing fossil fuel use and greenhouse gas emissions.

As illustrated in Figure 3, the tank would be 36 feet high, with a 222 foot inside diameter and an 11-inch wall thickness. The tank footing would extend 3 feet beyond the outside face of the tank wall. The influent line to the tank will connect to the waterline in the access road at the reservoir entrance. The effluent line will be a separate waterline about 450 feet long that will be installed in the Lālāmilo Parker Access Road and connect to an existing waterline at the entrance to Parker Well No. 3. to the left of the Well Site access road. The project also includes a gate, a 20-foot wide access road and 12-foot wide perimeter road, and a six-foot chain link fence painted black machinery enamel. Security lighting would be shielded, with a blue-deficient spectrum to protect dark skies and transiting seabirds.

The property would be subdivided to create an approximately 3.0-acre lot for the proposed facilities. All work would be conducted within this area, with the exception of the effluent line connecting to the existing waterline near Parker Well No. 3

The project site lacks sensitive resources such as native vegetation or habitat, watercourses, and archaeological or cultural resources, helping ensure that utilization of the site will avoid significant impacts to the environment.

The project is expected to cost in the range of \$10 to 12 million, an estimate that will be refined as project design proceeds. If approvals and funding proceed as planned, design will be finished by late 2021 or early 2022, with construction beginning within six months after completion of design and lasting approximately 21 months.

Figure 1. Regional and Site Location Maps



Figure 2. Project Site Photos



Looking north to project site ▲ ▼ Looking east to project site



1.2 Background and Purpose and Need

The purpose and need of the project are to provide added storage for adequate reserve water within the Lālāmilo Water System and provide energy efficient critical redundancy and additional water for fire protection. The proposed benefits include:

1. Additional water storage providing increased resilience of continued water service for customers should there be events such as power outages that prevent the wells from running normally.
2. Additional capacity for fire protection purposes for the area served by the Lālāmilo Water System area – a very dry area prone to brush fires, in which sufficient DWS water has been critical for Fire Department response.
3. Additional water storage increasing emergency preparedness for natural disasters such as hurricanes and earthquakes.
4. Energy storage by increasing the utilization of renewable wind energy from the adjacent 3.3-megawatt Lālāmilo Windfarm.
5. Assisting Hawai‘i County and the State of Hawai‘i in meeting the Hawai‘i Clean Energy Goals of reaching 100% clean energy by 2045, reducing fossil fuel use and greenhouse gas emissions.
6. Potential future development of in-line hydro power generation.
7. As power cost charges are a direct cost to DWS customers, any savings that would be realized would be passed on to customers island-wide.

The Lālāmilo Water System serves the coastal areas of South Kohala (Figure 4). Originally designed for the small village of Kawaihae in the early 20th century, the system evolved from depending on a 2-inch line from the Waimea Water System following Kawaihae Road to encompass wells drilled in the State lands of Lālāmilo and Parker Ranch lands that allowed development of the Mauna Kea and Mauna Lani Resorts, which remain the largest consumers of water. Supplied by six wells centered around the 1,200-foot elevation, the system now serves the Mauna Lani Resort, Puakō, Waialea, the Mauna Kea Resort, and Kawaihae communities in five operational zones, through two booster pump stations, nine storage tanks and transmission lines. It serves a population of about 1,975 with 718 services, and utilized approximately 4.38 million gallons per day (mgd) on average in 2019 (pre-pandemic), which required approximately 30,000 kilowatt hours per day (kWh/day) for pumping. Peak usage in 2019 was 4.532 mgd.

The project is in alignment with the objectives of the plans for water development in the Lālāmilo Water System and in the general area, including the Hawai‘i County General Plan (GP) (Hawai‘i County Planning Dept. 2005); 20-year Water Master Plan (WMP) (Hawai‘i County DWS 2006), the Hawai‘i Water Use and Development Plan (HWUDP) (DWS 2010), and the DWS 5-year Capital Improvement Program (CIP). Of particular relevance is the WMP, which is DWS’s vehicle for long-range planning to guide the development of its water service areas and the use of its resources over a 20-year time frame. Long-range development timetables are difficult to predict, as development projects are often market and economically driven.

TRUE NORTH
SCALE: 1" = 40'

PR PUU PA LLC
[TMK: (3)6-8-001:001]

TANK AND WELL SITE 5
(AS PER SUBD PLAN #5169)
(AS PER DWS - WELL 3)
[TMK: (3)6-8-001:044]

overflow line

effluent line

influent line

connect to exist WL

connect to exist WL

EASEMENT - J

EASEMENT - K

STONEWALL ± 2' TO 3.5' HIGH

STONEWALL ± 2' TO 3.5' HIGH

STONEWALL ± 2' TO 3.5' HIGH

"W-6"
PIPE IN CONC
FOUND - ADOPT

WAIKOLOA VILLAGE ASSOCIATION
[TMK: (3)6-8-002:019]

GRAPHIC SCALE:

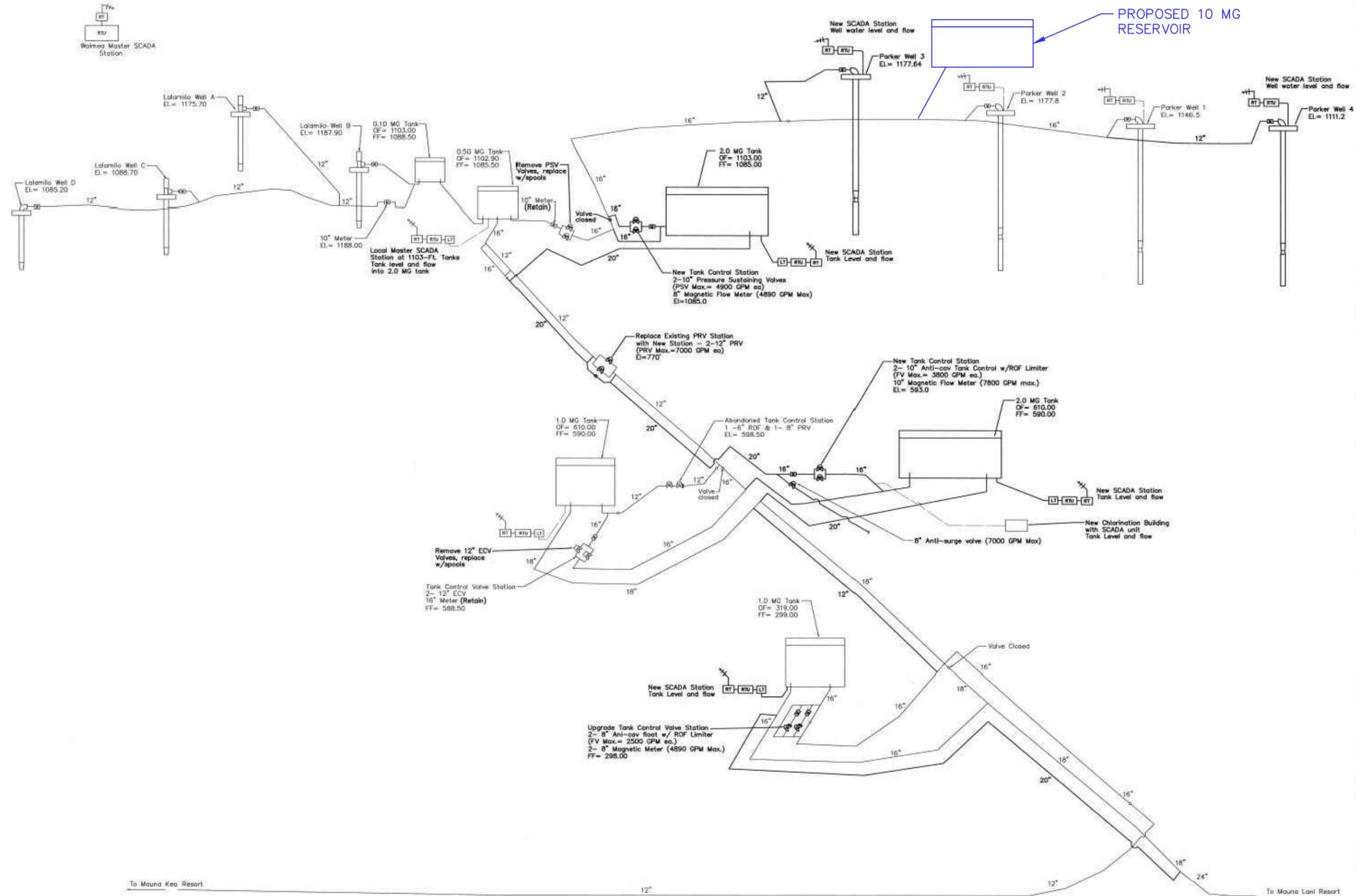


SCALE: 1" = 40'

PREFIX: G:\HDWS\1901 Lalamilo 10MG Reservoir\3100 DESIGN\310 Plans\
 FILE: HDWS1901 General Layout Plan.dwg
 CURRENT TIME: Jan 28, 2021 8:12am
 LAST MODIFIED: Thu, 28 Jan 2021 7:39am
 LAST SAVED BY: jsk
 LAYOUT: Layout1

GENERAL LAYOUT PLAN
SCALE: 1" = 40'

	DEPARTMENT OF WATER SUPPLY COUNTY OF HAWAII	
	PROJECT LALAMILO 10 MG RESERVOIR GENERAL LAYOUT PLAN	
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION	JOB NO. 2019-1107	SHEET 4 OF 100 SHEETS



To Mauna Kea Resort.

12"

12"

To Mauna Lani Resort

LALAMILO 10 MG TANK RESERVOIR

WATER SYSTEM SCHEMATIC

FIGURE

4

PATH: G:\HDWS\1901 Lalamilo 10MG Reservoir\700 REPORT\02 EA
 FILE: Figure 4 Lalamilo Water System Schematic.dwg
 CURRENT OPER: GHK Tuesday, April 6, 2021 3:41:28 PM
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Conceptual options for long-term source development and infrastructure improvements are usually linked to future expected private land development projects, which are always subject to change, postponement or cancellation. The 2006 WMP identified the projects DWS expected to require during the 2007-2026 planning period.

Chapter 7 of the WMP evaluates the required and available storage based on the projected demands within each DWS water system, arriving at a figure for surplus or deficit storage. The available storage in a system (or operational zone) should equal the maximum daily demand plus storage to provide needed fireflow. The WMP also discussed a condition assessment of existing tanks plus an energy efficiency evaluation that compares the potential for cost savings by constructing more or larger storage tanks in order to reduce energy costs by limiting pumping to the night when electricity rates are lower. The WMP includes a regularly updated 5-year capital improvement program (CIP) to enable DWS to plan for the staff resources, revenue requirements, and rate adjustments necessary to implement the CIP. In 2006, DWS developed various desired CIP projects for the Lālāmilo Water System. The CIP list included a 2.0 MG reservoir in the vicinity of the proposed project.

In the 14 years since that time, storage and energy needs have been re-evaluated, and the proposed project was developed for the current 5-year CIP that covers fiscal years 2021 to 2025. The DWS worked with the State legislature to secure State funds, and the project is approved for \$10.5M, of which \$8.75M would come from the State general obligation bond fund) and \$1.75M from DWS. An important goal of the current CIP program implementing and adapting the WMP is to enable water transmission from existing and proposed sources to accommodate future anticipated water demands. Implementation of these plans will allow the most efficient and economical use of water and will also promote the use of well sources in the area specified in the HWUDP.

1.3 Environmental Assessment Process

This Environmental Assessment (EA) is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200.1, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental review process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria.

Part 4 of this document states the anticipated finding that no significant impacts are expected to occur; Part 5 lists each criterion and presents the preliminary findings for each made by the Hawai‘i County Department of Water Supply, the proposing/determining agency. If, after considering comments to the Draft EA, the agency concludes that, as anticipated, no significant impacts would be expected to occur, then the agency will issue a Finding of No Significant Impact (FONSI), and the action will be permitted to proceed towards required permits and approvals and to construction. If the agency concludes that significant impacts are expected to occur as a result of the project, then an Environmental Impact Statement (EIS) will be prepared.

1.4 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the environmental assessment:

<u>State:</u>	Department of Transportation Department of Land and Natural Resources	Office of Hawaiian Affairs Department of Health
<u>County:</u>	Department of Environmental Management Police Department Fire Department	Public Works Department County Council Civil Defense Agency
<u>Private:</u>	Parker Ranch Hawai'i Island Chamber of Commerce	Waikoloa Village Association Sierra Club

Copies of communications received during early consultation are contained in Appendix 1a. Notice of the availability of the Draft EA was published in the June 8, 2021 *OEQC Environmental Notice*. Appendix 1b contains all written comments on the Draft EA. Various places in the EA have been modified to reflect input received in the comment letters; additional/modified non-procedural text is denoted by double underlines.

PART 2: ALTERNATIVES

2.1 No Action

Under the No Action Alternative, the new reservoir would not be built. The goals for the Lālāmilo Water System of achieving added storage for adequate reserve water, providing critical redundancy and additional water for fire protection, and, if available, taking advantage of renewable power as available, would not be realized. Because of its mandate to provide reliable and high-quality water service to all its customers, the Hawai‘i County Department of Water Supply considers the No Action Alternative highly undesirable.

The No Action Alternative would avoid impacts related to this particular use of land, which are primarily temporary construction-related impacts to natural if non-native vegetation, air quality and noise. The No Action Alternative serves as a useful baseline for analysis of both the temporary adverse impacts and the benefits of more efficient water system, and it is retained for analysis in this EA for impact comparison purposes.

2.2 Alternative Strategies and Locations

Aside from the proposed tank reservoir, there are no other practical, economical and environmentally sound approaches involving storage improvements that could accomplish the goals of the project. During early phases of project planning, DWS evaluated its system and determined that additional storage on the order of 10 MG was necessary to optimize the efficiency, lower the cost and reduce the greenhouse gas emissions of the system. The only variable was the location of the storage. A site near the windfarm and roughly at the same elevation was optimum, and existing road access was also desirable. The location also had to minimize disruption of Parker Ranch grazing activities. When all factors were considered, a site along the Lālāmilo Parker Access Road was most desirable. Although there are various other 3-acre portions that might have been selected, initial examination indicated that no sensitive resources were present in the particular area selected, which was optimum for access and utility purposes. Detailed investigation has confirmed this. Any other nearby site would have very similar characteristics. There do not appear to be any substantial environmental impacts or other disadvantages associated with the specific project site, and no other potentially appropriate site would appear to have lesser environmental impacts or would be as efficient in terms of access and utilities. Accordingly, no alternative tank reservoir sites have been advanced for detailed study in the Environmental Assessment.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The proposed reservoir site and surrounding areas that could be affected by construction are termed the *project site*. The term *project area* is used in a more flexible sense to refer to South Kohala or West Hawai‘i, depending on the resource under discussion (see Figures 1-2).

3.1 Physical Environment

3.1.1 Climate, Geology, Soils and Geologic Hazards

Environmental Setting

Temperatures are moderately hot and the annual rainfall is about 13 inches (Giambelluca et al 2013). Winds vary between northeast trades and sea breezes, and are often strong. Maps of wind energy potential produced by Hawaiian Electric indicate that the project site has average wind speeds of 17-18 mph at 50 meters in height (https://www.hawaiianelectric.com/documents/clean_energy_hawaii/renewable_energy_sources/hawaii_county_hawaii_island_SPD_50m_19_july_04.pdf). As discussed in detail below in this section, the world’s climate is changing and requires consideration in any infrastructure project.

The geologic substrate at the project site is Pleistocene-era lavas from Mauna Kea (Wolfe and Morris 1996). Soil here is classified by the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) within the Hapuna-Waikui-Lālāmilo complex, 0 to 20 percent slopes. (U.S. Soil Conservation Service 1973). This deep soil forms on ash deposits on lava flows and is well-drained, with fairly high runoff potential. This type of soil is used for pasture.

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. The U.S. Geological Survey assesses volcanic hazard in this area of Kohala, which is on the slopes of the inactive volcano Mauna Kea, as Lava Flow Hazard Zone 8, on a scale of ascending risk 9 to 1 (Heliker 1990:23). Only a few percent of this area has been covered in the past 10,000 years, and none in the last 750 years.

The Island of Hawai‘i experiences high seismic activity and is at risk from major earthquake damage (USGS 2000), especially to structures that are poorly designed or built. In October 2006, two damaging earthquakes of magnitude 6.7 and 6.0 struck the west side of Hawai‘i Island, and a 6.9 magnitude quake shook the east side of the island in May 2018. The 2006 Kiholo earthquake caused damage to two water tanks, which were repaired and retrofitted for greater seismic tolerance; the 2018 earthquake caused no damages to DWS water infrastructure in the project area. There are moderate slopes and stable soils on the project site and along pipelines and roadways, and no evidence of subsidence or rockfall or landslides. Lava tubes, which are the long cavities left behind by underground channels of lava, are common on pahoehoe lava flows in Hawai‘i, but can also be

present on ‘a‘a flows, which are under the discontinuous ash cover at the project site. Some lava tubes have openings large enough for human entry and may thus be classified as caves. Lava tube caves in Hawai‘i may have value as historic sites, recreation areas, as unique geological features, or for other reasons. No lava tubes were observed during the course of biological or archaeological fieldwork at the project site. The entire project site appears to have geologic conditions acceptable for the proposed reservoir use; a geotechnical study will be conducted as part of the design for this project to ensure that the site can be made suitable to support the reservoir.

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the project, and the proposed reservoir would not be imprudent to construct based on geologic conditions. Any water infrastructure that serves locations on the Big Island must be constructed within an area of similar seismic hazard, and generally much greater volcanic hazard. The substrate of the entire project site is suitable for bearing the weight of a tank reservoir, with proper engineering. All associated facilities will be designed in accordance with the DWS Water System Standards and the County of Hawaii Standard Specifications for Public Works Construction. In addition, any accessory structures needed for this project, including a concrete equipment pad with electrical equipment, will be designed in accordance with applicable codes and standards to accommodate the island’s seismic activity.

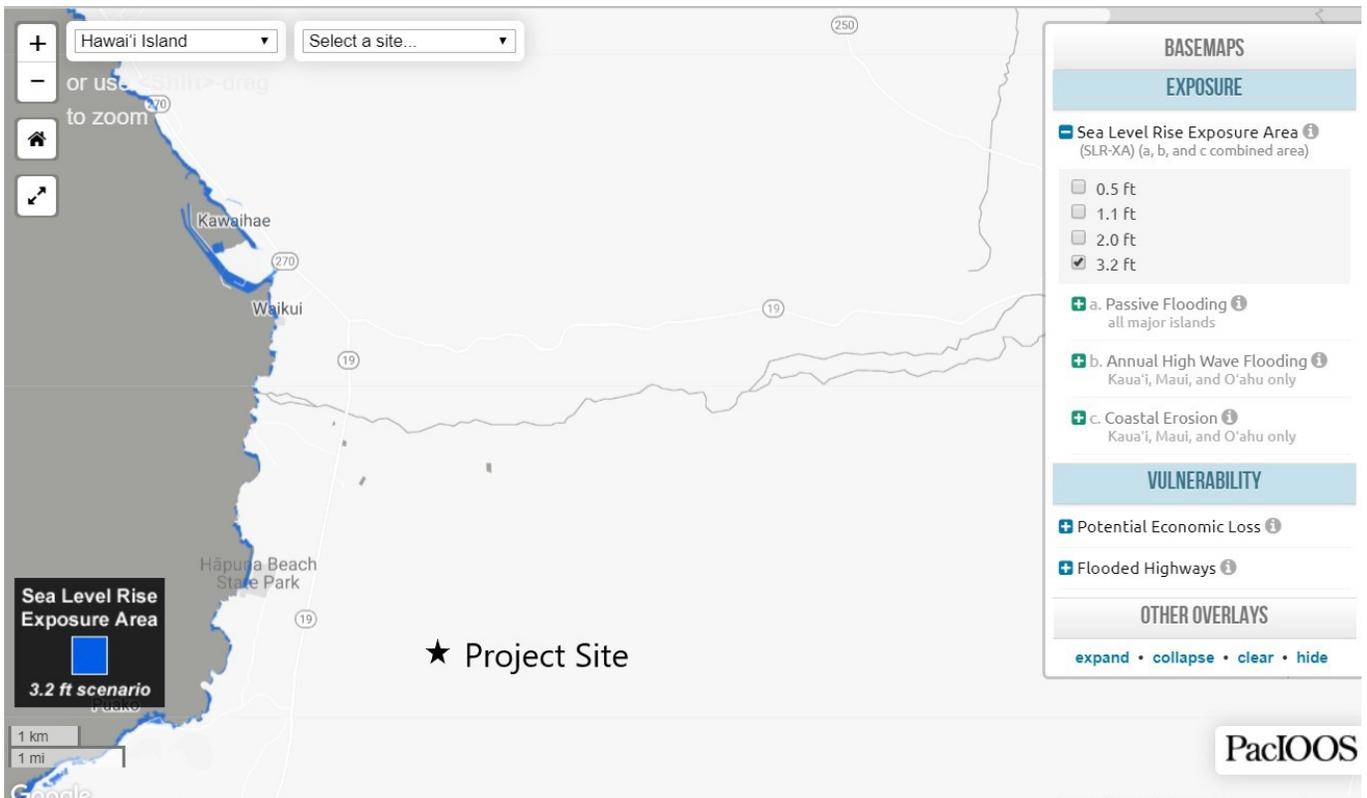
There is a scientific consensus that the earth is warming due to manmade increases in greenhouse gases in the atmosphere, according to the United Nations’ Intergovernmental Panel on Climate Change (UH Manoa Sea Grant 2014). Global mean air temperatures are projected to increase by at least 2.7°F by the end of the century. This will be accompanied by the warming of ocean waters, expected to be highest in tropical and subtropical seas of the Northern Hemisphere. For Hawai‘i, where warming air temperatures are already quite apparent, not only is the equable climate at risk but also agriculture, ecosystems, the visitor industry and public health. Guidance to federal agencies for addressing climate change issues in environmental reviews was released in August 2016 by the Council on Environmental Quality (US CEQ 2016). The guidance urged that when addressing climate change, agencies should consider: 1) the potential effects of a project on climate change as indicated by assessing greenhouse gas emissions in a qualitative, or if reasonable, quantitative way; and 2) the effects of climate change on a project and its environmental impacts. It recommends that agencies consider the short- and long-term effects and benefits in the alternatives and mitigation analysis in terms of climate change effects and resiliency to the effects of a changing climate. Although this guidance has since been withdrawn for political reasons, the State of Hawai‘i in Hawai‘i Revised Statutes §226-109 encourages a similar analysis, and both Act 17 of the 2018 Hawai‘i Legislature and Title 11, Chapter 200.1 now require analysis of sea-level rise and greenhouse gases in environmental impact statements.

In terms of precipitation, wet and dry season contrasts will increase, and wet tropical areas in particular are likely to experience more frequent and extreme precipitation. In general, rainfall in Hawai‘i has been variable in the recent past with some years drier and some wetter than average. The El Niño Southern Oscillation (i.e., periodic variation in winds and sea surface temperatures in the Pacific, the warming phase of sea temperature known as El Niño and the cooling phase as La

Niña) will likely continue to dominate precipitation patterns from year to year in the tropical Pacific. Climate change-related increases in air temperatures will lead to more evaporation and more moisture in the air. As a result, the variability in El Niño-related precipitation is likely to increase, making rainfall predictions difficult. However, it is very likely that warmer temperatures and larger and more frequent tropical storms and hurricanes will affect the Hawaiian Islands in the future. The project design will accommodate all expected runoff.

Due to the elevation of the project site at approximately 1,175 feet above sea level, there is no risk to the project from sea level rise (Figure 5), although the system it serves has vulnerable elements in certain locations, which is being addressed by DWS in system planning. Carbon emissions as a result of construction and operation of the project would be considered negligible and are not expected to contribute significantly to global climate change. Filling of the reservoir may occur when wind power from the nearby 3.3-megawatt Lālāmilo Windfarm Repowering Project is available, not only reducing pumping costs but also taking advantage of renewable power and reducing fossil fuel use and greenhouse gas emissions.

Figure 5 Sea Level Rise Map



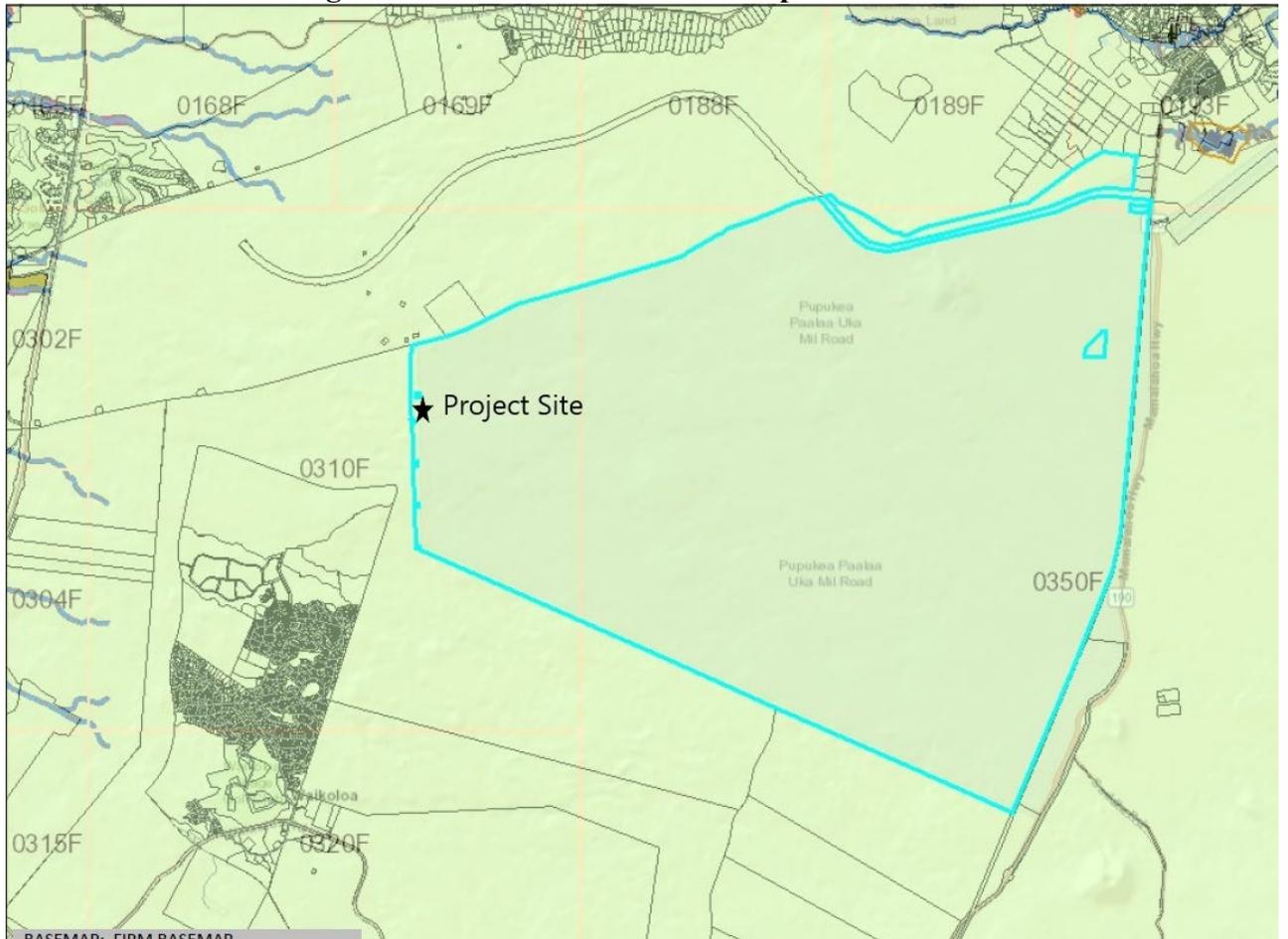
Source: <https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/>

3.1.2 Drainage, Water Features and Water Quality

Existing Environment

The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) 1551660310F shows the project site completely within Flood Zone X, areas determined to be outside of the 0.2% chance annual floodplain (formerly called 500-year floodplain) (Figure 6). Inspection of the project site revealed no apparent flood problems or drainage issues.

Figure 6. Flood Insurance Rate Map



Source: DFIRM for Hawai'i County: <http://gis.hawaiiifip.org/fhat/>

The Pacific Ocean and its bays, inlets and ponds are located three to four miles from the project site. There are no permanent streams that connect the project site with the ocean, but minor gullies that drain the area connect to an unnamed, highly intermittent dry stream gulch that empties into Hapuna Bay. This gulch and others nearby area all considered within the Kamakoa Watershed (<https://geoportal.hawaii.gov/>). The marine waters in this vicinity are classified by the State of Hawai'i as AA, with the highest level of water quality goals. These coastal waters are important for

fishing, recreation, visual quality, and traditional practices. Hawai'i Administrative Rules (HAR) 11-54-03(c)(1) states that class AA waters are:

“...high quality waters are those in which water quality is expected to exceed that necessary to support oceanographic research, propagation of aquatic communities and wildlife, compatible recreation and aesthetic enjoyment. It is the objective of class AA waters that these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected.”

The project site is located in the West Mauna Kea Aquifer Sector, which is part of the Waimea Aquifer System. Groundwater occurs as a freshwater lens, floating on denser saltwater within permeable lava flows near the coast. The fresh groundwater flows from the inland area west to the Pacific Ocean. Because the volcanic rocks are highly permeable, freshwater can readily discharge to the ocean and therefore groundwater levels are relatively low (less than 10 feet above sea level). The depth to groundwater is thus estimated at approximately 1,150 feet at the project site. The Waimea Aquifer System has a sustainable yield of 24 million gallons per day (Hawaii Commission on Water Resources Management: https://files.hawaii.gov/dlnr/cwrm/maps/gwhu_hawaii.pdf.)

Impacts and Mitigation Measure

Because of the scale of construction and the environmental setting, the risks for flooding or impacts to water quality are very minor. Generally, the drainage will be designed to comply with all County codes and ordinances. Policies implementing Chapter 27 of the Hawai'i County Code require that all drainage that crosses the site be accommodated and that all post-development runoff generated from the site be handled onsite. Surface runoff will be handled in accordance with State and County regulations through an upcoming drainage design that is currently envisioned to consist of a retention basin with a spillway that sheet flows to the adjacent area. The final design, which will come after the EA and will be reviewed and approved by the County of Hawai'i, Department of Public Works, will ensure that there are no drainage impacts to the adjacent land.

In order to minimize the potential for sedimentation and erosion, the contractor will be required to perform all earthwork and grading in conformance with Chapter 10, Erosion and Sediment Control, Hawai'i County Code. A National Pollutant Discharge Elimination System (NPDES) permit will be necessary because the project will likely grade more than an acre and will include hydrotesting discharge involved as part of connecting the new reservoir to the existing water system. This permit will be applied for by the construction contractor and obtained before the project commences. This permit requires the completion of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the emplacement of a number of best management practices (BMPs) for the project. Although the precise list of BMPs and their exact locations have not yet been developed, the following types of BMPS are expected:

Structural BMPS:

- These will include silt fences and/or compost filter socks, snake bags for drain/drywell inlet protection, dust fence or other dust control measure, sediment traps and filter berms.
- The contractor will be required to make every effort to install structural BMPs as near the pollutant source as practicable.
- Inlet protection shall serve as the last measure to prevent pollutants from entering receiving waters.
- The contractor will be required to inspect erosion and sediment control measures twice daily and after 0.5 inches of rainfall.

Non-Structural BMPs

- All waste materials shall be collected and stored in a securely lidded, leak proof metal dumpster, which shall be emptied a minimum of once per week.
- All hazardous waste materials shall be disposed of in the manner specified by local or State or federal regulations.
- All sanitary waste shall be collected from the portable restroom facilities a minimum of once per week, and more often, as necessary.
- All erosion and sediment control measures shall be inspected daily prior to and after each day's construction.
- All control measures, per approved NPDES plan, shall be maintained in good working order, with repairs, if necessary, initiated within twenty-four (24) hours of problem discovery.
- The contractor will be required to follow good housekeeping practices for materials to prevent spills or leaks, including storing only enough products and material required to perform the job, keeping products in their original containers, having secondary containment for appropriate products, and following manufacturers' directions for proper use and disposal.
- Hazardous products shall be kept in their original containers with the original manufacturer's labeling, with material safety data sheets (MSDS) retained and available for review by users, with all hazardous waste material disposed of in a manner permitted by local, State or federal regulations.
- All on-site vehicles shall be monitored for leaks and shall be subject to regular preventive maintenance to reduce the chance of leaks occurring, with leaks that cannot be repaired immediately contained in spill pans or other appropriate containers.
- Concrete trucks shall discharge drum wash water only at designated sites, and no wash water shall be discharged to the storm drain system.

3.1.3 Flora, Fauna and Ecosystems

Existing Environment

As stated in Section 3.1, the project site is in one of the driest areas on the Big Island. It is difficult to ascertain the precise pre-human vegetation of the area, since the introduction of certain grasses, grazing animals and fire have completely transformed not only the vegetation but also the soil and microclimate of the area. Gagne and Cuddihy (1990) described the vegetation in fairly undisturbed areas with similar geology and climate as Coastal Dry Forest. This vegetation type used to be dominated by pili grass (*Heteropogon contortus*) and shrubs such as ‘ilima (*Sida fallax*) with a perhaps diverse but fairly sparse cover of native dry-forest trees and shrubs. The vegetation, in turn, harbored a diverse fauna of birds and invertebrates. Previous surveys of the general project area indicate that most areas have a very low proportion of native cover and only a limited suite of native species, although certain environments such as cinder cones, cliff faces and shoreline locations may harbor rare species (Geometrician Associates 2010a; 2010b; 2010c; 2012; 2013a; 2013b; 2014a; 2014b; 2014c; 2017; 2018; 2019; Gerrish, G., 2014; U.S. Army Corps of Engineers (USACE) 1997).

Research for this EA involved a field-based flora and fauna assessment of a 10-acre area enclosing the project site conducted on August 13, 2020.

Vegetation and Flora

The current vegetation of the project site is a savanna comprised primarily of the alien plants kiawe (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*). These two plants account for more than 99 percent of biomass on the project site. The low diversity was created and is maintained by the combination of low average annual rainfall, periodic severe droughts, and grazing by cattle, sheep and goats.

Table 1
Plant Species Detected at Project Site

Scientific Name	Family	Common Name	Life Form	Status
<i>Cenchrus ciliaris</i>	Poaceae	Buffel grass	Grass	A
<i>Cenchrus setaceus</i>	Poaceae	Fountain grass	Grass	A
<i>Festuca myuros</i>	Poaceae	Rat tail fescue	Grass	A
<i>Leucaena leucocephala</i>	Fabaceae	Koa haole	Tree	A
<i>Prosopis pallida</i>	Fabaceae	Kiawe	Tree	A
<i>Sida fallax</i>	Malvaceae	‘Ilima	Shrub	I
<i>Waltheria indica</i>	Sterculiaceae	‘Uhaloa	Herb	I

A = Alien, I = Indigenous, E = Endemic

Birds

The species of birds detected during the 2-hour morning survey are non-natives typical of those found in similar lowland highly disturbed habitat (Table 2). Longer, repeated or differently timed

surveys would undoubtedly detect additional species, likely including the non-native yellow-fronted canary (*Serinus mozambicus*) and African silverbill (*Euodice cantans*), as well as the endemic subspecies of the short-eared owl or pueo (*Asio flammeus sandwichensis*) and the migratory bird Pacific golden-plover or kolea (*Pluvialis fulva*). The pueo is currently widespread in Kohala and does not have special protective status under either the State or federal endangered species statutes, although it is locally cherished. This diurnal bird of prey is regularly seen within the grasslands of North and South Kohala but was not noticed during the survey. The kolea is not a listed threatened or endangered species but is protected under the Migratory Bird Treaty Act (MBTA). Kolea are frequently observed on grassy areas or meadows in late fall, winter, and early spring. The kolea migrates to Alaska for the summer in late April, usually within a 24-hour period and return mostly during late August and September. Our survey took place in mid-August, when fewer birds will have returned. No kolea were observed, but they would likely be detected on the project site during long observation periods later in the season.

Table 2
Bird Species Detected at Project Site

Scientific Name	Common Name	Status
<i>Francolinus francolinus</i>	Black francolin	Alien resident
<i>Geopelia striata</i>	Zebra dove	Alien Resident
<i>Passer domesticus</i>	House sparrow	Alien Resident
<i>Pterocles exustus</i>	Chestnut-bellied sandgrouse	Alien Resident
<i>Sicalis flaveola</i>	Saffron finch	Alien Resident
<i>Streptopelia chinensis</i>	Spotted dove	Alien Resident

Several endangered birds may occasionally transit the area but are unlikely to use it as habitat, including the Hawaiian goose or nēnē (*Branta sandvicensis*) and several species of seabird. The nēnē is an endemic, federally listed endangered species). Nēnē breeding season generally runs from October through March with most goslings hatching in December and January. Eggs have been reportedly observed in all months except for May, June, and July. Goslings may be present in the nest for several months after hatching. When nēnē are not breeding, they rejoin flocking groups (USFWS 2004). Surveys in the general Waikoloa to Waimea area by the author of this EA, Geometrician Associates, have spotted nēnē in many locations, nearly always in association with open water such as golf course ponds, and rarely in open, dry, severely grazed grassland such as the project site, although their occasional presence could never be ruled out.

Small numbers of the endangered endemic Hawaiian petrel, or ‘ua‘u (*Pterodroma sandwichensis*), the endangered band-rumped storm petrel (*Oceanodroma castro*), and the threatened Newell’s shearwater (*Puffinus auricularis newelli*) over-fly the project site at night between the months of May and November. Hawaiian petrels were formerly common on the Island of Hawai‘i. This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea, as well as at the mid-to-high elevations of Hualālai and in the Kōhala Mountains. It has, within recent historic times, been reduced to relict breeding colonies in a few locations. Hawaiian petrels were first listed as an endangered species by the USFWS in 1967 and by the State of Hawai‘i in 1973. Newell’s shearwaters were also once common

on the Island of Hawai‘i. This species breeds on the islands of Kaua‘i, Hawai‘i, and Moloka‘i. Newell’s shearwater populations have dropped precipitously since the 1880s (Banko, 1980; Day et al., 2003). This pelagic species nests high in the mountains in burrows excavated under thick vegetation, especially uluhe (*Dicranopteris linearis*) fern. Newell’s shearwater was listed as a threatened species by the State of Hawai‘i in 1973 and by USFWS in 1975. The band-rumped storm-petrel was listed as an endangered species in 2017. When not at nesting sites, adult birds spend their time foraging on the open ocean. Adults visit the nest site after dark, where they can be detected by their distinctive calls. In Hawai‘i, adults establish nesting sites in April or May, and the nesting season occurs during the summer months, with incubation lasting about 42 days. This bird is reported currently and historically from the dry cliff ecosystem on Hawai‘i Island, Maui, and Kaua‘i. Although the species has been heard calling on high elevation lava flows on a portion of Pōhakuloa Training Area, only a few individuals have been conclusively observed on the Island of Hawai‘i, and it is unlikely that they would be present in or near the project site. No habitat for any of these seabird species is present in the project site.

The primary cause of mortality in these seabird species in Hawai‘i is thought to be predation by alien mammals at the nesting colonies. Collision with man-made structures is another significant cause. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. Disoriented seabirds may collide with manmade structures and, if not killed outright, become easy targets of predatory mammals including cats and mongooses.

Mammals

Although not detected in the survey, which took place in daylight, the only native Hawaiian land mammal, the Hawaiian hoary bat (*Lasiurus cinereus semotus*), may also be present in the general area, as it is present in many areas on the island of Hawai‘i and has been observed in kiawe scrub vegetation in Kohala. They may forage for flying insects over the project site on a seasonal basis, though the xeric habitat and the lack of dense vegetation provides few attractive food resources for a bat. Aside from bats, the mammalian fauna of the project area is composed of introduced species, including goats (*Capra h. hircus*), donkeys (*Equus a. asinus*), pigs (*Sus s. scrofa*), small Indian mongooses (*Herpestes a. auropunctatus*), feral cats (*Felis catus*), roof rats (*Rattus r. rattus*), Norway rats (*Rattus norvegicus*), European house mice (*Mus domesticus*) and possibly Polynesian rats (*Rattus exulans hawaiiensis*). None are of conservation concern and all are deleterious to native flora and fauna. Goats, domestic sheep (*Ovis aries*) and domestic cattle (*Bos taurus*) were encountered in adjacent paddocks. The project site is still being used intensively for grazing.

Invertebrates

Two types of rare, threatened or endangered invertebrates have at least some potential to be present in the lowlands of South Kohala: the endangered Blackburn’s sphinx moth (*Manduca blackburnii*) and various species of the endemic yellow-faced bee (*Hylaeus* spp.). The moth has been found at various locations on the west side of the Island of Hawai‘i and is present in many disturbed locations in South Kohala. The adult moth feeds on nectar from native plants including beach

morning glory (*Ipomoea pes-caprae*), ilie'e (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*). Moth larvae feed upon non-native tree tobacco (*Nicotiana glauca*), which occupies disturbed areas such as open fields and roadway margins, and the native 'aiea (*Nothocestrum spp.*), which is found in dry to moist forests at elevations ranging from 1,500 to 5,000 feet. There is no 'aiea nearby, but tree tobacco is common throughout all disturbed areas in Waikoloa, and it is rapidly spreading into adjacent undisturbed areas. However, there is no tree tobacco in or near the particular project site, and it is unlikely to invade the area without mechanical landclearing creating the rocky flats, pushpiles and mounds it tends to colonize.

Seven species of the endemic yellow-faced bee (*Hylaeus spp.*) have been listed as endangered because of their vital role as pollinators of native plants, their limited or threatened habitat, and their vulnerability to predators. The bees have been observed on 'ilima and a variety of other plants in various areas of the west side of the Island of Hawai'i in most entomological surveys of the area. One species, *Hylaeus anthracinus*, has within modern times been found at five locations on the Island of Hawai'i in the coastal and lowland dry ecosystems, including Kealakekua Bay and South Point (Daly and Magnacca, 2003). Given the difference in habitat between these locations and the project site, it is very unlikely that any endangered species of yellow-faced bee are present.

Aquatic Habitat

As described above in Section 3.1.2, there are no permanent streams that connect the project site with the Pacific Ocean, but runoff from the site eventually drains via gullies and an intermittent gulch into Hapuna Bay. The nearshore and deep marine waters are used by threatened green sea turtles, the endangered hawksbill sea turtle and the formerly endangered humpback whale. The endangered Hawaiian monk seal is frequently seen in the area and may rests on the shoreline. The waters are also important habitat for migratory shorebirds. Healthy water quality is important for optimum maintenance of not only habitat for native species, but also the cultural landscape and cultural practices.

Impacts and Mitigation Measures

No native ecosystems or threatened or endangered plant species are present, and there would be no effects to native flora or vegetation. Impacts to birds would be minor; there is some possibility the development of the project may temporarily displace pueo and kolea from a small area of habitat. Any such disturbance will be of a temporary nature, as there is abundant additional suitable habitat within the general area above and below for any displaced owls to move into.

No impacts to any other rare, threatened or endangered species would occur as a result of building and utilizing the new tank reservoir, provided the appropriate mitigation measures, which will be part of construction documents, are enforced during construction. Specific minimization measures adapted closely from the U.S. Fish and Wildlife Service are contained in Appendix 5. To summarize mitigation:

- Impacts to the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) will be avoided by the timing of woody vegetation removal. During clearing, grubbing or tree trimming/cutting, the removal of tall, woody vegetation can temporarily displace bats roosting in the vegetation. As bats use multiple roosts within their home territories, this disturbance from the vegetation removal is generally minimal. However, during the summer pupping season, female bats carrying pups may be less able to rapidly vacate a roost site when the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage, and very small pups may be unable to flee a tree that is being felled. Accordingly, there will be no clearing of woody vegetation (whether native or non-native) taller than 15 feet during the bat pupping season, from June 1 to September 15, unless a survey is conducted to ascertain definitively that there is no bat roosting in the affected shrub or tree. Additionally, no top-strand barbed wire will be utilized.
- The security lighting that is expected to be installed will be designed to have minimal impact on seabirds. It will be shielded in conformance with the Hawai‘i County Outdoor Lighting Ordinance (Hawai‘i County Code, Article 9). Furthermore, it will consist blue-deficient lighting such as filtered LED lights or amber LED lights, with a Correlated Color Temperature (CCT) of 2700 Kelvin. This will reduce the risk that the threatened or endangered seabirds that may be attracted to and then disoriented by the lighting. Additionally, no nighttime construction work will be allowed during the seabird-fledging season, which runs from September 15 through December 15 each year.
- Although not expected on the site, pre-construction will include another verification that there are no Hawaiian goose or nēnē (*Branta sandvicensis*) individuals or nests that could be disturbed by construction activity. If present, USFWS minimization measures will be instituted, and construction will not proceed until they have left the area; if necessary, USFWS and DLNR will be contacted.
- Although not expected on the site prior to construction, as the site is not disturbed and the area is managed to prevent infestation, tree tobacco will be searched for one more time prior to construction. If present, protocol for protecting Blackburn’s sphinx moth while dealing with the plants as specified in USFWS minimization measures will be strictly followed, in consultation with USFWS and/or the Hawai‘i Department of Land and Natural Resources. During construction, there is at least some potential for tree tobacco to sprout. Project managers will ensure that plants are removed at the juvenile stages prior to reaching three feet in height, when they are more likely to host the endangered moth.

The project permits required for construction of the tank reservoir will involve a Storm Water Pollution Prevention Plan whose implementation will ensure that storm water runoff is properly managed and mitigated, as described in Section 3.1.2, above.

3.1.4 Air Quality, Noise and Scenic Resources

Environmental Setting

Air pollution in West Hawai‘i is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic haze (vog) that may affect South Kohala during southerly winds at times when Kilauea Volcano is erupting, as it currently is.

Noise on the project site is very low and is derived primarily from natural sounds such as wind but also occasional aircraft.

There are no public views from or of the project site, which is located on the *makai* edge of a 13,285-acre private property and *mauka* of another 4,907-acre private property. No sensitive viewplanes or viewers are present near the project site. The nearest inhabited area or park is located 1.5 miles to the southeast in Waikoloa Village. The general area has no views listed as significant for their natural beauty in the Hawai‘i County General Plan.

Impacts and Mitigation Measures

The project would not measurably affect air quality except minimally during construction. The contractor will be required to implement a dust control plan during construction that will minimize both the generation and off-property transport of dust.

The State of Hawai‘i requires contractors engaged in construction activities to conform with Title 11, Chapter 46, HAR (Community Noise Control). The Hawai‘i State Department of Health’s (HDOH) Noise, Radiation and Indoor Air Quality Branch issues permits for construction activities that may generate noise. The permit is generally applied for during the construction phase by the contractor. HDOH will review the type of activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures. Possible measures include restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers. The precise combination of mitigation measures, if any, shall be specified by HDOH prior to construction. Because of the lack of any sensitive noise receptors within at least 1.5 miles, no permit or mitigation would appear to be necessary.

On an ongoing basis, pumps at the tank reservoir will generate small levels of noise, similar to several others in the area. As with those facilities, because there are no noise-sensitive receptors, no impacts should occur.

Because of the lack of sensitive viewplanes or visual receptors, no permanent scenic impacts would occur. To protect dark skies as well as transiting seabirds, security lighting would be shielded to prevent the light from shining upward, in conformance with the Hawai‘i County Outdoor Lighting Ordinance (Hawai‘i County Code, Article 9). In addition, the facility would use blue-deficient lighting such as filtered LED lights or amber LED lights, with a Correlated Color Temperature

(CCT) of 2700 Kelvin to protect dark skies. No fluorescent lights or high-intensity discharge lamps such as metal halide would be used.

3.1.5 Hazardous Materials, Toxic Substances and Hazardous Conditions

Environmental Setting

Current and previous use of the project site exclusively for pasture indicates a low probability for hazardous materials and toxic waste of most types. The State of Hawai‘i, Department of Health, Hazard Evaluation and Emergency Response Office maintains a geographic database of hazardous waste generators, hazardous spills, underground and above ground storage tanks (USTs and ASTs), leaking underground storage tanks (LUSTs), and various environmental permits (<http://eha-web.doh.hawaii.gov/ehw/>). Consultation of this online database did not reveal any incidents, USTs, ASTs, LUSTs, generators or permits at or near the project site. Visual assessments of the site and its surroundings during surveying, engineering and botanical investigations did not reveal any hazardous materials or toxic substances, or any nor structures, equipment, or storage containers that might be indicative of hazardous material use.

One prevalent hazardous condition shared by many locations in the Waikoloa area is the potential presence of Munitions and Explosives of Concern (MEC). MEC consists of several categories of military munitions that may pose explosives safety risks; that is, unexploded ordnance, discarded military munitions, or munitions constituents present in high enough concentrations to pose an explosive hazard. This hazard and the potential impacts and mitigation related to the Lālāmilo Tank Reservoir project are discussed in detail in Appendix 4 and summarized here. Most land in a rough rectangle bordered by the Waimea, Kawaihae, the Waikoloa Resort and the Saddle Road/Mamalahoa Highway junction is within the approximately 100,000-thousand acre former Waikoloa Maneuver Area (WMA). Through a licensing agreement with Richard Smart, then-owner of Parker Ranch, the U. S. Navy acquired 91,000 acres in Waikoloa in December of 1943. The area was bordered by Pōhakuloa Training Area, the sea, Kawaihae Road and the North Kona-South Kohala border. It was used as an artillery firing range on which live ammunition and other explosives were employed, with the remaining acreage utilized for troop maneuvers. A military cantonment was also established just outside Waimea town. Initially called Camp Waimea, it was later rechristened Camp Tarawa in honor of the first successful amphibious land invasion of the Pacific War. Camp Tarawa was the largest Marine training facility in the Pacific, covering an area of approximately 467 acres. In the artillery firing range, larger MEC items used included 37 millimeter (mm), 75 mm, 105 mm, and 155 mm high explosive (HE) shells, 4.2-inch mortar rounds, and barrage rockets. From 1943 through 1945 nearly the entire WMA was in constant use, as the Marine infantry reviewed every phase of training from individual fighting to combat team exercises. Intensive live-fire training was conducted in grassy areas, fields, and around the cinder hills of Pu‘u Pā and Pu‘u Holoholokū.

At least two ordnance clearance efforts were conducted within a decade of WWII, one in 1946 just prior to the departure of the 5th Marine Division, and the other in 1954 following accidental detonation of a dud fuse or shell that killed two civilians and seriously injured three others. The

1954 effort detected as many as 400 dud items including hand grenades, 60 and 81mm mortars, 75mm shells, and 105 and 155mm shell fuses, 31mm anti-tank cannon shells, and 4.2-inch mortars. Live ordnance, ranging from grenades and bazooka rounds to hedgehog missiles, continues to be found in the former WMA as land development progresses. Unexploded ordnance has even been found near Waimea Middle School. Artillery rounds have caused at least nine accidental deaths since the end of World War II. Given the presence of 20,000 persons who live, work, or go to school within the boundaries of the former WMA, as well as numerous visitors, the former WMA has been ranked high in national risk assessments.

As part of the first steps in an extensive, long-term cleanup program, the U.S. Army Engineering and Support Center, Huntsville (CEHNC), and the U.S. Army Corps of Engineers (USACE), Honolulu District (CEPOH), teamed to produce a Phase I Engineering Evaluation/Cost Analysis (EE/CA) in 1997 for the WMA, including the Pu‘u Pā area, under the Formerly Used Defense Sites (FUDS) program (USACE 1999). Significant quantity and variety of MEC were found, both within and outside the Pu‘u Pā area.

The Pu‘u Pā Munitions Response Site (MRS) is a portion of the overall former WMA used for live-fire training from 1943 to 1946. It is located in the northern section of the former WMA, and contains the Lālāmilo Tank Reservoir project site. The parcel was leased by the Army until 1998 and by the Hawai‘i Army National Guard (HIARNG) until 1999 or 2000. Although considered part of the WMA, the Pu‘u Pā MRS was transferred from the Formerly Used Defense Sites (FUDS) Military Munitions Response Program (MMRP) program to the Active Army MMRP program in 2009 because it was used as an operational training area until 1999 or 2000, well beyond the FUDS program eligibility end date of 1986.

In order to address this problem in the remainder of the WMA outside the Pu‘u Pā MRS, the USACE conducted the second phase of investigation, a *Phase II Engineering Evaluation/Cost Analysis (EE/CA)* (USACE 2002). The report documented the decision process to determine the most appropriate MEC response actions for the Former Waikoloa Maneuver Area and Nansay Sites.

The project site was divided into sectors based on past military usage, current and future land uses and other factors. Visual reconnaissance surveys, surface clearance, geophysical mapping, visual surface searches, anomaly investigation, and intrusive MEC sampling were all conducted in order to characterize the areas. A portion of the area (which now comprises over 100,000 acres), was investigated during the Phase II EE/CA field investigation. This effort detected thousands of individual items and many types of unexploded ordnance (hazardous) and scrap (inert and nonhazardous).

Since that time, MEC removal has been ongoing. As of 2020, more than 100 different types of munitions had been found at the former WMA, including mortars, projectiles, hand grenades, rockets, land mines and Japanese ordnances. Over 1,800 munitions and explosives of concern, over 117,000 pounds of military debris, and over 149,000 pounds of munitions debris have been removed from more than 25,000 acres. The current estimated cost is \$800 million to complete

investigation, clean-up and long term monitoring, which are being carried out through ongoing contracts involving hundreds of workers.

As stated previously, the actual project site is not contained in the FUDS-official WMA. The land associated with the Pu‘u Pā MRS (Tax Map Key [TMK] (3) 6-8-001-001) is owned by Parker Ranch. The Pu‘u Pā MRS was transferred from the FUDS Military Munitions Response Program (MMRP) because it continued to be used by the Department of Defense (DoD) under lease from the private landowner Parker Ranch for non-live firing training until 2000, after the 1986 date that establishes eligibility for inclusion in the FUDS program. The Pu‘u Pā MRS and has not undergone the same level of analysis and remediation as the main former WMA. As of this writing, only investigations but no removal actions have been conducted within its boundaries. The 1997 EE/CA referenced above investigated 521 acres in six discrete areas, one of them very close to the Lālāmilo Reservoir site. A total of 96 grids were geophysically and statistically sampled. Two UXO items were found: a 4.5-inch barrage rocket in Area D and a 60mm mortar projectile in Area C. A subsequent Remedial Investigation (RI) was also conducted in 2014, which found a wide variety of MEC scattered throughout the area. Clearly, a potential for MEC exists within many areas of the Pu‘u Pā MRS.

The USACE in 2021 began a Time Critical Removal Action for which MEC removal. It is occurring in the vicinity of the proposed Lālāmilo 10 MG Reservoir and will address and remove most surface MEC, with also the potential to remove subsurface items, within the next 18 months.

Impacts and Mitigation Measures

For conventional, non-MEC related hazardous materials or toxic substances, if evidence of suspicious materials or conditions appears during additional survey, design, or construction, the DWS will undertake a systematic assessment of the area and issue(s) and remediate appropriately.

Based on the historical presence of MEC in the Pu‘u Pā MRS, the area proposed for the tank reservoir must be investigated and any remaining surface as well as sub-surface MEC removed prior to construction, for safety purposes. It is not known at this time precisely when and to what degree MEC on the site will be removed by the USACE in 2021 in its Time Critical Removal Action. Under the assumption that it may not all be removed, GSI Pacific Inc. developed a detailed plan that is contained in Appendix 4 and summarized in the steps below.

1. Mobilization, and site preparation, including verification of all other environmental clearances (e.g., biological and archaeological)
2. Install Instrument Verification Strip (IVS);
3. Complete surface and subsurface clearance of MEC;
4. Perform any explosive disposal operations;
5. Perform Material Potentially Presenting an Explosive Hazard (MPPEH) processing and management;
6. Perform material documented as safe (MDAS) processing, certification and transfer;
7. Perform waste management (if necessary);

8. Complete data management;
9. Site restoration; and
10. Demobilization.

As required under the Occupational Health and Safety Administration (OSHA), MEC personnel will receive training on the work plan, site conditions, and site safety considerations. Unexploded ordnance (UXO) or other explosive materials that require demolition will be inspected by the UXO team, if detonation is required, the UXO Contractor will move the item to an out of the way location, if it is safe to do so, and the prime contractor will contact the police department for response.

Sven Lindstrom, the Voluntary Cleanup Program Specialist for Site Discovery, Assessment, and Remediation with the Hazard Evaluation and Emergency Response (HEER) Office within the Hawai'i Department of Health, reviewed the Draft EA and offered comments on the proposed mitigation and recommended additional mitigation measures. The HEER Office stated that cleanup efforts cannot be sure that 100% of MEC items have been removed from the site unless all soil at the site is excavated down to bedrock and the excavated soil is adequately sieved or thoroughly surveyed for MEC items. Removal of MEC in situ is limited by the depth of detection of the metal detectors used by USACE or the UXO contractor. Smaller projectiles commonly found at the Waikoloa Maneuver Area, such as the 37mm projectile, can only be detected with confidence to a depth of about 10 to 12 inches below ground. Therefore, even following a clearance by USACE or a private UXO contractor (unless all soil was excavated and screened), there is still a "residual risk" that a MEC hazard remains that must be mitigated by institutional controls. The Areawide Environmental Hazard Management Plan (AEHMP) for the Waikoloa Maneuver Area prepared by the HEER office provides guidance on mitigating residual risk of MEC hazards during and after redevelopment of properties in the Waikoloa area. Recommended mitigation measures generally consist of the use of UXO Construction Support during ground-disturbing activities and educational awareness training about UXO hazards to site users both during and after construction. DWS will address residual hazard after the MEC cleanup that will be conducted and ensure that appropriate construction support and UXO educational awareness training measures are incorporated in the project's construction and operation. DWS will provide a set of site-specific mitigation measures to the HEER office for review prior to construction.

3.2 Socioeconomic and Cultural

3.2.1 Land Use and Socioeconomic Characteristics

Historically, the Pu'u Pā parcel of Parker Ranch has been used primarily for the grazing of livestock (including horses, sheep, goats and cattle). Four internal fence lines extend across the parcel, separating the ranch into five major corrals. Land use surrounding the project site for several miles involves primarily pasture but also water facilities including wells, reservoirs, transmission lines, and wind turbines for well pumping. The reservoir facilities would be part of the Lālāmilo Water System, which serves coastal South Kohala from Mauna Lani northwards to Kawaihae. This system is unique among the County of Hawai'i's water systems in that most of its water goes to support

uses at the Mauna Lani and Mauna Kea resorts, including residential (over 1,000 single-family, townhome and condo units, mostly for vacation rental use), commercial (one shopping center) and three traditional hotels. Also important are the residential communities of Puakō and adjacent Waialea, with a population of approximately 900 in 2020, and Kawaihae, a village for which population is not tracked but with approximately 80 residential units. Puakō has increasingly become a community of second homes and vacation rentals, although there are many long-time local owners and renters as well. Kawaihae has a large harbor, a small commercial area, an industrial park, a County park and a National Historical Park, and several long-time residential subdivisions, including a mixed-density residential area at Kawaihae Village and shoreline Hawaiian Home Lands single-family homes.

Impacts and Mitigation Measures

By improving government services of the Department of Water Supply, the project would affect and benefit water service in the South Kohala District, as discussed in Chapter 1. The remote location of the proposed tank reservoir avoids inconvenience to residents while efficiently and optimally serving the system. No adverse socioeconomic effects would occur.

3.2.2 Cultural Resources

A cultural impact assessment (CIA) report for the project was performed by ASM Affiliates, Inc., and is included as Appendix 2. An extensive discussion of the historical background of the Island of Hawai‘i and the project site itself is contained in this appendix, as context for assessing cultural resources and practices and the potential for impacts to them. The discussion is not repeated here, but the following is a very brief summary of the principal conclusions. In the interest of readability, this summary has eliminated most scholarly references; readers interested in sources may consult Appendix 2.

Existing Environment

Polynesians settled Hawai‘i around A.D. 1000 (Kirch 2011). Early Hawaiian farmers developed new subsistence strategies during this period, adapting familiar patterns and traditional tools for use in their new environment. Hawaiians brought from their homeland a variety of Polynesian customs including the major gods of Kane, Ku and Lono; the *kapu* system of law and order; *pu‘uhonua* or places of refuge or asylum; the *‘aumakua* concept of a family or ancestral spirit and the concept of *mana*, or spiritual power. Later periods saw evolution of new tools, an increase in social stratification, full occupation of the most favorable windward areas as well as more settlement in more marginal areas on the island’s leeward side. Archaeologists have found evidence of permanent settlement on the Kohala shoreline from as early as A.D. 1300. Inhabitants subsisted primarily on marine resources likely supplemented by small-scale agriculture, with perhaps seasonal residence shifts. Large, irrigated field systems were developed in the uplands and expanded to some degree into more arid areas. *Loko* or fishpond aquaculture began to flourish.

A major sociopolitical development was the *ahupua'a*, a land unit that was typically wedge or pie-shaped, encompassing all of the eco-zones from the mountains to the sea and extending several hundred yards beyond the shoreline, assuring a diverse subsistence resource base. This land unit became the equivalent of a local community, with its own social, economic and political identity. *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or lesser chiefs and managed by a *konohiki*. *Ali'i* and *maka'ainana*, or commoners, were not confined to the boundaries of *ahupua'a*, as resources were shared when a need was identified.

The project site is located within the *ahupua'a* of Waikoloa, which is one of some seventy *ahupua'a* that make up the traditional *moku-o-loko* or *moku* (district) of Kohala. While Waikoloa is referred to today as an *ahupua'a*, traditionally, it was an *'ili* (land section smaller than an *ahupua'a*) of Waimea, a larger land unit.

The greatest concentration of pre-Western contact population settlement in South Kohala was at what is now the town of Waimea, about six miles from the project site. The long ridge of the Kohala Mountains extends perpendicular to the predominant northeasterly trade winds, creating an orographic rainfall pattern that separates the district into two distinct environmental zones: a wetter, windward zone on the eastern side, and a drier leeward zone on the western side. Waimea lies in the uplands, at the boundary between the two zones. Plants like sweet potato, *kalo*, *wauke* (paper mulberry), *māmaki*, plantains, bananas, sugarcane, coconuts, and *hala* (pandanus) were grown to support a sizable population. The fertile Mauna Kea soils were enhanced for cultivation with water from the Kohala Mountains via a network of channels referred to as the Lālāmilo Field System, which extended several miles downhill from Waimea. Based on several sources of data, it appears that the field system was created during the late 12th century. The project site lies well *makai* of the extent of the field system, within what was called the Pili zone (after the thatching grass *pili*), which was known for being dry, barren and stony. But even in this barren area, there is some evidence of a type of floodwater farming that was dependent on intermittent seasonal flows of surface water in a few of the larger gulches. Several small agricultural features have been identified at elevations similar to the project site within narrow Kamakoa Gulch, and also within Popo'o Gulch the base of Pu'u Hinai, about 1.5 and 5 miles south of the project site, respectively.

There were also residents in the shoreline zone of Kohala. They relied primarily on the ocean for sustenance, augmenting their diet with produce procured through trade with the upland areas. Marine resources were brought ashore in the small bays with sandy shores found in the coastal section of Waimea (now called South Kohala), where, as Handy et al. (1991) relate, fishermen lived and probably cultivated potatoes in small patches. Based on the size and configuration of the *ahupua'a* of Waikoloa, it is assumed that residents had direct access or access by exchange to the cultivated fields of Waimea and the marine, grass, and scoriaceous lava resources at lower elevations and along the coast. The exchange certainly have involved travel through lands at or near the project site. The Pili zone also served as a site for catching a limited range of birds for feathers, eggs and food, for example, the pueo or Hawaiian short-eared owl and nene or Hawaiian goose.

There are many *mo'olelo* or stories concerning Waikoloa, touching on the unique context of these lands, the ever-present winds, and famous historic or legendary events. The reader is referred to Appendix 2 for an extended discussion.

In the century or so prior to Western contact, there was an increase in warfare, both locally and between islands, including events in the Kawaihae area. One famous battle involved Lonoikamakahiki, the celebrated ruling chief of Hawai'i Island with lineal ties to the ancient Pili dynasty (a Hawai'i Island lineage associated with Waipi'o Valley) since roughly A.D. 1300. He was the son of Keawenui a 'Umi, the grandson of 'Umi a Liloa, and recognized as a skillful and accomplished warrior. Lonoikamakahiki is tied to the history and significance of Waikoloa because he triumphed over the invading Maui chief Kamalālāwalu in these lands. A large force of warriors from Maui under Kamalālāwalu suddenly invaded and a famous series of skirmishes and battles ensued, stretching from the shoreline into the dry uplands and possibly including areas near the project site. In the end, the grassy plains of Waimea became the setting for a final battle between the Maui warriors and the forces of chiefs from Kohala, Waimea, Kona, Puna and Ka'ū. The combined Hawai'i Island forces slew Kamalālāwalu and many of his chiefs and warriors, with the remainder making their way back to Maui.

Somewhat lesser known is another battle, fought before this engagement with the chief of Maui, between Lonoikamakahiki and his older brother, Kanaloakua'ana, who had rebelled against him. Pu'u Pā, referenced in the story, lies about four miles directly *mauka* of project site. According to Fornander (1880:120-121):

Informed by Kaikilani of the revolt on Hawaii, Lonoikamakahiki left Oahu at once, crossed the channels of the group, and avoiding the Kohala coast, where the rebels were in force, sailed to Kealakekua [Kealakekua], and sent messengers to Kau to acquaint Pupuakea of the arrival of himself and Kaikilani. Pupuakea responded promptly, and, taking a mountain road above the coast villages, he joined Lono and the forces that the latter had collected in Kona at Puuanahulu, on a land called Anaehoomalu, near the boundaries of Kohala and Kona. The rebel chiefs were encamped seaward of this along the shore. The next day Lono marched down and met the rebels at a place called Wailea, not far from Wainanalii, where in those days a watercourse appears to have been flowing. Lono won the battle, and the rebel chiefs fled northward with their forces. At Kaunaoa, between Puakō and Kawaihae, they made another stand, but were again routed by Lono, and retreated to Nakikiaianihau, where they fell in with reinforcements from Kohala and Hamakua. Two other engagements were fought at Puupa [on the plain north of Waikoloa] and Puukohola, near the Heiau of that name, in both of which Lono was victorious. His brother Kanaloakapulehu was taken prisoner, slain, and sacrificed at the Heiau, but Kanaloakuakawaiea escaped with the scattered remnant of the rebel forces. The rebels now fled into Kohala, and were hotly pursued by Lonoikamakahiki. Several skirmishes were fought during the pursuit; at Kaiopae, where Kanaloakuakawaiea was slain; at Kaiopihi, and finally at Puumaneo, on the high lands above Pololu, where the last remnant of the rebel force was conquered and slain, and the island returned to its allegiance to Lono and Kaikilani.

Kohala is also celebrated as the birthplace of Kamehameha I, who was born in the *ahupua'a* of Kokoiki, in what is now known as North Kohala. In 1775, Kalaniopu'u and his forces from Hana overran the neighboring Kaupo district and raided Moloka'i, Lana'i, Kaho'olawe and parts of West Maui. Kamehameha's efforts at the battle of Kalaeoka'ilio near Kaupo earned him recognition as a great warrior and the name of Pai'ea (meaning hard-shelled crab) from Maui chiefs and warriors.

In 1790 the ships *Eleanora* and *Fair American* were trading in Hawaiian waters. As retribution for the theft of a skiff and the killing of one of the sailors, the crew of the *Eleanora* massacred more than 100 natives at Olowalu, Maui. The *Eleanora* then sailed to Hawai'i Island, and one of its crew, John Young, went ashore, where he was detained by Kamehameha. The other vessel, the *Fair American*, was captured by the forces of Kamehameha off the Kekaha coast and its crew was killed except for one member, Isaac Davis. The foreign arms from the *Fair American* were turned over to Kamehameha. Kamehameha made Young and Davis his advisors. He also kept the vessel as part of his fleet. With the aid of his new advisors, new ship, and foreign arms Kamehameha conquered Maui, and by 1796 he had conquered all the island kingdoms except Kaua'i, which eventually gave him its allegiance. Mr. Davis and his progeny would soon figure large in the history of Kohala.

Kawaihae, located three miles south of the project site, eventually became one of the royal centers of the island at which Kamehameha resided, and one where he could make use of trade with foreign ships to acquire guns and ammunition. It was also the site of Pu'ukohola Heiau, dedicated to the war god Kuka'ilimoku. When in Kawaihae, Kamehameha stayed at Pelekane, located below Pu'ukohola. After his death in 1819, the royal residence consisted of multiple houses now occupied by his successor, Liholiho, also known as Kamehameha II. The area around Kawaihae was described as suitable for fishing and salt manufacture but very arid in early Western accounts, but it was known that wet taro was grown wherever streams flowed down from the mountains.

Major social and economic change occurred in the early 19th century. Sandalwood harvest and trade established by Europeans and Americans brought the kingdom and *ali'i* some wealth but contributed to the breakdown of the traditional subsistence system. Farmers and fishermen were required to toil at logging, which resulted in food shortages and a decline in population. Both the Kohala Mountains and Mauna Kea were major sources of sandalwood.

Following the death of Kamehameha I in 1819, the customary relaxing of *kapu* took place. But with the introduction of Christianity shortly thereafter, his successor, Kamehameha II, renounced the traditional religion and ordered that *heiau* structures either be destroyed or left to deteriorate. Very soon after, Protestant missionaries who arrived from Boston in 1820 soon were rewarded with land and government positions, as many of the *ali'i* were eager to adopt Western-style dress and culture. The assimilation of Western ways continued with the short-lived whaling industry and commercial sugarcane, which was more lucrative but carried a heavy environmental price.

The remainder of the 19th century saw significant changes in Kawaihae as the practice of trade led many to abandon traditional lifestyles. The result was a loss of population and resources, leaving one observer to describe the town as a "small dreary village" entirely lacking foliage except for "a few sickly cocoa-nut trees."

The Mahele ‘Aina that took place in 1848 placed all land in Hawai‘i into three categories: Crown Lands, Government Lands and Konohiki Lands. Ownership rights were “subject to the rights of the native tenants,” or those individuals who lived on the land and worked it for their subsistence and for their chiefs. The land claims of native tenants became known as *kuleana*.

The project site is located within the boundaries of the massive Land Claim Award (LCA) 8521-B, which was awarded to George Davis Hu‘eu. This award did not include the coastal areas of ‘Anaeho‘omalua and Kalāhuipua‘a, which were claimed and awarded to Hazaleleponi Kalama, the wife of the King Kamehameha III. LCA 8521-B was restricted to the non-agricultural *pili* lands south of the agriculturally-productive Lālāmilo area and *mauka* of the rich coastal resource area. The award has an interesting history. G.D. Hu‘eu had inherited and owned a large portion of the good grazing lands of Waikoloa. Kamehameha I had given the land to G.D. Hu‘eu’s father, Isaac Davis, as an *‘ili kūpono* for services rendered during the conquest of the Hawaiian Islands. Local chiefs claimed some portions of his land when Isaac Davis died intestate in 1810. It became necessary for his friend John Young to ask the crown for stewardship of the property for Davis’ children’s sake. Isaac Davis’ land (Royal Patent Grant 5671) was granted to G.D. Hu‘eu as an unsurveyed LCA (8521B) in 1865. G.D. Hu‘eu’s property contained a house lot, various livestock facilities, and huge tracts of *pili* land in the *kula* (uplands). At least 26 claims were made for *kuleana* plots in Waikoloa, none near the project site.

On July 2, 1868, G.D. Hu‘eu leased his land in Waikoloa to William L. Green on behalf of the Waimea Grazing and Agricultural Company (WGAC) for \$600 per year. The 20-year lease included all of LCA Number 8521-B Parcel 1, except properties previously sold to William C. Jones in October 1866. The lease allowed the Hu‘eu family to continue grazing approximately 1,000 cattle, 100 horses, and 1,000 sheep. In a complex arrangement, the WGAC, in turn, leased the land to Francis Spencer, who leased the grazing rights back to the WGAC. The lease, combined with previously owned/leased land (seven properties altogether) gave Francis Spencer and the WGAC the right to hunt wild (unbranded) cattle and sheep, and to graze their cattle, sheep, horses, and mules over a vast area of land from Hilo to Hāmākua, to South Kohala, and to Kona. A.W. Carter purchased the former Hu‘eu property in 1904 on behalf of Parker Ranch. During the 20th century, Parker Ranch became the largest sheep and cattle ranch on the Island of Hawai‘i and one of the largest in the U.S. Parker Ranch offices were centered in Waimea with ranch stations in the surrounding areas of Waikoloa, Hāmākua, Humu‘ula, and elsewhere. Much of the inland portion of the project area was used by Parker Ranch for cattle ranching, grazing or crossing over while driving cattle down to the coast for transport to O‘ahu and other ports.

Because of its arid nature, coastal South Kohala was not highly populated until visits by trade and whaling ships made the bay a frequent port of call. There were no regularly flowing streams to support agriculture, which instead took place far inland. The economy of Kawaihae received a boost from the introduction of cattle ranching. Cattle from Waimea were brought to Kawaihae via a road built in 1830 and held in pens for the trip to O‘ahu on cattle boats. The trade in hides and meat also helped turn Kawaihae into a major port. The *Pacific Commercial Advertiser* reported up to 50 whaling ships making a port call in Kawaihae in 1857. An 1883 map showed Kawaihae with a

lighthouse, wool shed, native store, jail, boat house, church and other buildings that were likely houses. Twenty years later, a plant had been built to manufacture soap from cattle tallow.

As discussed in Section 3.1.5, the project site is part of a 91,000-acre area licensed for use by the U.S. Navy as an artillery firing range by agreement with Richard Smart, owner of Parker Ranch. acquired 91,000 acres in Waikoloa in December of 1943. After WWII, Kawaihae continued to host harbor activities, and in 1959 a new deep-draft harbor was built by the federal government. Deposits from dredging of the shallow reef buried Kawaihae Village, its salt pans, the Kauhuhue Heiau and the majority of the coastal Land Commission awards up to 13 feet deep. Additional development in 1969 and 1970 further transformed the area into an industrial park.

Resorts were developed in the 1960s through 1980s, first at Kaunaoa (Mauna Kea Beach Resort), and then at Ana‘eho‘omalū (Waikoloa Resorts) and Pau‘oia and Kalahuipua‘a (Mauna Lani Resort). Tourism skyrocketed, changing the economy, landscape and demographics of South Kohala. The uplands, which formerly were used only for grazing – and briefly but intensively in WWII for military activities, now began to be explored and used for groundwater wells and water system infrastructure. Based on the success of the nearby Waikoloa deep wells, the State drilled an exploratory well on the lands of Lālāmilo at the 1,200-foot elevation. Subsequently, resort developers drilled more wells to allow the Mauna Lani and Mauna Kea resorts to expand facilities. Today, the area within a mile of the project site is dotted with wells, reservoirs and pipelines, and also contains the Lālāmilo Windfarm Repowering Project, which provides renewable energy for well pumping.

Existing Environment: Cultural Resources at the Project Site

The project site is confined entirely within an area used for grazing for a century and a half for cattle grazing and now used by goats and sheep. It is not located near the coast or streams and no fishing or gathering of aquatic resources occurs. The vegetation is non-native and does not contain the quality and quantity of resources that would be important for native gathering, and no hunting occurs at this developed site. No caves, springs, *pu‘u*, native forest groves, gathering resources or other natural features are present on or near the project site. As discussed below, there are no archaeological remains reflecting cultural history or supporting cultural values. As part of the EA, an extensive study of documentary sources was conducted that indicated that no specific uses or features, including trails, were present on the project site. An effort was made to obtain information from knowledgeable parties about any potential traditional cultural properties and associated practices that might be present, or have taken place at the project site. Various agencies including the Office of Hawaiian Affairs and the State Historic Preservation Division were contacted.

Of the various parties contacted, one individual had information to share and kindly consented to an interview. On September 16, 2020, ASM staff, Ms. Lokelani Brandt conducted a telephone interview with Mr. Gary Rapozo. Born in Honoka‘a, Mr. Rapozo worked between 1972 and 2002 for Parker Ranch, where he performed a variety of ranching duties including artificial insemination, pregnancy testing, livestock marketing, horseshoeing, and horse training to name a few. His work as a *paniolo* took him to various places on Hawai‘i Island including Waimea, Waikoloa, Ka‘ū, and

Pā‘auhau. In 2011, after a long and successful career as a *paniolo*, Mr. Rapozo was inducted into the Paniolo Preservation Society’s Hall of Fame to honor his many accomplishments. Mr. Rapozo explained that while he did have some knowledge of the proposed project site, other former *paniolo* who knew that area well have passed away. He recalled how the *paniolo* referred to the area as the Pu‘upā Range and that the range was divided into three main areas. The area *mauka* of Pu‘upā was Range 1 and the area *makai* of Pu‘upā was Range 2. He added that Range 2 and the project site vicinity was the *makai*-most extent of where Parker Ranch ran cattle. Additionally, Mr. Rapozo pointed out that the project area was part of the former military training area and noted the presence of military ordnance. Concerning cultural and historic properties, Mr. Rapozo said he believed that most archaeological sites in the Waikoloa area are located along the river bed, as rivers were the preferred settlement areas. Mr. Rapozo also noted that the old stone wall that extends from Kawaihae Road to Waikoloa Road was near the project area. He was unaware of any specific history of the long stone wall that runs north to south on the *makai* side of the road just *makai* of the project site.

In summary, there are no indications at this time of cultural resources, including traditional cultural properties, nor of traditional and customary practices, in or near the project site. There are no known valuable natural, cultural or historical resources that would be affected.

Impacts and Mitigation Measures

It currently appears that use of the project site for water system infrastructure to increase would not likely impact any culturally valued resources or cultural practices. OHA, SHPD and other parties were supplied a link to the Draft EA in order to help finalize this finding. No party reviewing the Draft EA supplied any cultural information.

3.2.3 Archaeology and Historic Sites

An archaeological assessment survey (AAS) report for the project was performed by ASM Affiliates, Inc. The AAS is included in this EA as Appendix 3. The historical background for the area is summarized above in Section 3.2.2; in the interest of readability, the summary below, which also is derived from other sources, has eliminated most scholarly references; readers interested in sources may consult Appendix 3.

Existing Archaeological Resources

The results of previous historical and archaeological research indicated that the project site is in a dry intermediate zone between more intensively utilized coastal and upland resource/habitation areas. Prior results suggested that archaeological features pre-dating the era of cattle ranching in the mid-nineteenth century are likely to be sparsely distributed, if present at all, in the project site. Earlier sites and features, if encountered, would likely be related primarily to the collection of specific resources (e.g., *pili* grass or birds such as *‘ua ‘u* and *nēnē*) and to travel between the coastal and upland areas. These features could include trails, surface architecture remains of temporary habitations and shelters (e.g., C-shapes and similar rock features), and midden or marine shell

scatters. Prior subsurface testing has only identified buried cultural deposits inside shelter and habitation features. Archaeological features associated with ranching are expected to be more numerous and widespread than Precontact features, as the general area was actively used as pasture beginning in the late nineteenth century until the present. Site SIHP 50-10-11-9012, a Historic ranching wall that divides Waikoloa, is located outside of the project site, across and *makai* of the paved Lālāmilo Parker Access Road, and will not be affected. Prior studies also indicate that military training during World War II has left behind numerous improvised firing positions that resemble low rock alignments or shelters. Modern reuse of these sites has also been indicated by the presence of recently-manufactured cartridge casings found near them. In addition, portions of the project site have undergone minor mechanical landclearing as part of ranching operations.

Fieldwork for the archaeological survey was conducted on August 13, 2020 by Lokelani Brandt, M.A. and Benjamin Barna, Ph.D. (Principal Investigator). During the field survey, the entire (100%) ground surface of a 10-acre area enclosing the 3-acre project site was visually inspected by field technicians walking transects oriented north-south, spaced no more than 15 meters apart (at the time of the fieldwork, engineers had not yet determined the exact location of the 3-acre area). Ground visibility was very good, with bare ground visible between low, patchy growths of buffel grass. All bedrock outcrops were given special attention and examined for evidence of modification or other human use. No subsurface sampling was conducted. This decision was made based on observed thin soil accumulation and the results of the prior studies in the area, which indicated such deposits are most likely to be found in the floor of protected temporary habitation/shelter sites.

No historic properties of any kind were observed within the project site. The only modifications included several two track roads. The ground surface was bare and rocky with apparently thin soil accumulation and occasional patches of buffel grass. Metal fragments (shrapnel) and other ordnance were observed, but no other associated military training features were present.

Impacts and Mitigation Measures

Given the negative findings of the archaeological survey with respect to archaeological resources, it is concluded that the development of the proposed 10 MG above-ground water reservoir with appurtenant water line and road connections will not affect any historic properties. The recommended determination of effect for the proposed project was “no historic properties affected.” With respect to the historic preservation review process of the Department of Land and Natural Resources—State Historic Preservation Division (DLNR—SHPD), it was recommended that no further work needs to be conducted within the current project area prior to, or during, project implementation. In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, sand deposits, or sink holes are identified during the demolition and/or construction work, contractors will be required to cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division at (808) 933-7651, pursuant to HAR 13§13-280-3. The archaeological survey was submitted to DLNR-SHPD for review; by letter of June 15, 2021, the agency accepted the report and concurred with the finding of no historic properties (see Appendix 3).

3.3 Public Facilities, Utilities and Services

Roadways

The project site is accessed via a private road known as the Lālāmilo Parker Access Road, which connects to an unnamed *mauka-makai* road, which in turn connects to Queen Ka‘ahumanu Highway (State Highway 19) at an unsignalized intersection opposite the Puakō Beach Drive, the entrance to Puakō Village (see Figure 1). These roads are gated and locked and have easements for local landowners, ranchers, Hawaiian Electric, the Lālāmilo Windfarm Repowering site, and the DWS.

During construction, materials, personnel and equipment will be moving onsite. In general, the levels of construction-related traffic will be very minor and would not appear to require mitigation. For larger pieces of equipment or materials, if there is a potential to disrupt traffic, work will be required by the construction contract to occur outside of peak AM and PM traffic on Queen Ka‘ahumanu Highway. Professional traffic control will be utilized as necessary to optimize traffic flow. Access to all properties will be maintained at all times, except in infrequent cases where access must be closed for brief periods. Such situations will be negotiated with the access holder(s).

Operationally, a negligible increase in traffic related to occasional maintenance DWS visits is expected.

Utilities and Drainage Facilities

Electrical poles and lines are present at the project site and along the access roads. The existing electric lines are overhead and the project will not affect them. These locations will be indicated on design plans and construction contractors will be aware of and will take action to prevent damage and reduce any interruption in service to the minimum time necessary. Appropriate coordination with HELCO will be conducted during design and construction to ensure that their utility lines are not adversely affected.

No drainage facilities such as drywells, seepage pits or culverts are present at the project site, and none will be affected. As discussed in Section 3.1.2, new drainage facilities to handle the additional runoff from the project will be constructed. No impact to drainage will occur.

Police, Fire, Emergency Medical, Solid Waste Services

Emergency medical and fire services are available at the Mauna Lani Fire Station, located on Queen Ka‘ahumanu Highway Road 6 road miles from the project. The Hawai‘i County Police Department serves the South Kohala area from a station on Mamalahoa Highway, 17 road miles away. The nearest hospital is the North Hawai‘i Community Hospital, located near the Police Station. All emergency facilities that might be required for incidents related to construction or operation are thus located in or near the project area.

The construction waste generated by the project shall be disposed of at a solid waste disposal facility that complies with the applicable provisions of Title 11, Hawai‘i Administrative Rules, Chapter 11-58.1 “Solid Waste Management Control.”

3.4 Secondary and Cumulative Impacts

The proposed project would not involve any secondary or cumulative impacts, such as population changes or effects on public facilities, because it simply fulfills the mandate of the Department of Water Supply to provide high-quality service to its customers in existing service areas. Although the project would provide some short-term construction jobs, these would almost certainly be filled by local residents and would not induce in-migration.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. The adverse effects of the project – very minor and temporary disturbance to air quality, noise, and visual quality during construction – are very limited in severity, nature and geographic scale. Consultation of the *OEQC Environmental Notice* and the Planning Department files did not indicate any highway or development projects being undertaken in the project area in the 2021-2023 timeframe that would combine in such a way as to produce adverse cumulative effects or involve a commitment for larger actions. However, even if construction of single or even multiple small to medium-scale development projects were to occur, the limited scale would prevent any significant cumulative impacts that would require mitigation beyond that imposed for the reservoir project.

3.5 Required Permits and Approvals

The following permits and approvals would be required:

- National Pollutant Discharge Elimination System Permit (NPDES)
- County Building Permits
- County Grading Permit
- State Historic Preservation Division HRS Chapter 6E Approval

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai‘i State Plan

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the Hawai‘i State Plan are individual and family self-sufficiency, social and economic mobility, and community or social well-being. The proposed project would promote these goals by modernizing and improving water service for the South Kohala District.

3.6.2 Hawai‘i County Zoning, General Plan and South Kohala CDP

Hawai‘i County Zoning. The project site is zoned A-5a (Agricultural, minimum lot-size 5 acres). Potable water infrastructure is permitted in this zoning district. No part of the project site is situated within the County’s Special Management Area (SMA).

The Hawai‘i County General Plan Land Use Pattern Allocation Guide (LUPAG). The LUPAG map component of the General Plan is a graphic representation of the Plan’s goals, policies, and standards as well as of the physical relationship between land uses. It also establishes the basic urban and non-urban form along with certain planned public and cultural facilities, public utilities and safety features, and transportation corridors. The project site is classified as Extensive Agriculture, where public utilities such as tank reservoirs are permitted.

The General Plan for the County of Hawai‘i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i. The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai‘i County Planning Department). Another revision is currently in preparation.

The General Plan itself is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai‘i. Most relevant to the proposed project are the following Goal and Policies, and Courses of Action:

PUBLIC UTILITIES

Goals

- (a) Ensure that properly regulated, adequate, efficient and dependable public and private utility services are available to users.
- (b) Maximize efficiency and economy in the provision of public utility services.
- (c) Design public utility facilities to fit into their surroundings or concealed from public view.

Policies

- (a) Public utility facilities shall be designed to complement adjacent land uses and shall be operated to minimize pollution or disturbance.
- (b) Provide utilities and service facilities that minimize total cost to the public and effectively service the needs of the community.
- (c) Utility facilities shall be designed to minimize conflict with the natural environment and natural resources.
- (d) Improvement of existing utility services shall be encouraged to meet the needs of users.
- (f) Develop short and long-range capital improvement programs and plans for public utilities within its jurisdiction that are consistent with the General Plan.

PUBLIC UTILITIES – WATER

Policies

- (a) Water system improvements shall correlate with the County’s desired land use development system.
- (b) All water systems shall be designed and built to Department of Water Supply standards.
- (c) Improve and replace inadequate systems.
- (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.

Standard

- (a) Public and private water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.

Courses of Action – South Kohala

- (a) Seek alternative sources of water for the Lālāmilo system.
- (b) Improve and replace inadequate distribution mains and steel tanks.
- (c) Continue to seek additional groundwater sources for the Waimea System.

Discussion: The proposed project satisfies relevant goals, policies and standards, as well as courses of action related to water systems South Kohala District.

ECONOMIC GOALS

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

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

ENVIRONMENTAL QUALITY GOALS

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

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

ENVIRONMENTAL QUALITY POLICIES

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

ENVIRONMENTAL QUALITY STANDARDS

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

Discussion: The proposed construction and operation of the tank reservoir project would not have a substantial adverse effect on the environment and would not diminish the valuable natural resources of the region. The improvements would be compatible with the existing area. Pertinent environmental regulations would be followed, including those for mitigation of water quality impacts.

HISTORIC SITES GOALS

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

HISTORIC SITES POLICIES

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

Discussion: An archaeological survey has properly documented historic properties, of which none were found, to ensure that there are no effects to significant historic sites. The archaeological survey has been submitted to the State Historic Preservation Division for review. There are no known or

expected cultural uses on the specific project site, and the project does not affect the cultural values or resources of the area.

FLOOD CONTROL AND DRAINAGE GOALS

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

FLOOD CONTROL AND DRAINAGE POLICIES

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

FLOOD CONTROL AND DRAINAGE STANDARDS

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

Discussion: The project will conform to all applicable drainage regulations and policies of the County of Hawai‘i.

NATURAL BEAUTY GOALS

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

NATURAL BEAUTY POLICIES

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

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

NATURAL RESOURCES AND SHORELINES GOALS

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

NATURAL RESOURCES AND SHORELINES POLICIES

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

Discussion: The project is not located near the coast, and no aspect of the project would adversely affect natural resources.

The South Kohala Community Development Plan (CDP) (Hawai'i County Planning Department 2008) has many elements and wide-ranging implications, but there are several major strategies that embody the guiding principles related to land use, housing, public facilities, infrastructure and

services, and transportation. All aspects of the project are consistent with the CDP. Only a few water projects are named in the CDP, not including the proposed project, but the CDP repeats the Courses of Action from the General Plan for Water Systems (per discussion above), and thus the project is consistent with the goals of the CDP for the Lālāmilo Water System.

Importantly, the project also supports the CDP’s overall strategy for “Alternative, Renewable, Natural Energy” through energy efficiency gained through the use of renewables.

3.6.3 Hawai‘i State Land Use Law

All land in the State of Hawai‘i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 205, HRS. The project site is within the Agricultural Land Use District, and tank reservoirs and associated facilities are allowed in this district with no Chapter 205, HRS permitting required by the State Land Use Commission.

3.6.4 Hawai‘i Water Plan

The *Hawai‘i Water Plan* includes plans developed by the Hawai‘i State Commission on Water Resources Management (CWRM) dealing with protecting water resources, ensuring water quality, developing water resources, and serving State projects.

The purpose of the plans is to set forth specific objectives, policies, programs and projects to guide State and county governments. In summary, they plan present guidelines for development of water resources for municipal, agricultural and industrial requirements; preservation of ecological, recreational, and aesthetic values and quality; and regulation of the use of water to assure adequate supplies for the future. The project would develop storage facilities in a rational manner to maintain water supply and drinking water quality, assure adequate water for planned growth, and it would not adversely affect ecological, recreational or aesthetic values. The project is thus consistent with the basic guidelines of the plan.

Component plans include the *Water Quality Plan* and the *Agricultural Water Use and Development Plan* (from 1990 and 2008, respectively), but the most relevant plans for this discussion are the *Water Resources Protection Plan* (2008), the *State Water Projects Plan, Volume 2, Island of Hawai‘i* (2003), and the *Hawai‘i County Water Use and Development Plan Update* (2010).

The *Water Resources Protection Plan* inventoried the water resources of the State, determined their sustainable yields based on available data, and recommended means of conserving and augmenting these resources. The proposed project does not involve source development, and instead is focused on storage. The Waimea Aquifer System of the West Mauna Kea Aquifer Sector has not been declared a Groundwater Management Area by the CWRM. There will be no effect on aquifer pumpage.

The primary objective of the *State Water Projects Plan, Volume 2, Island of Hawai‘i* (SWPP) is to provide a framework for the planning and implementation of water development strategy for future State projects. No State projects are triggering the current proposal, and it does not directly affect any other proposed State projects, which in the area of the Lālāmilo Water System is restricted to a need for an additional 0.0527 MGD of potable water at Hapuna State Park. However, optimizing the storage of potable water will promote orderly and efficient use of existing water, thus supporting the goals of the SWPP.

The *Hawai‘i County Water Use and Development Plan Update* (HWUDP) (Hawai‘i County DWS 2010) amended a plan from 1990. This plan is meant to aid CWRM in granting permits for water use and designating water management areas, as well as serving as a reference document of current and future water resource conditions. In overview, the HWUDP includes an inventory of existing water uses and developments by hydrologic units, addresses future land uses and water needs, and is consistent with State and County land and water policies. This plan also guides DWS in future operations and in identifying the improvements and facilities required to provide safe, affordable and reliable water service to the island of Hawai‘i in a sustainable and financially secure manner.

The primary objective of the HWUDP is to set forth the allocation of water to land use. Each of the four counties is responsible to prepare a WUDP to include, but not be limited to the following:

1. Status of county water and related land development including an inventory of existing water uses for domestic, municipal, and industrial users, agriculture, aquaculture, hydropower development, drainage, reuse, reclamation, recharge, and resulting problems and constraints;
2. Future land uses and related water needs; and
3. Regional plans for water developments including recommended and alternative plans, costs, adequacy of plans, and relationship to the water resource protection plan and water quality plan.

The County of Hawai‘i adopted by ordinance the Water Use and Development Plan Update dated August 2010 (2010 HWUDP), and the CWRM granted approval in December 2011. The 2010 HWUDP update implemented a broad, uniform approach island-wide to evaluate conservatively the County’s land use policies set forth in the County General Plan and Zoning Code. The General Plan is the long-range conceptual land use plan for the island of Hawai‘i, whereas the Zoning Code is the legal instrument that regulates land development and implements the General Plan policies. The intent of the 2010 HWUDP was to guide the County in prioritization and focus of future assessment efforts. The HWUDP provided scenarios of low, medium, and high growth rates and estimated the public water needs for the island for various years in the future. Common to all scenarios in all areas is a steadily increasing demand for water and the need for more efficient storage and transmission. The project does not provide any additional water, but it provides more for more cost-efficient and sustainable use of water, and it is thus consistent with the HWUDP.

Long-range planning to guide the development of its water service areas and the use of its resources is outlined in 20-year Water Master Plans (WMPs), the latest of which is dated 2006. Near-term

needs are provided for DWS and its partnerships through the DWS 5-year Capital Improvement Program (CIP). The context of the project in relation to the WMP and CIP has been discussed above, in Section 1.2.

3.7 Federal “Cross-Cutter” Authorities

The following sub-sections address the proposed project’s relationship to other federal “crosscutting” environmental, economic, social, and miscellaneous federal authorities as required by the State of Hawai‘i’s Drinking Water State Revolving Fund (DWSRF) program.

3.7.1 Archeological and Historic Preservation Act (16 U.S.C. § 469a-1) and National Historic Preservation Act (16 U.S.C. § 470) (NHPA)

An archaeological assessment survey conducted under the authority of Chapter 6E, Hawai‘i Revised Statutes, has properly documented historic properties to ensure that there are no effects to significant historic sites. The survey determined that no sites were present. The archaeological survey has been submitted to the State Historic Preservation Division for review. If previously undocumented sites are inadvertently discovered in other areas, SHPD will be contacted immediately and advised of the circumstances of the find, its location, and the presence or absence of associated cultural resources, as outlined in Hawai‘i Administrative Rules 13§13-275-12.

At the appropriate time, if required, consultation will be conducted and an archaeological report prepared according to will be prepared and submitted by the Department of Water Supply to the State Historic Preservation Officer for review and concurrence in order to satisfy Section 106 of the NHPA.

3.7.2 Clean Air Act as Amended (42 USC 7401, et seq.)

As discussed in Section 3.1.4, air quality at the project site is acceptable. The site is within an air quality attainment area as defined by the State of Hawai‘i Department of Health in its EPA-approved Air Quality program. Construction will include plans to minimize fugitive dust through watering and planting as soon as feasible. Diesel-powered construction equipment will produce emissions that will slightly degrade air quality for the short period of time that engines are in operation. However, all applicable emission and ambient air quality standards will continue to be met. No sensitive receptors are present within several miles of the project site. Normal operation of the tank reservoir will not produce any on-site air emissions. Consequently, the project complies with the provision of the Clean Air Act.

3.7.3 Coastal Barriers Resource Act, 16 U.S.C. 3501

The Coastal Barrier Resources Act designated various undeveloped coastal barrier islands, depicted by specific maps, for inclusion in the Coastal Barrier Resources System. No coastal barriers are present in the State of Hawai‘i, and the project is not inconsistent with the Coastal Barriers Resource Act.

3.7.4 Coastal Zone Management Act, 16 U.S.C.1456(c)(1)

The Hawai'i Coastal Zone Management (CZM) Program was established in 1977 through the adoption of the Coastal Zone Management Act, incorporated in Chapter 205A HRS. Projects with federal involvement significantly affecting areas under jurisdiction of the State CZM Agency may be required to undergo review for consistency with the State's approved coastal program. The entire State of Hawai'i is included in the coastal zone for such purposes. The CZM objectives are as follows:

- Recreational Resources. Provide coastal recreational opportunities accessible to the public.
- Historic Resources. Protect, preserve, and, where desirable, restore those natural, man-made historic, and pre-historic resources in the CZM area that are significant in Hawaiian and American history and culture.
- Scenic and Open Space Resources. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.
- Coastal Ecosystems. Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.
- Economic Use. Provide public or private facilities and improvements important to the State's economy in suitable locations.
- Coastal Hazards. Reduce hazard to life and property from tsunamis, storm waves, stream flooding, erosion, and subsidence.
- Managing Development. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. Stimulate public awareness, education, and participation in coastal management, and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. Protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and minimize loss of improvements due to erosion.
- Marine Resources: Implement the state's ocean resources management plan.

The project site is 3.6 miles from the shoreline. No historic sites, coastal ecosystems, streams or wetlands, beaches, scenic or open space resources will be impacted. The DWS has evaluated the project and believes that it does not impact coastal zone resources and is consistent with the objectives of the program. The Hawai'i CZM Program is not authorized to provide federal consistency reviews for Safe Drinking Water Act State Revolving Funds projects. However, this EA has been submitted by DWS to the Hawai'i CZM Program for general review.

3.7.5 Endangered Species Act, 16 U.S.C. 1536(a)(2) and (4), Essential Fish Habitat Consultation Process Under the Magnuson-Stevens Fishery Conservation and Management Act, 16 USC 1801, and Fish and Wildlife Coordination Act, 16 USC 661

The Endangered Species Act (16 U.S.C. §§ 1531-1544, December 28, 1973, as amended 1976-1982, 1984 and 1988) provides broad protection for species of plants and animals that are listed as threatened or endangered in the U.S. or elsewhere. The Act mandates that federal agencies seek to conserve endangered and threatened species and use their authorities in furtherance of the Act's purposes. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The Act outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species, and contains exceptions and exemptions.

Existing biota on and near the project site are discussed in detail in Section 3.1.3 of this EA. In general, the vegetation is highly degraded buffel/fountain grass-kiawe savanna, with only a few common native plants. Relative to threatened or endangered species, review of biological records and maps and inspection of the project site has determined that there is no critical habitat and no threatened or endangered plant species on or immediately around the project site. The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) may roost, nest, or utilize resources here, despite the relative lack of trees and poor habitat. Three wide-ranging seabird species may occasionally transit the area but are unlikely to use it as habitat: the endangered Hawaiian petrel, or 'ua'u (*Pterodroma sandwichensis*), the endangered band-rumped storm petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*). No tree tobacco (*Nicotiana glauca*) or any other Solanaceae that provide habitat for the egg and larval stages of the endangered Blackburn's sphinx moth (*Manduca blackburni*) are present, but construction could lead to ground conditions that could encourage tree tobacco to sprout.

There is very little potential for use by the endangered Hawaiian goose or nēnē (*Branta sandvicensis*) because the sparse, open, dry and rocky grassland is not favorable habitat. Nevertheless, they are wide-ranging birds and their occasional presence cannot be ruled out.

Because of the lack of native ecosystems or threatened or endangered species in disturbed area, no adverse impacts to biological resources would occur as a result of building the new water line, provided that appropriate minimization measures, which will be part of construction documents, are enforced during construction. Specific minimization measures adapted closely from the U.S. Fish and Wildlife Service are contained in Appendix 5. Mitigation is summarized above in Section 3.1.5.

The U.S. Fish and Wildlife Service is being coordinated with as part of the Draft EA review process to verify the biological characterization of the project site and the adequacy of the proposed mitigation measures to protect threatened and endangered species. The Final EA will report the results of the coordination.

DWSRF assistance recipients must determine whether a proposed project may adversely affect Essential Fish Habitat (EFH). According to the Western Pacific Regional Fishery Management Council

(WESPAC) (2005) in its *Fishery Ecosystem Plan for the Hawaii Archipelago*, several areas of Essential Fish Habitat (EFH) in nearshore (non-pelagic waters) in the Hawaiian Archipelago have been designated approved by the Secretary of Commerce. EFH designations for Bottomfish and Seamount Groundfish, Crustaceans, Precious Corals and Pelagic Management Unit Species (MUS) were approved by the Secretary on February 3, 1999 (64 FR 19068). EFH designations for Coral Reef Ecosystem MUS were approved by the Secretary on June 14, 2002 (69 FR 8336). Maps available at the National Marine Fisheries Service's Essential Fish Habitat Mapper website do not indicate any areas of EFH near the project area (<http://www.habitat.noaa.gov/protection/efh/habitatmapper.html>). No aspect of the project would affect Essential Fish Habitat, as it does not occur near the sea nor affect it directly or indirectly.

Under the Fish and Wildlife Coordination Act, 16 USC 661, DWSRF assistance recipients should seek the assistance of wildlife officials to determine the effect the proposed project may have on wildlife and its habitat. As discussed above, the U.S. Fish and Wildlife Service is being contacted by letter and supplied a copy of the Draft EA to assist in this determination, and apart from the endangered species discussed above, impacts to which can be avoided, there are not expected to be any wildlife or habitat concerns.

3.7.6 Environmental Justice, Executive Order 12898

The Environmental Justice Executive Order was issued in 1994 for the purpose of protecting low income and minority residents of the United States from disproportionate exposure to environmental and health hazards.

According to the most recent South Kohala CCD Hawaii demographic data available from the U.S. Census Bureau released in the American Community Survey in December of 2019, the largest group in South Kohala of Hawai'i are White (35.8 percent), followed by Two or More Races (30.6%), Asian (19.3%), and Native Hawaiians and Pacific Islanders (13.0%), in terms of major categories recognized by the U.S. Census. As with almost every major census area in Hawai'i, South Kohala is "majority minority." However, this breakdown inadequately describes the ethnic makeup as perceived by Hawai'i residents, who distinguish among Native Hawaiians, Samoans, Japanese, Chinese, Koreans, Puerto Ricans, Portuguese and Filipinos. In addition, more than half of all births in Hawai'i since 1970 involve parents of different or mixed ethnic backgrounds, leading to often inconsistent identifications on census forms. Consequently, the conventional definition of ethnic affiliation is problematic in Hawai'i. Discussions of environmental justice in Hawai'i generally center on the Native Hawaiian and Pacific Islander population, which is usually recognized as disadvantaged in terms of income, health, home ownership, and many other measures of socioeconomic well-being. The proportion of Native Hawaiians in South Kohala closely tracks that of the County and State as a whole. Other Pacific Islanders are less represented on the neighbor islands as compared to O'ahu and the State as a whole.

As a measure of the extent of low-income populations, this EA uses poverty rates as representative, because data on poverty are readily available. There are no County or State data concerning income levels or poverty rates in individual communities on the Island of Hawai'i. The most fine-scaled and

recent data are contained in the U.S. Census’s American Community Survey. These data are updated each year. Poverty status is determined by comparing annual income to a set of dollar values called poverty thresholds that vary by family size, number of children and age of householder. If a family’s before-tax monetary income is less than the dollar value of their threshold, then that family and every individual in it are considered to be in poverty. For people not living in families, poverty status is determined by comparing the individual’s income to his or her poverty threshold. For small populations and small sample sizes, high margins of error occur. The poverty rate as of 2019 for South Kohala was 17.2 percent, similar to that of the County as a whole, which is 13.1 percent.

It is clear that minority and low income populations are present, at levels very similar to most of the County and State. The purpose of the proposed water project is to provide residents of South Kohala adequate water service that conforms to State and federal standards. The project will not have any more than minor and temporary adverse secondary environmental, economic, or social impacts, as discussed in previous sections. Moreover, the State and federal regulations regarding safe drinking water are applicable to all water systems in Hawai‘i, irrespective of the economic or demographic characteristics of their residents. Thus, the proposed Project complies with this Executive Order.

3.7.7 Farmland Policy Protection Act, 7 U.S.C. 4202(8)

The Farmland Protection Policy Act (FPPA) (Public Law 97-98, Sec. 1539-1549) requires identification of projects that would affect any lands classified as prime and unique farmlands. Agencies must consider alternative actions that could reduce adverse effects and ensure that their programs, to the extent practicable, are compatible with State, local government and private programs and policies to protect farmland. The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) has national leadership for administering the FPPA.

“Farmland,” as used in the FPPA and applied to the State of Hawai‘i, includes Agricultural Lands of Importance in the State of Hawai‘i (ALISH), a system in which the State Department of Agriculture classifies lands into three categories: (1) Prime Agricultural Land, (2) Unique Agricultural Land, and (3) Other Important Agricultural Land. There are no Prime, Unique, or Other Important Agricultural Lands at or near the project site, which is too dry and rocky to be included. The project will not impact such land or the agricultural use of any properties. The project is intended to serve residents of South Kohala, many of whom are involved in agriculture, and it appears to be in compliance with the FPPA.

3.7.8 Floodplain Management Act, 42 U.S.C., 4321, and Executive Order 11988, Floodplain Management (24 May 1977)

The Floodplain Management Act deals with critical action inside designated floodplains, and Executive Order 11988 requires federal agencies to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy of the floodplain, and to avoid direct and indirect support of floodplain development where there is a practicable alternative. In accomplishing this objective, “each agency shall provide leadership and shall take action to reduce

the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains.”

The project does not occur within and will not impact floodplains in any way. The project is consistent with EO 11988 and the Floodplain Management Act.

3.7.9 Protection of Wetlands, Executive Order No. 11990 & Exec. Order No. 12608, and Clean Water Act, as Amended (33 USC 1251 et seq.)

Fieldwork confirmed through consultation of maps from the U.S. Fish and Wildlife Service demonstrated that no wetlands or other waters of the U.S. are present on any part of the project site.

The project would comply with the Clean Water Act, Section 404(b)(1) Guidelines. None of the proposed construction materials would be expected to contain any contaminants.

As discussed in Section 3.1.2, a National Pollutant Discharge Elimination System (NPDES) permit will need to be obtained by the construction contractor before the project commences. This permit requires the completion of a Storm Water Pollution Prevention Plan (SWPPP) in order to properly manage storm water runoff through appropriate best management practices (BMPs). Acquisition of the NPDES permit and implementation of the permit conditions will ensure compliance with the Clean Water Act.

3.7.10 Safe Drinking Water Act, 42 U.S.C., 300H-3(E)

The Safe Drinking Water Act (SDWA) is the principal federal law that ensures the quality of Americans’ drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. The SDWA requires that all public water systems meet stringent water quality standards. These standards cover a long list of potential chemical, radiological and biological contaminants.

The storage improvements will assist DWS in maintaining the compliance of the Lālāmilo Water System with the standards mandated pursuant to the SDWA. Testing of the water will be undertaken by the County of Hawai‘i before it is connected to the system to ensure that the water is consistent with all State of Hawai‘i and federal standards for potable water.

The Safe Drinking Water Act is also the authority for regulatory protection of principal or sole source aquifers. Specifically, once a sole source aquifer is designated, commitments for federal assistance must ensure that projects will not contaminate the aquifer through a recharge zone so as to create a significant hazard to public health.

As identified by the U.S. Environmental Protection Agency, Region IX groundwater Office (<http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/upload/SSAGeneralInformation.pdf>) (accessed February 2021), there are only two sole source aquifers in Hawai‘i. They are the Southern O‘ahu Basal Aquifer on the Island of O‘ahu and the Moloka‘i Aquifer on the island of

Moloka‘i. There are no sole source aquifers on the Island of Hawai‘i. The project will therefore not affect sole source aquifers.

3.7.11 Wild and Scenic Rivers Act, 15 U.S.C. 1271-1287

The Act makes it the national policy that certain rivers of the U.S which, along with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition. There are no designated Wild and Scenic Rivers in the State of Hawai‘i at this time. Consequently, the project is consistent with the provisions of the Wild and Scenic Rivers Act.

3.7.12 Demonstration Cities and Metropolitan Development Act of 1966, Pub.L. 89-754, as Amended (42 USC § 3331)

To demonstrate compliance with this Act, the Hawai‘i State Department of Health requires DWSRF assistance recipients to describe a proposed project’s effect on local development plans. Section 3.6 of this EA addresses this requirement by discussing the project’s full consistency with the Hawai‘i State Plan, the County of Hawai‘i General Plan, and the South Kohala Community Development Plan.

3.7.13 Administration of the Clean Air Act and the Water Pollution Control Act with Respect to Federal Contracts or Loans (Executive Order 11738)

Executive Order 11738, entitled “Administration of the Clean Air Act and the Water Pollution Control Act with respect to federal Contracts or Loans,” prohibits the provision of Federal assistance to facilities that are not in compliance with either the Clean Water Act or the Clean Air Act unless the purpose of the assistance is to remedy the cause of the violation. As discussed in Sections 4.2.1.2 and 3.2.2, the project will comply with applicable provisions of the Clean Air Act and Clean Water Act. Consequently, it is consistent with the intent of this Executive Order.

3.7.14 Procurement Prohibitions (Executive Order 11738, Section 306 of the Clean Air Act)

This Executive Order requires recipients of federal assistance to certify that they will not procure goods, services or materials from suppliers who are on the EPA’s list of Clean Air Act violators. DWS will comply with this requirement in selecting contractors, construction materials, and other services for the project.

3.7.15 Procurement Prohibitions (Section 508 of the Clean Water Act)

This Executive Order requires recipients of federal assistance to certify that they will not procure goods, services or materials from suppliers who are on the EPA’s list of Clean Water Act violators. DWS will comply with this requirement in selecting contractors, construction materials, and other services for the project.

3.7.16 Social Policy Authorities

For any Drinking Water State Revolving Fund Loan, the applicant, in this case the County of Hawai‘i, is also required to certify that it has complied, or will comply with, the following federal social policy authorities. This information is required to be contained in an Environmental Assessment, if one is applicable for the project.

- **Age Discrimination Act of 1975 (42 USC § 6102).** This Act stipulates that no person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. DWS will comply with this requirement in hiring contractors and other staff for the project.
- **Civil Rights Act of 1964, Title VI (42 USC §2000(d)).** This Act stipulates that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. DWS will comply with this requirement in hiring contractors and other staff for the project.
- **Equal Employment Opportunity (Executive Order 11246, as amended).** This Executive Order requires all recipients of federal contracts to include certain non-discrimination and “affirmative action” provisions in all contracts. The provisions commit the contractor or subcontractor to maintain a policy of non-discrimination in the treatment of employees, to make this policy known to employees, and to recruit, hire and train employees without regard to race, color, sex, religion and national origin. DWS will include these provisions in all contracts for the project.
- **Minority Business Enterprise Development, Executive Order 12432.** This executive order sets forth in more detail the responsibilities of federal agencies for the monitoring, maintaining of data and reporting of the use of minority enterprises. DWS will comply with all such requirements for all contracts for the project.
- **National Program for Minority Business Enterprise, Executive Order 11625.** This Executive Order directs federal agencies to promote and encourage the use of minority business enterprises in projects utilizing federal funds. DWS will comply with all such requirements for all contracts for the project.
- **National Women’s Business Enterprise Policy and National Program for Women's Business Enterprise, Executive Order 12138.** This Executive Order directs each department or agency empowered to extend federal financial assistance to any program or activity to issue regulations requiring the recipient of such assistance to take appropriate affirmative action in support of women’s business enterprises and to prohibit actions or policies which discriminate against women’s business enterprises on the grounds of sex. DWS will comply with all the Executive Order for the project.
- **Rehabilitation Act of 1973, 29 USC 794.** This Act mandates that no otherwise qualified handicapped individual in the United States shall, solely by reason of his handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance. DWS will comply with the Act for all contracts for the project.

- **Small Business Administration Reauthorization and Amendment Act of 1998, Pub. L. 100-590, Section 129.** This Amendment directs federal agencies to promote and encourage the use of small business enterprises in projects utilizing federal funds. DWS will comply with the Act for all contracts for the project.
- **Department of Veterans Affairs and Housing and Urban Development, and Agencies Appropriations Act, 1993, Pub. L. 102-389.** This Act requires the Administrator of the Environmental Protection Agency, to the fullest extent possible, ensure that at least 8 per cent of federal funding for prime and subcontracts awarded in support of authorized programs, including grants, loans and contracts for wastewater treatment and for leaking underground storage tanks, be made available to businesses or other organizations owned or controlled by socially and economically disadvantaged individuals (within the meaning of Section 8(a)(5) and (6) of the Small Business Act (15 USC 637(a)(5) and (6)), including historically black colleges and universities. For purposes of this section, economically and socially disadvantaged individuals shall be deemed to include women...” DWS will comply with the Act for the project.
- **Disadvantaged Business Enterprise Rule, 2008, 40 CFR Part 33.** This Rule sets forth in detail the responsibilities of entities receiving an identified loan under a financial assistance agreement capitalizing a revolving loan fund, for the monitoring, maintaining of data and reporting of the use of disadvantaged business enterprises (DBEs). The Applicant is required to comply with 40 CFR Part 33, entitled “Participation by Disadvantaged Business Enterprises in Procurement Under Environmental Protection Agency (EPA) Financial Assistance Agreements” and ensure that all contracts funded by a DWSRF loan include a term or condition requiring compliance with 40 CFR Part 33. The Applicant is required not to discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Applicant shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the Applicant to carry out these requirements is a material breach of this contract, which may result in the termination of the contract or other legally available remedies. DWS will comply with the Rule for all contracts for the project.

PART 4: DETERMINATION

Based on the findings below, and upon consideration of comments to the Draft EA, the Hawai‘i County Department of Water Supply has determined that the proposed action will not have any significant effect in the context of Chapter 343, Hawai‘i Revised Statutes and Chapter 11-200.1-13 of the State Administrative Rules significantly alter the environment, as impacts will be minimal, and will accordingly issue a Finding of No Significant Impact (FONSI).

PART 5: FINDINGS AND REASONS

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

- (a) In considering the significance of potential environmental effects, agencies shall consider and evaluate the sum of effects of the project on the quality of the environment.
- (b) In determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a project, the expected impacts, and the proposed mitigation measures. In most instances, an action shall be determined to have a significant effect on the environment if it may:
 1. *Irrevocably commit a natural, cultural, or historic resource.* No valuable natural or cultural resource would be committed or lost. A few common native plants are present but native ecosystems would not be adversely affected, particularly given the disturbed nature of the flora and fauna. No adverse impact upon vegetation or endangered species should occur. An archaeological survey has properly documented historic properties, of which none are present, to ensure that there are no effects to significant historic sites. The archaeological survey has been submitted to the State Historic Preservation Division for review. There are no known or expected cultural uses on the specific project site, and the project does not affect the cultural values or resources of the area. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way.
 2. *Curtail the range of beneficial uses of the environment.* No restriction of beneficial uses would occur by constructing the proposed tank reservoir within three acres of Parker Ranch pasture. In terms of Covid-19, the Department of Water Supply has a policy of continuing to advance projects through pre-construction regulatory review and approval processes and then, if determined safe and appropriate to do so, incorporate requirements for the safety of construction workers, County staff and the public that would allow construction to proceed in a responsible and safe manner, minimizing public health impacts.
 3. *Conflict with the State’s environmental policies or long-term environmental goals established by law.* The State’s long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is environmentally beneficial and minor, and it is thus consistent with all elements of the State’s long-term environmental policies.
 4. *Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.* The project would not have any substantial adverse effect on the economic or social welfare of the Big Island community or the State of Hawai‘i. No valuable cultural resources and practices such as forest access, fishing, gathering, hunting, or access to ceremonial sites would be affected in any way. The social and economic welfare of the area would be enhanced through addition of potable water storage.

5. *Have a substantial adverse effect on public health.* The project would not affect public health and safety in any adverse way, and would benefit public health by providing water storage for a public water system.
6. *Involve adverse secondary impacts, such as population changes or effects on public facilities.* Providing additional cost-effective and sustainable water storage would not produce any major secondary impacts, such as population changes or effects on public facilities.
7. *Involve a substantial degradation of environmental quality.* The project is minor and environmentally benign, and thus it would not contribute to environmental degradation.
8. *Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions.* Other than the precautions for preventing adverse effects of sedimentation during construction listed above, no special mitigation measures should be required to counteract the small adverse cumulative effect.
9. *Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.* Thorough survey has determined that no endangered plant species are present. Other than the Hawaiian hoary bat, an island wide-ranging species that will experience no adverse impacts due to mitigation in the form of timing of vegetation removal, no rare, threatened or endangered species of fauna are known to exist on or near the project site, and none would be affected by any project activities.
10. *Have a substantial adverse effect on air or water quality or ambient noise levels.* No substantial effects to air, water, or ambient noise would occur. Brief, temporary effects would occur during construction and would be mitigated. The context of the project site's location, with no residences, parks, or other sensitive uses nearby, will help avoid noise impacts. Erosion and sedimentation impacts will be avoided by implementation of Best Management Practices during grading, which will occur in a limited area.
11. *Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.* Although the project would be located in an area with minor volcanic and moderate seismic risk, the entire Island of Hawai'i shares this risk, and the project is not imprudent to construct, and employs design and construction standards appropriate to the seismic zone. The project site is not located in a flood zone or any other hazardous area, and it would not affect any such area. The project site is more than 1,000 feet above sea level and will not be affected directly by sea level rise. The project has adapted to climate change by accounting for the potential for larger storms, through minimizing hard surfaces that generate runoff in heavy rainfall.
12. *Have a substantial adverse effect on scenic vistas and viewplanes, during day or night, identified in county or state plans or studies.* No scenic views are located nearby or would be

affected in any way. The security lighting that is expected to be installed will be designed to be shielded in conformance with the Hawai‘i County Outdoor Lighting Ordinance (Hawai‘i County Code, Article 9). Furthermore, it will consist blue-deficient lighting such as filtered LED lights or amber LED lights, with a Correlated Color Temperature (CCT) of 2700 Kelvin. This will reduce light pollution and also the risk that the threatened or endangered seabirds that may be attracted to and then disoriented by the lighting.

13. *Require substantial energy consumption or emit substantial greenhouse gases.* While non-negligible amounts of energy input and greenhouse gas emission would be required for construction and use of the facility, filling of the reservoir may occur when wind power from the nearby 3.3-megawatt Lālāmilo Windfarm Repowering Project was available, not only reducing pumping costs but also taking advantage of renewable power and reducing fossil fuel use and greenhouse gas emissions.

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Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 1a

Comments in Response to Early Consultation

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Harry Kim
Mayor



Paul K. Ferreira
Police Chief

Kenneth Bugado, Jr.
Deputy Police Chief

County of Hawai'i

POLICE DEPARTMENT

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May 8, 2020

Mr. Ron Terry
Principal
Geometrician Associates, LLC
P. O. Box 396
Hilo, Hawai'i 96721

**SUBJECT: EARLY CONSULTATION FOR ENVIRONMENTAL ASSESSMENT FOR
LĀLĀMILO RESERVOIR TANK(S) (10 MG STORAGE), SOUTH KOHALA
DISTRICT, ISLAND OF HAWAII**

Dear Mr. Terry:

This is in response to your correspondence dated April 21, 2020, with regard to the above-referenced early consultation for environmental assessment.

Thank you for allowing the Hawai'i Police Department to offer comments regarding this request. At this time, the Hawai'i Police Department has no objections or comments.

Please direct any questions or concerns to Captain Sherry D. Bird, Commander of our South Kohala District, at (808) 887-3080, or via email at Sherry.Bird@hawaiicounty.gov.

Sincerely,

PAUL K. FERREIRA
POLICE CHIEF


ROBERT WAGNER
ASSISTANT POLICE CHIEF
AREA II OPERATIONS

SB/jaj
20HQ0344

From: Lindstrom, Sven <sven.lindstrom@doh.hawaii.gov>

Sent: Monday, May 18, 2020 10:42 AM

To: rterry@hawaii.rr.com

Cc: Ichinotsubo, Lene K <lene.ichinotsubo@doh.hawaii.gov>; Grange, Gabrielle Fenix <Gabrielle.Grange@doh.hawaii.gov>; Galvez, Elizabeth (Liz) <elizabeth.galvez@doh.hawaii.gov>; Nelson, Carrie CIV USARMY USAG (US) <carrie.nelson.civ@mail.mil>; Wurlitzer, Lisa K CTR (US) <lisa.k.wurlitzer.ctr@mail.mil>

Subject: Comments on Early Consultation for EA for Lalamilo Reservoir Tank(s)

Mr. Terry,

Please find attached Hawaii Department of Health HEER Office comments on the proposed Lalamilo Reservoir storage Tank on Parker Ranch property north of Waikoloa Village. This property was formerly used for artillery practice and there is a potential for unexploded ordnance (UXO) to be present which should be considered an explosive hazard. Please follow the guidance in the attached letter. If you have any questions, please feel free to contact me.

Thank you,

Sven Lindstrom

Sven Lindstrom
Remedial Project Manager
Site Discovery, Assessment, and Remediation Section
Hazard Evaluation and Emergency Response Office
Hawaii Department of Health
2385 Waimano Home Road
Pearl City, HI 96782
(808)586-4249
<https://health.hawaii.gov/heer/>

DAVID Y. ICE
GOVERNOR OF HAWAII



BRUCE S. ANDERSON, Ph.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
175088 SL

May 18, 2020

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

Facility/Site: Pohakuloa Training Area Puu Paa

Subject: *Comments on Early Consultation for Environmental Assessment for Lālāmilo Reservoir Tank(s) (10 MG Storage), South Kohala District, Island of Hawai'i Letter dated April 21, 2020*

Dear Mr. Terry:

The Hawaii Department of Health (HDOH), Hazard Evaluation and Emergency Response (HEER) Office reviewed the above-referenced letter and has the following comment:

The proposed location of the 10-million-gallon reservoir tank(s) is within the former Waikoloa Maneuver Area and the former Pu'u Pa'a Army Training Area. This area was used as an artillery target area during World War II and may also have been used for various munitions activities by the Army in the decades after the war. Therefore, there is a significant risk of encountering unexploded ordnance (UXO) at the site. The U.S. Army Garrison Hawaii is currently in the process of assessing and remediating the former Pu'u Pa'a Training Area for UXO hazards. A recently completed Remedial Investigation of the area determined that there are "high potential explosive conditions" across the site due to the presence of UXO.

HDOH recommends following the HEER Office's Areawide Environmental Hazard Management Plan (AEHMP) guidance during all ground-disturbing activities at the site, including any preliminary geotechnical assessments. For your safety, we also recommend that workers and visitors be accompanied during any site visits, including those that do not involve soil disturbance, by a Department of Defense Explosive Safety Board (DDESB)-Certified UXO Technician to scan for UXO hazards on the surface, since the site has not undergone any UXO removal activities since the 1950s.

The HEER Office AEHMP for the former Waikoloa Maneuver Area is available online at the following link: <https://health.hawaii.gov/heer/files/2019/11/WMAAEHMP.pdf>. The AEHMP provides guidance on safe redevelopment within the former Waikoloa Maneuver Area as well as background information about former Department of Defense use of the site. I have attached a two-page Fact Sheet that summarizes the information found in the AEHMP.

Mr. Ron Terry, Principal

May 18, 2020

Page 2 of 2

All site workers and visitors should follow the “3Rs of Explosive Safety” to “Recognize” potential explosive hazards from UXO, “Retreat” a safe distance from any suspect UXO, and “Report” any suspect UXO by calling 9-1-1. I have also taken the liberty of attaching a “3Rs” pamphlet. More information about UXO in the former Waikoloa Maneuver Area and the “3Rs” safety program is available at the U.S. Army Corp of Engineers website:

<https://www.poh.usace.army.mil/Missions/Environmental/FUDS/Waikoloa.aspx>

Should there be any questions, or if you are interested in developing a Site-Specific Environmental Hazard Management Plan (SSEHMP) for this project with the HEER Office, then please do not hesitate to contact me at sven.lindstrom@doh.hawaii.gov or by phone at (808) 586-5815.

Sincerely,



Sven Lindstrom
Hazard Evaluation and Emergency Response Office
Hawaii Department of Health

cc: Lene Ichinotsubo, HDOH Solid and Hazardous Waste Branch (via e-mail)
Carrie Nelson, U.S. Army Garrison Hawaii (via e-mail)



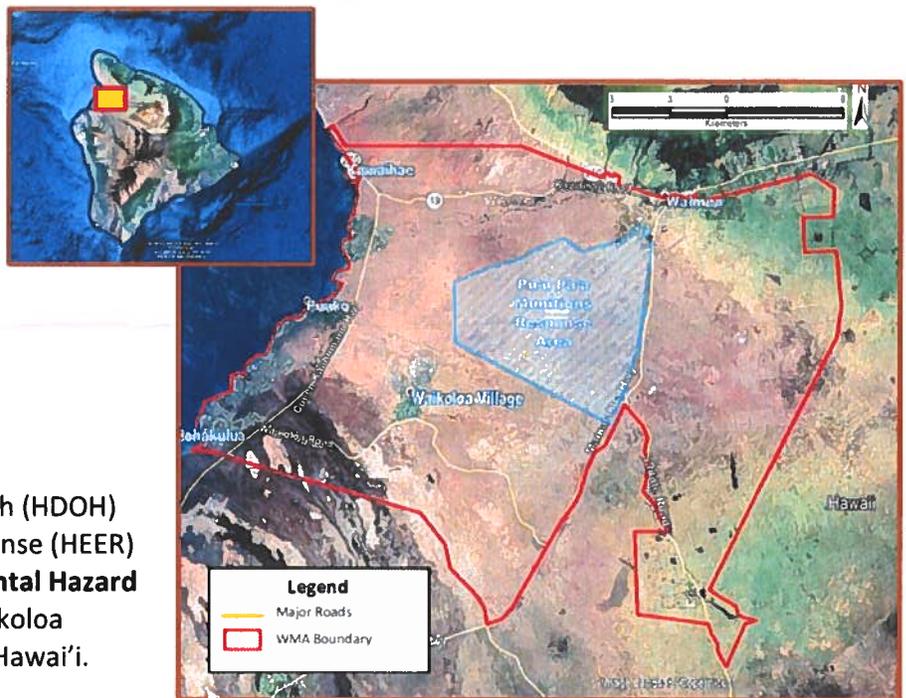
The **Hazard Evaluation and Emergency Response (HEER) Office** is part of the Hawai'i Department of Health's Environmental Health Administration whose mission is to protect human health and the environment. The HEER Office provides leadership, support, and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to releases or threats of releases of hazardous substances.

Explosives Safety Guidance to Help Protect You from Munitions Hazards in the Waikoloa Maneuver Area (WMA)

available online at <https://health.hawaii.gov/heer/files/2019/11/WMAAEHMP.pdf>



Examples of Unexploded Ordnance (UXO) found at Waikoloa Maneuver Area



Location of WMA on the Island of Hawai'i

In 2019, the Hawaii Department of Health (HDOH) Hazard Evaluation and Emergency Response (HEER) Office released an **Areawide Environmental Hazard Management Plan (AEHMP)** for the Waikoloa Maneuver Area (WMA) on the Island of Hawai'i.

The purpose of the AEHMP is to address the risk of explosive hazards from Unexploded Ordnance (UXO) present in the area from historic military use during World War II and to provide UXO safety guidance for construction and development projects within the WMA.

What's in the AEHMP?

The following is a summary of the WMA AEHMP Guidelines:

- Within the WMA, even areas that have been previously cleared by the U.S. Army Corps of Engineers (USACE) have a 'residual risk' of UXO, due to limitations of technology and other factors. Therefore, **all areas** within the WMA present a potential UXO exposure and explosive hazard to users of the property.



- Property owners in the WMA should inform all users of their property (visitors, tenants, landscapers, etc.) of the potential danger presented by the presence of UXO and inform them of the “3Rs” of UXO Safety; “Recognize” UXO are dangerous, “Retreat” – do not pick up the item, move to safety, and “Report” the item by calling 911.
- When developing within the WMA, use ‘UXO Construction Support’ provided by a Department of Defense Explosives Safety Board (DDESB)-Certified UXO Contractor to further reduce your risk of exposure to UXO. This is particularly important when excavating for a pool or septic tank or re-grading a property, but it is also important for small projects like installing a fence or planting a tree.
- For large-scale projects, such as a housing development or shopping center, the property owner should work with HDOH to prepare a Site-Specific EHMP (SSEHMP) to help ensure the protection of their workers and the public from UXO during and after the construction process.
- Soil from properties in the WMA must be managed during development to prevent inadvertent transport of UXO from one area to another, or to properties outside of the WMA. Soil should be excavated in 1-foot lifts using UXO Construction Support, and any soil removed from the property should be sifted and/or re-scanned by the UXO Contractor. The AEHMP includes a **Soil Management Plan Reporting Form** to document soil excavation and disposal.
- When selling or leasing a property, the owner must inform the new owner/occupant of potential UXO hazards and provide them with the information in the AEHMP and any SSEHMP.
- The property owner should provide USACE with Rights-of Entry (ROEs) to allow them free access to complete their investigations on the property, and use USACE as a resource for pamphlets, information, and signage that can be shared with property users to inform them of UXO hazards.
- In addition to calling 911 to report suspect UXO items, use the **UXO Report Form** provided in the AEHMP to inform HDOH and USACE when UXO are identified on your property.

Where can I find the AEHMP?

The AEHMP is available online at <https://health.hawaii.gov/heer/files/2019/11/WMAAEHMP.pdf>

Note: Use of this AEHMP is voluntary unless otherwise required under an agreement between the landowner and HDOH

Further Information

For questions related to UXO, contact:

Hawai'i Department of Health
 Hazard Evaluation and Emergency Response Office
 2385 Waimano Home Road #100
 Pearl City, Hawai'i 96782

Telephone: (808) 586-4249
 Website: <https://health.hawaii.gov/heer>

WMA Remediation Project Manager (RPM):

Sven Lindstrom: sven.lindstrom@doh.hawaii.gov

**Observe the “3Rs” of
 UXO Safety and Reporting:
 Recognize...Retreat...Report!**



Background

The 160 square mile Former Waikoloa Maneuver Area (FWMA) is in South Kohala on the Island of Hawaii. FWMA includes Ouli, Waikoloa Village, and Waimea.

The Navy established FWMA on Parker Ranch in 1943 through an agreement with Parker Ranch. Training included artillery firing with live ammunition and troop maneuvers. In 1946, the land was returned to Parker Ranch. Although several munitions removal actions have been conducted, munitions including artillery shells, fuzes, mines, rockets, grenades and mortars are still present. Although these munitions have been in the environment for nearly 70 years, they remain dangerous. Some munitions become more sensitive with age and can detonate with the slightest touch.

The US Army Corps of Engineers is removing munitions from areas easily accessible to the public, but this will take many years to complete. Even though munitions are rarely encountered, people living and playing near the FWMA should be aware of the potential hazard munitions pose. As such, being wary of any of old metal objects they come across in the area.

Help protect yourself, your family, and community from the potential explosive hazards present by learning and following the 3Rs of Explosive Safety (Recognize, Retreat, Report).



Former Waikoloa Maneuver Area

Waikoloa Information

3Rs Safety Guide

Emergency Contacts

- On land: Call 911
- At sea: Use Channel 16 (156.800 MHz)

An area containing printed information on the Former Waikoloa Maneuver Area is located at:
Thelma Parker Memorial
Public & School Library
Phone: (808) 887-6067

Contact US Army Corps of Engineers:
Public Affairs Office - Honolulu District
Phone: (808) 835-4004

CEPOH-PA@usace.army.mil
WMABoundaryExpansion@usace.army.mil

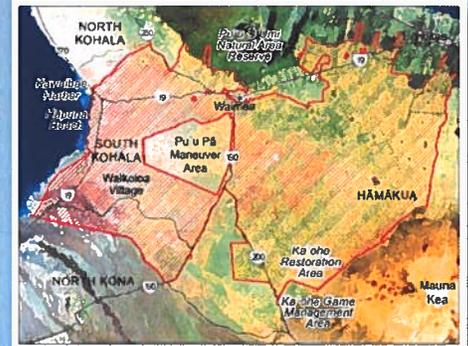
Project website:
[www.poh.usace.army.mil/Missions/
Environmental/FUDS/Waikoloa.aspx](http://www.poh.usace.army.mil/Missions/Environmental/FUDS/Waikoloa.aspx)
for additional information.

Learn and follow the
3Rs of Explosives Safety



Visit the US Army's Explosive Safety Education website:
3Rs.mil

October 2019



3Rs.mil

Follow the 3Rs

Recognize

Recognize when you may have encountered a munition and that munitions are dangerous.

Recognizing when you may have encountered a munition and that munitions are dangerous are the most important steps in reducing the risk of injury or death. Munitions may be encountered on land or in the water. They may be easy or hard to identify.

To avoid the risk of injury or death, follow the 3Rs of explosives safety and remember:

- ▶ Munitions may be encountered on land or in the water. They may be easy or hard to identify.
- ▶ Be aware that munitions are dangerous and they do not become safer with age
- ▶ Do not be tempted to take or keep a munition as a souvenir.

Munitions come in many sizes, shapes and colors. Some may look like bullets or bombs while others look like pipes, small cans or even a car muffler. Whether whole or in parts, new or old, shiny or rusty, munitions can still explode. The easiest way to avoid injury or death is to stay out of areas marked with warning signs or charted as restricted.



Retreat

Do not approach, touch, move or disturb it, but carefully leave the area.

When you encounter or think you have encountered a munition, avoid death or injury by retreating from the area.

If you encounter or suspect you have encountered a munition:

- ▶ Do not approach, touch, move or disturb it.
- ▶ Immediately and carefully leave the area; retrace your steps out of the area by the same path which you entered.

Once safely away from the munition, mark the path (e.g., with a piece of clothing) so response personnel can find the munition.



Report

Immediately notify the police if on land, or the U.S. Coast Guard, if on navigable waters.

Protect yourself, your family, your friends and your community by immediately reporting munitions or suspected munitions to the police.

Help us by providing as much information as you can remember about what you saw and where you saw it. This will help the police and military or civilian explosive ordnance disposal personnel find, evaluate and address the situation.

If you believe you may have encountered a munition, call 911 and report:

- ▶ The area where you encountered it.
- ▶ Its general description. Remember, do not approach touch, move or disturb it.
- ▶ When possible, provide:
 - Its estimated size
 - Its shape
 - Any visible markings, including coloring



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850



In Reply Refer To:
01EPIF00-2020-TA-0455

September 11, 2020

Ron Terry
Geometrician Associates, LLC
10 Hina Street
Hilo, Hawaii 96720

Subject: Technical Assistance for Lalamilo Reservoir Tank(s), South Kohala District, Island of Hawaii

Dear Mr. Terry,

The U.S. Fish and Wildlife Service (Service) received your correspondence on August 26, 2020, on behalf of County of Hawaii, Department of Water Supply, requesting comment on the proposed construction of either one 10-million gallon (MG) or two 5 MG reservoir tanks to ensure adequate reserve water within the Lalamilo Water System and provide critical redundancy and water for fire protection. The proposed project would occur on Parker Ranch property (TMK 6-8-001:001), which would be subdivided to create a 10 acre lot to accommodate the facilities. Power to fill the reservoir could come from the Lalamilo Windfarm. The project footprint includes several acres on site, as well as a 1000' water line connecting to Parker Ranch Well No. 3.

We have reviewed the information you provided and pertinent information in our files, as it pertains to listed species in accordance with section 7 of the ESA. Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwichensis*), band-rump storm-petrel (*Oceanodroma castro*), Hawaiian stilt (*Himantopus mexicanus*), Hawaiian coot (*Fulica alai*), Blackburn's sphinx moth (*Manduca blackburni*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*) and Hawaiian goose (*Branta sandvicensis*). The Hawaiian petrel, band-rump storm-petrel, and Newell's shearwater will hereafter collectively be referred to as "Hawaiian seabirds". The Hawaiian stilt and coot will hereafter collectively be referred to as "Hawaiian waterbirds."

The Hawaiian hawk (*Buteo solitarius*), a species that was recently removed from the federal list of threatened and endangered species, is known to occur in the area. While the Service no longer consults on the Hawaiian hawk, this species is still protected under Hawaiian state regulations

INTERIOR REGION 9
COLUMBIA-PACIFIC NORTHWEST
IDAHO, MONTANA*, OREGON*, WASHINGTON
*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS
AMERICAN SAMOA, GUAM, HAWAII, NORTHERN
MARIANA ISLANDS

(H.R.S. §195D-4) and the Migratory Bird Treaty Act (16 U.S.C. 703-712). Please reference those regulations for any additional consultation or mitigation requirements.

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 and construction. This letter has been prepared under the authority of, and in accordance with, provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) as amended (ESA).

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 seabirds

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 waterbirds

Listed Hawaiian waterbirds are found in fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation.

Based on the project details provided, our information suggests that your project may result in standing water or the creation of open water, thus attracting Hawaiian waterbirds to the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

To avoid and minimize potential project impacts to Hawaiian waterbirds we recommend you incorporate the following applicable measures into your project description:

- In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.
- If water resources are located within or adjacent to the project site, incorporate applicable best management practices regarding work in aquatic environments into the project design (see enclosure).
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
 - Contact the Service within 48 hours for further guidance.
 - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
 - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

Hawaiian goose

Nene are found on the islands of Hawaii, Maui, Molokai, and Kauai. They are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to nene we recommend you incorporate the following applicable measures into your project description:

- Do not approach, feed, or disturb nene.
- If nene are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with the nesting behavior of nene survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).

- Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.
- In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

Blackburn's sphinx moth

The Blackburn's sphinx moth may be in the vicinity of the proposed project area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), iliee (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*); larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothoestrum* sp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for up to a year (or more) before emerging from the soil. Soil disturbance can result in death of the pupae.

We offer the following survey recommendations to assess whether the Blackburn's sphinx moth is within the project area:

- A biologist familiar with the species should survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.
 - Surveys should be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and within 4-6 weeks prior to construction.
 - Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
 - If moths or the native aiea or tree tobacco over 3 feet tall are found during the survey, please contact the Service for additional guidance to avoid take.

If no Blackburn's sphinx moth, aiea, or tree tobacco are found during surveys, it is imperative that measures be taken to avoid attraction of Blackburn's sphinx moth to the project location and prohibit tree tobacco from entering the site. Tree tobacco can grow greater than 3 feet tall in approximately 6 weeks. If it grows over 3 feet, the plants may become a host plant for Blackburn's sphinx moth. We therefore recommend that you:

- Remove any tree tobacco less than 3 feet tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity.
 - Monitoring for tree tobacco can be completed by any staff, such as groundskeeper or regular maintenance crew, provided with picture placards of tree tobacco at different life stages.

Hawaiian hawk

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 a 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.

Measures to Avoid the Spread of Invasive Species

All activities, including site surveys, risk introduction of nonnative species into project areas. Ensure that all equipment, personnel, and supplies are properly checked and are free of contamination (weed seeds, organic matter, or other contaminants) before entering project areas. Please see attached Biosecurity Protocol for Hawaii Island.

Compliance with the ESA

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. If there is no federal action agency, but take of listed species cannot be fully avoided, further coordination with us pursuant to ESA compliance is necessary.

Thank you for participating with us in the protection of our endangered species. Please send us a copy of the EA when it is completed. If you have any further questions or concerns regarding this consultation, please contact Melissa Cady, Fish and Wildlife Biologist, 808-933-6963, email: melissa_cady@fws.gov. When referring to this project, please include this reference number: 01EPIF00-2020-TA-0455.

Sincerely,

**MICHELLE
BOGARDUS**

Digitally signed by
MICHELLE BOGARDUS
Date: 2020.09.11
15:30:13 -10'00'

Michelle Bogardus
Island Team Manager
Maui Nui and Hawaii Island

Enclosures: Recommended Standard Water Quality Best Management Practices, Biosecurity Protocols for the Island of Hawaii

Recommended Standard Water Quality Best Management Practices

The U.S. Fish and Wildlife Service recommends that the measures below be incorporated into projects to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.
2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.
3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.
4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.
5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.
6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.
7. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see <http://www.haccp-nrm.org/Wizard/default.asp>) to prevent attraction and introduction of non-native species.
8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.
9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.
10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).

BIOSECURITY PROTOCOL – HAWAI‘I ISLAND

The following biosecurity protocol (based on National Park Service, State of Hawai‘i, U.S. Fish and Wildlife, U.S. Geological Survey, and the DOI Office of Native Hawaiian Relations guidance) should be followed when operating on Hawai‘i Island to prevent the introduction of harmful invasive species including frogs, ants, weeds, and fungi into local natural areas (e.g., Hawai‘i Volcanoes National Park, Hakalau Forest National Wildlife Refuge, State of Hawai‘i “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 'Ōhi'a Death (ROD) fungus.

a. Avoid wounding 'ōhi'a 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 'ōhi'a parts:

a. 'Ōhi'a firewood, 'ōhi'a logs, and 'ōhi'a 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.

geometrician

A S S O C I A T E S , L L C
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August 26, 2020

Michelle Bogardus
Island Team Manager – Hawai‘i and Maui Nui
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
Via email only: Michelle_Bogardus@fws.gov

Dear Ms. Bogardus:

Subject: Early Consultation and Request for Technical Assistance, Lālāmilo Reservoir Tank(s) (10 MG Storage), South Kohala District, Island of Hawai‘i

Our firm is in the process of preparing an Environmental Assessment (EA) for a proposed County of Hawai‘i activity, in compliance with Chapter 343, Hawai‘i Revised Statutes (HAR), and Title 11, Chapter 200.1, Hawai‘i Administrative Rules (HAR).

The County of Hawai‘i, Department of Water Supply (DWS) proposes to construct either one 10-million gallon (MG) reservoir tank or two 5-MG reservoir tanks on property currently owned by Parker Ranch and designated by TMK 6-8-001:001 (see map, below). The property would be subdivided to create an approximately 10-acre lot for the proposed facilities between Parker Well No. 2 and Parker Well No. 3 (see photos, below). The purposes of the project are to provide added storage for adequate reserve water within the Lālāmilo Water System and provide critical redundancy and additional water for fire protection. Filling of the reservoir could occur when wind power from the nearby 3.3-megawatt Lālāmilo Windfarm Repowering Project was available, not only reducing pumping costs but also taking advantage of renewable power and reducing fossil fuel use and greenhouse gas emissions.

All work is expected to be conducted within an area of several acres, plus a connecting water line to Parker Ranch Well No. 3 about 1,000 feet in length. As with any construction project, the proposed work has the potential to produce construction equipment noise, emissions and fugitive dust. However, because of the isolated location and planned mitigation, these effects would be minimal and unlikely to affect the public. The EA will generally address federal cross cutters as part of compliance with Safe Drinking Water State Revolving Fund (SRF) documentation as supervised by the Department of Health, Safe Drinking Water Branch (DOH-SDWB).

We have already performed a biological reconnaissance of the area, which is within an existing cattle/sheep paddock. The current vegetation of the project site is a savanna comprised primarily of the alien plants kiawe (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*). These two plants account for more than 99 percent of biomass on the project site. The only native plants were a few small individuals of ‘ilima (*Sida fallax*) and ‘uhaloa (*Waltheria indica*). The low diversity was created and is maintained by the combination of low rainfall, periodic droughts, and grazing by cattle, sheep and goats. The five species of birds detected

during the two-hour morning survey are non-natives typical of those found in similar lowland highly disturbed habitat, although longer, repeated or differently timed surveys would undoubtedly detect additional species. No tree tobacco or other members of the Solanaceae that could be utilized by the endangered Blackburn's sphinx moth (*Manduca blackburnii*) are present. The pasture is poor nēnē (*Branta sandvicensis*) habitat but it is likely that Hawaiian hoary bats forage there.

Currently, the following mitigation measures are proposed for wide-ranging but listed animal species:

- The security lighting expected to be installed will be designed to have minimal impact on listed seabirds, specifically the Hawaiian petrel, or 'ua'u (*Pterodroma sandwichensis*), the endangered band-rumped storm petrel (*Oceanodroma castro*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*). Lighting will be shielded in conformance with the Hawai'i County Outdoor Lighting Ordinance (Hawai'i County Code, Article 9). Furthermore, it will consist blue-deficient lighting such as filtered LED lights or amber LED lights, with a Correlated Color Temperature (CCT) of 2700 Kelvin. This will reduce the risk that the threatened or endangered seabirds that may be attracted to and then disoriented by the lighting. Additionally, no nighttime construction work will be allowed during the seabird-fledging season, which runs from September 15 through December 15 each year.
- Impacts to the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) will be avoided by the timing of woody vegetation removal, if any is necessary. There will be no clearing of woody vegetation (whether native or non-native) taller than 15 feet during the Hawaiian hoary bat pupping season, unless a survey is conducted to ascertain definitively that there is no bat roosting in the affected shrub or tree.
- Although not expected on the site, pre-construction will include another verification that there are no nēnē individuals or nests that could be disturbed by construction activity. If present, construction will not proceed until they have left the area; if necessary, USFWS and DLNR will be contacted.
- Although not expected on the site prior to construction, as the site is not disturbed and the area is managed to prevent infestation, tree tobacco will be searched for one more time prior to construction. If present, protocol for protecting Blackburn's sphinx moth while dealing with the plants will be strictly followed, in consultation with USFWS. During construction, there is at least some potential for tree tobacco to sprout. Project managers will ensure that plants are removed at the juvenile stages prior to reaching three feet in height, when they are more likely to host the endangered moth.

At this time, we would like to request from your agency a list of threatened and endangered species and any other information you have on biological or other environmental conditions or impacts related to the development. Please contact me at rterry@hawaii.rr.com or 808-969-7090 if you have any questions or require clarification. Kindly indicate whether you wish to receive a copy of the EA when it has been completed.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Site Map



Site Photos



Project site, looking north to Parker Well No. 3 ▲ ▼ Project site, looking southwest to Parker Well No. 2





United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2020-TA-0455

September 11, 2020

Ron Terry
Geometrician Associates, LLC
10 Hina Street
Hilo, Hawaii 96720

Subject: Technical Assistance for Lalamilo Reservoir Tank(s), South Kohala District, Island of Hawaii

Dear Mr. Terry,

The U.S. Fish and Wildlife Service (Service) received your correspondence on August 26, 2020, on behalf of County of Hawaii, Department of Water Supply, requesting comment on the proposed construction of either one 10-million gallon (MG) or two 5 MG reservoir tanks to ensure adequate reserve water within the Lalamilo Water System and provide critical redundancy and water for fire protection. The proposed project would occur on Parker Ranch property (TMK 6-8-001:001), which would be subdivided to create a 10 acre lot to accommodate the facilities. Power to fill the reservoir could come from the Lalamilo Windfarm. The project footprint includes several acres on site, as well as a 1000' water line connecting to Parker Ranch Well No. 3.

We have reviewed the information you provided and pertinent information in our files, as it pertains to listed species in accordance with section 7 of the ESA. Our data indicate the following federally listed species may occur or transit through the vicinity of the proposed project area: the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), Hawaiian petrel (*Pterodroma sandwichensis*), band-rump storm-petrel (*Oceanodroma castro*), Hawaiian stilt (*Himantopus mexicanus*), Hawaiian coot (*Fulica alai*), Blackburn's sphinx moth (*Manduca blackburni*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*) and Hawaiian goose (*Branta sandvicensis*). The Hawaiian petrel, band-rump storm-petrel, and Newell's shearwater will hereafter collectively be referred to as "Hawaiian seabirds". The Hawaiian stilt and coot will hereafter collectively be referred to as "Hawaiian waterbirds."

The Hawaiian hawk (*Buteo solitarius*), a species that was recently removed from the federal list of threatened and endangered species, is known to occur in the area. While the Service no longer consults on the Hawaiian hawk, this species is still protected under Hawaiian state regulations

INTERIOR REGION 9
COLUMBIA-PACIFIC NORTHWEST

IDAHO, MONTANA*, OREGON*, WASHINGTON
*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS

AMERICAN SAMOA, GUAM, HAWAII, NORTHERN
MARIANA ISLANDS

(H.R.S. §195D-4) and the Migratory Bird Treaty Act (16 U.S.C. 703-712). Please reference those regulations for any additional consultation or mitigation requirements.

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 and construction. This letter has been prepared under the authority of, and in accordance with, provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq.*) as amended (ESA).

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 seabirds

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 waterbirds

Listed Hawaiian waterbirds are found in fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation.

Based on the project details provided, our information suggests that your project may result in standing water or the creation of open water, thus attracting Hawaiian waterbirds to the site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

To avoid and minimize potential project impacts to Hawaiian waterbirds we recommend you incorporate the following applicable measures into your project description:

- In areas where waterbirds are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.
- If water resources are located within or adjacent to the project site, incorporate applicable best management practices regarding work in aquatic environments into the project design (see enclosure).
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys where appropriate habitat occurs within the vicinity of the proposed project site prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
 - Contact the Service within 48 hours for further guidance.
 - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
 - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks/ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

Hawaiian goose

Nene are found on the islands of Hawaii, Maui, Molokai, and Kauai. They are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to nene we recommend you incorporate the following applicable measures into your project description:

- Do not approach, feed, or disturb nene.
- If nene are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with the nesting behavior of nene survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).

- Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.
- In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

Blackburn's sphinx moth

The Blackburn's sphinx moth may be in the vicinity of the proposed project area. Adult moths feed on nectar from native plants, including beach morning glory (*Ipomoea pes-caprae*), iliee (*Plumbago zeylanica*), and maiapilo (*Capparis sandwichiana*); larvae feed upon non-native tree tobacco (*Nicotiana glauca*) and native aiea (*Nothocestrum* sp.). To pupate, the larvae burrow into the soil and can remain in a state of torpor for up to a year (or more) before emerging from the soil. Soil disturbance can result in death of the pupae.

We offer the following survey recommendations to assess whether the Blackburn's sphinx moth is within the project area:

- A biologist familiar with the species should survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.
 - Surveys should be conducted during the wettest portion of the year (usually November-April or several weeks after a significant rain) and within 4-6 weeks prior to construction.
 - Surveys should include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
 - If moths or the native aiea or tree tobacco over 3 feet tall are found during the survey, please contact the Service for additional guidance to avoid take.

If no Blackburn's sphinx moth, aiea, or tree tobacco are found during surveys, it is imperative that measures be taken to avoid attraction of Blackburn's sphinx moth to the project location and prohibit tree tobacco from entering the site. Tree tobacco can grow greater than 3 feet tall in approximately 6 weeks. If it grows over 3 feet, the plants may become a host plant for Blackburn's sphinx moth. We therefore recommend that you:

- Remove any tree tobacco less than 3 feet tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during, and after the proposed ground-disturbing activity.
 - Monitoring for tree tobacco can be completed by any staff, such as groundskeeper or regular maintenance crew, provided with picture placards of tree tobacco at different life stages.

Hawaiian hawk

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 a 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.

Measures to Avoid the Spread of Invasive Species

All activities, including site surveys, risk introduction of nonnative species into project areas. Ensure that all equipment, personnel, and supplies are properly checked and are free of contamination (weed seeds, organic matter, or other contaminants) before entering project areas. Please see attached Biosecurity Protocol for Hawaii Island.

Compliance with the ESA

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. If there is no federal action agency, but take of listed species cannot be fully avoided, further coordination with us pursuant to ESA compliance is necessary.

Thank you for participating with us in the protection of our endangered species. Please send us a copy of the EA when it is completed. If you have any further questions or concerns regarding this consultation, please contact Melissa Cady, Fish and Wildlife Biologist, 808-933-6963, email: melissa_cady@fws.gov. When referring to this project, please include this reference number: 01EPIF00-2020-TA-0455.

Sincerely,

Michelle Bogardus
Island Team Manager
Maui Nui and Hawaii Island

Enclosures: Recommended Standard Water Quality Best Management Practices, Biosecurity Protocols for the Island of Hawaii

Recommended Standard Water Quality Best Management Practices

The U.S. Fish and Wildlife Service recommends that the measures below be incorporated into projects to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.
2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.
3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.
4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.
5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.
6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.
7. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see <http://www.haccp-nrm.org/Wizard/default.asp>) to prevent attraction and introduction of non-native species.
8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.
9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.
10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).

BIOSECURITY PROTOCOL – HAWAI‘I ISLAND

The following biosecurity protocol (based on National Park Service, State of Hawai‘i, U.S. Fish and Wildlife, U.S. Geological Survey, and the DOI Office of Native Hawaiian Relations guidance) should be followed when operating on Hawai‘i Island to prevent the introduction of harmful invasive species including frogs, ants, weeds, and fungi into local natural areas (e.g., Hawai‘i Volcanoes National Park, Hakalau Forest National Wildlife Refuge, State of Hawai‘i “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 \(https://www.antcafe.com/\)](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 ‘Ōhi‘a Death (ROD) fungus.

a. Avoid wounding ‘ōhi‘a 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 ‘ōhi‘a parts:

a. ‘Ōhi‘a firewood, ‘ōhi‘a logs, and ‘ōhi‘a 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.

Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 1b

Comments to Draft EA and Responses

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STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
179822 SL

May 21, 2021

Ms. Shari Uyeno
County of Hawai'i
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 9672

Facility/Site: **Pohakuloa Training Area Puu Paa**

Subject: **Comments on Draft Environmental Assessment for Lālāmilo 10 MG Reservoir Project, dated May 2021**

Dear Ms. Uyeno:

The Hawaii Department of Health (HDOH), Hazard Evaluation and Emergency Response (HEER) Office reviewed the above-referenced Draft Environmental Assessment and has the following comments:

1. Section 3.1.5, **Hazardous Materials, Toxic Substances and Hazardous Conditions, Impacts and Mitigation Measures** states: "Based on the historical presence of MEC in the Pu'u Pā MRS, the area proposed for the tank reservoir must be investigated and any remaining surface as well as sub-surface MEC removed prior to construction, for safety purposes." It further states that it is not known when and to what degree MEC on the site will be removed by USACE during their current Removal Action and therefore GSI Pacific Inc. (GSI) developed a detailed plan to address remaining MEC that is summarized in this section. Item 3 of the list of GSI activities on Page 24 states that GSI will complete a "surface and subsurface clearance of MEC".

Please be aware that you cannot be sure that 100% of MEC items have been removed from the site unless all soil at the site is excavated down to bedrock and the excavated soil is adequately sieved or thoroughly surveyed for MEC items. This is because the removal of MEC in situ is limited by the depth of detection of the metal detectors used by USACE or the UXO contractor. Smaller projectiles commonly found at the Waikoloa Maneuver Area, such as the 37mm projectile, can only be detected with confidence to a depth of about 10- to 12-inches below ground. Therefore, even following a clearance by USACE or a private UXO contractor (unless all soil was excavated and screened), there is still a "residual risk" that a MEC hazard remains that must be mitigated by institutional

Ms. Shari Uyeno

May 21, 2021

Page 2 of 2

controls. The Areawide Environmental Hazard Management Plan (AEHMP) for the Waikoloa Maneuver Area prepared by the HEER office provides guidance on mitigating residual risk of MEC hazards during and after redevelopment of properties in the Waikoloa area (<https://health.hawaii.gov/heer/files/2019/11/WMAAEHMP.pdf>).

Recommended mitigation measures generally consist of the use of UXO Construction Support during ground-disturbing activities and educational awareness training about UXO hazards to site users both during and after construction.

HDOH recommends that you edit this section to include mitigation measures to address residual risk of MEC hazards following the MEC clearance unless complete excavation to bedrock is planned across the site.

2. Appendix 4, Section 3.1.2, **Project Activities** states that the RA process will include "Complete Surface and Subsurface Clearance of MEC;" however, it does not specify whether this will be limited by depth of detection of MEC and "residual risk" will remain, or if the "Clearance" will include site-wide excavation to bedrock to ensure the removal of **all** MEC items (see above). HDOH recommends clarifying the limitations of the RA and including a description of institutional controls that will be established for the site to manage and mitigate "residual risk" following the RA.
3. Appendix 4, Section 4.2.1, **Assumptions** states that the property "must be cleared of all equipment/rubbish/project material prior to the MEC Clearance" and "UXO Contractor will not perform site rubbish removal".

Please be aware that the removal of rubbish and other materials on site is essential to ensure the clearance of all MEC from the site, since MEC could be hidden beneath or mixed-in with rubbish or other materials that can mask the MEC from detection. Rubbish removal should be completed prior to the MEC clearance. HDOH recommends including the removal of such rubbish in the scope of work for the UXO contractor. At a minimum, if the removal of rubbish and other project materials involves potential disturbance of soil at the site, then HDOH recommends using UXO Construction Support during the activity since UXO could be present mixed-in-with or beneath the rubbish or other materials.

Should there be any questions, please do not hesitate to call me at (808) 586-5815 or send me an email at sven.lindstrom@doh.hawaii.gov.

Sincerely,



Sven Lindstrom
Voluntary Cleanup Program Specialist
Site Discovery, Assessment, and Remediation
Hazard Evaluation and Emergency Response Office
Hawaii Department of Health

cc: Ron Terry (via e-mail)

geometrician

A S S O C I A T E S , L L C
integrating geographic science and planning

phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Sven Lindstrom
Voluntary Cleanup Program Specialist
Site Discovery, Assessment, and Remediation
Hazard Evaluation and Emergency Response Office
Hawai'i Department of Health
PO Box 3378
Honolulu HI 96801-3378

Dear Mr. Lindstrom:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your very helpful comment letter dated June 4, 2021. In answer to your individual comments:

1. *Section 3.1.5, Hazardous Materials, Toxic Substances and Hazardous Conditions: One cannot be sure that 100% of MEC items have been removed from the site unless all soil at the site is excavated down to bedrock and the excavated soil is adequately sieved or thoroughly surveyed for MEC items. Removal of MEC in situ is limited by the depth of detection of the metal detectors used by USACE or the UXO contractor. Smaller projectiles commonly found at the Waikoloa Maneuver Area, such as the 37mm projectile, can only be detected with confidence to a depth of about 10- to 12-inches below ground. Therefore, even following a clearance by USACE or a private UXO contractor (unless all soil was excavated and screened), there is still a "residual risk" that a MEC hazard remains that must be mitigated by institutional controls. The Areawide Environmental Hazard Management Plan (AEHMP) for the Waikoloa Maneuver Area prepared by the HEER office provides guidance on mitigating residual risk of MEC hazards during and after redevelopment of properties in the Waikoloa area. Recommended mitigation measures generally consist of the use of UXO Construction Support during ground-disturbing activities and educational awareness training about UXO hazards to site users both during and after construction. HDOH recommends that you edit this section to include mitigation measures to address residual risk of MEC hazards following the MEC clearance unless complete excavation to bedrock is planned across the site. The DWS sincerely appreciates your review and comment. It is not expected that MEC clearance efforts will include clearance to bedrock and screening of excavated soil. DWS will ensure that residual risk is addressed and that appropriate construction support and UXO educational awareness training measures are incorporated in the project's construction and operation. As part of the UXO Construction Support process, a Work Plan*

will be completed before field activities begin that provides a set of site-specific mitigation measures. DWS will provide this to the HEER office for review prior to construction.

2. *Appendix 4, Section 3.1.2, states that the RA process will include "Complete Surface and Subsurface Clearance of MEC;" however, it does not specify whether this will be limited by depth of detection of MEC and "residual risk" will remain, or if the "Clearance" will include site-wide excavation to bedrock to ensure the removal of all MEC items (see above). HDOH recommends clarifying the limitations of the RA and including a description of institutional controls that will be established for the site to manage and mitigate "residual risk" following the RA. The use of the specific term "Remedial Action (RA)" has been removed and the action has been re-worded as appropriate in Appendix 4. Please also refer to response to Comment 1.*

3. *Appendix 4, Section 4.2.1, Assumptions states that the property must be cleared of all equipment/rubbish/project material prior to the MEC Clearance" and "UXO Contractor will not perform site rubbish removal". Please be aware that the removal of rubbish and other materials on site is essential to ensure the clearance of all MEC from the site, since MEC could be hidden beneath or mixed-in with rubbish or other materials that can mask the MEC from detection. Rubbish removal should be completed prior to the MEC clearance. HDOH recommends including the removal of such rubbish in the scope of work for the UXO contractor. At a minimum, if the removal of rubbish and other project materials involves potential disturbance of soil at the site, then HDOH recommends using UXO Construction Support during the activity since UXO could be present mixed-in-with or beneath the rubbish or other materials. In Appendix 4, Section 4.2.1, the 5th bullet has been revised to read: "As part of the scope of work, the UXO contractor will clear all equipment/rubbish/project material prior to the MEC Clearance."*

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiiidws.org or (808) 961-8070 ext 252.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 4, 2021

County of Hawaii
Department of Water Supply
Attn: Ms. Shari Uyeno
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 96720

via email: suyeno@hawaiiidws.org

Dear Ms. Uyeno:

SUBJECT: Draft Environmental Assessment for the Proposed **Lalamilo 10 MG Tank Reservoir** located at South Kohala District, Island of Hawaii; TMK: (3) 6-8-001: 001 (por.)

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

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

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Enclosures

cc: Central Files
Geometrician Associates, LLC (w/copies)
Attn: Mr. Ron Terry (via email: rterry@hawaii.rr.com)

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 11, 2021

MEMORANDUM

FROM:

TO:

DLNR Agencies:

- Div. of Aquatic Resources
- Div. of Boating & Ocean Recreation
- Engineering Division (DLNR.ENGR@hawaii.gov)
- Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
- Div. of State Parks
- Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
- Office of Conservation & Coastal Lands
- Land Division – Hawaii District (gordon.c.heit@hawaii.gov)

TO:

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Draft Environmental Assessment for the Proposed **Lalamilo 10 MG Tank Reservoir**

LOCATION: South Kohala District, Island of Hawaii; TMK: (3) 6-8-001: 001 (por.)

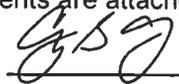
APPLICANT: Geometrician Associates LLC on behalf of County of Hawaii, Department of Water Supply

Transmitted for your review and comment is information on the above-referenced subject matter. The DEA was published on May 8, 2021 in the Office of Environmental Quality Control's periodic bulletin, The Environmental Notice, at the following link:

[http://oegc2.doh.hawaii.gov/The Environmental Notice/2021-05-08-TEN.pdf](http://oegc2.doh.hawaii.gov/The%20Environmental%20Notice/2021-05-08-TEN.pdf)

Please submit any comments by **June 5, 2021**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura via email at darlene.k.nakamura@hawaii.gov. Thank you.

- We have no objections.
- We have no comments.
- We have no additional comments.
- Comments are attached.

Signed: 

Print Name: Carty S. Chang, Chief Engineer

Division: Engineering Division

Date: Jun 1, 2021

Attachments
cc: Central Files

**DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION**

LD/Russell Y. Tsuji

Ref: Draft Environmental Assessment for the Proposed Lalamilo 10 MG Tank Reservoir

Location: South Kohala District, Island of Hawaii

TMK(s): (3) 6-8-001: 001 (por.)

**Applicant: Geometrician Associates LLC on behalf of County of Hawaii,
Department of Water Supply**

COMMENTS

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

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

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

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai: County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

Signed: _____



CARTY S. CHANG, CHIEF ENGINEER

Date: Jun 1, 2021

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 11, 2021

MEMORANDUM

TO: **DLNR Agencies:**
 ___ Div. of Aquatic Resources
 ___ Div. of Boating & Ocean Recreation
 X Engineering Division (DLNR.ENGR@hawaii.gov)
 X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
 ___ Div. of State Parks
 X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
 ___ Office of Conservation & Coastal Lands
 X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Draft Environmental Assessment for the Proposed **Lalamilo 10 MG Tank Reservoir**

LOCATION: South Kohala District, Island of Hawaii; TMK: (3) 6-8-001: 001 (por.)

APPLICANT: Geometrician Associates LLC on behalf of County of Hawaii, Department of Water Supply

Transmitted for your review and comment is information on the above-referenced subject matter. The DEA was published on May 8, 2021 in the Office of Environmental Quality Control's periodic bulletin, The Environmental Notice, at the following link:

http://oeqc2.doh.hawaii.gov/The_Environmental_Notice/2021-05-08-TEN.pdf

Please submit any comments by **June 5, 2021**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura via email at darlene.k.nakamura@hawaii.gov. Thank you.

- () We have no objections.
- We have no comments.
- () We have no additional comments.
- () Comments are attached.

Signed: 

Print Name: DAVID G. SMITH, Administrator

Division: Division of Forestry and Wildlife

Date: May 31, 2021

Attachments
cc: Central Files

DAVID Y. IGE
GOVERNOR OF HAWAII



SUZANNE D. CASE
CHAIRPERSON

KAMANA BEAMER, PH.D.
MICHAEL G. BUCK
ELIZABETH A. CHAR, M.D.
NEIL J. HANNAHS
WAYNE K. KATAYAMA
PAUL J. MEYER

M. KALEO MANUEL
DEPUTY DIRECTOR

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

June 2, 2021

REF: RFD.5372.8

TO: Mr. Russell Tsuji, Administrator
Land Division

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

SUBJECT: Draft Environmental Assessment for the Proposed Lalamilo 10 MG Tank Reservoir

FILE NO.: RFD.5372.8
TMK NO.: (3) 6-8-001:001

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.

1. We recommend coordination with the county to incorporate this project into the county's Water Use and Development Plan. Please contact the respective Planning Department and/or Department of Water Supply for further information.
2. We recommend coordination with the Engineering Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.
3. We recommend coordination with the Hawaii Department of Agriculture (HDOA) to incorporate the reclassification of agricultural zoned land and the redistribution of agricultural resources into the State's Agricultural Water Use and Development Plan (AWUDP). Please contact the HDOA for more information.
4. We recommend that water efficient fixtures be installed and water efficient practices implemented throughout the development to reduce the increased demand on the area's freshwater resources. Reducing the water usage of a home or building may earn credit towards Leadership in Energy and Environmental Design (LEED) certification. More information on LEED certification is available at <http://www.usgbc.org/leed>. A listing of fixtures certified by the EAP as having high water efficiency can be found at <http://www.epa.gov/watersense>.
5. We recommend the use of best management practices (BMP) for stormwater management to minimize the impact of the project to the existing area's hydrology while maintaining on-site infiltration and preventing polluted runoff from storm events. Stormwater management BMPs may earn credit toward LEED certification. More information on stormwater BMPs can be found at <http://planning.hawaii.gov/czm/initiatives/low-impact-development/>
6. We recommend the use of alternative water sources, wherever practicable.
7. We recommend participating in the Hawaii Green Business Program, that assists and recognizes businesses that strive to operate in an environmentally and socially responsible manner. The program description can be found online at <http://energy.hawaii.gov/green-business-program>.
8. We recommend adopting landscape irrigation conservation best management practices endorsed by the Landscape Industry Council of Hawaii. These practices can be found online at http://www.hawaiiscape.com/wp-content/uploads/2013/04/LICH_Irrigation_Conservation_BMPs.pdf.

- 9. There may be the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.
- 10. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit is required prior to use of water. The Water Use Permit may be conditioned on the requirement to use dual line water supply systems for new industrial and commercial developments.
- 11. A Well Construction Permit(s) is (are) are required before the commencement of any well construction work.
- 12. A Pump Installation Permit(s) is (are) required before ground water is developed as a source of supply for the project.
- 13. There is (are) well(s) located on or adjacent to this project. If wells are not planned to be used and will be affected by any new construction, they must be properly abandoned and sealed. A permit for well abandonment must be obtained.
- 14. Ground-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.
- 15. A Stream Channel Alteration Permit(s) is (are) required before any alteration can be made to the bed and/or banks of a steam channel.
- 16. A Stream Diversion Works Permit(s) is (are) required before any stream diversion works is constructed or altered.
- 17. A Petition to Amend the Interim Instream Flow Standard is required for any new or expanded diversion(s) of surface water.
- 18. The planned source of water for this project has not been identified in this report. Therefore, we cannot determine what permits or petitions are required from our office, or whether there are potential impacts to water resources.

- OTHER:

If you have any questions, please contact Neal Fujii of the Commission staff at 587-0216.

5/24/21

DAVID Y. IGE
GOVERNOR OF HAWAII



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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

May 11, 2021

MEMORANDUM

TO: **DLNR Agencies:**
 ___ Div. of Aquatic Resources
 ___ Div. of Boating & Ocean Recreation
 X Engineering Division (DLNR.ENGR@hawaii.gov)
 X Div. of Forestry & Wildlife (rubyrosa.t.terrago@hawaii.gov)
 ___ Div. of State Parks
 X Commission on Water Resource Management (DLNR.CWRM@hawaii.gov)
 ___ Office of Conservation & Coastal Lands
 X Land Division – Hawaii District (gordon.c.heit@hawaii.gov)

FROM: Russell Y. Tsuji, Land Administrator

SUBJECT: Draft Environmental Assessment for the Proposed Lalamilo 10 MG Tank Reservoir

LOCATION: South Kohala District, Island of Hawaii; TMK: (3) 6-8-001: 001 (por.)

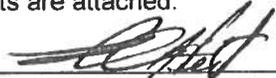
APPLICANT: Geometrician Associates LLC on behalf of County of Hawaii, Department of Water Supply

Transmitted for your review and comment is information on the above-referenced subject matter. The DEA was published on May 8, 2021 in the Office of Environmental Quality Control's periodic bulletin, The Environmental Notice, at the following link:

http://oeqc2.doh.hawaii.gov/The_Environmental_Notice/2021-05-08-TEN.pdf

Please submit any comments by **June 5, 2021**. If no response is received by this date, we will assume your agency has no comments. Should you have any questions, please contact Darlene Nakamura via email at darlene.k.nakamura@hawaii.gov. Thank you.

- We have no objections.
- We have no comments.
- We have no additional comments.
- Comments are attached.

Signed: 
 Print Name: GORDON C. HEIT
 Division: Land Division
 Date: 5/18/21

Attachments
cc: Central Files

geometrician

A S S O C I A T E S , L L C
integrating geographic science and planning

phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Russell Y. Tsuji, Administrator
Hawai'i State DLNR Land Division
P.O. Box 621
Honolulu HI 96809

Dear Mr. Tsuji:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your comment letter on the Draft EA dated May 11, 2021, to which memos from four DLNR units were attached. We wish to acknowledge the no-comment memos by the Land Division - Hawai'i District and the Division of Forestry and Wildlife, as well as the additional comment memo from the Engineering Division concerning compliance with the rules and regulations of the National Flood Insurance Program (NFIP). DWS is coordinating with the Hawai'i Department of Public Works and will comply with all applicable floodplain regulations.

With respect to the memo from the Commission on Water Resource Management, as the project was initiated and is being managed by DWS, the project is being incorporated into the county's Water Use and Development Plan. No State projects are involved, but the DLNR Engineering Division has been made aware of the project. As discussed in Section 3.1.2 of the EA, appropriate 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 are an integral part of project design.

We appreciate your review of the document and circulation to various units within DLNR. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiiidws.org or (808) 961-8070 ext. 252.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

From: Cab General <Cab.General@doh.hawaii.gov>
Sent: Friday, June 4, 2021 2:40 PM
To: suyeno@hawaiidws.org; rterry@hawaii.rr.com
Subject: FW: Lalamilo 10 MG Tank Reservoir--Draft EA (AFNSI)

Aloha

Thank you for the opportunity to provide comments on the subject project.
Please see our standard comments at:

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

Please let me know if you have any Questions

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

geometrician

A S S O C I A T E S , L L C
integrating geographic science and planning

phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Lisa M.M. Wallace
EHS QA Officer
Clean Air Branch
Environmental Health Office, Hilo
Via email: Cab.General@doh.hawaii.gov

Dear Ms. Wallace:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your comment email dated June 4, 2021, in which you provided a link to your office's set of standard comments. These were consulted during preparation of the EA, which discusses air quality in Sections 3.1.4 and 3.7.2.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiidws.org or (808) 961-8070 ex.t 252.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

Mitchell D. Roth
Mayor



Steven Ikaika Rodenhurst, P.E.
Director

Lee E. Lord
Managing Director

Stephen M. Pause, P.E.
Deputy Director

County of Hawai'i
DEPARTMENT OF PUBLIC WORKS
Aupuni Center
101 Pauahi Street, Suite 7 · Hilo, Hawai'i 96720-4224
(808) 961-8321 · Fax (808) 961-8630
public_works@hawaiicounty.gov

JUNE 7, 2021

ATTN: SHARI UYENO
COUNTY OF HAWAII
DEPARTMENT OF WATER SUPPLY
345 KEKIANAOKA STREET, SUITE 20
HILO, HAWAII 96720
(via email to suyeno@hawaiidws.org)

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE LALAMILO 10 MG
RESERVOIR PROJECT
SOUTH KOHALA DISTRICT, ISLAND OF HAWAII
TMK: (3) 6-8-001:001 (POR)

We received the subject letter on May 10, 2021 and have the following comments:

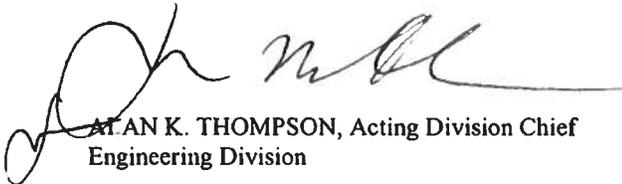
The subject parcel is in an area designated as Zone X on the Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA). Zone X is an area determined to be outside the 500-year floodplain.

All development-generated runoff shall be disposed of on site and not directed toward any adjacent properties. A drainage study shall be prepared and the recommended drainage system shall be constructed meeting the approval of the Department of Public Works.

All activities shall comply with the requirements of Hawaii County Code, Chapter 10, Erosion and Sedimentary Control.

Access to the subject property is via a private road that connects to Queen Ka'ahumanu Highway (State Highway 19) which is under the State of Highway jurisdiction.

Should there be any questions concerning this matter, please contact Ms. Robyn Matsumoto in our Engineering Division at (808) 961-8924.



ALAN K. THOMPSON, Acting Division Chief
Engineering Division

RM

cc: Ron Terry, Geometrician Associates, LLC. (via email to rterry@hawaii.rr.com)

geometrician

A S S O C I A T E S , L L C
integrating geographic science and planning

phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Alan K. Thompson, Acting Division Chief
Engineering Division
Hawai'i County Department of Public Works
101 Pauahi Street, Suite 7
Hilo HI 96720-4224

Dear Mr. Thompson:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your comment letter dated June 7, 2021. In answer to your specific comments:

1. *Subject parcel is in an area designated as Zone X.* Thank you for the flood zone information for the parcel and project area.
2. *Development-generated runoff must be disposed of onsite and not be directed toward adjacent properties, and drainage study shall be prepared by a licensed civil engineer and the recommended drainage system shall be constructed meeting the approval of the Department of Public Works.* Project design and construction will ensure adherence to these requirements of Chapter 27.
3. *Earthwork and grading shall conform with Chapter 10 of the Hawai'i County Code.* Conformance with Chapter 10 is understood to be required, and the contractor will apply for a grading permit at the appropriate time.
4. *Access to the subject property is via a private road that connects to Queen Ka'ahumanu Highway (State Highway 19,) which is under the State of Highway jurisdiction.* This is acknowledged.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiiidws.org or (808) 961-8070 ext. 252.

Sincerely,

A handwritten signature in black ink that reads "Ron Terry". The signature is written in a cursive style with a large, stylized "R" and "T".

Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

Mitchell D. Roth
Mayor

Lee E. Lord
Managing Director

West Hawai'i Office
74-5044 Ane Keohokālole Hwy
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Phone (808) 323-4770
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County of Hawai'i PLANNING DEPARTMENT

Zendo Kern
Director

Jeffrey W. Darrow
Deputy Director

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

June 6, 2021

Shari Uyeno
County of Hawaii, Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, HI 96720

Dear Shari Uyeno,

Subject: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
Applicant: Department of Water Supply
Project: Lalamilo 10MG Tank Reservoir
TMK: (3) 6-8-001:001(por.), South Kohala District, Island of Hawai'i

Ola I Ka Wai. Thank you for including us in consultation for this draft environmental assessment and anticipated finding of no significant impact (DEA-AFNSI) for the Lalamilo 10 MG Tank Reservoir.

We understand the proposal deals with storage not source development and there will be no effect on aquifer pumpage; however, peak usage is projected to grow with demand- having 10 MG reservoir is a substantial addition to reserve supply. Cumulatively, the proposed action represents increasing overall supply capacity in a 'water system' that has continued to expand since at least the early 20th century. Such situations bring the future of South Kohala land use into stark contrast with sustainability of environmental resources.

- Each water use and development plan and the state water projects plan shall be consistent with the respective county land use plans and policies, including general plan and zoning as determined by each respective county¹.
- The proposed action lies within the West Mauna Kea Aquifer Sector and the Waimea Aquifer System. Demand as of December 16, 2016 was reported at 86.4% of sustainable yield².
- The State Land Use District is Agriculture, and the Hawai'i County Land Use Pattern Allocation Guide (LUPAG) designations of the project area are "Open" and "Extensive Agriculture". County zoning districts include "Agricultural – 5 acres" and "Open".
- The water utility courses of action for South Kohala in the Hawaii County General Plan are as follows:
 - (a) Seek alternative sources of water for the Lalamilo system.
 - (b) Improve and replace inadequate distribution mains and steel tanks.
 - (c) Continue to seek additional groundwater sources for the Waimea System.

¹ HRS 13-170-32(2)

² Water Resources Protection Plan 2019 Update, Table H-10 Waimea Aquifer

- Full build-out water demands associated with the maximum density of Land Use Pattern Allocation Guide (LUPAG) land uses in the existing 2005 General Plan are not sustainable. Existing Zoning if legally developed would require nearly 60 percent of the existing sustainable yield if agricultural demands are not included, and over six times the sustainable yield if “worst” case agricultural demands are included³.
- General Policies 5.9, 5.3, 5.2, and 5.1 of the South Kohala Community Development Plan contain strong language for the protection and stewardship of the region’s groundwater resources.
- As documented, the health of this aquifer is questionable in relation to current and future development build out, aquifer sustainable yield, and aquifer recharge. This concern was reflected in the 2019 WRPP draft update as it considered lowering the aquifer’s sustainable yield from 24 MG per day to 16 MG per day.

We support reserve water for adequate fire protection as well as energy-efficient infrastructure systems. Nevertheless, continued caution in respect to any development of Lalamilo Water System is required and close coordination to match aquifer carrying capacity to desired future land use patterns is critical. Because groundwater in Hawaii is a public trust and, adverse effects in one area may affect other water resources, we must find ways together to remain hyperaware of this and other aquifer’s quality and quantity of water, including transition zones; “(any) changes in ‘boundary conditions’ amongst these (aquifer) areas will also affect and change recharge analysis and quantities...”⁴.

In conclusion, “when...the proposing agency and the agency making the determination are the same, the OEQC may review the agency’s determination, consult and advise the agency of potential conflicts, to comply with this section”.⁵ We request that the final determination also take into account all cumulative, secondary and nonphysical aspects of this proposal. While the project is presented as individually limited, there may be needed commitments for larger actions; other significance factors may be enjoined⁶.

We recommend collaboration with the following groups and look forward to reviewing the final determination:

- The South Kohala Partnership
- South Kohala CDP Action Committee
- Hawaii Wildfire Management Organization
- Waikoloa Dry Forest Initiative
- Hawaii Watershed Partnerships (HAWP)

Sincerely,



ZENDO KERN
Planning Director

KKS:kvs

\\coh01\planning\public\wpwin60\CH343\2020\LalamiloReservoir DEA

³ Hawaii County Water Use and Development Plan Update. Sec. 803.5.Resource and Facility Recommendations

⁴ Water Resources Protection Plan 2019 Update

⁵ HRS 343-5(c)(5)

⁶ Chapter 11-200.1-13, Hawai'i Administrative Rules

Shari Uyeno
County of Hawaii, Department of Water Supply
June 6, 2021
Page 3

Cc:
Office of Environmental Quality Control
235 South Beretania Street, Suite 702, Honolulu, Hawai'i 96813
oeqchawaii@doh.hawaii.gov
Ron Terry Geometrician Associates
10 Hina Street Hilo HI 96720
Or by email to rterry@hawaii.rr.com

Proposing/ Determining Agency: (Please send original comments)
Or by email to suyeno@hawaiiidws.org

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phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Zendo Kern, Director
Hawaii County Planning Department
101 Pauahi Street, Suite 3
Hilo HI 96720

Dear Mr. Kern:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your comment letter dated June 6, 2021. In answer to your specific comments:

1. *Peak usage is projected to grow with demand - having 10 MG reservoir is a substantial addition to reserve supply.* If we understand your comment correctly, you reason that an increase in storage will lead to an increase in consumption. This is not the case. Additional reserve supply for the Lālāmilo Water System will not promote or even allow an increase in average daily consumption, because there will be no increase in source and thus, no increase in water availability for that water system. We acknowledge the concerns about the future health of the aquifer and sustainability in your bullet points relating to the water use plans and policies, the sustainable yield of the aquifer, and future water demands if every property were fully developed to its current zoning or future LUPAG category and ended up utilizing groundwater for all or most such demands. However, they are not germane to a project whose only purpose is a more rational and sustainable storage system.

What the project will allow is improved fire-fighting capability and the ability to utilize renewable energy to pump into storage reservoirs. The Department recognizes the sensitivity of the local aquifer system and continues to implement water conservation measures and work with the Commission on Water Resources Management to properly manage this resource.

2. *OEQC may review the agency's determination.* This is acknowledged.

3. *The final determination should also take into account all cumulative, secondary and nonphysical aspects of this proposal. While the project is presented as individually limited, there may be needed commitments for larger actions; other significance factors may be enjoined.* Cumulative and secondary impacts are fully discussed in the Draft EA. Again, the project will cause no increase in average daily consumption.

4. *Recommend collaboration with the following groups: The South Kohala Partnership; South Kohala CDP Action Committee; Hawaii Wildfire Management Organization; Waikoloa Dry Forest Initiative; Hawaii Watershed Partnerships (HAWP).* The DWS would be happy to collaborate with any of these agencies as part of water use planning. None of these agencies commented on the Draft EA. In DWS's view, the benefit to fire protection, and therefore watershed health, would be welcomed by most if not all of these groups. Please note that the Waikoloa Village Association, which is the owner of the land occupied by the Waikoloa Dry Forest Preserve, provided a comment letter supporting the project on the basis of increased fire protection.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiidws.org or (808) 961-8070 ext. 252.

Sincerely,

A handwritten signature in black ink that reads "Ron Terry". The signature is written in a cursive style with a large, stylized "R" and "T".

Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

From: Roger Wehrsig <gm@wvagolf.com>
Sent: Wednesday, May 26, 2021 2:03 PM
To: uyeno@hawaiiidws.org
Cc: rterry@hawaii.rr.com
Subject: Lalamilo 10 MG Tank Reservoir - Draft EA - TMK (3) 6-8-001:001

Aloha Mr. Uyeno,

On behalf of the Board of Director's for the Waikoloa Village Association that comprises 3,037 residential home and condominium's within the Waikoloa Village Community would like to note our support of the County of Hawaii, Department of Water Supply's, development of a 10 MG Tank Reservoir to be located on Parker Ranch Land abutting the Waikoloa Village Association's parcel: 6-8-002:019.

While the Waikoloa area draws its water from Hawaii Water Service, the development of reliable water resources to accommodate the anticipated growth in the South Kohala area as well as provide the water for the Hawaii County Fire Department to have an additional resource to draw water from in the event of a wildfire threatening the area is of high importance. As Hawaii Water Service, on their own initiative install three fire hydrants along the utility road that runs along the utility road mauka of the village, we would also like to recommend that the County of Hawaii, Department of Water Supply also as part of the 10 MG Tan Reservoir also install water hydrants along the paved roadway for Wells #5, #6, #7 and #8.

The paved roadway that provides access to the Department of Water's Supplies Lalamilo Well sites is the only paved roadway access that the Hawaii County Fire Department can access to combat a wildfire in that area. As you are aware, there have been a number of large wildfires one of which originated from the Lalamilo Farm Lots Area and threatened the Waikoloa Village Community. Foresight by the County by installing the fire hydrants in the area may save lives and homes in the future.

We thank you for considering our request.

Best regards,

ROGER WEHR SIG
General Manager
Waikoloa Village Association

Bus: (808) 883-9422
Fax: (808) 883-9246

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phone: (808) 969-7090 10 Hina Street Hilo Hawaii 96720 rterry@hawaii.rr.com

August 18, 2021

Roger Wehrsig
General Manager
Waikoloa Village Association
gm@wvagolf.com

Dear Mr. Wehrsig:

**SUBJECT: COMMENT TO DRAFT ENVIRONMENTAL ASSESSMENT FOR LĀLĀMILO
10 MG TANK RESERVOIR, TMK (3) 6-8-001:001 (POR.), SOUTH KOHALA DISTRICT,
HAWAI'I ISLAND**

Thank you for your comment letter dated May 26, 2021, in which you noted your organization's support for the proposal. On behalf of DWS, thank you for your statement of support. You also recommended that as part of the 10 MG Tank Reservoir project, DWS install water hydrants along the paved roadway for Wells #5, #6, #7 and #8.

Installing fire hydrants requires various factors including lines with proper pressure. Please call Kurt Inaba at your convenience at (808) 961-7238 or (808) 936-7704 to discuss the potential for fire hydrants in this or other locations that could assist the Waikoloa Village Association in managing fire hazards.

We very much appreciate your review of the document. If you have any questions about the EA, please contact me at (808) 969-7090. For questions concerning the project, please contact Ms. Shari Uyeno at suyeno@hawaiiidws.org or (808) 961-8070 ext. 252.

Sincerely,



Ron Terry, Principal
Geometrician Associates

Cc: Shari Uyeno, DWS; Ken Kawahara, Akinaka and Associates

Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 2

Cultural Impact Assessment

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A Cultural Impact Assessment for the Department of Water Supply Lālāmilo 10MG Reservoir

TMK: (3) 6-8-001:001 (por.)

Waikōloa Ahupua‘a
South Kohala District
Island of Hawai‘i



Prepared By:
Lokelani Brandt, M.A.,
Nicole Ishihara, B.A., and
Halena Kapuni-Reynolds, M.A.

Prepared For:
Ron Terry, Ph.D.
Geometrician Associates
P.O. Box 396
Hilo, HI 96721

December 2020

ASM Project Number 34690.00



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**A Cultural Impact Assessment for the
Department of Water Supply
Lālāmilo 10MG Reservoir**

TMK: (3) 6-8-001:001 (por.)

Waikōloa Ahupua‘a
South Kohala District
Island of Hawai‘i

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1. INTRODUCTION

At the request of Ron Terry, Ph.D. of Geometrician Associates, on behalf of the County of Hawai‘i Department of Water Supply (agency), ASM Affiliates (ASM) prepared this Cultural Impact Assessment (CIA) for the proposed construction of a 10 million gallon (MG) above-ground water reservoir with appurtenant water line and road connections to existing infrastructure (referred to hereafter as the ‘proposed project’). The roughly 10-acre project area is located along the western boundary of Tax Map Key (TMK): (3) 6-8-001:001 situated in Waikōloa Ahupua‘a, South Kohala District Island of Hawai‘i. The 10-acre project area is a portion of a 13,285.024-acre agricultural zoned parcel currently owned by PR Puu Pa LLC (Figures 1, 2, and 3).

The expenditure of County funds qualifies the proposed project as an action subject to the Hawai‘i Environmental Policy Act (HEPA) as codified in Hawai‘i Revised Statutes (HRS) Chapter 343. This CIA study is intended to inform an Environmental Assessment (EA) conducted in compliance with HRS Chapter 343 and is conducted pursuant to Act 50 and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impacts*, adopted by the Environmental Council, State of Hawai‘i, on November 19, 1997 (OEQC 1997). Act 50, which was proposed and passed as Hawai‘i State House of Representatives Bill No. 2895 and signed into law by the Governor on April 26, 2000, specifically acknowledges the State’s responsibility to protect native Hawaiian cultural practices. Act 50 further states that “environmental assessments . . . should identify and address effects on Hawai‘i’s culture, and traditional and customary rights” and that “native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the ‘aloha spirit’ in Hawai‘i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on governmental agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.”

This report is divided into four main sections, beginning with an introduction which includes a description of the proposed project as well as a general description of the project area. To provide a physical and cultural context of the project area, section two includes a detailed culture-historical background specific to Waikōloa Ahupua‘a, and at times, the greater South Kohala District. A presentation of prior cultural and archaeological studies conducted in the vicinity of the proposed project area is also included in this section. Section three reports the results of the consultation

1. Introduction

process and section four concludes with a discussion of potential cultural impacts and recommended actions and strategies that may help to mitigate any such impacts.

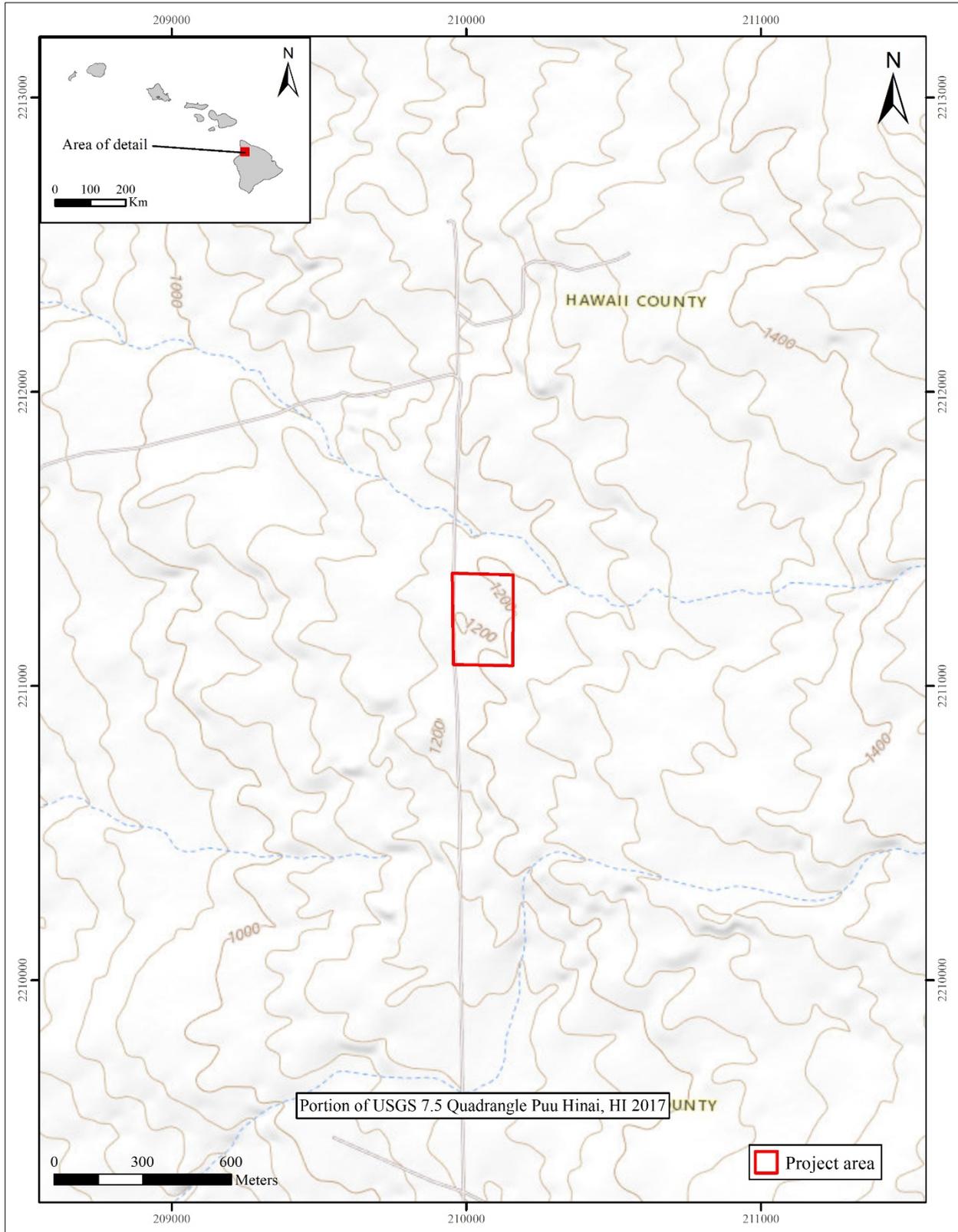


Figure 1. Study area location plotted on a portion of the USGS Pu‘u Hīna‘i quadrant map.

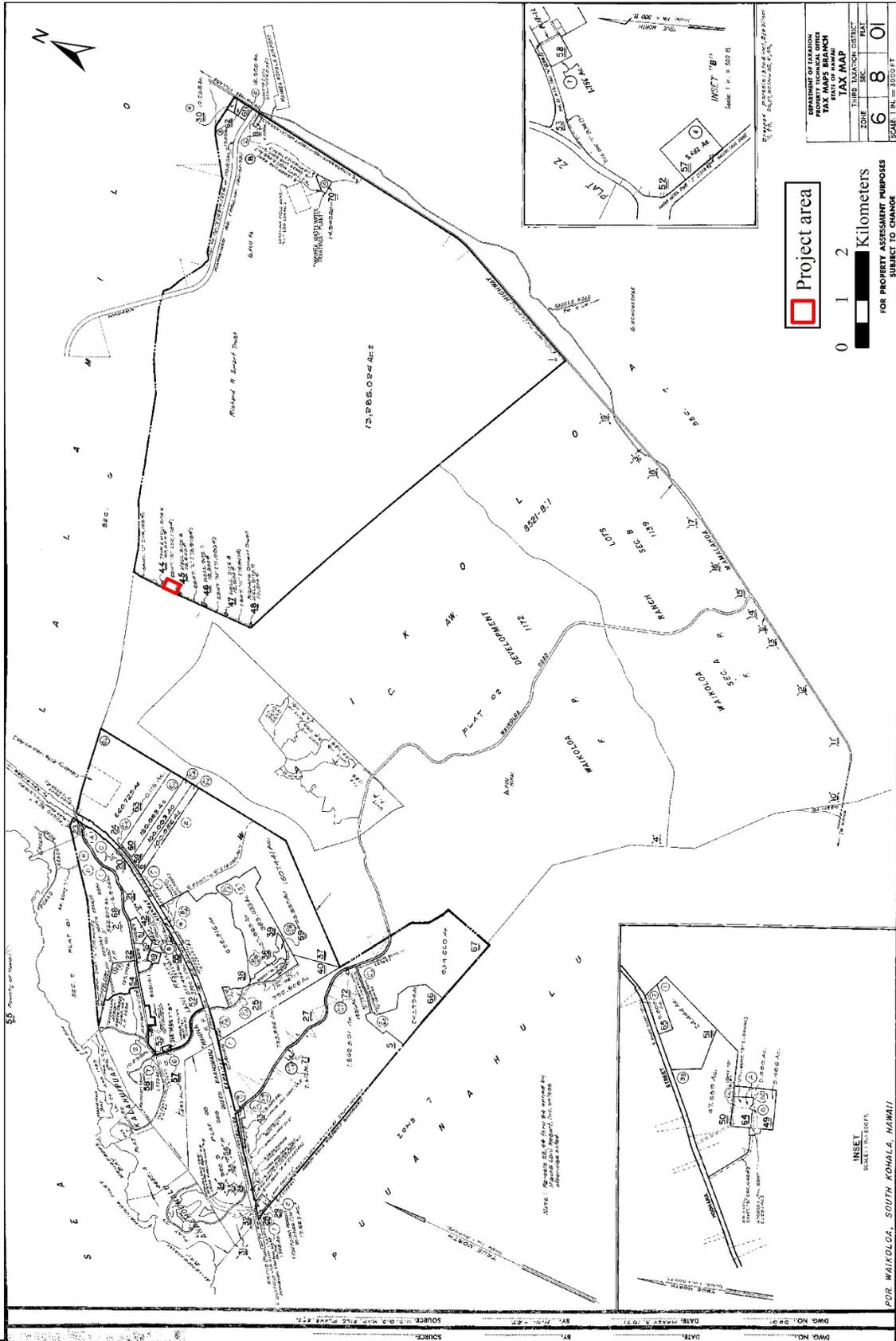


Figure 2. Tax Map Key (3) 6-8-001 showing the location of the project area.

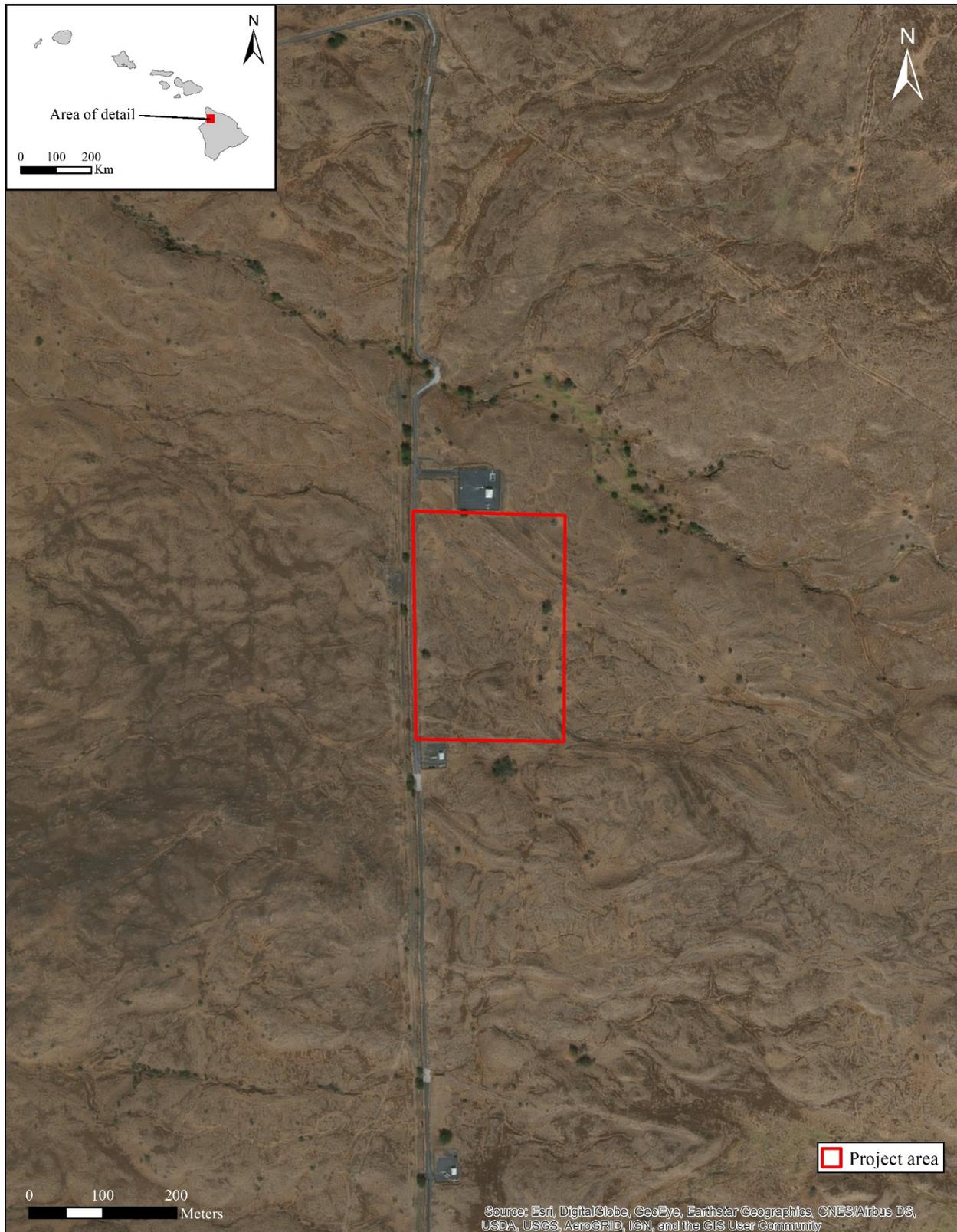


Figure 3. Google Earth™ satellite image showing the project area location.

DESCRIPTION OF THE PROPOSED PROJECT

The current project area encompasses roughly 10-acres situated along the western boundary of TMK (3) 6-8-001:001 and near the northern boundary of Waikōloa Ahupua‘a, South Kohala District, Island of Hawai‘i (see Figure 2). It is located at an elevation of 1,200 feet (366 meters) above sea level, roughly 6 kilometers from the coast (see Figure 1). The project area is situated between two existing well sites (Parker No. 2 and Parker No. 3) and is accessed by a paved road that connects these and several other existing well and reservoir sites with Queen Ka‘ahumanu Highway to the west (see Figure 3).

Soils within the project area are classified as belonging to the Hapuna-Waikui-Lalamilo complex (mapped in Figure 4 as “373”) on 0 to 20 percent slopes (Soil Survey Staff 2018). These soils consist of well-drained medial fine sandy loam derived from weathered ash deposits on ‘a‘ā lava flows (mapped in Figure 5 as “Qhm”) originating from Mauna Kea 64 to 300 thousand years ago during the Pleistocene (Wolfe and Morris 1996). The climate in the project area is generally warm with a mean annual temperature ranging between 67 to 74 degrees Fahrenheit (Giambelluca et al. 2014). The mean annual rainfall is approximately 13 inches (330 millimeters), with the majority of the rainfall occurring during December and January and the least occurring between July and August (Giambelluca et al. 2013). These arid and slightly breezy conditions, coupled with historic and active livestock grazing, have resulted in the sparse vegetation found in the project area today.

Vegetation in the project area is limited to *kiawe* (*Prosopis pallida*), buffelgrass (*Cenchrus ciliaris*), fountain grass (*Pennisetum setaceum*) (Figure 6), and an occasional but heavily grazed ‘uhaloa (*Waltheria indica*). The terrain within the project area gently slopes to the west, with two prominent *mauka/makai* trending ridgelines crossing diagonally through the northeast corner of the project area (Figure 7) and the mouth of a small drainage located in the southeastern corner (Figures 8 and 9). Extending along the south side of the ridgeline in the northeast portion of the project area is an unpaved road (see Figure 7). A small *pu‘u* rises in the south-central portion of the project area (Figure 10). A barbed-wire fence extends along the length of the central portion of the project area and passes on the eastern side of the *pu‘u* (see Figure 10).

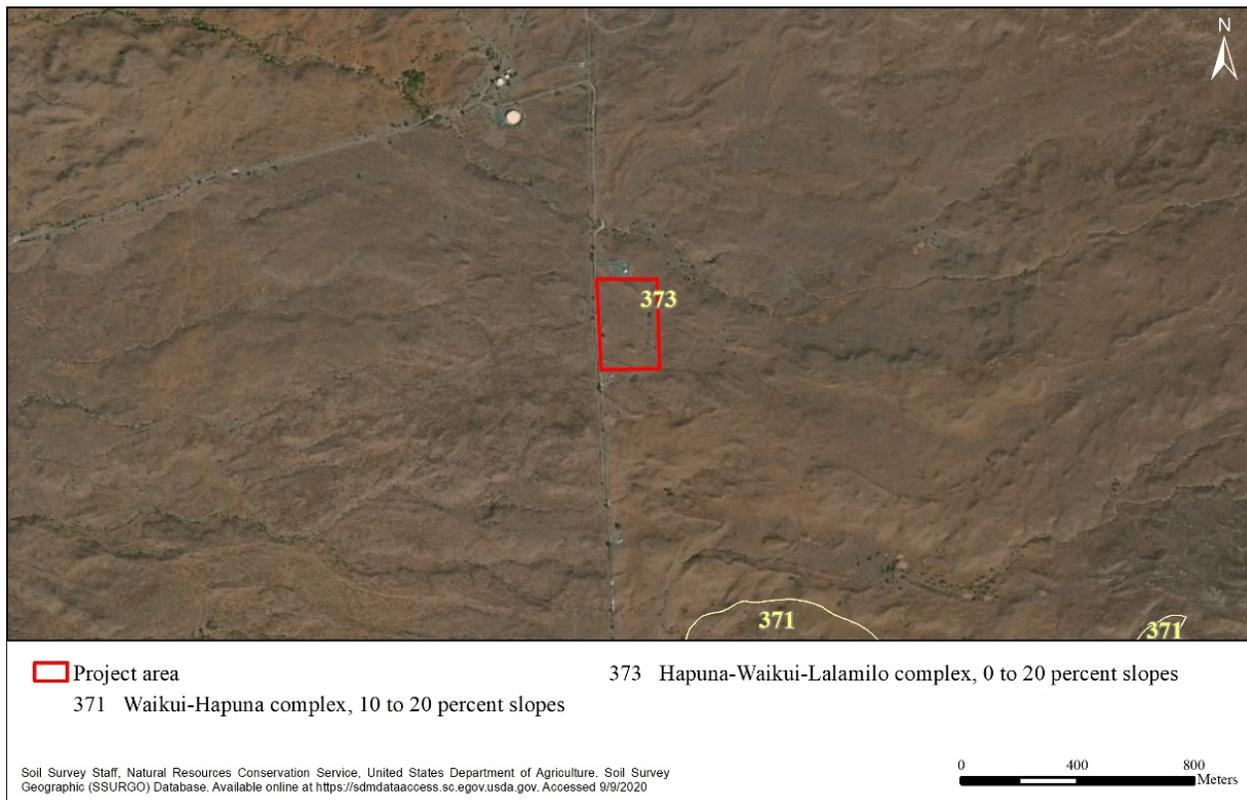


Figure 4. Soils in the project area.

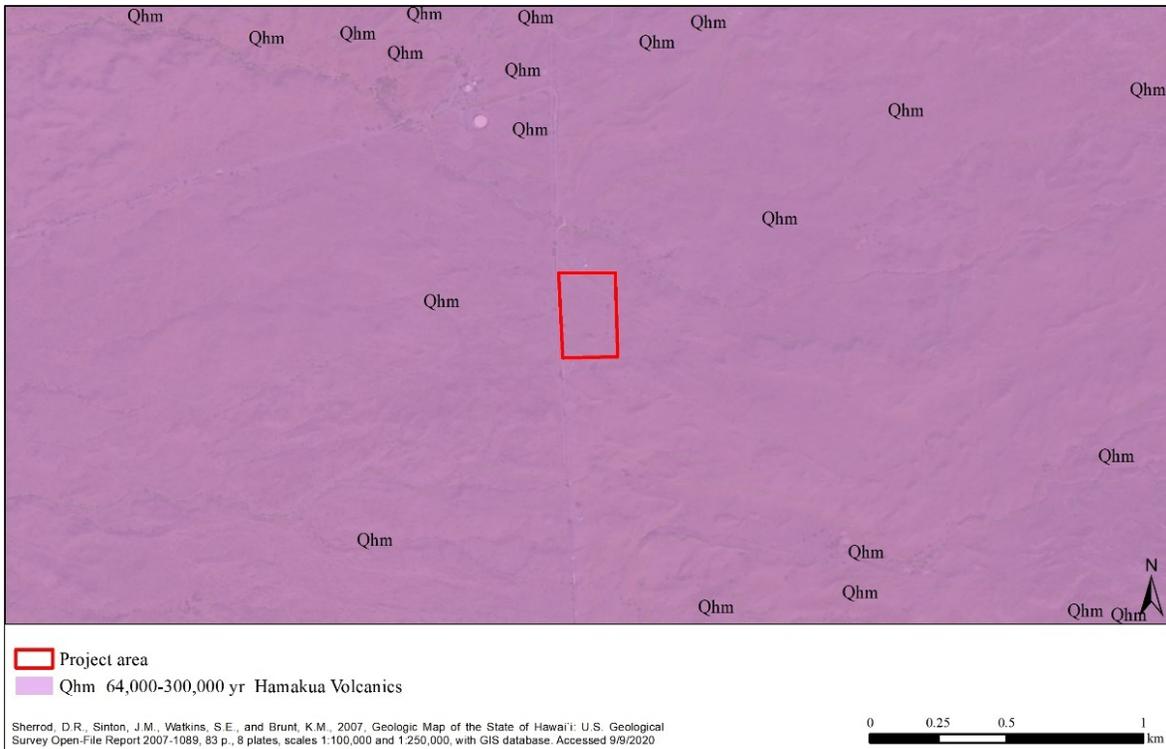


Figure 5. Geology in the project area.



Figure 6. Vegetation in the project area, view to the north.



Figure 7. Ridgeline in the northeast corner of the project area with unpaved road extending along the south side of ridgeline, view to the northwest.



Figure 8. Mouth of drainage in the project area, view to the northwest.



Figure 9. View of the *mauka* portion of drainage outside of the project area, view to the southeast.



Figure 10. *Pu'u* in the south-central section of the project area with a fenceline extending on the *mauka* (eastern) side of *pu'u*, view to the north.

2. BACKGROUND

As specified in the OEQC *Guidelines for Assessing Cultural Impacts* (1997:1), "...the geographical extent of the inquiry should, in most instances, be greater than the area over which the proposed action will take place. This is to ensure that cultural practices which may not occur within the boundaries of the project area, but which may nonetheless be affected, are included in the assessment." For this cultural impact assessment, the *ahupua'a* of Waikōloa is considered the study area. At the same time, the proposed location of the DWS 10Mh reservoir located on a portion of TMK: (3) 6-8-001:001 is referred to as the project area. To generate a set of expectations regarding the nature of cultural resources that might be encountered within the current project area and to establish a context to assess such resources' significance, the background section begins with a general culture-historical context. Following this description is culture-historical background information concerning the history of Waikōloa. Background of South Kohala, the broader regional designation in which Waikōloa is situated, also falls within the parameters of the OEQC guidelines and ensures that a broader set of cultural practices and histories are considered. Following this background section is a discussion of relevant prior archaeological studies that have been conducted in the vicinity of the project area.

RESEARCH METHODS

The culture-historical context and summary of previously conducted archaeological and cultural research presented below are based on research conducted by ASM Affiliates at various physical and digital repositories. Primary English language and Hawaiian language resources were found at multiple state agencies, including the State Historic Preservation Division, Hawai'i State Archives, and the Department of Accounting and General Services Land Survey Division. Digital collections provided through the Office of Hawaiian Affairs Pāpakilo and Kīpuka databases, Waihona 'Āina, the Ulukau Hawaiian Electronic Library, the Hawai'i Genealogical Indexes, and Newspapers.com provided further historical context and information. Lastly, secondary resources stored at ASM Affiliates' Hilo office offer general information regarding the history of land use, politics, and culture change in Hawai'i, enhancing the broad sampling of primary source materials cited throughout this cultural impact assessment.

CULTURE-HISTORICAL CONTEXT

The following subsections are intended to provide a general overview of Hawaiian origins, settlement, and expansion, emphasizing socio-political and cultural transformations over time. The discussion continues with a summary of traditional philosophies associated with the land and the intensification and development of Hawaiian land stewardship practices.

A Generalized Model of Hawaiian Origins and Settlement

While the question of when Polynesians first settled Hawai‘i remains contested, scholars working in archaeology, folklore, Hawaiian studies, and linguistics have offered several theories. With advances in palynology and radiocarbon dating techniques, Kirch (2011), Athens et al. (2014), and Wilmshurst et al. (2011) have argued that Polynesians arrived in the Hawaiian Islands sometime between A.D. 1000 and A.D. 1200. This initial migration took place on intricately crafted *wa‘a kaulua* (double-hulled canoes) to Hawai‘i from Kahiki, the ancestral homelands of Hawaiian deities and peoples from southern Pacific islands and continued from initial settlement to the 13th century. According to Fornander (1969), Hawaiians brought from their homeland certain Polynesian customs and beliefs that included the major gods Kāne, Kū, Lono, and Kanaloa (who have cognates in other Pacific cultures), the *kapu* system of political and religious governance, and the concepts of *pu‘uhonua* (places of refuge), *‘aumakua* (ancestral deity), and *mana* (divine power). Kenneth Emory, an archaeologist who worked in the early to mid-20th century, reported that the sources of early Hawaiian populations originated from the southern Marquesas Islands (Emory in Tatar 1982). However, Emory’s theory is not universally accepted, as Hawaiian scholars in the past and present have argued for a pluralistic outlook on ancestral Hawaiian origins from Kahiki (Case 2015; Fornander 1916-1917; Kamakau 1866; Kikiloi 2010; Nakaa 1893; Poepoe 1906).

While stories of episodic migrations were widely published in the Hawaiian language by knowledgeable and skilled *kū‘auhau* (individuals trained in the discipline of remembering genealogies and associated ancestral stories), the cultural belief that living organisms were *hānau ‘ia* (born) out of a time of eternal darkness (*pō*) and chaos (*kahuli*) was also brought and adapted by ancestral Hawaiian populations to reflect their intimate connection to their environment. For example, the *Kumulipo*, Hawai‘i’s most famed *ko‘ihonua* (a cosmogonic genealogical chant), establishes a birth-rank genealogical order for all living beings (Beckwith 1951; Liliuokalani 1978). One such genealogical relationship that remains widely accepted in Hawai‘i is the belief that *kalo* (taro) plants (in addition to all other plants, land animals, and sea creatures) are elder siblings to humans (Beckwith 1951). This hierarchical creation concept enforces the belief that all life forms are connected, a belief initial settlement populations developed further over generations through intensive interaction with their local environment to form a unique Hawaiian culture.

In Hawai‘i’s ancient past, inhabitants were primarily engaged in subsistence-level agriculture and fishing (Handy et al. 1991). Following the initial settlement period, communities clustered in the *ko‘olau* (windward) shores of the Hawaiian Islands due to the abundance and easy access to freshwater sources. Sheltered bays allowed for nearshore fisheries (enriched by numerous estuaries) and deep-sea fisheries to be easily accessed (McEldowney 1979). Widespread environmental modification on land also occurred as early Hawaiian *mahi‘ai* (farmers) developed new subsistence strategies, adapting their familiar patterns and traditional tools to work efficiently in their new home (Kirch 1985; Pogue 1978). Areas with the richest natural resources became heavily populated, resulting in the population’s expansion to the *kona* (leeward) side of the islands and more remote areas (Cordy 2000).

As populations expanded, significant socioeconomic changes occurred, such as the development of complex social stratification and land modification systems. During this expansion period, additional migrations to Hawai‘i occurred from the islands of Tahiti. Rosendahl (1972a) proposed that settlement during this period was seasonally recurrent, in which coastal sites were occupied in the summer to exploit marine resources, and upland agricultural plots were maintained during the winter months. Hommon (1976) adds that increasing reliance on agricultural products may have caused a shift in social networks as kinship links between coastal settlements disintegrated with the expansion of *mauka-makai* (upland-coastal) settlements that allowed for the exchange of agricultural products for marine resources. This shift is believed to have resulted in establishing the *ahupua‘a* system sometime during the 15th century (Kirch 1985). The implications of this model include a shift in residential patterns from seasonal, temporary habitation to the permanent dispersed habitation of both coastal and upland areas.

Overview of Traditional Hawaiian Land Management Strategies

Adding to an already complex society was the development of traditional land stewardship systems, including the *ahupua‘a*. The *ahupua‘a* was the principal land division that functioned for both taxation purposes and furnished its

residents with nearly all subsistence and household necessities. *Ahupua'a* are land divisions that typically include multiple ecozones from *ma uka* (upland mountainous regions) to *ma kai* (shore and near shore regions), assuring a diverse subsistence resource base (Hommon 1986). Although the *ahupua'a* land division typically incorporated all of the eco-zones, their size and shape varied greatly (Cannelora 1974). Noted Hawaiian historian and scholar Samuel Kamakau in his serialized history of Hawai'i titled *Ka Moololo o Hawaii* (The History of Hawaii) listed the various terms that were given to the ecozones found from the mountaintops to the ocean, ecozones that are also found in *ahupua'a*. Published in the newspapers *Ke Au Okoa* in 1869, a translation of Kamakau's original Hawaiian text is provided below:

Here are some of the terms that were given to the mountainous regions and mountaintops. *Mauna* is the general term for the frequently-used term *kuahiwi*, however, there are numerous terms that are associated with the mountains. Here are some of the terms associated with the mountains. The central region located in front and behind the mountain was termed *kuamauna*. Below the *kuamauna* is the *kuahea*, and below the *kuahea* is the *kuahiwi*, which is where shrubs and small trees grow. It (the *kuahea* and *kuahiwi*) is a place also called the *wao nahele*. Further down, the trees grow taller. This is the *wao lipo*. Below the *wao lipo* is the *wao 'eiwa*. Below the *wao 'eiwa* is the *wao ma 'ukele*. Below the *wao ma 'ukele* is the *wao akua*. Below the *wao akua*, is the *wao kanaka*, which is where people farm. Below the *wao kanaka* is the *'ama 'u*. Below the *'ama 'u* is the *'āpa 'a*. Below the *'āpa 'a* is the *pahē 'e* and *'ilima*. And below that is the *kula* and the *'āpoho* all the way to the villages. Below the villages is the *kahakai*, the *kahaone*, the *kālawa*, and then the *'aekai*, and that is how the people of old named their environment. (Kamakau 1869:1)

The *maka 'āinana* (commoners, literally the “people that attend the land”) who lived on the land had rights to gather resources for subsistence and tribute within their *ahupua'a* (Jokiel et al. 2011). As part of these rights, residents were required to supply resources and labor to *ali'i* (chiefs) of local, regional, and island chiefdoms. The *ahupua'a* became the equivalent of a local community with its own social, economic, and political practices and served as the taxable land division during the annual *Makahiki* procession (Kelly 1956). During the *Makahiki*, the paramount *ali'i* sent select members of his/her retinue to collect *ho'okupu* (tribute and offerings) in the form of goods from each *ahupua'a*. The *maka 'āinana* brought their share of *ho'okupu* to an *ahu* (altar) that was marked with the image of a *pua'a* (pig), serving as a physical visual marker of *ahupua'a* boundaries. In most instances, these boundaries followed mountain ridges, hills, rivers or ravines (Alexander 1890). However, Chinen (1958:1) reports that “oftentimes only a line of growth of a certain type of tree or grass marked a boundary; and sometimes only a stone determined the corner of a division.” These ephemeral markers, as well as their more permanent counterparts, were oftentimes named as evidenced in the thousands of boundary markers names that are listed in Soehren (2005b).

Ahupua'a were ruled by *ali'i 'ai ahupua'a* or chiefs who controlled the *ahupua'a* resources. Generally speaking, *ali'i 'ai ahupua'a* had complete autonomy over the *ahupua'a* they oversaw (Malo 1951). *Ahupua'a* residents were not bound to the land nor were they considered the property of the *ali'i*. If the living conditions under a particular *ahupua'a* chief were deemed unsuitable, the residents could move freely in pursuit of more favorable conditions (Lam 1985). This structure safeguarded the well-being of the people and the overall productivity of the land, lest the chief loses the principal support and loyalty of his or her supporters. In turn, *ahupua'a* lands were managed by an appointed *konohiki*, oftentimes a chief of lower rank, who oversaw and coordinated stewardship of an area's natural resources (Lam 1985). In some places, the *po'o lawai'a* (head fisherman) held the same responsibilities as the *konohiki* (Jokiel et al. 2011). When necessary, the *konohiki* took the liberty of implementing *kapu* (restrictions and prohibitions) to protect the *mana* of an area's resources from environmental and spiritual depletion.

Many *ahupua'a* were divided into smaller land units termed *'ili* and *'ili kūpono* (often shortened to *'ili kū*). *'Ili* were created for the convenience of the *ahupua'a* chief and served as the basic land unit which *hoa'āina* (caretakers of particular lands) often retained for multiple generations (Jokiel et al. 2011; MacKenzie 2015). As *'ili* were typically passed down in families, so too were the *kuleana* (responsibilities, privileges) that were associated with it. The right to use and cultivate *'ili* was maintained within the *'ohana*, regardless of the succession of *ali'i 'ai ahupua'a* (Handy et al. 1991). Malo (1951) recorded several types of *'ili*, including the *'ili pa'a* (a single intact parcel) and *'ili lele* (a discontinuous parcel dispersed across an area). Whether dispersed or wholly intact, *'ili* required a cross-section of available resources, and for the *hoa'āina*, this generally included access to agriculturally fertile lands and coastal fisheries. *'Ili kūpono* differed from other *'ili* lands because they did not fall under the jurisdiction of the *ahupua'a* chief. Rather, they were specific areas containing resources that were highly valued by the ruling paramount chiefs, such as fishponds (Handy et al. 1991).

Ali'i 'ai ahupua'a, in turn, answered to an *ali'i 'ai moku* (chief who claimed the abundance of the entire *moku* or district) (Malo 1951). Hawai'i Island is comprised of six *moku* (districts) that include Kona, Ka'ū, Puna, Hilo, Hāmākua, and Kohala. Although a *moku* comprises multiple *ahupua'a*, *moku* were considered geographical subdivisions with no explicit reference to rights in the land (Cannelora 1974). While the *ahupua'a* was the most common and fundamental land division unit within the traditional Hawaiian land management structure, variances occurred, such as the existence of the *kalana*. By definition, a *kalana* is a division of land that is smaller than a *moku*. *Kalana* was sometimes used interchangeably with the term *'okana* (Lucas 1995; Pukui and Elbert 1986), but Kamakau (Kamakau 1976) equates a *kalana* to a *moku* and states that *'okana* is merely a subdistrict. Despite these contending and sometimes conflicting definitions, what is clear is that *kalana* consisted of several *ahupua'a* and *'ili 'āina*.

This form of district subdividing was integral to Hawaiian life and the product of advanced natural resource management systems. As populations resided in an area over centuries, direct-teaching and extensive observations of an area's natural cycles and resources were retained, well-understood, and passed down orally and experientially over the generations. This knowledge informed management decisions that aimed to sustainably adapt subsistence practices to meet the needs of growing populations. The *ahupua'a* system and the highly complex land management system that developed in the islands are but one example of the unique Hawaiian culture that developed in these islands.

Intensification and Development of Hawaiian Land Stewardship Practices

Hawaiian philosophies of life in relation to the environment helped to maintain both natural, spiritual, and social order. In describing the intimate relationship that exists between Hawaiians and *'āina* (land), Kepā Maly writes:

In the Hawaiian context, these values—the “sense of place”—have developed over hundreds of generations of evolving “cultural attachment” to the natural, physical, and spiritual environments. In any culturally sensitive discussion on land use in Hawai'i, one must understand that Hawaiian culture evolved in close partnership with its' natural environment. Thus, Hawaiian culture does not have a clear dividing line of where culture and nature begins.

In a traditional Hawaiian context, nature and culture are one in the same, there is no division between the two. The wealth and limitations of the land and ocean resources gave birth to, and shaped the Hawaiian world view. The *'āina* (land), *wai* (water), *kai* (ocean), and *lewa* (sky) were the foundation of life and the source of the spiritual relationship between people and their environs. (Maly 2001)

The *'ōlelo no 'eau* (proverbial saying) “*hānau ka 'āina, hānau ke ali'i, hānau ke kanaka*” (born was the land, born were the chiefs, born were the commoners), conveys the belief that all things of the land, including *kanaka* (humans), are connected through kinship links that extend beyond the immediate family (Pukui 1983:57). *'Āina* or land, was perhaps most revered, as noted in the *'ōlelo no 'eau* “*he ali'i ka 'āina; he kauwā ke kanaka*,” which Pukui (Pukui 1983:62) translated as “[t]he land is a chief; man is its servant.” The lifeways of early Hawaiians, which were dependent entirely from the finite natural resources of these islands, necessitated the development of sustainable resource management practices. Over time, what developed was an environmentally responsive management system that integrated the care of watersheds, natural freshwater systems, and nearshore fisheries (Jokiel et al. 2011).

Disciplined and astute observation of the natural world became one of the most fundamental stewardship tools used by Hawaiians of the ancient past. The vast knowledge acquired through direct observation enabled them to detect and record subtle changes, distinctions, and correlations in the natural world. Examples of their keen observations are evident in the development of a Hawaiian nomenclature to describe various rains, clouds, winds, stones, environments, flora, and fauna. Many of these names are geographically unique or island-specific and have been recorded in *oli* (chants), *mele* (songs), *pule* (prayers), *inoa 'āina* (place names), and *'ōlelo no 'eau* (proverbial sayings). Other Hawaiian arts and practices such as *hula* (traditional dance), *lapa'au* (traditional healing), *lawai'a* (fishing), *mahi'ai* (farming) further aided in the practice of knowing the rhythms and cycles of the natural world.

Comprehensive systems of observing and stewarding the land were coupled by the strict adherence to practices that maintained and enhanced the *kapu* and *mana* of living and non-living persons, objects, and materials. In Hawaiian belief, all things—places, people, animals, plants, rocks, etc.—possessed *mana* or “divine power” (Pukui and Elbert 1986:235; Pukui et al. 1972). *Mana* is derived from the plethora of Hawaiian gods (*kini akua*) embodied in elemental forces, land, natural resources, and specific material objects and persons (Crabbe et al. 2017). Buck (1993) expanded on this concept noting that *mana* was associated with “the well-being of a community, in human knowledge and skills (canoe building, harvesting) and in nature (crop fertility, weather, etc.)” (c.f. Else 2004:244).

To safeguard the *mana* of a person, place, or resource, *kapu* were implemented and strictly enforced to limit over-exploitation and defilement. Elbert and Pukui (1986:132) defined *kapu* as “taboo, prohibitions; special privilege or

exemption.” Kepelino noted that *kapu* associated with *akua* (deities) applied to all social classes, while *kapu* associated with *ali‘i* were applied to the people (in Beckwith 1932). As *kapu* dictated social relationships, they also provided “environmental rules and controls that were essential for a subsistence economy” (Else 2004:246). The companion to *kapu* was *noa*, translated as “freed of taboo, released from restrictions, profane, freedom” (Pukui and Elbert 1986:268). Some *kapu*, particularly those associated with maintaining social hierarchy and gender differentiation, were unremitting, while those *kapu* placed on natural resources were applied and enforced according to seasonal changes. The application of *kapu* to natural resources ensured that such resources remained available for future use. When the *ali‘i* or the lesser chiefs (including *konohiki* and *po‘o lawai‘a*) determined that a particular resource was to be made available to the people, a decree was proclaimed indicating that *kapu* had been lifted, thereby making it *noa*. Although transitioning a resource from a state of *kapu* to *noa* allowed for its use, people were expected to practice sustainable harvesting methods and pay tribute to the paramount chief and the *akua* associated with that resource. *Kapu* were strictly enforced, and violators faced severe consequences, including death (Jokiel et al. 2011). Violators who escaped execution sought refuge at a *pu‘uhonua*, a designated place of refuge, or an individual who could pardon the accused (Kamakau 1992).

In summary, the layering and interweaving of beliefs, land stewardship practices, and the socio-political system form the basis of the relationship between Hawaiians and the land. We can develop a more nuanced understanding of land use and relationships to land from a Hawaiian worldview through the analysis and recognition of these dynamic elements.

WAIKŌLOA AHUPUA‘A AND THE GREATER KOHALA DISTRICT

The proposed project area is located within the *ahupua‘a* of Waikōloa, which is one of some seventy *ahupua‘a* that make up the traditional *moku-o-loko* or *moku* (interior district) of Kohala (Figure 11). Kohala is one of six major districts that make up Hawai‘i Island. Through legislative acts passed in 1859, the district of Kohala and the adjacent Kona were further divided, creating new boundaries that followed basic geographic distinctions, which included Kohala ‘Ākau (North Kohala) and Kohala Hema (South Kohala) (King 1935). As Waikōloa Ahupua‘a is the southernmost land division within Kohala, the project area is situated in Kohala Hema. Traditional poetical expressions for this district identifies other geographical designations. Once such saying derived from an ancient chant titled *Kū E Ho‘opi‘o Ka Lā* states:

‘O Kohala-iki, ‘o Kohala-nui	lesser Kohala, greater Kohala
‘O Kohala-loko, ‘o Kohala-waho...	inner Kohala, outer Kohala...
(Pukui and Korn 1973:188)	(Pukui and Korn 1973:190)

While the aforementioned geographical designations do not appear on maps, Maly (1999:25) explains that “[t]he lands from Kawaihae to ‘Anaeho‘omalū are within the region called *Kohala waho* (outer Kohala)...” which were affectionately referred to as “...*Kohala makani ‘Āpa‘āpa‘a* (Kohala of the ‘Āpa‘āpa‘a wind). Another traditional Hawaiian proverb describes the extent of the Kohala district, spanning from Honoke‘ā in the north to Keahualono, an *ahu* (altar, shrine) on Waikōloa’s southern boundary. (Pukui 1983:196)

Waikōloa, which translates literally as “duck water” (Pukui et al. 1974:223), is bound on the north by Lālāmilo Ahupua‘a, to the east by Pā‘auhau Ahupua‘a, and to the south by the *ahupua‘a* of Pu‘u Anahulu, situated in the North Kona District. The name “Waikōloa” has also been interpreted to mean “water-carried-far” and is the name of a wind goddess (Maly 1999). While Waikōloa is referred to today as an *ahupua‘a*, traditionally, it was an ‘*ili* (land section smaller than an *ahupua‘a*) of the *kalana* (or ‘*okana*) of Waimea. In ancient times, the area was referred to as Waikōloa Nui. As a *kalana*, Waimea was treated as a *moku-o-loko* (sub-district) composed of *ahupua‘a* and the more independent ‘*ili kūpono* (Maly and Maly 2002). The lands subject to the *kalana* of Waimea were those that formed the southern limits of the present-day South Kohala District, including the lands of ‘Ōuli, Wai‘aka, Lālāmilo, Puakō, Kalāhuipua‘a (Lāhuipu‘a), ‘Anaeho‘omalū, Kakanaka, Ala‘ōhi‘a, Paulama, Pu‘ukalani (Pukalani), Pu‘ukapu, and Waikōloa. In ancient times, Waikōloa was referred to as Waikōloa Nui, and the neighboring area of Lālāmilo was referred to as Waikōloa Iki (Maly 1999). Bernice Judd, a former librarian at the Hawaiian Mission Children’s Society, explains that:

In the early days Waimea meant all the plateau between the Kohala Mountains and Mauna Kea, inland from Kawaihae. This area is from eight to ten miles long and from three to five miles wide. There was no running water on Mauna Kea, so the inhabitants lived at the base of the Kohala Mountains, where three streams touched the plain on their way towards the sea. . . The middle stream, which was famous for wild ducks, was named Waikoloa, or Duckwater. This and the most

westerly stream, called Kahakohau, went towards Kawaihae, but neither reached the sea, except in times of flood. (Judd 1932:14)

Occupying coastal Waikōloa are two *'ili kūpono*, which has been defined by Lucas (1995) as a traditional land division that is wholly independent of the *ahupua'a* in which it is located. The names of these *'ili kūpono* are *'Anaeho'omalū* (lit. restricted mullet) and *Lāhuipua'a* (lit. the family of pigs) which was known by other epithets, including *Kalāhuipua'a* and *Kalāhuipu'a* (McElroy et al. 2016; Pukui et al. 1974). Lucas (1995) noted that the chiefs who oversaw *'ili kūpono* lands paid tribute directly to the high chief and not to the *ahupua'a* chief. The location of these *'ili kūpono* are shown in Hawai'i Registered Map 2060 from 1901 (see Figure 11). Both locales are known for their naturally occurring brackish ponds, modified in traditional times into *loko i'a* (fishponds). Keala et al. (2007:7) elaborated on the historic role of fishponds, noting that they "...were used to provide a reliable, convenient, and ever-ready supply of fresh seafood for the ruling ali'i (chief) and royal court." Within *'Anaeho'omalū* are the fishponds of Kahapapa and the larger Ku'uali'i, and within *Lāhuipua'a* are seven named ponds, the largest of which is *Lāhuipua'a*, Waipuhi, Manoku, Hope'ala, Kahinawao, Kaaio, and Waipuhi iki, which was reportedly built by Francis 'I'i Brown in the historic era (Apple and Kikuchi 1975; McElroy et al. 2016). The location of these fishponds is shown in Hawai'i Registered Map 825, prepared by J. S. Emerson in 1880 (Figure 12). Early archaeological investigations of these coastal lands have found evidence of temporary habitation and extensive marine exploitation, both direct (e.g., marine shell, fish bones) and indirect (e.g., fishing equipment, tool manufacturing) (Kirch 1979). While the coastal areas of Waikōloa were utilized predominately for the exploitation of marine resources, Handy et al. (1991:532) contends that limited agricultural pursuits may have been undertaken near the coast:

The coastal section of Waimea, now called South Kohala, has a number of small bays with sandy shores where fishermen used to live, and where they probably cultivated potatoes in small patches. *Anaeho'omalū*, *Waialua*, *Honokaope*, *Kalahuipua'a* and *Pauoa* all have sandy strips along the sea; and there is an area of black cinder in this section where sweet potatoes might be grown in rainy seasons. *Puako* near the Kona border was a sizable fishing village at one time where there were undoubtedly many sweet-potato patches. The same is true of *Kawaihae*, which was an important locality in ancient times as is indicated by the great temple of *Pu'ukohola*.

2. Background

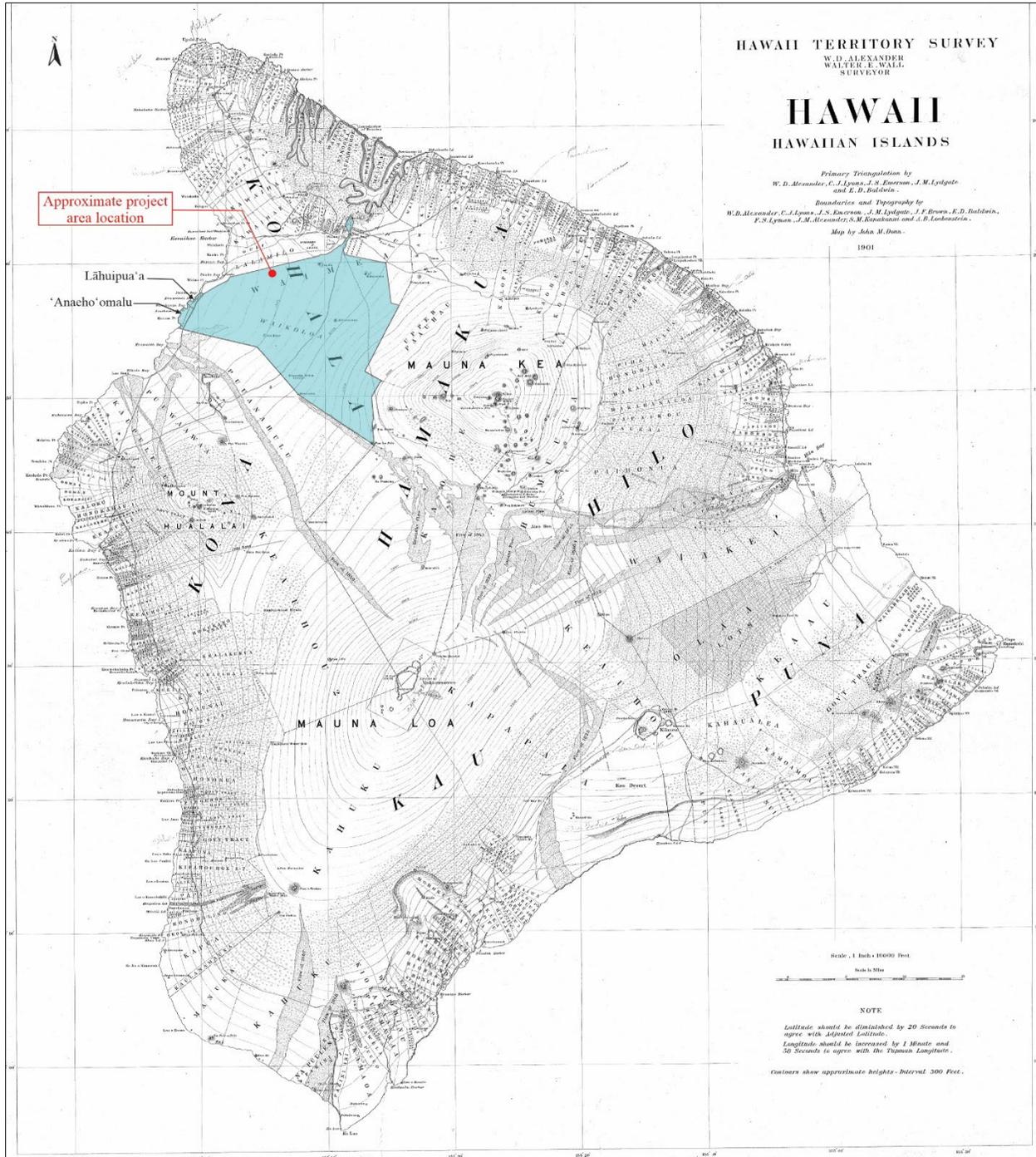


Figure 11. Hawai'i Registered Map No. 2060 by J. M. Donn showing the proposed project area location within Waikōloa Ahupua'a (shaded blue).

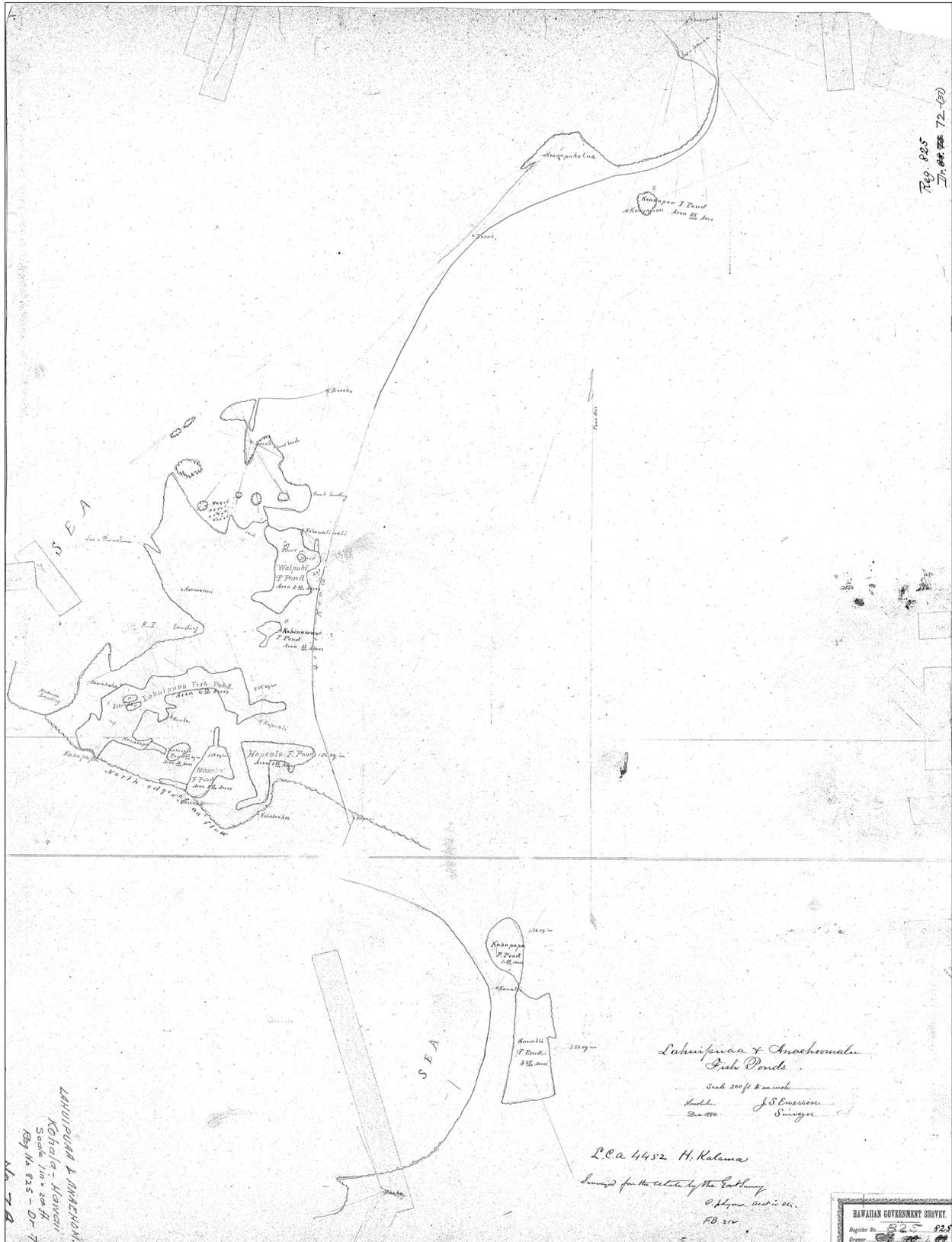


Figure 12. Hawai'i Registered Map No. 825 of Lāhupua'a and 'Anaho'omalū by J. S. Emerson, 1880.

Agricultural Practices of the South Kohala District

In the district of Kohala, the long ridge of the Kohala Mountains extends perpendicular to the predominant northeasterly trade winds, creating an orographic rainfall pattern that separates the district into two distinct environmental zones: a wetter, windward zone on the eastern side, and a drier leeward zone on the western side. Initial permanent settlements were established in Kohala at sheltered bays with access to freshwater, primarily in the windward valleys and gulches. These early communities would have shared extended familial relations and had an occupational focus on collecting marine resources. The upland habitation that followed focused on agricultural field systems, which undoubtedly provided much of the coastal inhabitants' produce (Carlson and Rosendahl 1990). Most of the *kalo* (taro) and *'uala* (sweet potato) fields of this part of the island were located in the rainier uplands near the present-day town of Waimea (see Figure 11), where there was a sizable permanent population as well. Waimea's high elevation, fertile landscape, and sufficient rainfall facilitated the creation and development of the Waimea Field System during the 16th century. Plants like sweet potato, *kalo*, *wauke* (paper mulberry), *māmaki*, plantains, bananas, sugarcane, coconuts, and *hala* (pandanus) were grown to support a sizable population (Haun et al. 2003). Coastal residents in South Kohala, however, relied primarily on the ocean for sustenance, augmenting their diet with produce procured through trade with the upland areas. Marine resources were brought ashore in the small bays with sandy shores found in the coastal section of Waimea (now called South Kohala), where, as Handy et al. (1991) relate, fishermen lived and probably cultivated potatoes in small patches.

In drawing from early historic accounts, ground and aerial photography, and pedestrian surveys conducted during the early 1980s, Holly McEldowney (1983) provided a vegetation reconstructive model to represent predominant historic (1792-1850) native plant communities for the South Kohala region. As the first cattle were introduced to the Waimea plateau of Hawai'i Island in 1793 by Captain George Vancouver, their sizeable population and decades of incessant roaming had severely degraded the native forest and plant life found in the region (Bergin 2004; Kuykendall 1938). Based on McEldowney's (1983:414-415) model, the project area falls within the "Pili land 1" zone, which is historically characterized as beginning at the coast and extending to roughly the 1500 foot elevation and described as "barren, stoney, and dried landscape" with "very low shrubs, thistles, and dry looking grass." Other plants that would have been found within this zone and likely along the coast would have included *niu* (*Coconut nucifera*), *lauhala* (*Pandanus sp.*), *loulu*, (*Prichardia sp.*), *kou* (*Cordia subcordata*), and *milo* (*Thespesia populnea*). The occupational focus in this zone included salt production, aquaculture, and fishing (McEldowney 1983).

Native Hawaiian Bird Hunting

The upper reaches of Waikōloa Ahupua'a and the greater Kohala District were ideal for bird hunting, where the prized feathers were utilized for the creation of *'ahu'ula* (feathered cloak), *mahiōle* (feathered helmet), and *kahili* (feathered standard) —all iconic symbols of Hawaiian royalty. Birds were additionally an important source of protein for subsistence purposes (Gomes 2016:33). Birds could be found throughout an *ahupua'a*, spanning from the ocean (sea birds, shorebirds, and wetland species) to the plains (*kōlea* [Pacific golden plover; *Phuvialis dominica*] and *pueo* [Hawaiian short-eared owl; *Asio flammeus sandwichensis*]) to the forests where the rare *'ua'u* (dark-rumped petrel; *Pterodroma phaeopygia sandwichensis*) can still be found today (Gomes 2016:39). The *'ua'u* (also spelled *'uwa'u*) is characterized by its gray to black feathers spanning from its crown to tail, with white feathers on its throat to undertail.

One of the most highly prized feathers came from the *mamo* (black Hawaiian honeycreeper; *Drepanis pacifica*), an all-black honeycreeper with hints of yellow on its back and flank, which was previously only on Hawai'i Island (Mitchell 2001:93; Pukui and Elbert 1986:235). Other prized feathers include those found from the *'ō'ō* (black honeyeater; *Moho nobilis*), a black bird with yellow patches on its nape, wings, and flank; the *'i'iwi* (scarlet Hawaiian honeycreeper; *Vestiaria coccinea*) was known for its bright red-orange feathers and black wings and tail; and the *'apapane* (Hawaiian honeycreeper; *Himatione sanguinea*), a bird noted for its red body, black wings, and white rump (Mitchell 2001:93-94). Another prized bird was the *'amakihi* (Hawaiian honeycreeper; *Loxops virens*) that was entirely yellow-green.

Kia manu (bird catcher) techniques varied by island, district, and *ahupua'a*. *Pule* (prayers) and *ho'okupu* (offerings) were performed before entering the forest (Emerson 1894:103). Proper tools, such as a sticky gum produced from the fruits of the *pāpala kēpau* (*Pisonia*) and a long pole, were prepared and brought by the *kia manu* to the forest (Mitchell 2001:93). The *kia manu* would mimic a bird's call, thus enticing the bird to land on the ultra sticky *pāpala kēpau* sap, where it was collected. However, one of the more critical aspects of bird-catching was observing each bird species' behaviors and habitat. Emerson (1894:104) noted that two bird seasons corresponded to

the flowering seasons of the *lehua*. The first season, when *lehua* were abundant in the lower elevations, spanned from March to May. When *lehua* were abundant in higher elevations, birds could be found there more frequently between August and early November.

Some of the most insightful sources about bird catching can be found in Boundary Commission testimonies. These testimonies were recorded in the 1870s and describe the metes and bounds of an area while clarifying an owner's holdings. Furthermore, this evidentiary source provided details of traditional land use activities (Cordy 2003). For instance, the Boundary Commission testimony provided by Ehu for Isaac Davis in the 'ili of Waikōloa Nui states:

There was no pili grass on that land—my father was not a bird catcher, he used to mahiai [farm]. Waikoloa was the land that had the birds. The boundary as stated is the boundary from the time of Kamehameha first. (Soehren 2005b)

While the above sections provide insight into the traditional landscape and practices of Waikōloa, the following section covering select traditional accounts relates other significant cultural information, including the formation of natural features, past chiefs, their life, practices, and connection to this vast landscape.

Traditional Accounts of Waikōloa Ahupua'a

As the Hawaiian people had no written language until after the arrival of the first Protestant missionaries in 1820, *mo'olelo* (stories, tales, and myths), *mele* and *oli* (songs and chants), and *'ōlelo no'eau* (proverbs and sayings) were transmitted orally from one generation to the next. Traditional *mo'olelo* with explicit reference to Waikōloa are limited, with primary focus given to the famous winds of the Kohala region, including the intense *Mūmuku*, *Āpa'apa'a*, and *Waikōloa* winds. Other references to Waikōloa include exalted figures in Hawaiian history such as Lonoikamakahiki, Kamalālāwalu, Keawenui a 'Umi, and at least one eminent battle that took place in the area that played a significant role in the sociopolitical history of Hawai'i Island.

The Ancestry of Waikōloa in The Heart Stirring Story of Ka-Miki

The name of a land division sometimes indicates its importance, records its history, or reveals something about its resources or population. The *mo'olelo* titled *ke Ka'ao Ho'oniuu Pu'uwai no Ka-Miki* (The Heart Stirring Story of Ka-Miki), initially published in the Hawaiian language newspaper *Ka Hōkū o Hawai'i* between 1914 and 1917, illustrates this point. *Ka-Miki* was likely authored in the late 19th to early 20th centuries by noted Hawaiian scholars John Wise and J.W.H.I. Kihe. Although the *mo'olelo* was fabricated during this period, the information regarding places that are visited by the main characters in the *mo'olelo* is much older. Maly (1998:17) expands on this, stating that although the *mo'olelo*:

. . . is not an ancient account, the authors set the account in the thirteenth century (by association with the chief Pili, who came to Hawai'i with Pā'ao). They used a mixture of local stories, tales, and family traditions in association with place names to tie together fragments of site specific history that had been handed down over the generations. Thus, while in many cases, the personification of individuals and their associated place names may not be "ancient," the site documentation within the "story of Ka-Miki" is of both cultural and historical value.

This *mo'olelo* (story) tells of the two supernatural brothers named Ka-Miki and Maka-'iole. They were both skilled *'ōlohe* (competitors/fighters) who traveled by way of the ancient trails and paths (*ala loa* and *ala hele*) found throughout Hawai'i Island to compete with other *'ōlohe*. Upon his mysterious and premature birth, Ka-Miki was placed in the cave of Pōnahanaha and given up for dead. He was eventually saved and raised by his ancestress, Kuluhe-nui-hihi-kolo-i-uka, a manifestation of the goddess Haumea, at Kalama'ula, an area located on Hualālai. Ka-Miki was later joined by his elder brother Maka-'iole. While there, Ka-uluhe-nui-hihi-kolo-i-uka trained her grandsons to become experts skilled in fighting, wrestling, debating, riddle solving, and running. She also trained Ka-Miki and Maka-'iole to draw upon their supernatural powers when needed.

A portion of this tale describes the naming of South Kohala's land divisions and focuses explicitly on the Waimea region and three associated 'ili, including Lālāmilo, Puakō, and Waikōloa:

Pili-a-Ka'aiea the chief of Kona greatly loved octopus fishing, and had sent several messengers to inquire of Lālāmilo how he might acquire the lure. All of the messengers were killed by Lālāmilo and Piliamo'o. While at the contest field called Hinakahua in Puapua'a, Ka-Miki agreed to fetch the lure for Pili as one of the conditions he needed to fulfill in order to become the foremost favorite of Pili. Now as these events at the court of Pili were unfolding, Lālāmilo decided to visit his father Pu'u-hīna'i [located to the southeast of the proposed project area]; his sister Pu'u'iwa'iwa; and his

grand aunt Waikōloa, who was Pu‘u‘iwa‘iwa’s guardian. To this day, places are named for all of these people as well.

Lālāmilo arose and told his wife Puakō, and his mother Nē‘ula that he was going to the uplands to visit his father, sister, and the people who worked the upland plantations. Lālāmilo desired to eat the sugar cane and bananas, and drink the ‘awa which grew on the hill of Po‘opo‘o. Po‘opo‘o was also the name of a seer (makāula) who saw to the continued peaceful dwelling of the people. Lālāmilo placed the lure in Kanakanaka’s gourd and secured it near the ridge pole of his house. Lālāmilo then asked Puakō and Nē‘ula to go and look after the gourd in which the ‘ōnohi (eyeball or cherished possession) of Ha‘alua was kept.

Lālāmilo then departed and traveled up towards the residences and agricultural lands of Pu‘uhina‘i mā, as he drew near his destination, his thoughts returned to the lure. Lālāmilo looked towards the ocean, and his desire to see the lure was very great (July 5, 1917). At the same time, Lālāmilo also had a premonition, so he returned to the shore without visiting his father and sister. During the time when Lālāmilo was gone, Ka-Miki had traveled to Lālāmilo’s land and met with a man of the area named Nīheu. Ka-Miki inquired, “Where is the chief Lālāmilo’s house?” Nīheu said, “It is there above the canoe landing.” Ka-Miki then asked, “And where is the chief?” Nīheu responded by saying, “I don’t know, perhaps he is in the house.” Ka-Miki then went to Lālāmilo’s house, peering in he saw the gourd container and he lowered it, removing the cordage. Ka-Miki then took out the lure and departed from Lālāmilo without incident. . . (Maly 1998:28)

Another portion of the legend was set in Waikōloa, where the brothers gathered *Ka-lau-o-ke-kāhuli*, a native sedge to strain their ‘awa (kava; *Piper methysticum*) to mix with the sacred waters from Mauna Kea. Upon transporting the bowl of ‘awa from Holoholokū in Waimea, a gust of wind identified in the story as the Waikōloa wind blew a bit of the sacred water out of the bowl, thereby forming a spring called Waiki‘i:

Upon completing their training, Ka-uluhe sent Ka-Miki and Maka‘iole to fetch ‘awa from Waipi‘o water from a sacred spring on Mauna Kea, and other items needed to prepare the ‘awa for drinking. While traveling on the plain of Waikōloa, Ka-Miki and Maka‘iole gathered the sedge *Ka-lau-o-ke-kāhuli* which was to be used for straining the ceremonial ‘awa drink. At Holoholokū, some of the sacred water of Kāne which Ka-Miki was carrying in the ‘awa bowl Hōkū‘ula was lifted out by the wind, Waikōloa. The water was carried some distance, and where it fell a spring was formed. The deity Pōhaku-a-Kāne retrieved some of the water from the spring, and carried it to his companion deity Pōhakuola at the base of Mauna Kea. The spring from where Pōhakuakāne fetched the water came to be called Waiki‘i (Water fetched). . .

While on their journey around the island, the brothers stopped at Kapalilua, South Kona, and Ka-Miki was described as the skilled ‘ōlohe from the lands of Nāpu‘u (the Pu‘u Anahulu-Kekaha region). In describing Nāpu‘u, the wind Waikōloa was mentioned:

Nāpu‘u (pū) ‘Alu Kinikini i ku‘ia e ke ao-lewa i ka makani i ka ho‘ohae a ka Nāulu, i ka hō‘elo ‘ia e ka Waikōloa a me ke Kaumuku kuehu lepo i ke kula pili – the many gullied or folded hills where the wind borne Nāulu rain clouds appear, [land] moistened by the Waikōloa wind, with the Kaumuku winds which stir up the dust on the pili grass covered plain. . .

Native historian Samuel Kamakau also wrote that Waikōloa was one of several winds that came to Hawai‘i from Kahiki when they were sent by Lonopele as he tried to destroy the priest Pā‘ao and his companions. (Maly 1999:25)

The Legend of Kuapāka‘a and the Wind-Gourd of La‘amaomao

The winds of Kohala are also enumerated in a traditional *mo‘olelo* featuring the famous wind-gourd La‘amaomao, which was said to contain all the winds of Hawai‘i. Originally published by Moses Kuaea Nakuina, the legend relates the story of Pāka‘a, son of La‘amaomao and Kūanu‘uanu, and the highly trusted and favored personal attendant of the *ali‘i ‘ai moku* Keawenui a ‘Umi, grandson of celebrated *ali‘i nui* ‘Umi a Līloa. Pāka‘a succeeded his father as *kahu* (personal attendant) of Keawenui a ‘Umi, and had charge over many of the chief’s belongings. However, Pāka‘a’s greatest and most cherished responsibility was keeping a highly treasured personal possession: a very special and sacred *ipu* (gourd) passed down to him from his mother. The *ipu*, known as the wind-gourd of La‘amaomao, belonged to Pāka‘a’s grandmother. In the *mo‘olelo*, Nakuina (2005:14-15) explains the gifting of the *ipu* to Pāka‘a from his mother:

Then La‘amaomao lifted the lid of a large calabash and took out a small, long, highly polished gourd in a woven bag. The gourd was covered securely. She [La‘amaomao] turned to her keiki and said, “I’m giving you this gourd which belonged to your extraordinary kupunawahine for whom I was named. Her bones are inside the gourd. While she was alive, she controlled all the winds of the islands—she had them under a supernatural power. She gathered all the winds and put them into this gourd, where they’re still kept. She memorized one by one the names of all the winds of Hawai‘i to Ka‘ula. On windless days, she could remove the cover and call out the name of a wind, and the wind in this gourd would blow. This gourd, called ‘the wind gourd of La‘amaomao,’ was famous.

Before she died, she entrusted me to put her bones inside this gourd and care for them until I had a child. Then I was to give the gourd to the child to watch over. You’re my only child, so now I’m giving the gourd to you. You must look after it according to the wishes of your extraordinary kupunawahine.

You must care for this gourd because it had been handed down from the kupuna. This gourd has great value—you may not think so now, but when you sail with the ali‘i and arrive at an area where no wind blows and the canoes are becalmed, say that the winds are at your command; all you have to do is call, and the winds will blow.

“When you’re laughed at, remove the lid of the gourd and call for a wind. The wind will blow and bring the canoes to shore. The ali‘i will be grateful to you, and you’ll be loved and valued by him.”

Before Pāka‘a sailed off, La‘amaomao taught him the names of all the winds, along with the prayers, songs and chants concerning them, and when she was done, Pāka‘a had memorized everything. Then he took the wind gourd and tied it with a cord he had made, prepared his other things for the voyage, and left home.

Pāka‘a settled into his role as *kahu*, and he became the utmost favorite of Keawenui a ‘Umi. However, the favoritism of Pāka‘a inspired considerable virulence and collusion against him by two men, Ho-okele-i-Hilo and Ho-okele-i-Puna. The pair successfully conspired to entrap Pāka‘a in a scandal by spreading lies about him to Keawenui a ‘Umi as a way to undermine Pāka‘a’s prestige in the eyes of his *haku* (lord, overseer). Keawenui a ‘Umi, having heard of these rumors, was incensed and relinquished all of Pāka‘a’s gifted lands and authority, transferring all power to Ho-okele-i-Hilo and Ho-okele-i-Puna, who had usurped Pāka‘a’s power with their cruel deception. Hurt by Keawenui a ‘Umi’s naivety to the slander that had befallen his name, Pāka‘a gathered some of the belongings of his former *haku*, placed them inside his family’s heirloom, departed from Waipi‘o, and eventually made a life for himself on Moloka‘i. While on Moloka‘i, Pāka‘a fathered a son, Kūapāka‘a, whom he raised to become a *kahu* that could avenge Pāka‘a.

Meanwhile, the true character of the two schemers who deposed Pāka‘a of his esteemed position began to surface, and Keawenui a ‘Umi grew regretful of his decision to scorn his former *kahu* in their favor. The tale continues with Keawenui a ‘Umi’s frantic and persistent search for Pāka‘a, with whom he had been communicating with in dreams. Pāka‘a and Kūapāka‘a knew that the *ali‘i* would come searching for them. They strategically positioned themselves in their canoe where they fished for *uhu* (parrot fish; *Scarus perspicillatus*) in the early morning off the shore of Moloka‘i. When Keawenui a ‘Umi’s party approached the pair, his men were unsuspecting of Pāka‘a’s and Kūapāka‘a’s true identity, especially since Pāka‘a had disguised himself as a deaf, hunched-over fisherman. The six fleets of men and chiefs from each district on Hawai‘i Island approached Pāka‘a and Kūapāka‘a, led by the *ali‘i* of Kohala, Wahilani:

Then Wahilani’s canoe passed by, and Kūapāka‘a called out loudly: “Wahilani, our ali‘i of Kohala goes by. He’s not an ali‘i, only a *kaukauali‘i* [low-ranking chief] who hides himself in the stands of Kohala cane. The only i‘a in his land is the grasshopper—there on the sugarcane leaf, there on the flower-stem of grass. Kohala is a land without any i‘a and the only ‘ai is the sweet potato. The defect in the land is that Wahilani is not an ali‘i, yet he enjoys the bounty of Kohala, so he’s called an ali‘i.” (Nakuina 2005:31)

With each passing fleet, Kūapāka‘a continued to hurl insults, incensing each district *ali‘i*, who continued past the father and son, allowing Keawenui a ‘Umi’s bevy closer and closer to them. Just before dawn, as Keawenui a ‘Umi’s party approached, Kūapāka‘a chanted to his *haku* at his father’s request. His chant was rivaled by a chant from the Kuhina Nui, Kahikuokamoku, who was part of Keawenui a ‘Umi’s party and unaware of the youth’s true identity. Kūapāka‘a, in an effort to lure Keawenui a ‘Umi’s party onshore so he could isolate Ho-okele-i-Hilo and Ho‘okele-i-Puna, continued his chants implicating impending stormy weather. However, Kahikuokamoku challenged his

2. Background

prophecy, arguing the impossibility of poor weather, and refused to come ashore. Furthermore, Kahikuokamoku challenged Kūapāka'a's knowledge of the winds of Hawai'i Island, for how could a young native boy from Moloka'i possibly understand and foretell that strong winds would be heading towards them from Hawai'i Island that would force them to land ashore. In response, Kūapāka'a drew upon his heirloom gourd and his ancestral knowledge and began chanting his warning of destruction. Although no specific wind name for Waikōloa is recounted in this chant, the wind names (bolded and underlined) of the adjacent lands (bolded and italicized) are mentioned. Only those portions of the chant making explicit reference to South Kohala area cited below:

Kīpu'upu'u is of *Waimea*,
 'Ōlauniu is of Kekaha,
 Pa'ala'a is in the ocean,
Nāulu is of *Kawaihae*,
A wind that comes
And dashes the milo leaves of *Makaopau*,
***Kalāhuipua'a*, 'Āpa'apa'a is of *Kohala's* upland cliffs,**
The wind that flies about like vapor (Nakuina 2005:39-40)

Keawenui a 'Umi was rapt with attention at the youth's enumeration, so Kūapāka'a continued chanting, the winds of Hawai'i:

At Ka'ū's windy cape is Ka 'Īlio a Lono,
The paddle is dipped into the sea of Kāiliki'i,
At Puna's foundation turns the sun, the light,
Go and feel the wind of Kumukahi,
Hilo's wind-blown rain at sea,
The rain is seaward, over the hala of Leleiwi,
The spray of rain is at Hāmākua,
Hāmākua is the bridge to the cliffs,
At *Kohala-iki* is the Moa'e wind, the Moa'e blows,
Kona awakens with the Kēhau breeze,
Kona's burden diminishing with the Kēhau breeze,
Keawenuia'umi, come ashore, a storm is coming. (2005:40)

Kūapāka'a continued, again making reference to the lands of South Kohala:

There, there are the winds rising from the earth,
The 'Āpa'apa'a is of *Kohala*,
The rainy wind called Nāulu is of *Kawaihae*,
The Kīpu'upu'u is of *Waimea*,
A cold wind that hurts the skin,
A wind that whips the kapa of that land about,
Tossing up dust before it,
Frightening the procession of travelers, (2005:41-42)

After Kūapāka'a's recital of the winds of Hawai'i, O'ahu, Kaua'i, Maui, and Ka'ula, Keawenui a 'Umi became unsettled with a suspicion that the boy's forecast would be realized. Perturbed at the possibility of meeting certain death in the face of violent weather, Keawenui a 'Umi consulted with his two advisors, and thus the ultimate targets of the trickery, who adamantly insisted that Kūapāka'a was lying and that they should depart. Kūapāka'a continued chanting his warning, enumerating upon the winds of Maui and Moloka'i in an effort to beguile them onshore, but Keawenui a 'Umi's party still retained suspicion and were not sure if they were being duped. Kahikuokamoku demanded the youth's name, but Kūapāka'a denied him, arguing that he would reveal his name once the men landed, but they did not comply, and instead, the canoes sailed off to O'ahu.

Soon after their departure, and upon the command of his father, Kūapāka'a chanted:

Ē winds that I've called,
Blow here, those of Ka'ula and Kaua'i first,
Those of O'ahu and Hawai'i from the sides,
Those of Maui and Moloka'i last,
Blow true, and overtake the canoe fleet
Of Keawenuia'umi, the ali'i. (2005:63)

And with this utterance, every wind that had escaped Kūapāka'a's lips through chant ravaged the atmosphere, wreaking utter havoc upon Keawenui a 'Umi's fleet. Soon, the survivors and their *ali'i* made their way back to Moloka'i to escape the mayhem and were led safely to shore by Kūapāka'a and his father. They continued to play the role of the unassuming fisherman. Keawenui a 'Umi was cold and wet from the escapade, and Kūapāka'a was concerned for his wellbeing:

By evening, all the canoes had landed, but Keawenui'a'umi remained on the platform of his double-hulled canoe because he had no dry kapa or malo to wear since all his clothing had been lost at sea. Kūapāka'a saw his haku shivering on the canoe, so he went to speak to his father: "I pity my haku because he's suffering from the cold. He just sits there in a wet malo on the canoe, without any kapa covering."

Pāka'a took out one of Keawenui'a'umi's malo which he had cared for when he was the ali'i's haku; he gave it to his keiki: "Here's one of your haku's malo. Take it to him. Ask him to remove the wet malo he's wearing and bring it back here. Tell him that this malo you give him is yours."

Kūapāka'a took the dry malo and offered it to Keawenui'a'umi saying, "Here's my insignificant malo for you. Please remove your wet one."

Keawenui'a'umi gave his wet malo to Kūapāka'a, and the keiki gave the ali'i the dry one. Keawenui'a'umi noticed the dry malo looked very much like one of his own. He said to Kūapāka'a, "Perhaps this is one of my malo—it looks like one of mine."

The keiki said, "The malo is mine. My mother beat the kapa for it and I was saving it until I could wear it in public as an adult. But now it's yours, my haku."

After the ali'i had taken off his wet malo and put on the dry one, he placed the wet one in the keiki's care.

The keiki returned with it and when he reached the door of Pāka'a's hale, his father asked him, "Where is your haku's malo?"

"Here it is."

"Hang it at the door of my hale, so that the 'ā'ipu'upu'u can no longer come in here."

"I've hung it at the door."

Pāka'a said, "Now only you can enter here because you've been made sacred for your haku by the handling of his kapa. From now on, you'll distribute the food in here to the 'ā'ipu'upu'u who come, because they can longer enter." (2005:66-67)

The scenario repeated with Pāka'a giving Kūapāka'a a beautifully-scented *kapa* (cloth made of *wauke* or *māmaki* bark) that he had cared for over the years for Keawenui a 'Umi. Although suspicious, the *ali'i* presumed the tale told to him by the boy was true, that it was a *kapa* of the same fragrance as his but from Wailau, Moloka'i and not in fact one of his own. Being that Keawenui a 'Umi had lost everything in the storm, Kūapāka'a continued to care for his *haku*, who was still clueless as to the boy's true identity. He dutifully attended to his every need, just as his father (Pāka'a) had in previous years. Meanwhile, Pāka'a continued to craft his revenge plot on Ho'okele-i-Hilo and Ho'okele-i-Puna, and in order to facilitate this, his son let loose the winds of his gourd to keep the weather just unstable enough so Keawenui a 'Umi would not be able to leave the island.

Four months later the weather became agreeable once more, and Keawenui a 'Umi and his men readied their canoes for sailing. That night, Kūapāka'a chanted to each of the six district *ali'i* and their men to ready themselves for sailing:

Get up, get up, it's day, there's light,
The sun has arrived, and there above,
Iao [the planet Jupiter], Maio [a navigation star],
Kamaha, Kahikikuokamoku,
Kani-'ū'ū, the star at Helani,
Get up, move, Kohala,
The land of Wahilani. (2005:73-74)

The men were confused, as the voice urging them to depart belonged to Kūapāka'a, who instructed them to set sail to Ka'ula and explained to them that Keawenui a 'Umi would shortly follow. However, Kūapāka'a did not wake his *haku* immediately, and allowed him to sleep in, while the other fleets departed Moloka'i. When day broke, Keawenui a 'Umi and his men (including Ho'okele-i-Hilo and Ho'okele-i-Puna) departed to Ka'ula in search of Pāka'a. Being that the rest of his party had departed, Keawenui a 'Umi requested that Kūapāka'a accompany him to Ka'ula to search for Pāka'a, which he agreed to do as this was part of his father's plan. As part of Pāka'a's conspiracy

to exact revenge on his enemies, he had instructed his son to load the double-hulled canoe of the *ali* 'i with a hollowed-out tree trunk secretly filled with food, drink, palm fronds, and a large stone to be used as an anchor.

Meanwhile, the rest of Keawenui a 'Umi's party was en route to Ka'ula, but stalled at O'ahu to wait for their *ali* 'i, but he never arrived. Exhausted from their journey, the men fell asleep. When they awoke, they unexpectedly found that they had drifted to Hawai'i Island, and found themselves on the shores of Kawaihae. Meanwhile, Keawenui a 'Umi and his party were voyaging to Ka'ula, with Ho'okele-i-Hilo and Ho'okele-i-Puna steering the canoe, oblivious to their imminent, discretely planned demise. To carry out the final segment of the grand scheme, Kūapāka'a allowed the winds out of La'amaomao, and the weather became severe. He anchored the canoe with his big rock and encouraged the men to ride out the storm in place, arguing that it would be better than fighting the bad weather. The bitter wind and rain chilled the men to the bone and they began to get hypothermic. Just before they reached the verge of death, Kūapāka'a then revealed the hidden trove of food. He gave palm fronds for protection and food and drink for strength to everyone on board except his father's enemies, Ho'okele-i-Hilo and Ho'okele-i-Puna, who inevitably succumbed to the cold and perished.

As the weather cleared and became pleasant, Kūapāka'a assumed the now-deceased steersmen's role and set sail for Ka'ula. However, that night when everyone was sleeping, the boy opened his wind-gourd yet again, and the winds wafted them to Hawai'i Island where they landed at Kawaihae. Once there, joy and excitement overcame Keawenui a 'Umi and his party, and they rushed to lovingly greet their families while Kūapāka'a was utterly forgotten, abandoned, and alone. Eventually, word of a canoe race that the boy participated in reached the ears of Keawenui a 'Umi by a messenger, and it was realized that Kūapāka'a's neglect had been inadvertent, as it was mistakenly presumed that the youth had been taken in and cared for. As part of the wager for the canoe race against Keawenui a 'Umi's favorite fishermen, it was agreed that should Kūapāka'a reign victorious, the losers be baked in an *imu* (underground oven). During their conversation, Kūapāka'a informed his *haku* that he intended to make true on his wager and defeat the men. But he was met with opposition from Keawenui a 'Umi, who did not want to see his men perish. Eventually, a deal was made in which Kūapāka'a would fetch Pāka'a from Moloka'i if Keawenui a 'Umi agreed that the fishermen be put to death.

Though Pāka'a longed to serve his *haku* once more, he refused to travel back to Hawai'i Island without having his land, position as navigator, and other rights restored. When Keawenui a 'Umi was informed of this, he immediately consented, eager to reconnect. Only once Keawenui a 'Umi agreed to restore everything that had been revoked from Pāka'a, did his beloved *kahu* return to him to serve him faithfully for the rest of his days.

Lonoikamakahiki and the Battle of Hōkū'ula

Lonoikamakahiki was a celebrated ruling chief of Hawai'i Island with lineal ties to the ancient Pili dynasty (a Hawai'i Island lineage with ties to Waipi'o Valley) since roughly A.D. 1300. He was the son of Keawenui a 'Umi, the grandson of 'Umi a Līloa, and recognized as an accomplished and dexterous warrior. Lonoikamakahiki is tied to the history and significance of Waikōloa because he triumphed over the invading Maui chief Kamalālāwalu in these lands. During Lonoikamakahiki's reign, several battles transpired in the coastal portion of South Kohala. One such battle was fought between Lonoikamakahiki and his older brother, Kanaloakua'ana, who rebelled against him. According to Fornander (1880:120-121):

Informed by Kaikilani of the revolt on Hawaii, Lonoikamakahiki left Oahu at once, crossed the channels of the group, and avoiding the Kohala coast, where the rebels were in force, sailed to Kealakekua [Kealakekua], and sent messengers to Kau to acquaint Pupuakea of the arrival of himself and Kaikilani. Pupuakea responded promptly, and, taking a mountain road above the coast villages, he joined Lono and the forces that the latter had collected in Kona at Puuanahulu, on a land called Anaehoomalu, near the boundaries of Kohala and Kona. The rebel chiefs were encamped seaward of this along the shore. The next day Lono marched down and met the rebels at a place called Wailea, not far from Wainanalii, where in those days a watercourse appears to have been flowing. Lono won the battle, and the rebel chiefs fled northward with their forces. At Kaunaoa, between Puako and Kawaihae, they made another stand, but were again routed by Lono, and retreated to Nakikiaianihau, where they fell in with reinforcements from Kohala and Hamakua. Two other engagements were fought at Puupa [on the plain north of Waikōloa] and Puukohola, near the Heiau of that name, in both of which Lono was victorious. His brother Kanaloakapulehu was taken prisoner, slain, and sacrificed at the Heiau, but Kanaloakuakawaiea escaped with the scattered remnant of the rebel forces. The rebels now fled into Kohala, and were hotly pursued by Lonoikamakahiki. Several skirmishes were fought during the pursuit; at Kaiopae, where

Kanaloakuakawaiea was slain; at Kaiopihi, and finally at Puumane, on the high lands above Pololu, where the last remnant of the rebel force was conquered and slain, and the island returned to its allegiance to Lono and Kaikilani.

Fornander (1916-1917) relates that a series of subsequent attacks were instigated and waged by Kamalālāwalu, the *ali'i nui* of Maui, against Lonoikamakahiki. These battles occurred along the South Kohala coastline, the first of which ensued at Wailea, then Kauna'oa, and finally commenced at Puakō, where his brother and high chief Kanaloakua'ana, was brutally tortured and eventually slaughtered. Thereafter, Kamalālāwalu and his army, upon the advice of two of Lonoikamakahiki's allies, Kauhapaewa and Kihapaewa, who had gained his trust and infiltrated Kamalālāwalu's camp, proceeded to Hōkū'ula in Waimea in anticipation of the continuation of battle in which they assumed an automatic victory. Upon awakening the next morning, Kamalālāwalu was stunned to discover that a great constellation of men had amassed near the coast. What seemed like thousands of warriors from all of Hawai'i Island had gathered as far as the eye could see, prepared to wage war upon the intruding Maui chief.

Realizing that he was vastly outnumbered, Kamalālāwalu attempted to reconcile differences with Lonoikamakahiki in an attempt to escape certain death. Still, the former, being enraged at how his ally Kanaloakua'ana was slain, denied him. The overwhelming number of Lonoikamakahiki's forces was incomparable to Kamalālāwalu's, especially when coupled with the latter's unfamiliarity with the battleground. According to Fornander (1916-1917:344), "the Kau and Puna warriors were stationed from Holoholoku to Waikoloa. Those of Hilo and Hamakua were located from Mahiki to Puukanikanihia, while those of Kohala guarded from Momoualua to Waihaka." After just three days, Lonoikamakahiki reigned victoriously, and Kamalālāwalu and nearly all of the invaders, except for his son Kauhiakama, were executed.

‘Ōlelo No‘eau of South Kohala

The oral tradition of Hawai'i is perhaps best preserved in *‘ōlelo no‘eau*, which has been passed down throughout the generations. Many *‘ōlelo no‘eau* speak of South Kohala, and most mention the famed winds of the region. The following sayings illustrate the character of South Kohala in great detail, and appear below as they were interpreted and published in *‘Ōlelo No‘eau, Hawaiian Proverbs & Poetical Sayings* by Mary Kawena Pukui (1983):

‘A‘ohe u‘i hele wale o Kohala.

No youth of Kohala goes empty-handed.

Said in praise of people who do not go anywhere without a gift or a helping hand. The saying originated at Honomaka‘u in Kohala. The young people of that locality, when on a journey, often went as far as Kapua before resting. Here, they made *lei* to adorn themselves and carry along with them. Another version is that no Kohala person goes unprepared for any emergency. (Pukui 1983:25)

He pā‘ā kō kea no Kohala, e kole ai ka waha ke ‘ai.

A resistant white sugar cane of Kohala that injures the mouth when eaten.

A person that one does not tamper with. This was the retort of Pupukea, a Hawai'i chief, when the Maui chief Makakuikalani made fun of his small stature. Later used in praise of the warriors of Kohala, who were known for valor. (ibid.:95)

I ‘ike ‘ia no o Kohala i ka pae kō, a o ka pae kō ia kole ai ka waha.

One can recognize Kohala by her rows of sugar cane which can make the mouth raw when chewed. When one wanted to fight a Kohala warrior, he would have to be a very good warrior to succeed. Kohala men were vigorous, brave, and strong. (ibid.:127)

Ipu lei Kohala na ka Moa‘ekū.

Kohala is like a wreath container for the Moa‘e breeze.

Kohala is a windy place. (ibid.:136)

Kahilipulu Kohala na ka makani.

Kohala is swept, mulch and all, by the wind.

Kohala is a windy place. (ibid.:143)

Ka makani ‘Āpa‘apa‘a o Kohala.

The ‘Āpa‘apa‘a wind of Kohala.

Kohala was famed in song and story for the ‘Āpa‘apa‘a wind of that district. (ibid.:157)

Kohala 'āina ha'aheo.

Kohala, land of the proud.

The youths, *lei*-bedecked, were proud of their handsome appearance and of their home district. (ibid.:196)

Kohala ihu hakahaka.

Kohala of the gaping nose.

Kohala is full of hills, and the people there are said to breathe hard from so much climbing. (ibid.:196)

Le'i o Kohala i ka nuku na kānaka.

Covered is Kohala with men to the very point of land.

A great population has Kohala. Kauhiakama once traveled to Kohala to spy for his father, the ruling chief of Maui. While there, he did not see many people for they were all tending their farms in the upland. He returned home to report that there were hardly any men in Kohala. But when the invaders from Maui came they found a great number of men, all ready to defend their homeland. (ibid.:213)

Lele au la, hokahoka wale iho.

I fly away, leaving disappointment behind.

Said of one who is disillusioned after giving many gifts. Waka'ina was a ghost of North Kohala who deceived people. He often flew to where people gathered and chanted. When he had their attention he would say, "I could chant better if I had a tapa cloth." In this way he would name one thing after another, and when all had been given him he would fly away chanting these words. (ibid.:213)

Lele o Kohala me he lupe la.

Kohala soars as a kite.

An expression of admiration for Kohala, a district that has often been a leader in doing good works. (ibid.:214)

Na 'ilina wai 'ole o Kohala.

The waterless plains of Kohala, where water will not remain long.

After a downpour, the people look even in the hollows of rocks for the precious water. (ibid.:243)

Nani ka waiho a Kohala i ka la'i.

Beautiful lies Kohala in the calm.

An expression of admiration for Kohala, Hawai'i, or for a person with poise and charm—especially a native of that district. (ibid.:248)

'Ope 'ope Kohala i ka makani.

Kohala is buffeted by the wind. (ibid.:277)

'Uala ne'ene'e o Kohala.

Ne'ene'e potato of Kohala.

A person who hangs around constantly. Ne'ene'e, a variety of sweet potato, also means "to move up closer." (ibid.:309)

Chiefly Rule in South Kohala, the Death of Kamehameha, and Early Historic Accounts

'Umi a Līloa, a renowned *ali'i* (chief) of the Pili line, is often credited with uniting the Island of Hawai'i under one rule during the Precontact Period (Cordy 1994). 'Umi-a-Līloa is also credited with formalizing the land division system on Hawai'i Island and separating the various classes of chiefs, priests, and laborers (Beamer 2014; Cordy 2000; Kamakau 1992). Upon the death of 'Umi-a-Līloa, Hawai'i Island came under the control of his eldest son Keli'iokāloa-A-'Umi (Cordy 2000), whose reign is marked by his mistreatment of the lesser chiefs and commoners. His reign was short-lived and by the early 18th century Hawai'i Island fell under the control of Alapa'inui, who assembled a robust army and assigned his closest potential usurpers (his nephews Keawema'uhili, Kalani'ōpu'u, and Keōua) as generals in his militia. The prodigious 'Ī clan, which spread across the districts of Ka'ū, Puna, Hilo, and portion of Hāmākua, was also a powerful force and threat to Alapa'i campaign (Cordy 2000). As Alapa'i gathered his forces to wage war against Kekaulike, the *ali'i nui* of Maui, the high ranking *ali'i wahine* (chiefess) Keku'iapoiwa made her way to Kokoiki, Kohala to give birth to Pai'ea, the birth name of Kamehameha, sometime between A.D. 1736 and 1758 near Mo'okini Heiau (Kamakau 1992). Kamehameha was reared in the traditions and customs of the

ancient chiefs and trained under some of the most skilled warriors of that time including Kekūhaupi'o. Upon Alapa'i's death, his eldest son Keawe'ōpala was named heir to the kingdom.

By the mid-18th century, the young and determined Kamehameha directed his efforts toward consolidating Hawai'i Island under his rule. To accomplish this monumental task, Kamehameha continued his training under his more experienced kin namely Kalani'ōpu'u, who was the *ali'i nui* of Hawai'i Island (Ii 1959). During Kalani'ōpu'u's reign, he fought several battles against Maui *ali'i* Kahekili between 1777 and 1779. During this time the first foreign vessels arrived in Hawaiian waters captained by the British explorer, James Cook. Cook first landed at Waimea, Kaua'i in 1778 and in 1779, he anchored just off the shores of Kealakekua Bay, Kona. Aboard these ships were innovative technologies and diseases unknown to the inhabitants of these islands. Items such as metal, nails, guns, canons, and the large foreign vessels themselves stirred the interest of the *ali'i* and *maka'āinana* (commoners) alike. The acquisition of these technological advancements came through barter.

On February 4th, Cook set sail from Kealakekua Bay, but a storm off the Kohala coast damaged the mast of the *H.M.S. Resolution*, and both ships were forced to return to Kealakekua Bay to make repairs. With Cook's return, many of the inhabitants of Kealakekua began to doubt that he was the physical manifestation of Lono (Kamakau 1992). After conflicts with Hawaiians who were accused of stealing nails from the British ships and the theft of one of Cook's boats, Cook set ashore at Ka'awaloa with six marines to ask Kalani'ōpu'u for its return. Kalani'ōpu'u denied any knowledge of the theft, so Cook decided to hold the chief captive until the boat was returned (Kamakau 1992). When Cook tried to seize Kalani'ōpu'u, a scuffle ensued and Cook was killed (along with four of his men and several natives) there on the shores of Ka'awaloa, struck down by a metal dagger.

After the death of Captain Cook and the departure of *H.M.S. Resolution* and *Discovery*, Kalani'ōpu'u moved to Kona, and while he was living there, famine struck the district (Kamakau 1992). Kalani'ōpu'u ordered that all the cultivated products of that district be seized, and then he set out on a circuit of the island. While in North Kohala, Kalani'ōpu'u proclaimed that his son Kīwala'ō would be his successor, and he gave the guardianship of the war god Kūka'ilimoku to Kamehameha. However, Kamehameha and a few other chiefs were concerned about their land claims, which Kīwala'ō did not seem to honor (Fornander 1996; Kamakau 1992). After dedicating the *heiau* of Moa'ula in Waipi'o (ca. A.D. 1781), Kalani'ōpu'u set out for Hilo to quell a rebellion by a Puna chief named Imakakolo'a. Imakakolo'a was eventually captured and brought to a *heiau* called "Pakini, or Halauwailua, near Kama'oa" in Ka'ū (Kamakau 1992:108), where Kīwala'ō was to sacrifice him. However, before Kīwala'ō could finish the first offerings, Kamehameha, "grasped the body of Imakakolo'a and offered it up to the god, and the freeing of the tabu for the *heiau* was completed" (Kamakau 1992:109). Upon observing this single act of insubordination, many of the chiefs believed that Kamehameha would eventually rule over all of Hawai'i. Kamehameha retreated to his home district of Kohala, where he farmed the land, growing taro and sweet potatoes (Handy et al. 1991). Kalani'ōpu'u died in April of 1782 and was succeeded by his son Kīwala'ō.

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

In the twelve years following the death of Captain Cook, sixteen foreign ships (all British and American) called in Hawaiian waters (Restarick 1928). In 1790, two sister ships, the *Eleanora* and the *Fair American*, were trading in Hawaiian waters when a skiff was stolen from the *Eleanora* and one of its sailors was murdered. The crew of the *Eleanora* proceeded to slaughter more than 100 natives at Olowalu, Maui. After leaving Maui, the *Eleanora* sailed to Hawai'i Island, where one of its crew, John Young, went ashore and was detained by Kamehameha's men. The other

vessel, the *Fair American*, was captured by the forces of Kamehameha off the coast of North Kona, and in an act of retribution for the Olowalu massacre, they slaughtered all but one crew member, Isaac Davis. Guns and a cannon (later named “Lopaka”) were recovered from the *Fair American*, and were kept by Kamehameha as part of his fleet (Kamakau 1992). Kamehameha eventually made John Young and Isaac Davis his advisors, the latter of which would eventually be gifted a portion of Waikōloa by Kamehameha.

In 1792, Captain George Vancouver, who had sailed with Cook during his 1778-1779 voyages, arrived in Kealahou Bay with a small fleet of British ships, where he met with Kamehameha. Vancouver stayed only a few days on this first visit but returned in 1793 and 1794 to take on supplies. Vancouver introduced cattle to the Island of Hawai‘i during his 1793 and 1794 visits, giving them as gifts to Kamehameha I, who at the advice of Vancouver, immediately made them *kapu*, thus preventing them from being killed (Bergin 2004; Kamakau 1992). During one of his visits, Vancouver anchored at Kawaihae, and a member of his crew, Archibald Menzies, a surgeon and naturalist, trekked inland towards Waimea and provided the following narrative:

I travelled [*sic*] a few miles back...through the most barren, scorching country I have ever walked over, composed of scorious dregs and black porous rock, interspersed with dreary caverns and deep ravines...The herbs and grasses which the soil produced in the rainy seasons were now mostly in the shriveled state, thinly scattered and by no means sufficient to cover the surface from the sun’s powerful heat, so that I met with few plants in flower in this excursion. (Menzies 1920:55-56)

Around the turn of the century, Kamehameha gave control of Waikōloa Nui Ahupua‘a (excluding the coastal *‘ili* of ‘Anaeho‘omalua and Kalāhuipua‘a) to Isaac Davis (Rosendahl 2000). Although the land of Waikōloa Nui gifted to Davis encompassed a large area, it lacked extensive resources and was primarily a place for catching birds and gathering *pili* grass. When Davis died in 1810 without naming an heir, John Young took control of the land and protected it for Davis’ children, who were at that time too young to take on the responsibility (Rosendahl 2000).

Waikōloa Nui would eventually become a favored pasture for the cattle given by Vancouver to Kamehameha. After 1794, the *kapu* cattle quickly multiplied in the region, becoming a scourge for the native planters of the area, so much so that sometime between 1813 and 1819 their numbers necessitated that a wall be built from the northern boundary of Waikōloa Nui to the area near Pu‘u Huluhulu (Barrère 1983). The wall was designed to keep wild cattle in Waikōloa Nui, and out of the more agriculturally productive areas on the Waimea side. The wall was called the Pā of Kauliokamoa after the *konohiki* who oversaw its construction (Wolforth 2000).

Kamehameha I died on May 8, 1819, at Kamakahonu in Kailua-Kona, and the changes that had been affecting the Hawaiian culture since the arrival of Captain Cook in the Islands began to accelerate (Kamakau 1992). Following the death of a prominent chief, it was customary to eliminate all of the regular *kapu* that maintained social order and the separation of men and women, elite and commoner. Thus, following Kamehameha’s death, a period of *‘ai noa* (free eating) was observed along with the relaxation of other traditional *kapu*. It was the responsibility of the new ruler and *kahuna* to re-establish *kapu* and restore social order, but at this point in history, traditional customs were altered. Immediately upon the death of Kamehameha I, Liholiho (his son and to be successor) was sent away to Kawaihae to keep him safe from the impurities of Kamakahonu brought about from the death of Kamehameha. After purification ceremonies, Liholiho returned to Kamakahonu but rather than reinstate the *kapu*, he made a public display of continuing the period of *‘ai noa*, and, at the prompting of Ka‘ahumanu, decreed that the *kapu* was permanently ended (Kamakau 1992). While many supported this change, others, like Kekuaokalani, caretaker of the war god Kūka‘ilimoku, was dismayed by his cousin’s (Liholiho) actions. Kekuaokalani revolted against Liholiho but was ultimately defeated in the battle of Kuamo‘o. By December of 1819, Liholiho had sent edicts throughout the kingdom renouncing the ancient state religion, ordering the destruction of the ancient *ki‘i* (carved wooden images often placed at *heiau*), and ordering that the *heiau* structures be destroyed or abandoned and left to deteriorate. He did, however, allow the personal family religion, the *‘aumakua* worship, to continue (Kamakau 1992; Oliver 1961). With the end of the *kapu* system, changes in the social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O‘ahu, lessening the burden of resource procurement for the chiefly class on the residents of Hawai‘i Island. Some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods that they could trade with Western visitors.

The Arrival of Westerners and Early Historical Accounts of South Kohala (1823-1847)

The arrival of Western explorers in Hawai‘i in 1778 signified the end of the Precontact Period and the beginning of the Historic Period. With the influx of foreigners, Hawai‘i’s culture and economy underwent drastic changes. Demographic trends during the early Historic Period indicate population reduction in some areas, due to war and disease, yet increase in others, with relatively little change in material culture. At first, there was a continued trend

toward craft and status specialization, intensification of agriculture, *ali'i* controlled aquaculture, the establishment of upland residential sites, and the enhancement of traditional oral history. The Kū cult, *luakini heiau* (sacrificial altar), and the *kapu* system were at their peaks, although Western influence was already altering the cultural fabric of the islands (Kent 1983; Kirch 1985). Foreigners very quickly introduced the concept of trade for profit, and by the time Kamehameha had conquered O'ahu, Maui, and Moloka'i, in 1795, Hawai'i saw the beginnings of a market system economy (Kent 1983). Some of the work of the *maka'āinana* shifted from subsistence agriculture to the production of foods and goods to trade with early visitors. Introduced foods often grown for trade included yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845).

During this period, the sandalwood trade wreaked havoc on the lives of the commoners, as they weakened from the heavy production, exposure, and famine just to fill the coffers of the *ali'i*, (Kuykendall 1967; Oliver 1961). The lack of control of the sandalwood trade was to soon lead to the first Hawaiian national debt as promissory notes and levies were initiated by American traders and enforced by American warships, and was the force that ultimately propelled the assimilation of Hawaiian and Western culture (Oliver 1961).

Shortly after 1820, Christianity established a firm foothold in the islands, and introduced diseases and global economic forces began to have a devastating impact on traditional lifeways. Some of the earliest written descriptions of Kohala come from the accounts of the first Protestant Missionaries to visit the island. While explicit references to Waikōloa are notably absent from these accounts, several exist for the greater South Kohala region. In 1823, British missionary William Ellis and other members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawai'i seeking out communities in which to establish church centers for the growing Calvinist mission (Ellis 2004). Ellis described the coastal communities of the north part of the island (presumably along the shores of North and South Kohala) as subsisting almost exclusively on dried, salted fish, *poi*, and *'uala*. While in South Kohala, Ellis visited Kawaihae and attested to the great number of Kohala men involved in the transportation of sandalwood from the uplands to the harbor at the time of his visit:

About eleven at night we reached Towaihae [Kawaihae], where we were kindly received by Mr. Young... Before daylight on the 22nd, we were roused by vast multitudes of people passing through the district from Waimea with sandal-wood, which had been cut in the adjacent mountains for Karaimoku [Kālainimoku], by the people of Waimea, and which the people of Kohala, as far as the north point, had been ordered to bring down to his storehouse on the beach, for the purpose of its being shipped to Oahu. There were between two and three thousand men, carrying each from one to six pieces of sandal-wood, according to their size and weight. It was generally tied on their backs by bands of ti leaves, passed over the shoulders and under the arms, and fastened across their breasts. (Ellis 2004:405-406)

Much of the population of South Kohala at this time resided near the shore or in the rainier uplands of Waimea. Lorenzo Lyons arrived at Kawaihae on July 16, 1832, and replaced Reverend Dwight Baldwin as the minister in Waimea (Maly 1999). Lyons' missionary territory, although centered in Waimea, included the districts of Kohala and Hāmākua. He served as the preeminent missionary of the area until his death in 1886 (Puakō Historical Society 2000), becoming one of the most beloved of the Hawaiian missionaries, known to his parishioners as *Ka Makua Laiana, haku mele o ka aina Mauna* (Father Lyons, lyric poet of the mountain country). During his tenure at Waimea, Lyons' toured the territory spreading the gospel and helping the needy. He helped establish and maintain many of the early churches and schools in Kohala, including a school at Puakō and Hōkūloa Church. In 1835, Lyons visited the nearby village of Puakō, which was likely very similar to 'Anaeho'omalū at that time. There he found a coastal village still deeply rooted in traditional lifeways:

Puako is a village on the shore, very like Kawaihae, but larger. It has a small harbor in which native vessels anchor. Coconut groves give it a verdant aspect. No food grows in the place. The people make salt and catch fish. These they exchange for vegetables grown elsewhere (Lyons in Doyle 1953:85)

With Kawaihae being the principal port of South Kohala, the development of a thoroughfare was necessary to accommodate the growing numbers of people who required reliable access to it. A detailed description of the coastal section of South Kohala was provided in *The Southern Literary Messenger* published in 1837. Described as barren and warm, improvements to the district had begun with the establishment of a convict-constructed roadway leading to Pu'u Koholā Heiau and the continual advancement of Kawaihae as an intensively utilized port:

... The western district on the coast is barren rock and long grass—and nothing relieves the eye but the yellow blossoms of the *Nohu* (Tribulus). A road has lately been made to the plains by clearing

away the stones, and covering the surface with long grass—done by convicts. The road terminates at a *large temple* built by *Kamehameha the First*. The strong north-east wind is called *Mumuku*. There are *salt works* at Kawaihae, and also *tepid baths*. Once it was the head quarters of the chiefs. The climate of the island varies “from the oven-like dryness and heat of Kawaihae, to the cold-wet rawness of Pukapu [Pu‘ukapu] and the freezing snows of Mauna Kea”. . . There is much rain and wind at Kawaihae—a nasty drizzling, soaking Scotch mist for weeks. If you remain in the house you are tormented by the bites of mosquitoes [mosquitos]. . . The earth on the shore on the west side is at an even temperature of 80 throughout the year. The water is brackish. Population fluctuates according to the movements of Governor Adams *Kuakini*, who frequently resides here. Many foreigners, chiefly mechanics, are on the cattle farms. Large quantities of leather are made. Principal articles exported—livestock, salt and jerked beef, hides, tallow, leather, Mamaki kapas, feathers, koa plank, &c. &c. (The Southern Literary Messenger 1837:422)

In 1840, Lieutenant Charles Wilkes, head of the U.S. Exploring Expedition, traveled to Kawaihae. His narrative provides a similar account to those written by others in earlier times, illustrating the Kawaihae landscape as arid and gusty, and remarking upon the bustling port of Kawaihae:

. . . Kawaihae is the port or bay nearest to Maui and the islands to the westward, and there are many small native vessels which trade to this island, which only frequent this port. This bay is readily known by the gorge in the mountains that is directly behind it, in which lies the town of Waimea, where a lively trade is carried on by the natives shipping their productions to Honolulu, consisting of hides, tallow, leather, beef, wood, &c. The mountains rise from the coast to a great height, and the country has the appearance of a parched or burnt district. This port was first brought into notice by Kuakini, well known under his English appellation of Governor Adams. The Bay of Kawaihae does not deserve the name of a port. Being under the lee of the island, it is difficult to reach; calms and light airs predominate; the trade wind sometimes blows very strong, rushing down the mountain side; vessels lying in the roadstead are frequently blown off. A peculiar squall, called by the natives *Mumuke* [*Mumuku*], sometimes bursts upon the bay a short time before sunset; its duration is not long, but of great violence; its coming is prognosticated by an illuminated streak, seen far inland, by the natives, who prepare in time to resist its violence; it is accompanied by quantities of sand. . . As a place of resort it is by no means agreeable, the air being hot and stifling. The morning hours are best to transact business in, and the shipment of cargo at that time does not meet with interruption from the weather. (Wilkes 1861:291-292)

With the arrival of foreigners in Hawai‘i, the introduction of a western economy, and the rise of the sugar and cattle industries, life in Kohala drastically changed. The population of the district also declined rapidly as native populations were decimated by disease and a depressed birth rate. Epidemics in 1848 and 1849 killed more than 10,000 people in twelve months throughout the Hawaiian Islands (Tomonari-Tuggle 1988). In 1848 in North Kohala, Reverend Bond reported that 100 people had died within three weeks, and in October of that year he reported that a measles epidemic had nearly every resident of the district in the hospital (Damon 1927). Following these epidemics, the population of the district had been reduced to nearly half of the more than 6,000 people reported in the 1835 census (Schmitt 1977).

During this time, leeward settlement shifted to the windward side of Kohala as the leeward, agriculturally marginal areas were abandoned in favor of more productive and wetter sugarcane lands. According to Tomonari-Tuggle (1988), the remnant leeward population nucleated into a few small coastal communities and dispersed upland settlements. These settlements were no longer based on traditional subsistence patterns, largely because of the loss of access to the full range of necessary resources. The wetter windward slopes of North Kohala and the Waimea plain were the focus of the shifting settlement pattern and they eventually became the population centers for the district. Tomonari-Tuggle (1988:33) clarifies some of the reasons for this migration:

Outmigration and a demographic shift from rural areas to growing urban centers reflected the lure of a larger world and world view on previously isolated community. Foreigners, especially whalers and merchants, settled around good harbors and roadsteads. Ali‘i and their followers gravitated towards these areas, which were the sources of Western material goods, novel status items which would otherwise be unavailable. Associated with the emergence of the market, cash-based economy, commoners followed in search of paying employment.

While the early historical accounts lack detailed information about the proposed project area, collectively these accounts describe important cultural transformation of this time period. These written descriptions depict the

movement of people in the greater South Kohala District and their connection to the changing industries all while facing serious epidemics that continued to send the Hawaiian population into decline.

The *Māhele* ‘*Āina* of 1848

By the mid-19th century, the Hawaiian Kingdom was an established center of commerce and trade in the Pacific, recognized internationally by the United States and other nations in the Pacific and Europe (Sai 2011). As Hawaiian political elite sought ways to modernize the burgeoning Kingdom, and as more Westerners settled in the islands, major socioeconomic and political changes took place. A significant example of these changes is the formal adoption of a Hawaiian constitution by 1840, the shift in governance from an absolute monarchy to a constitutional monarchy, and the shift towards a Euro-American model of private land ownership. This change in land governance was partially influenced by ex-missionaries and Euro-American businessmen in the islands who were generally hesitant to enter business deals on leasehold lands that could be revoked from them at any time. *Mōʻī* (Ruler) Kamehameha III, through intense deliberations with his high-ranking chiefs and political advisors, separated and defined the ownership of all lands in the Kingdom (King n.d.). They decided that three classes of people each had one-third vested rights to the lands of Hawai‘i: the *Mōʻī*, the *ali‘i* and *konohiki*, and the *hoa ‘āina*, the native tenants. In 1846, Kamehameha III formed the Board of Commissioners to Quiet Land Titles (more commonly known as the Land Commission) to adopt guiding principles and procedures for dividing the lands, creating grant land titles, and act as a court of record to investigate and ultimately award or reject all claims brought before them (Bailey in Commissioner of Public Lands 1929). All land claims, whether by chiefs for an entire *ahupua‘a* or *‘ili kūpono* (nearly independent *‘ili* land division within an *ahupua‘a* that paid tribute to the ruling chief and not to the chief of the *ahupua‘a*), or by *hoa ‘āina* for their house lots and gardens, had to be filed with the Land Commission within two years of the effective date of the Act (February 14, 1846) to be considered. This deadline was extended several times for chiefs and *konohiki*, but not for native tenants (Soehren 2005a).

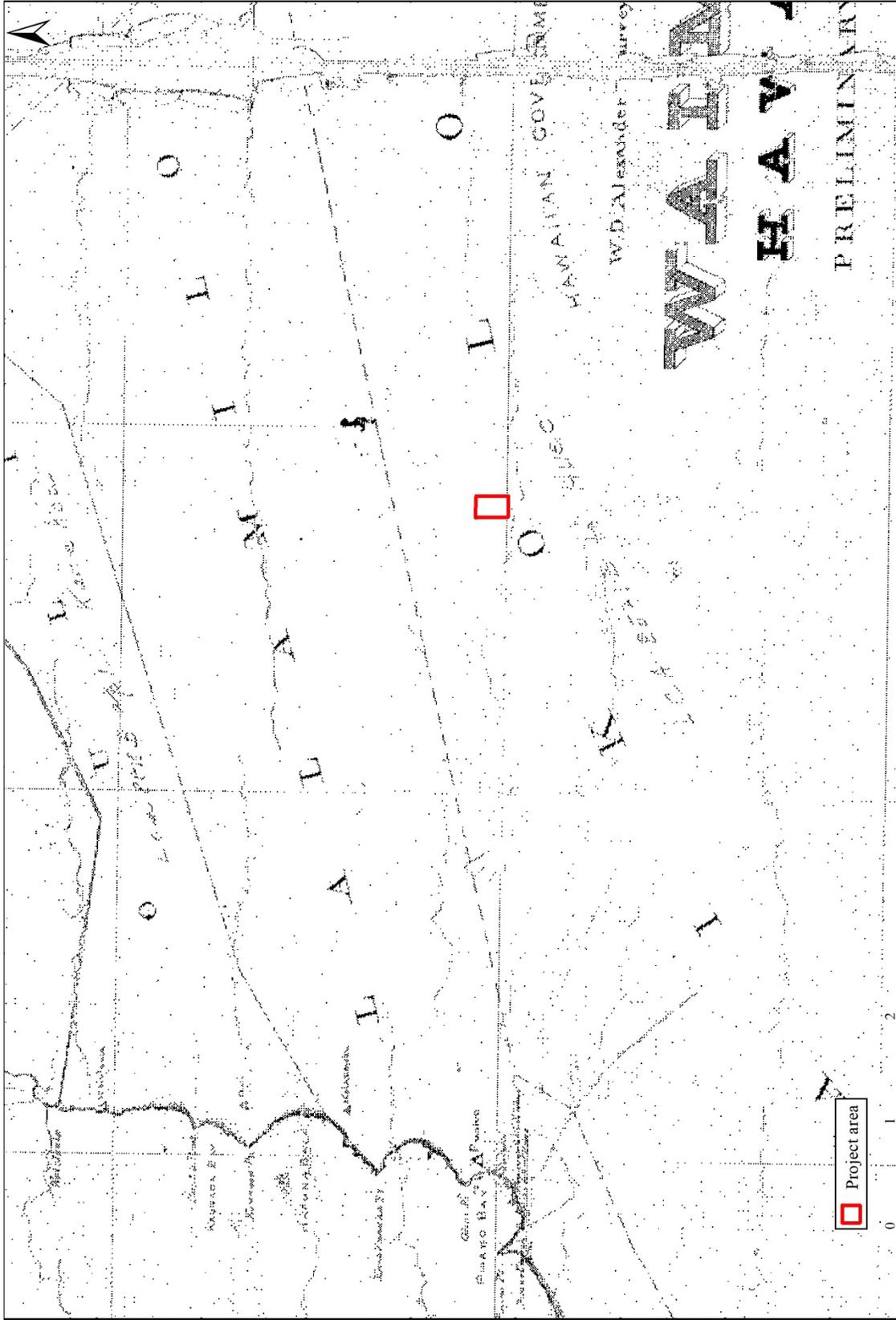
The King and some 245 chiefs spent nearly two unsuccessful years attempting to divide all the lands of Hawai‘i amongst themselves before the whole matter was referred to the Privy Council on December 18, 1847 (King n.d.; Kuykendall 1938). Once Kamehameha III and his chiefs accepted the principles of the Privy Council, the *Māhele* ‘*Āina* (Land Division) was completed in just forty days (on March 7, 1848). The names of all of the *ahupua‘a* and *‘ili kūpono* of the Hawaiian Islands, as well as the names of the chiefs who claimed them, were recorded in the *Buke Māhele* (*Māhele* Book) (Buke Māhele 1848; Soehren 2005a). As this process unfolded, King Kamehameha III, who received roughly one-third of Hawai‘i’s lands, realized the importance of setting aside public lands that could be sold to raise money for the government and also purchased for fee simple title by his subjects. Accordingly, the day after the division, when the name of the last chief was recorded in the *Buke Māhele*, the King commuted about two-thirds of the lands awarded to him to the government (King n.d.). Unlike Kamehameha III, the chiefs and *konohiki* were required to present their claims to the Land Commission to receive their Land Commission Awards (LCAw.). The chiefs who participated in the *Māhele* were also required to provide to the government commutations of a portion of their lands in order to receive a Royal Patent giving them title to their remaining lands. The lands surrendered to the government by the King and chiefs became known as “Government Land.” The lands personally retained by the King became known as “Crown Land.” Lastly, the lands received by the chiefs became known as “Konohiki Land” (Chinen 1958:vii; 1961:13). To expedite the work of the Land Commission, all lands awarded during the *Māhele* were identified by name only, with the understanding that the ancient boundaries would prevail until the lands could be formally surveyed.

Disposition of Waikōloa at the time of the 1848 Māhele ‘Āina

As a result of the *Māhele*, Waikōloa Nui (originally an *‘ili* of Waimea *kalana*) was awarded to George Davis Hū‘eu as an *ahupua‘a* based on Kamehameha I’s gift of the land to Hū‘eu’s father Isaac Davis. This award (LCAw. 8521-B:1) did not include the coastal areas of ‘Anaeho‘omalū and Kalāhuipua‘a, which were claimed and awarded to Hazaleleponi Kalama, the wife of the King Kamehameha III. The Davis Hū‘eu award was restricted to the non-agricultural *pili* lands south of the agriculturally-productive Lālāmilo area and *mauka* of the rich coastal resource area. A portion of Hū‘eu’s awarded lands is shown in Hawai‘i Registered Map No. 1080 from 1885 (Figure 13). While no natural or built features are shown in the project area, the 1885 map (see Figure 13) documents the names of several nearby *pu‘u* including Pu‘uhuluhulu northeast of the project area on the Waikōloa-Lālāmilo boundary and the closest being Pu‘u Pā located directly *mauka* (east) of the project area. The undated Hawai‘i Registered Map No. 574 (Figure 14) produced by John L. Kaelemakule illustrates various natural and cultural features in Waikōloa. In the vicinity of the project area, Kaelemakule’s map (see Figure 14) shows Pu‘u Pā, east of the project area as well as the “*Alanui o ka wa kahiko*” translated as ancient trail on the Waikōloa-Ouli (present-day Lālāmilo) boundary.

2. Background

Upon closer examination, this trail connected the rich coastal lands of ‘Anaeho‘omalu and Lāhuipua‘a to the agriculturally fertile area of upper Waikōloa and Waimea.



2. Background

Figure 13. A portion of the 1885 map (Hawai'i Registered Map No. 1080) with the project area showing a portion of Waikōloa Ahupua'a awarded to George Davis Hū'eu (spelled as "Hueo" on map).

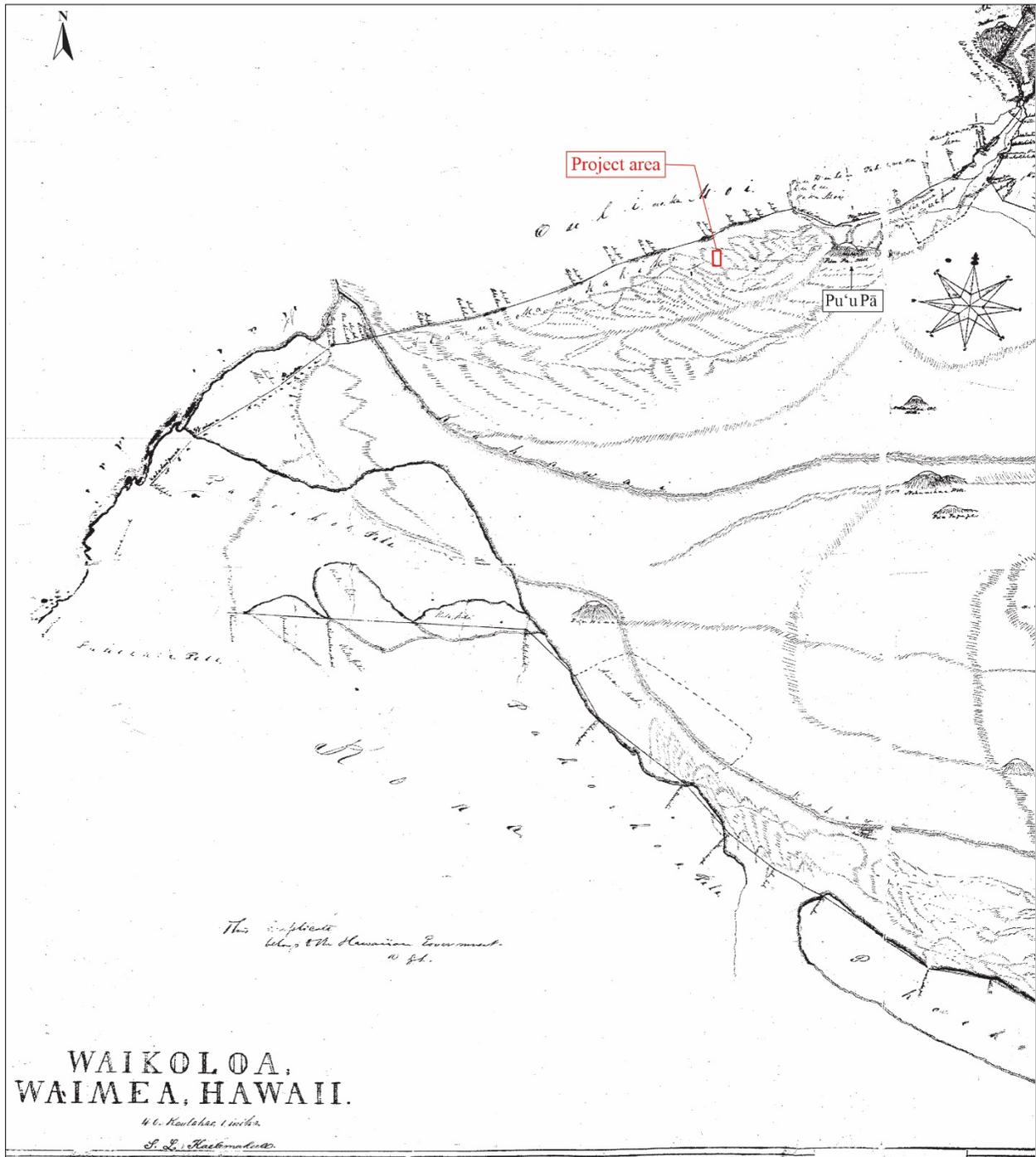


Figure 14. Undated Hawai'i Registered Map No. 574 by J. L. Kaelemakule showing the "Alanui o ka wa kahiko" (ancient trail) extending along the Waikōloa-Ouli (present-day Lālāmilo) boundary.

Waikōloa and the Greater South Kohala District after the *Māhele*

By the mid-1860s the Waimea Grazing and Agricultural Company (WGAC), founded by Robert C. Janion and William H. Green in 1861, and joined by F. Spencer and Company soon thereafter, had acquired considerable strategic assets around Waimea in an attempt to monopolize the livestock industry in the region (Bergin 2004). From the outset, Spencer, Janion, and Green maintained an adversarial relationship with Parker Ranch, and land disputes and alleged cattle rustling were common occurrences between these two competing entities. During the early 1860s, Parker successfully thwarted Janion's men from harvesting unbranded cattle on his lands, but attacks by Frank Spencer contesting Parker's claim to more than 17,800 acres in other parts of the island were more difficult to resolve and were still ongoing when John Palmer Parker, the founder of Parker Ranch, died on August 20, 1868 (Bergin 2004). At the time Parker Ranch controlled about 47,000 acres of land in the region. The ranch lands were divided evenly between John Parker II and his adopted son and nephew, Sam Parker Sr. (Bergin 2004).

On July 2nd, 1868, G. D. Hū'eu leased his remaining lands in Waikōloa Nui to the WGAC for twenty years (Maly and Maly 2002). With the acquisition of this land, the WGAC became the largest ranching operation on the island. Under the terms of the lease, the Hū'eu family was allowed to continue grazing their 1,000 head of cattle, 1,000 head of sheep, and 100 horses on the Waikōloa lands (Escott 2008). An 1877 *Report of the Royal Commissioners on Development of Resources* documents the effects of cattle ranching on the environment of the Kohala-Waimea region, and the resultant outmigration of the native population during this period:

The forests on the Kohala mountains are dying rapidly. The land is mostly for grazing purposes, though on the mountain potatoes of fine quality can be raised in large quantities. In sheltered places, coffee would doubtless grow, but owing to the sparseness of the population and the superior attractions to other parts of the district, this part will hardly soon be settled. The once fertile and populous plain of Waimea looked sterile and desolate when visited by the Commission - a painful contrast to Kohala loko on the other side of the mountain.

The complaint of the people is well founded. The water they use is fouled in many places by cattle, horses and other animals, and as the stream is sluggish it has no chance to free itself of impurities, and the water used by the people in their houses must be a cause of disease and death, especially to the children . . . It is little wonder that with his crops trodden out by the sheep or cattle of his stronger neighbors, his family sickened perhaps to death by the polluted waters, that the small holder should yield to despair, and abandoning his homestead seek employment in some other district, usually without making another home . . .

The plains of Pukapu [Pu'ukapu] and Waimea are subject to high winds, aggravated by the loss of the sheltering forests of former days. The soil however is very good in many places for sugar cane and other products. To develop its best resources, efforts must be made to restore the forests and husband the supply of water at their sources to furnish a supply for agricultural purposes. At present the lands are used almost exclusively for grazing purposes. Although the proprietors and lessors are probably not averse to the establishment of agricultural enterprises, it is to be feared that the denudation of the neighboring mountains and plains of the forests will render the climatic conditions unfavorable to success.

It would seem that a wise appreciation of the best interests of this district, even of the grazing interests themselves, would lead to the decrease of the immense herds which threaten not only Waimea but even Hamakua with almost irreparable disaster. It is to be feared that they will in time render a large part of the land of little value even for grazing purposes. Owing to the increasing frequency and severity of droughts and consequent failure of springs. Some thousands of cattle are said to have died this last winter from want of water, and the works erected in Waimea for the purpose of trying out cattle have been idle for months for want of water.

The commission do not propose here to discuss fully the vexed Questions of the causes of the diminution of the forests, but in view of the fact that they are diminishing and the streams and springs diminishing a corresponding rations, also that with the cattle running upon the lands as at present, any effort to restore them must be futile and any hopes of their recuperation vain, the Government, if it would wish to preserve that part of the island of Hawaii from serious injury, must take some steps for reclaiming the forests.

In this connection we would say that it is unfortunate that large tracts of Crown and Government lands have been lately leased on long terms for grazing purposes, without conditions as to their protection from permanent injury, at rates much lower than their value even as preserves for Government purposes or public protection. The commission deem (sic) this a matter of grave importance, challenging the earnest attention of the Government, and involving the prosperity of two important districts. (in Maly and Maly 2005:58-59)

By the late-1870s, largely due to persistent drought conditions within its grazing lands, the WGAC went out of business, and its herd was purchased by Parker Ranch (Parker Ranch would also eventually acquire the lease for Waikōloa Ahupua‘a) (Bergin 2004). Francis Spencer formed Pu‘uloa Sheep and Stock Company and continued to raise sheep in Waikōloa and neighboring lands. In October of 1876, Spencer sold his interest in the sheep ranch to George W. Macfarlane; included in this transaction were the Waikōloa Nui lands lease from G. D. Hū‘eu (Maly and Maly 2002). George Bowser, the editor of *The Hawaiian Kingdom Statistical and Commercial Directory and Tourists Guide*, visited Waimea in 1880 and stayed at Spencer’s house. Bowser writes:

. . . Waimea has always been a place of some considerable importance, and there are around it several pretty homesteads, notably the residences of Mr. F. Spencer and the Reverend Lyons. From Mr. Spencer’s veranda there is a striking view of Maunakea, the summit of which was at this time of the year still in its winter robe of snow. The snow never leaves this mountain top entirely, but the position of the snow-line varies considerably with the season of the year, and also from one year to another, according to the weather which characterizes them. The country all round is chiefly suitable for grazing, and, besides innumerable wild cattle, descended, no doubt, from those which Vancouver gave to Kamehameha I, there are some 20,000 head depastured in the neighborhood, the property of Mr. Parker, who has, besides, some large droves of horses, probably numbering a thousand head in all. Mr. Spencer has turned his attention chiefly to sheep farming, and occupies a large tract of country with his flock of 15,000 sheep and 15,000 goats. Waimea itself, although of immemorial age, and once populous, is now only a scattered village, with but two stores and a boarding and lodging house and coffee saloon. (Bowser 1880:540)

Parker Ranch continued to expand its operations in the Waimea area throughout the 1870s and 1880s. The ranch eventually acquired the lease to roughly 95,000 acres in Waikōloa still held by G. D. Hū‘eu that had formerly been leased to the WGAC. By the mid-1880s Sam Parker’s poor business dealings had led to a rapidly degenerating financial situation for Parker Ranch, and in 1887 the entire ranching operation was entrusted to Charles R. Bishop and Co. for a fee of \$200,000 (Bergin 2004). With the move to trusteeship, new managers were brought in to oversee the day-to-day operations at the ranch.

By the early 1900s, Parker Ranch was under the direction of Alfred W. Carter, chosen as the guardian and trustee for Thelma Parker, John Parker III’s daughter, upon his death at the age of nineteen. Early on in his tenure as Ranch Manager, Carter concentrated on acquiring and converting more of the ranch’s lands from leasehold to fee simple. In 1903, with only a short period left on its lease, Carter acquired nine-tenths interest in the Waikōloa Nui lands from Ms. Lucy Peabody for \$112,000, securing important grazing lands for the ranch (Bergin 2004). Soon thereafter, Carter purchased the adjacent lands of ‘Ōuli and the Pu‘uloa Sheep and Stock Company, encompassing over 3,700 acres and including the Ke‘āmuku Sheep station in Waikōloa, which he converted to cattle ranching over the next decade. Much of these grazed lands were divided into paddocks, and transportation and water conveyance infrastructure projects were undertaken to increase the productivity of the Waikōloa rangelands. In 1906, on behalf of Thelma Parker, Carter bought out Sam Parker’s half-interest in Parker Ranch for a sum of \$600,000. Other important purchases made by Carter during the first dozen or so years of his trusteeship included Humu‘ula, Ka‘ohe, Waipunalei, and Kahuku Ranch (Bergin 2004). During his time as ranch manager, Alfred W. Carter obtained water rights at the headwaters in the Kohala watershed, which he used to create a large high-pressure water pipe that brought water up to nearby Waiki‘i (which had no consistent water source). This waterline ran from the headwaters in the Kohala Mountains down through the current day Waimea Town. From the town, the pipeline expanded into a network of pipes that continued across the Waimea-Waikōloa plains, and on to Waiki‘i. This system was quite controversial on the ranch and contributed to the on-going conflict between Carter and Sam Parker, Jr. (Bergin 2004). After Carter’s initial pipeline proved successful, however, other pipes and pump stations were added to this water conveyance system.

The expansion of Parker Ranch's land- and lease holdings throughout the late 19th and early 20th centuries allowed the ranch to raise cattle and sheep in paddocks around the island. Once ready for the market, these animals would be brought back to Waimea for sorting before being driven down to Kawaihae to be shipped (Figure 15). During these cattle drives, the cowboys followed a well-used network of trails that connected the distant stations at Waiki'i, Kalai'ehā, and Ke'āmuku with the town of Waimea and shipping harbors on the Kohala coast (Maly and Maly 2002).



Figure 15. Parker Ranch *paniolo* loading cattle at Kawaihae (Hawai'i State Archives PP 13-7-017).

The earliest published depiction of a trail through Waikōloa from Waimea Town was published in the *Pacific Commercial Advertiser* on February 17, 1859 (Figure 16). The route appears as a dashed line between Waimea and the saddle between Mauna Kea and Mauna Loa. The scale of the map, which was drawn to show the progress of the lava flow from the Mauna Loa eruption, does not allow for any detailed information about the route. The general route indicated in the 1859 map proceeds in a southerly direction from Waimea, across Waikōloa, and around Mauna Kea into the saddle. While the position of the trail is shown in very general terms, the basic route across Waikōloa appears to have persisted at least until the turn of the 20th century, when the Waimea-Kona highway redirected traffic across the Waikōloa plain. Three years after the 1859 map was published, surveying work began on a "Mountain Road" between Waimea and Hilo that crossed through Waikōloa. S. C. Wiltse was contracted to survey a route that would connect Waimea with Hilo *via* Waiki'i and Kalai'ehā (Maly and Maly 2003:118).

During the period of Wiltse's contract for the Mountain Road, the WGAC had begun to expand into Waikōloa by leasing G. D. Hū'eu's lands for cattle grazing. The trails connecting the WGAC's and other ranching stations appear in maps drawn by J. Perryman in J.S. Emerson's Field Note Books from 1882 (Figure 17) (Book 251:109 reproduced in Maly and Maly 2002:100). As seen on Perryman's map, the project area is labeled as "Grazing land gradual slope makai." Additionally, a trail labeled "To Waimea" is shown passing along the north side of the project area which connected the coastal village of Puakō to Waimea.

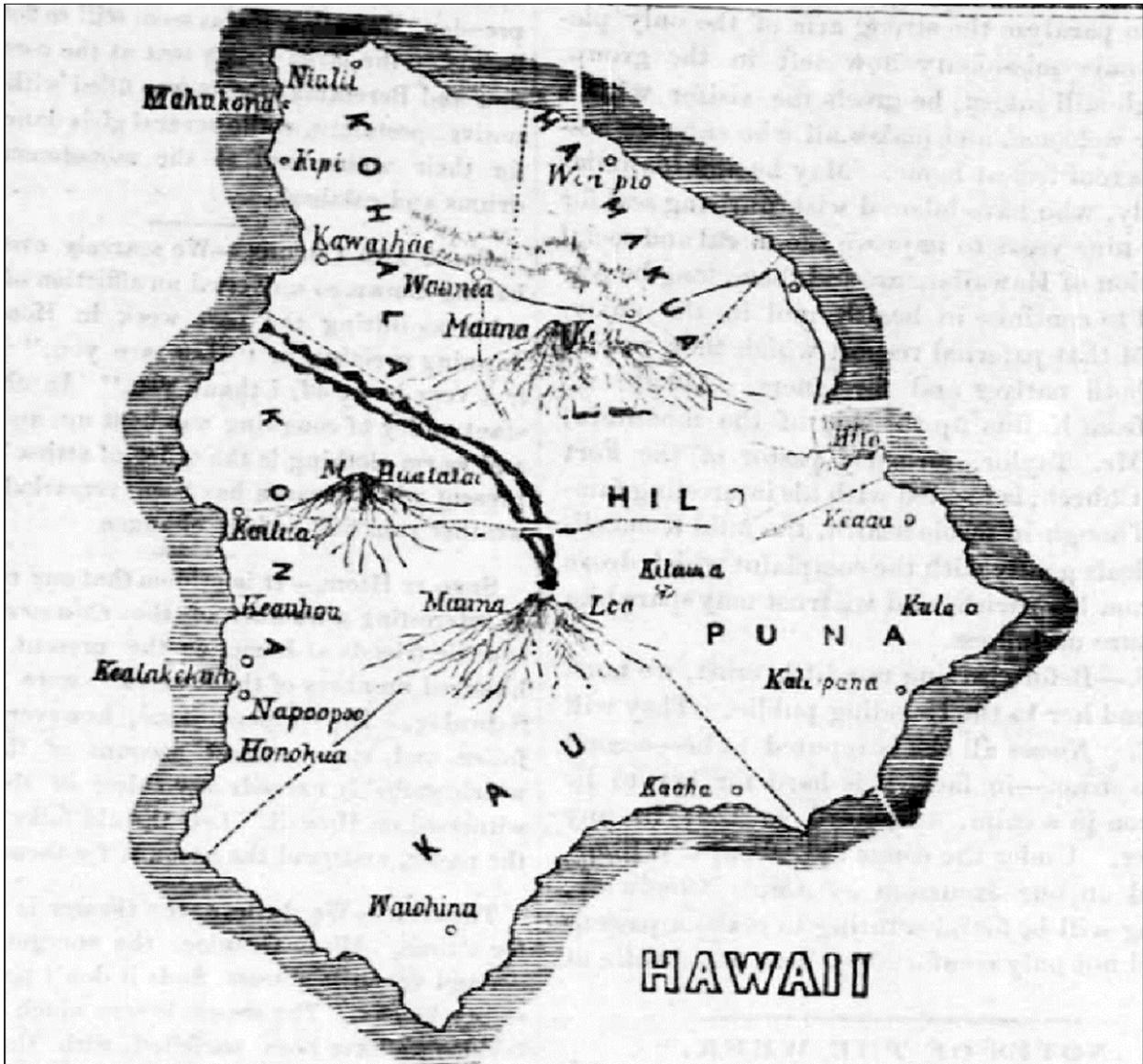


Figure 16. Map of Hawai'i Island published in the *Pacific Commercial Advertiser* on February 17, 1859 showing a trail across Waikōloa connecting Waimea and Hilo.

2. Background

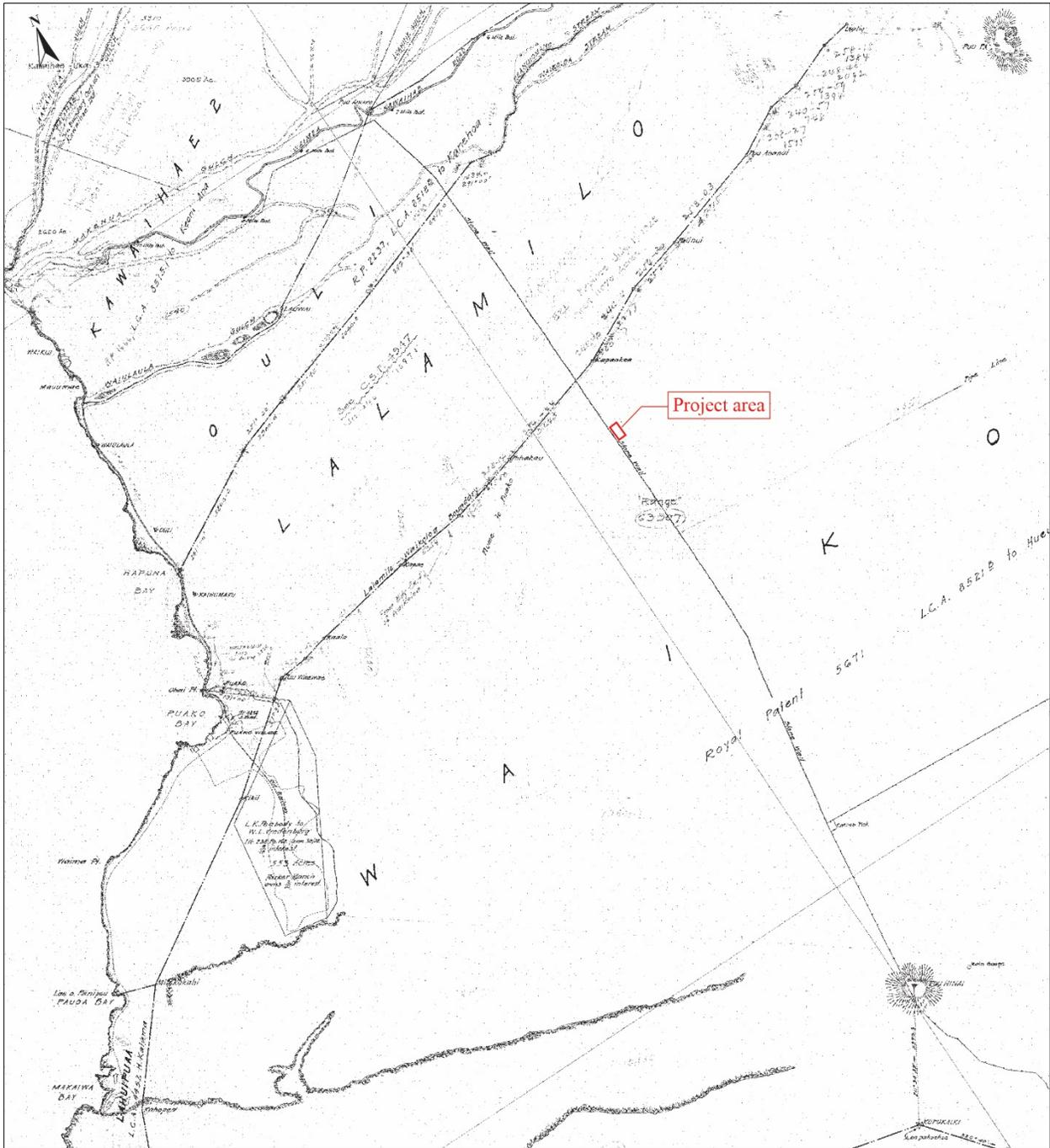


Figure 18. Detail of 1917 Hawai'i Registered Map No. 2786 by G. F. Wright showing what appears to be a trail depicted as a faint line passing on the south side of the project area.

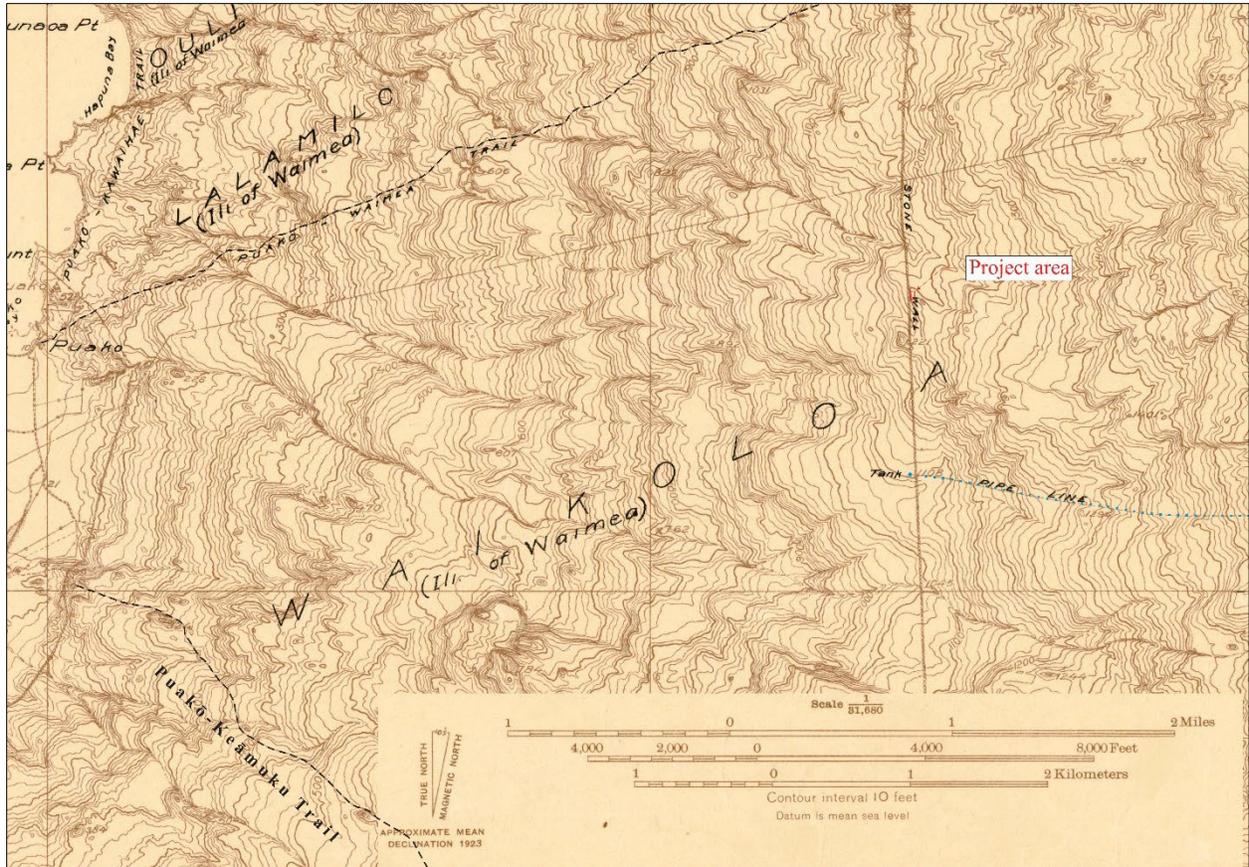


Figure 19. Portion of the 1923 USGS Pu'u Hina'i Quadrangle.

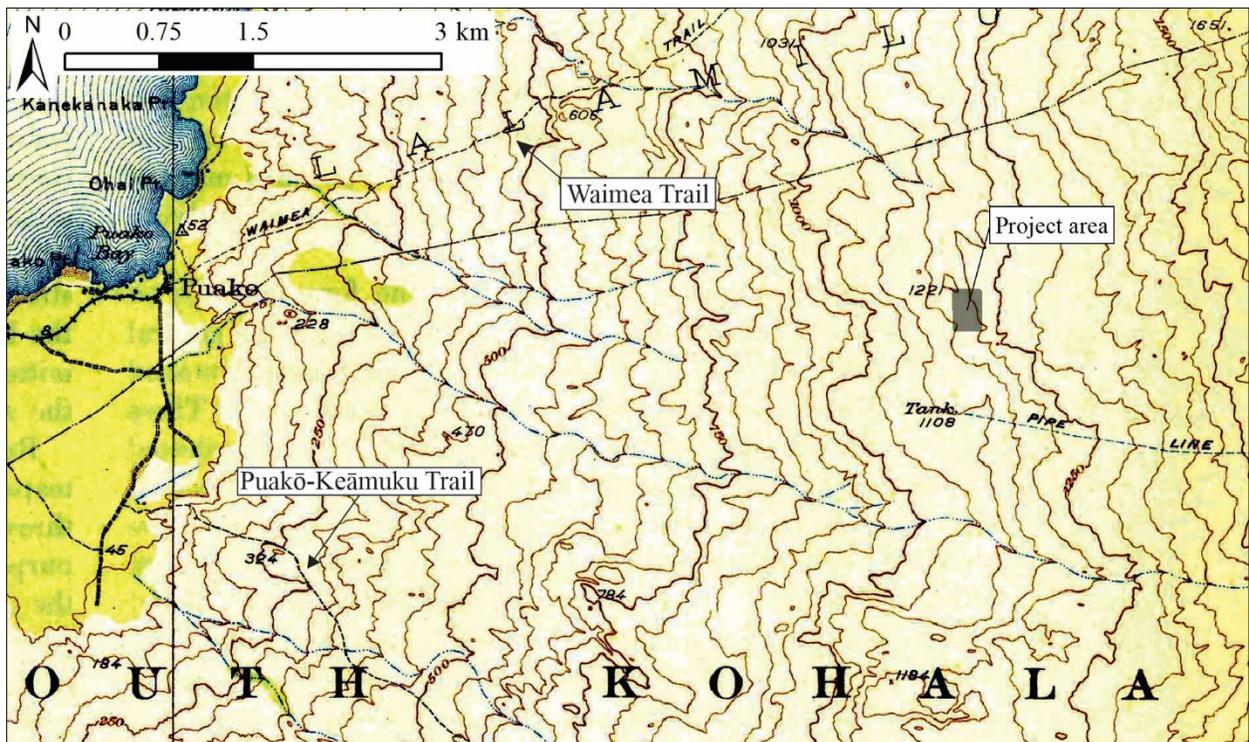


Figure 20. Portion of the 1928 USGS Puakō quadrangle map.

Waikōloa Maneuver Area

The use of the current project area and vicinity solely for cattle grazing was briefly interrupted during World War II. Several months before the bombing of Pearl Harbor in 1941, the U.S. Army established an infantry headquarters at Parker Ranch in the Pu‘ukapu area of Waimea (Bergin 2006). This was in keeping with a spirit of cooperation between the military and the ranch that began in 1908 with the ranch participating in the U.S. cavalry’s remount program. In December of 1943, the Second Marine Division arrived on Hawai‘i Island for rest and relaxation after fighting in the Gilbert Islands (Chapman 2014). They were dispersed into three camps: one at Hāpuna Bay, one at Pōhakuloa, and one in Waimea, which became known as Camp Tarawa. In December of 1943, nearly 123,000 acres of land in the Waimea-Waikōloa area were leased by the U.S. War Department for use as a troop training area (Escott 2008). With this lease the current project area became part of the U.S. Navy’s 91,000-acre Waikōloa Maneuver Area, which included the 9,141-acre Lālāmilo Firing Range, and extended from the coast to the Pohakuloa Training Area, and from the Waimea-Kawaihae Road to south of the Waikoloa Road. Much of the area was acquired through a license agreement with Richard Smart of Parker Ranch for the nominal fee of one dollar (Haun et al. 2010). According to Escott:

. . . The military utilized portions of this property for troop maneuvers and weapons practice, while other areas served as artillery, aerial bombing and naval gun fire ranges. Troop exercises were conducted using 30 caliber rifles, 50 caliber machine guns, hand grenades, bazookas, flame throwers, and mortars. Larger ordnance and explosive (OE) or unexploded ordnance (UXO) items used included 37 millimeter (mm), 75 mm, 105 mm, and 155 mm high explosive (HE) shells, 4.2 inch mortar rounds, and barrage rockets. From 1943 through 1945 nearly the entire Waikoloa Maneuver Area was in constant use, as the Marine infantry reviewed every phase of training from individual fighting to combat team exercises. Intensive live-fire training was conducted in grassy areas, cane fields, and around the cinder hills of Pu‘u Pa and Pu‘u Holoholoku. (Escott 2008:47)

The 2nd Marine Division was the first to train at Waikōloa, for five months, in preparation for the invasion of Saipan and Tinian. The 5th Marine Division replaced the 2nd Division in August 1944 and used the Waikōloa Maneuver Area to prepare for the assault on Iwo Jima. While training, the marines resided at a military camp established just outside of Waimea Town. Initially called Camp Waimea, the camp was later renamed Camp Tarawa in honor of the first successful invasion of the Pacific War. Camp Tarawa was the largest U.S. Marine training facility in the Pacific, covering an area of approximately 467 acres, and between 1943 and 1945 as many as 50,000 men passed through the camp on their way to the Pacific Theater (Escott 2008). According to Williams et al. (2000), in addition to the 2nd and 5th Marine Divisions, the 31st Naval Construction Battalion, the 471st Army Amphibian Truck Company, the 726th Signal Aircraft Warning Company, the 11th Amphibian Tractor Battalion, the 5th Joint Assault Signal Company, and the 6th Marine War Dog Platoon also passed through Camp Tarawa.

The last of the Marines of the 5th Division departed Camp Tarawa in June of 1946, and the Waikōloa Maneuver Area, with the exception of the 9,141 acre Lālāmilo Firing Range, was returned to the Parker Ranch in September of 1946 (Haun et al. 2010). The Lālāmilo Firing Range, through a permit granted by the Territory of Hawai‘i, was retained by the U.S. Marines as a training area and camp site until 1953 (Escott 2008). When the use permit was cancelled in December of that year, the lands once again reverted to leased cattle pasture administered by the Territory of Hawai‘i. Clean-up of unexploded ordnance (UXO) within the Waikōloa Maneuver Area is still ongoing.

Waikōloa Ahupua‘a Post World War II

By the 1950s, portions of the trail mapped in 1923 and 1928 took on the form of unimproved dirt roads, a result of increased motor vehicles and use of the Waikōloa area for military training during World War II. The 1956 USGS Pu‘u Hīnai quadrangle map (Figure 21) shows the Puakō-Ke‘āmuku trail following roughly the same route inland from Puakō Bay through Waikōloa Ahupua‘a. The Puakō-Waimea trail, on the other hand, now ascends nearly east from bay in the general direction of the current project area before forking at about the 720-foot elevation contour (about 1.5 kilometers *makai* of the current project area). At this fork, the trail to Waimea turns north-northeast, and a second jeep road continues toward a water tank located about 0.75 kilometers south of the current project area and onward to the uplands of Waikōloa Ahupua‘a. It is likely that this road was built by the U. S. military during World War II to access lands within the Waikōloa Maneuver Area and then used as the road to Waimea and the rangelands *mauka* of the project area after the conclusion of the war.

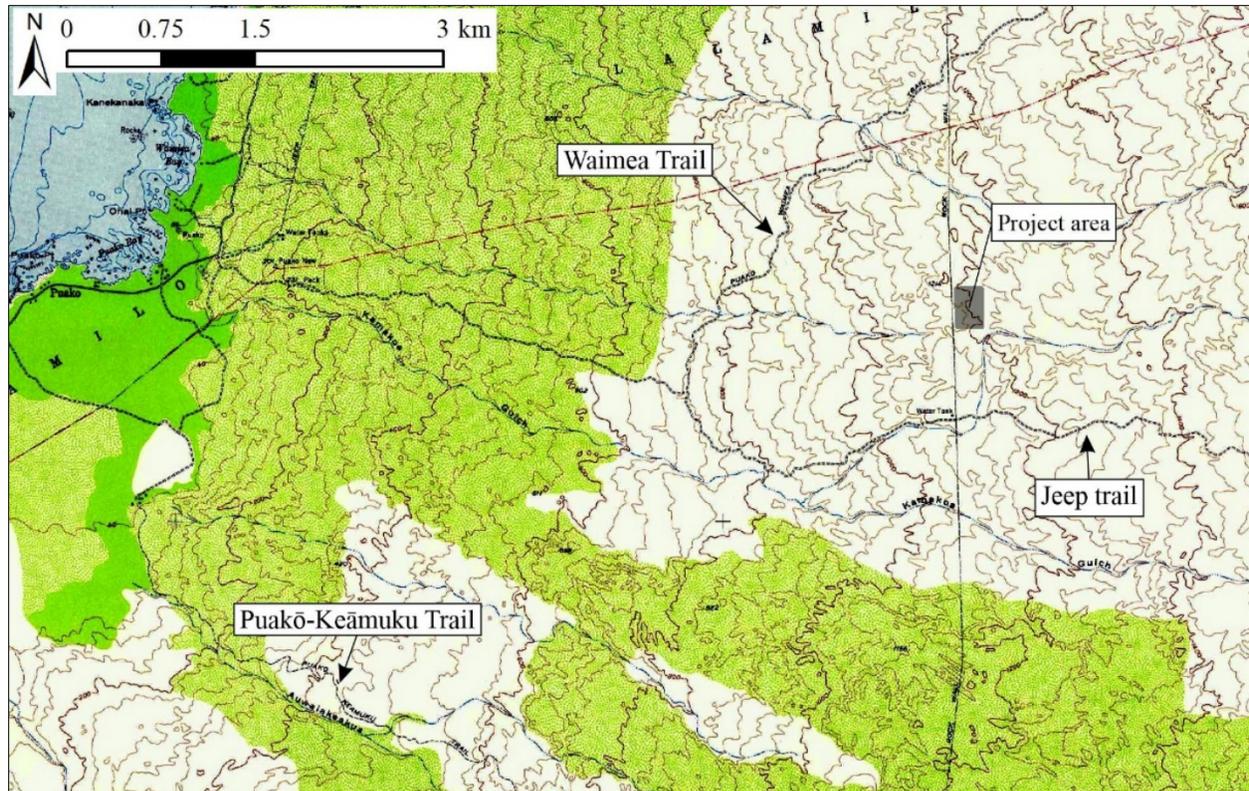


Figure 21. Portion of the 1956 USGS Pu'u Hīna'i quadrangle map.

Substantial changes in the area began in the first quarter of the 20th century with the development of the Old Waimea-Kona Belt Road, which was constructed between 1916 and 1922 and served as the main Kona-Waimea connector for eleven years (Escott and Keris 2009). Due to the tough road conditions on the driver and automobile, the use of the Old Waimea-Kona Belt Road was short-lived, and the Government decided to begin construction on a wider, more improved road. The new belt road (Highway 190) was finished in 1933. The construction of the main thoroughfare connecting Waimea to Kona was not only beneficial for mere transportation purposes but also facilitated urbanization in Waikōloa.

Rise of the Resort Industry and the Development of Waikōloa Village

Substantial changes of the Parker Ranch lands began to occur in the mid-twentieth century with the transfer to its sixth-generation heir, Richard Palmer Smart. Upon inception as ranch proprietor, Smart chose to retain all Parker Ranch lands except for 'Anaeho'omalū and lands extending north towards Kawaihae, which were to be "made available on long-term lease for resort development". By December 1959, Smart initiated the \$300,000,000 resort and residential development of 10,000 acres of land along the South Kohala coastline referred to as the "Gold Coast" (Honolulu Star-Bulletin 1968; The Honolulu Advertiser 1959). Despite its barrenness capable of supporting "only brush, scrubby trees, cactus and rocks" and the notion of it being "difficult to envision. . . as a future resort or city," a good deal of interest was spurred among a host of developers who sought to establish resort facilities and residential communities along this highly desired section of coastline (Honolulu Star-Bulletin 1969).

Although Smart initially intended to retain 'Anaeho'omalū as part of Parker Ranch and simply make its acreage available through lease, he listed the 31,000-acre land division for sale in 1963 for roughly \$11 million. In May of 1968, the Boise Cascade Home and Land Corp. purchased 25,500 acres of land above 'Anaeho'omalū Bay (excluding select portions of the coastline) with visions of creating an amenity-rich resort dreamscape. Although the development of the resort was aimed at attracting tourists to the famed coast, the ultimate success of the resort was at least partially reliant on the creation of Waikōloa Village, a residential subdivision *mauka* of 'Anaeho'omalū Bay and southwest of the current project area. To facilitate the imminent urbanization of 'Anaeho'omalū, a main thoroughfare leading *makai* from Māmalahoa Highway (currently the Waikōloa junction) to 'Anaeho'omalū was developed (Figure 22). This road

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was not only beneficial for mere transportation purposes but afforded commercial growth and economic promise to the barren region.

By the late 1960s, the groundwork for the Waikōloa Village community was underway and on June 27, 1970, Boise Cascade held their first open house to welcome the public and to “celebrate the advances made by Boise Cascade and Morrison-Knudsen in reclaiming the Ahupua‘a of Waikoloa for Man” (Boise Cascade 1970:1). The road (Figure 18) leading *makai* from Māmālahoa Highway to the newly created Waikōloa Village community was paved just in time for the gathering and this new road was “the pathway that, in a sense, tangibly opens Waikoloa to its rebirth” (Boise Cascade 1970:1). Plans for this new community included the construction of a vast water system to furnish future residents and businesses; the creation of a golf course, a residential subdivision, an equestrian center, condominiums, and a shopping center. By August of 1972, the Waikōloa Village saw its first permanent resident (Boise Cascade 1972) and on July 7th, 1974, the road leading *makai* from Waikōloa Village to ‘Anaeho‘omalu was formally dedicated (Waikoloa Office of Public Affairs 1974), thus drastically reducing travel time from the newly created village to other important centers along the Kona-Kohala coast. By the mid to late-1970s, Waikōloa Village had been mostly built out which effectively transformed this once barren lava landscape into a budding community. With the opening of the coastal resorts in the mid-1980s, Waikōloa Village continued to expand to meet the demands of a growing visitor industry and saw an influx of new residents.

While most of the early development of Waikōloa Village was centered around the area southwest of the project area, from the mid-1980s to the present day, the development and expansion of critical infrastructure such as water and electricity to support the growing South Kohala community have since expanded to the land surrounding Waikōloa Village. Since the 1970s, mandated archaeological studies prompted by the passing of federal and state legislature concerning the preservation of historic and cultural sites have been conducted in the project area vicinity. The following section summarizes the findings of the previous archaeological and cultural studies conducted within the project area vicinity.

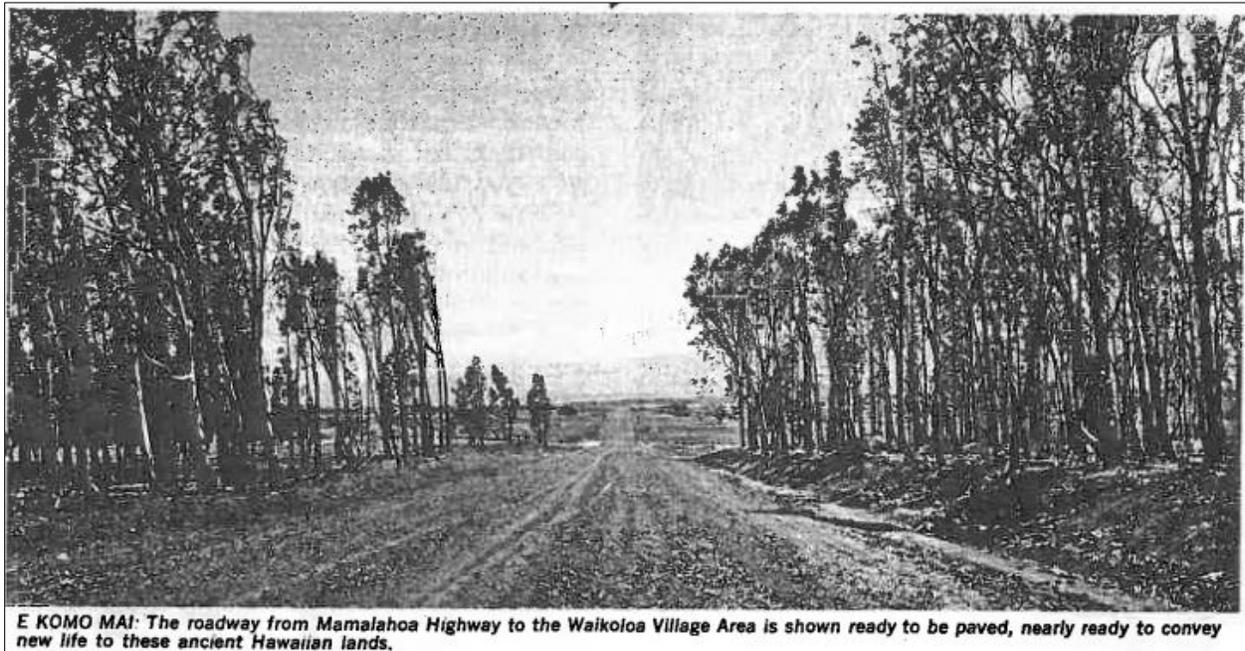


Figure 22. Unpaved *maka* Waikōloa Road in the 1970s (Boise Cascade 1970:1).

PREVIOUS ARCHAEOLOGICAL STUDIES

Many of the early archaeological and cultural studies conducted in Waikōloa Ahupua‘a have concentrated on the coastal areas near large resort developments *makai* of Queen Ka‘ahumanu Highway. The ‘*ili* of ‘Anaeho‘omalu, in particular, is one of the most extensively investigated areas in this region (Burgett and Rosendahl 1990; Ching 1971; Corbin 2011; Cordy 1987; Haun and Henry 2014, 2017; Jensen 1989a, 1989b, 1989c, 1989d, 1989e, 1989f, 1989g, 1990a, 1990b, 1990c, 1991a, 1991b, 1994; Jensen 1990d; Kirch 1979; Reinecke 1930; Rosendahl 1972b, 2000; Tam Sing and Barna 2019; Tam Sing and Brandt 2019; Walker and Rosendahl 1986; Yent 1991; Yent and Giffin 1978).

Collectively, these investigations document a wide array of archaeological sites that represent permanent habitation, ritual activity, marine resource exploitation, and fishpond management within the immediate coastal zone (between the shoreline and about 100 meters inland), along with temporary habitation occurring along trails within the coastal zone.

In the vicinity of the current project area, multiple studies have been conducted in the arid, intermediate inland portion of Waikōloa and neighboring Lālāmilo *mauka* of Queen Ka‘ahumanu Highway. Many of these studies have included small well parcels and access corridors (Clark and Rechtman 2005, 2011; Rechtman 2003, 2005, 2006, 2008a, 2008b, 2008c; Rosendahl 1992a, 1992b). Larger studies conducted near present-day Waikōloa Village (Bevacqua 1972; Clark and Kirch 1983; Clark et al. 2014; Clark et al. 2016; Kennedy 1987; Moore et al. 2002; Rieth and Morrison 2010; Schilz and Shun 1991; Sinoto and Dashiell 2004; Spear and Chaffee 1994) have identified a relatively sparse distribution of sites pre-dating the military training activities that occurred during World War II (and slightly afterward in Lālāmilo). The most common feature types recorded *mauka* of the Queen Ka‘ahumanu Highway have been C-shaped shelters and cairns, along with Historic military and ranching features. The findings of the previous studies agree that the dry, intermediate inland areas of Waikōloa Ahupua‘a were not extensively utilized during Precontact times, but were an area where small scale resource procurement was conducted on a limited basis. Previous archaeological studies conducted in this intermediate zone and near the current project area (Table 1, Figure 23) are discussed in more detail below.

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

<i>Year</i>	<i>Author(s)</i>	<i>Type of Study</i>	<i>Relevant Findings</i>
1972	Bevacqua	Reconnaissance	Five sites in Area F
1983	Clark and Kirch	Survey	World War II military training features
1984	Soehren	Survey	World War II debris, rock alignments
1987	Kennedy	Reconnaissance	1 rock shelter
1991	Jensen and Burgett	Inventory Survey	5 sites (Alignments, terraces, modern hunting blinds)
1992a, b	Rosendahl	Inventory Survey and Research	Cattle wall (Site 9012)
1992	Schilz and Shun	Inventory Survey	Lava tube burial, modern hunting blinds
1994	Spear and Chaffee	Inventory Survey	2 shell middens
2002	Moore et al.	Inventory Survey	10 sites (C-shapes, <i>ahu</i>)
2003	Rechtman	Inventory Survey	No findings
2004	Sinoto and Dashiell	Inventory Survey Addendum	No findings
2005	Clark and Rechtman	Inventory Survey	C-shaped enclosure and small rock pile
2005	Rechtman	Inventory Survey	No findings
2006	Rechtman	Field Inspection	No findings
2008a	Rechtman	Field Inspection	No findings
2008b	Rechtman	Field Inspection	No findings
2008c	Rechtman	Field Inspection	No findings
2010	Rieth and Morrison	Inventory Survey	8 mounds, stone wall (Site 9012)
2011	Clark and Rechtman	Inventory Survey	Flume, 2 rock piles, dike, hunting blind, C-shape
2014	Clark et al.	Inventory Survey	21 short-term or recurrent habitation complexes (Precontact and Historic), trail segment, hunting blinds
2020	Barna	Inventory Survey	No findings

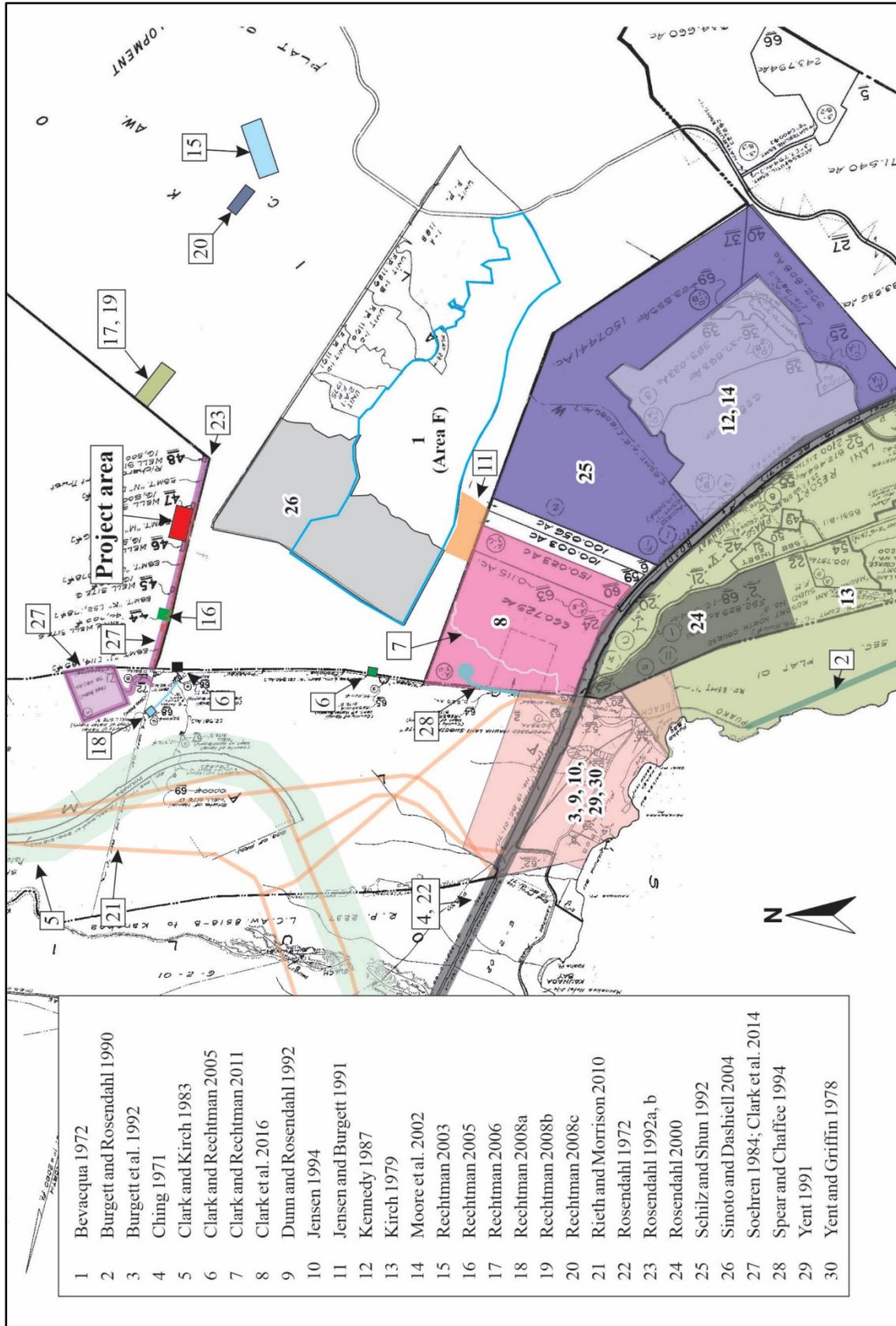


Figure 23. Previous archaeological studies conducted in the vicinity of the current project area.

The B. P. Bishop Museum conducted an archaeological study (Bevacqua 1972) of portions of Waikōloa Ahupua‘a in order to determine the nature and distributions of archaeological sites within areas that were slated for development at that time. Seven large areas (Areas A-G) dispersed throughout the *ahupua‘a* were examined. The most proximate of these was Area F, all located to the west/southwest of the current project area (see Figure 23). Five sites (Sites 17 through 21) were identified within Survey Area F, including a roughly circular stone enclosure, a C-shaped shelter, two cairns, and a small, badly deteriorated cluster of four C-shaped shelters, a rectangular enclosure, four walls, and a cairn.

The Mudlane-Waimea-Kawaihae Road Corridor, which passes to the west of the current project area, was the subject of an archaeological survey conducted by the Bishop Museum (Barrera and Kelly 1974), with subsequent feature excavations and historic studies (Clark and Kirch 1983) (see Figure 23). As a result of the Barrera and Kelly (1974) fieldwork 4,561 archaeological features were identified, with the majority situated along the coastal margin of Kawaihae and in the uplands of Lālāmilo. Archaeological investigations in Section 2 of the proposed road, a roughly 600-meter wide corridor extending from an elevation of 145 meters above sea level in ‘Ōuli Ahupua‘a to 620 meters above sea level in Lālāmilo Ahupua‘a and passing the current project area to the west, revealed the presence of sixty-four sites containing 381 features (Clark and Kirch 1983:138-179). Three main categories of features were identified at these sites including cairns, shelters, and alignments. Clark and Kirch (1983) indicate that the majority of structures in Section 2 appeared to have been built as defensive positions and wind shelters during World War II. Only a few sites were located in the middle zone of Section 2 at elevations proximate to the current project area; subsurface testing of features within this zone revealed that all were likely of modern or military origins. Except for one rock wall at 1,200 feet above sea level (SIHP Site 9012), none of the archaeological features were still in use. Survey of areas outside of the road corridor indicated that Hawaiian occupation of the middle zone may have been limited to the banks of Waikoloa Stream and along Wai‘ula‘ula Gulch. Most of the features in Section 2 were concentrated in the upland zone nearest the more agriculturally productive soils. Radiocarbon dates indicated that Hawaiian use of the upland area may have begun as early as A.D. 1600 and lasted until ca. 1800-1850.

Soehren (1984) conducted an archaeological reconnaissance survey of approximately 80 acres for the construction of the first Lālāmilo Wind Farm located to the west of the current project area near the Lālāmilo-Waikōloa boundary (see Figure 23). Soehren (1984) identified evidence of World War II-era military training, and possibly 19th-century ranching use, in the form of surface debris and a stacked stone alignment. Thirty years later, Soehren’s (1984) 80-acre project area was resurveyed by ASM Affiliates (Clark et al. 2014). Three archaeological sites were identified including a rock wall (SIHP Site 9012), a WWII military encampment with a possible earlier Precontact component (SIHP Site 30109), and a complex of cairns marking the boundary between Lālāmilo and Waikōloa Ahupua‘a (SIHP Site 30110).

Archaeological Consultants of Hawai‘i conducted an archaeological reconnaissance survey (Kennedy 1987) of roughly 1,000 acres within Waikōloa Ahupua‘a extending inland from Queen Ka‘ahumanu Highway and southeast of the current project area (see Figure 23). Only one site consisting of a shallow rock shelter, an *ahu*, and a low wall, was identified. Kennedy (1987) noted the presence of a single *‘opihi* shell at the site and modern debris, but given the reconnaissance nature of the survey, did not investigate further. Moore et al. (2002) later conducted an archaeological inventory survey of this same project area (see Figure 23), identifying ten archaeological sites containing a total of thirteen features (SIHP Sites 22509-22518). The recorded sites included the rock shelter previously recorded by Kennedy (1987), seven C-shaped walls with associated *ahu*, four independent *ahu* (three of which were grouped together), and a stone covered hearth. With the exception of the individual *ahu*, which were interpreted as demarcating Historic pasturelands, the recorded sites were thought to have been “utilized for temporary habitation during the pre-Contact Period with the utilization of some sites potentially extending into the early post-Contact Period” (Moore et al. 2002:i). A radiocarbon date obtained from charcoal in the rock shelter returned a date of A.D. 1480, interpreted to represent the initial utilization of the site.

In 1991, PHRI conducted an AIS (Jensen and Burgett 1991) of an approximately 80-acre portion of TMK: (3) 6-8-002:019 located in Waikōloa Ahupua‘a to the south of the current project area (see Figure 23). Five archaeological sites (SIHP Sites 15066-15070) containing twenty-two features were identified. These included three boulder alignments (possibly check dams) that span Kamakoa Gulch, terraces on the northwestern bank of Kamakoa Gulch, a wall, and seventeen hunting blinds. Jensen and Burgett (1991) interpret the boulder alignments and terraces within the Kamakoa Gulch drainage channel (SIHP Sites 15066, 15067, and 15068) as potential Precontact Period features, suggesting that intermittent water flow within the drainage may have been channeled and stored to provide water for agricultural pursuits along the gulch edges. A low wall (SIHP Site 15069), which extended along a meandering course across a flat area between two knolls south of Kamakoa Gulch, was interpreted as having a possible agricultural function. Seventeen hunting blinds (SIHP Site 15070) consisted of crudely constructed stacked stone structures located

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within a 150 by 50-meter area to the south of SIHP Site 15069. Expended shotgun shells (pre-dating 1965) were found at all of the blinds. The hunting blinds were interpreted as modern features by Jensen and Burgett (1991), who did not consider Site 15070 a historic property requiring further evaluation

Rosendahl (1992b) conducted an AIS of a roughly 2,800-meter-long by 40-meter-wide corridor across a portion of TMK: (3) 6-8-001:001 and extends just outside of the *makai* boundary of the current project area (see Figure 23). Extensive disturbance was noted throughout the corridor, although Rosendahl (1992b:5) did note the presence of a cattle wall along with “bulldozer berms, and recent trash.” Hibbard of DLNR-SHPD, cited an earlier correspondence that indicated that the proposed wells were “adjacent to a long historic boundary wall (Site 9012) that divides Waikōloa and has been determined to be significant under criterion ‘a’ or for its association with events important to broad patterns in Hawaii’s history” (Hibbard 1991), and did not concur with Rosendahl’s findings. In response to the letter, Rosendahl (1992a) conducted additional historical research to document the history of the wall. Following this, construction was allowed to proceed on two of the proposed well (Parker wells No. 1 and 2) and the paved roadway along the *mauka* edge of the Site 9012 wall.

Schilz and Shun (1992) conducted an archaeological survey and evaluation of approximately 3,000 acres surrounding the area earlier surveyed by Kennedy (1987) and later by Moore et al. (2002) (see Figure 23). Schilz and Shun (1992) identified one burial site consisting of a lava tube containing human skeletal remains (SIHP Site 15033). They also noted twelve additional features in the survey area (cairns, wall shelters, rock mounds, and C-shapes) that they interpreted as modern. The four C-shapes were interpreted to be hunters’ blinds.

In 1994, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey (Spear and Chaffee 1994) of a transmission route for the Kohala Water System Project (see Figure 23). The archaeological survey area extended south, following Akoni Pule Highway and then Queen Ka’ahumanu Highway, from Makapala Ahupua’a in North Kohala to Lālāmilo Ahupua’a *makai* of the current project area. Along the access route to the proposed reservoir location (the reservoir was never built), SCS identified two archaeological sites (SIHP Sites 19777 and 19778), both surface scatters of shell midden, located within Waikōloa Ahupua’a. The shell scatters were interpreted as rest stops (Precontact temporary habitation areas) utilized by travelers along a trail route that once followed the Lālāmilo/Waikōloa boundary between the coastal settlement zone and the inland agricultural zone. No trail route or surface architecture was identified near either site. A shovel probe excavated at SIHP Site 19777 revealed the absence of any subsurface cultural deposit. The marine shell fragments from the surface of both sites were collected by SCS. SIHP Sites 19777 and 19778 were deemed significant (under Criterion d) for information they contained, but no further work was recommended. Spear and Chaffee (1994) argued that sufficient data was gathered during the inventory survey to make the sites no longer significant; DLNR-SHPD concurred with this recommendation.

Rechtman (2003) conducted an AIS for a proposed access roadway and waterline corridor at approximately 1,200 feet to 1,320 feet (366–402 meters) above sea level, east of the current project area (see Figure 23). No archaeological resources were observed within that project area.

Sinoto and Dashiell (2004) conducted an archaeological inventory survey of TMK: (3) 6-8-02:022 encompassing roughly 860 acres within the Waikōloa Village development area (see Figure 23), a portion of which was previously surveyed as part of Bevacqua’s (1972) Area F. Sinoto and Dashiell (2004) reported no archaeological findings as a result of their study.

In 2005, Rechtman Consulting, LLC conducted an AIS (Clark and Rechtman 2005) of two proposed water tank locations near the Lālāmilo-Waikōloa boundary northwest of the current project area (see Figure 23). One archaeological site (SIHP Site 24396) consisting of a C-shaped enclosure (Feature A) and small rock pile (Feature B), were identified. A test unit was excavated within Feature A which yielded no cultural material. It was determined that this feature may have functioned as a temporary habitation shelter during Precontact times. Nearby Feature B was interpreted as a cairn that may have been associated with Feature A, but also potentially may have served as an *ahupua’a* boundary or trail marker. SIHP Site 24396 was evaluated as significant under Criterion d, and no further work was the accepted treatment for the site.

That same year, Rechtman (2005) inspected an area within the Rosendahl (1992b) survey corridor for the proposed development of Parker well No. 3 and the stub road leading to it (see Figure 23). No archaeological sites, features, or deposits were observed.

Rechtman Consulting, LLC conducted three other archaeological studies (see Figure 23) at proposed well sites near the current project area (Rechtman 2008a, 2008b, 2008c). All of these studies reported no findings within their respective project areas. At Lālāmilo Well E (north of the current project area in Lālāmilo Ahupua’a), Rechtman (2008a:3) noted:

... three small enclosures were noted outside the corridor near the existing Well D. Based on the presence of broken glass, bullets and bullet shell casings, the enclosures appear to be U.S. Military WW II era training related features. All three features are located along the upper edge of a south facing slope, spaced four to fifteen meters west (outside) of the survey area. They were likely constructed by U.S. marines in the 1940s as defensive positions during training exercises.

Rieth and Morrison (2010) conducted an archaeological inventory survey of a roughly 1,548 acre area of potential road corridors extending from Māmalahoa Highway near Waimea Town to Highways 19 and 270, traversing Waikōloa, Lālāmilo, ‘Ōuli, and Kawaihae Ahupua‘a (see Figure 23). In the general vicinity (at the same elevation) of the current study area they identified nine sites, eight of which were described as single mounds of undetermined age and function and the ninth was the prominent stone wall (SIHP Site 9012) that extends north/south through the greater area. Like the earlier Clark and Kirch (1983) study, Rieth and Morrison (2010) indicated that the mid-elevation area of Lālāmilo has a relatively low density of archaeological resources.

Clark and Rechtman (2011) investigated a *mauka-makai* oriented corridor located south of the current project area (see Figure 23). Five archaeological sites were identified (SIHP Sites 28682-28686) that included a portion of the old Puakō Sugar Plantation’s wooden flume from Waikōloa Stream, two rock piles that seemed to mark the former route of a World War II-era communications line, a Historic dike constructed for flood-control purposes, a circular enclosure containing a rock pile that may have been a Historic hunting blind or skeet shooting area, and a C-shaped enclosure that may have been the location of a Precontact shelter.

To the west of the Schilz and Shun (1992) study area, (Clark et al. 2016) conducted an archaeological inventory survey of a roughly 810-acre area in Waikōloa Ahupua‘a extending inland from Queen Ka‘ahumanu Highway along the Lālāmilo boundary (see Figure 23). Archaeological inventory surveys of two corridors across this property had previously been conducted by (Spear and Chaffee 1994) and Clark and Rechtman (2011). All of the previously recorded sites in these two project areas, along with a portion of Site 21976, a Historic cart path, previously recorded by Rosendahl (2000), were incorporated into the findings of the Clark et al. (2014) study. Sites newly identified by Clark et al. (2016) (Sites 30071 to 30083) included two C-shaped enclosures interpreted as Precontact Period shelters, three Precontact Period habitation complexes, two modified outcrops interpreted as Precontact Period shelters, a rock pile and modified outcrop that appear to have functioned as a Historic survey station, a short wall interpreted as a Precontact Period shelter, a surface scatter of marine shell, a rock pile with an associated trail segment that may have been a rest area along an old trail route, a complex of features used for Historic Period habitation and agricultural purposes, and a complex of eighty-nine 20th century hunting blinds built by bird hunters. The Precontact Period sites, mostly indicative of short-term or recurrent habitation, were concentrated in the northern portion of the project area near the Lālāmilo boundary. Clark et al. (2016) suggest, like Chaffee and Spear (1994) before them, the presence of these site types in that area is evidence of the route of an old trail that once extended along *ahupua‘a* boundary.

More recently, ASM Affiliates conducted an archaeological inventory survey of the current project area (Barna 2020). Fieldwork for the study took place in August 2020 and consisted of a pedestrian field survey where the entire (100%) ground surface was visually inspected. Aside from the occasional metal fragments (shrapnel), no historic properties of any kind were observed within the study parcel. Barna (2020:24) determined that no historic properties would be affected by the construction of the proposed 10MG reservoir and that in “the unlikely event that archaeological resources are discovered during ground-disturbing activity associated with the proposed development, work should cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.”

Summary of Cultural Impact Assessment Studies

Cultural Impact Assessments conducted in Waikōloa between the Queen Ka‘ahumanu Highway (Highway 19) and the Hawai‘i Belt Road (Highway 190) (Hammatt 2006; Ishihara and Brandt 2020; Rechtman and Kepa‘a 2014; Tam Sing et al. 2019; Vernon et al. 2018; Wong-Smith 2007) revealed no on-going cultural practices within this portion of Waikōloa Ahupua‘a. Jennifer Lawson of the Waikōloa Dry Forest Initiative pointed out in a previous CIA (Ishihara and Brandt 2020) that Waikōloa was once known as an area to collect native birds whose feathers were used to make *lei* (neck garland) and *‘ahu‘ula* (feathered cloaks) for *ali‘i*. However, due to the degradation of native forests in this region, the native bird population also declined and as a result, the traditional practice of collecting feathers from native birds has ceased. Aunty Hannah Springer shared the following general concern regarding the cultural landscape:

My concern is that we need to understand that the whole landscape is a cultural landscape which is an impact. Just because we do not find anything does not mean there is no cultural impact to a landscape. It is dependent on the cultural practitioners of those lands in order to see the depth of

impact. It requires the people of the land. We, people who live and know lava lands look at the land with a different eye. We have a deeper familiarity with body form of the lava lands. It does not diminish the impact. It is my hope that there will be attention made to the cultural landscape in its entirety. The Hill Puu Hina'i I use as an example of degradation to our lands. To us it is about a sense of place and a sense of space, thus allowing the new people coming in to the breath in the spaciousness of the land. (Hammatt 2006:20-21)

3. CONSULTATION

Gathering input from community members with genealogical ties and long-standing residency or relationships to the study area is vital to the process of assessing potential cultural impacts to resources, practices, and beliefs. It is precisely these individuals that ascribe meaning and value to traditional resources and practices. Community members often possess traditional knowledge and in-depth understanding that are unavailable elsewhere in the historical or cultural record of a place. As stated in the OEQC (1997) *Guidelines for Assessing Cultural Impacts*, the goal of the oral interview process is to identify potential cultural resources, practices, and beliefs associated with the affected project area. It is the present authors' further contention that the oral interviews should also be used to augment the process of assessing the significance of any identified traditional cultural properties. Thus, it is the researcher's responsibility to use the gathered information to identify and describe potential cultural impacts and propose appropriate mitigation as necessary.

In an effort to identify individuals knowledgeable about traditional cultural practices and/or uses associated with the current subject property, a public notice was submitted to the Office of Hawaiian Affairs (OHA) for publication in their newspaper, *Ka Wai Ola*. The notice was submitted via email on August 26th and appeared in the September issue. A copy of the public notice is included in Appendix A of this report. As a result of the public notice, one response was received by Mr. Rick Gmirkin of the Ala Kahakai National Historic Trail. Mr. Gmirkin contacted ASM to determine the exact location of the project area. Mr. Gmirkin stated that he was aware of historic trails in the nearby vicinity with one near the Lālāmilo-Waikōloa boundary. After confirming the exact location of the project area, Mr. Gmirkin shared that he was not aware of any historic trails in the project area.

Additionally, eight individuals/organizations were contacted via email and/or phone: Camp Tarawa Foundation, Hawai'i Forest Association Industry, KAHEA, Micah Kamahoali'i of the Waimea Hawaiian Homesteaders' Association's Cultural Committee, the Office of Hawaiian Affairs, Kaena Peterson of the South Kohala Hawaiian Civic Club, M. Gary Rapozo, Julia Rose of the South Kohala Coastal Partnership; and the Waimea Hawaiian Homesteaders' Association. Of the eight contacted, one individual, Julia Rose provided a referral and one individual, Mr. Gary Rapozo, accepted the interview request. Table 2 is a complete list of all persons contacted along with additional details.

Prior to the interview, ASM staff provided information about the nature and location of the proposed project and informed the potential interviewees about the current study. The potential interviewees were informed that the interviews were completely voluntary and that they would be given an opportunity to review their interview summary prior to inclusion in this report. With their consent, ASM staff then asked questions about their background, their knowledge of past land use, and history of the project area, as well as their knowledge of any past or ongoing cultural practices. The informants were also invited to share their thoughts on the proposed development and offer mitigative solutions. Upon completion of the interview, ASM staff prepared an interview summary, which was mailed to the interviewee for review. With the approval of the interviewee, the finalized version of the summary is included below.

Table 2. Persons/organizations contacted for consultation.

<i>Name.Organizaton</i>	<i>Initial Contact Date</i>	<i>Response</i>
Camp Tarawa Foundation	October 30, 2020	No response
Gmirkin, Rick/Ala Kahakai National Historic Trail	September 1, 2020	Responded to public notice
Hawai'i Forest Association Industry	October 30, 2020	No response
KAHEA	October 26, 2020	No response
Kamohoali'i, Micha	October 26, 2020	No response
Office of Hawaiian Affairs	October 30, 2020	No response
Peterson, Kaena	October 26, 2020	No response
Rapozo, Gary	September 24, 2020	See summary below

South Kohala Coastal Partnership	October 26, 2020	Julia Rose of The Nature Conservancy Responded and referred ASM staff to Ala Kahakai National Historic Trail
Waimea Hawaiian Homesteaders' Association	October 26, 2020	No response

GARY J. RAPOZO

On September 16, 2020, ASM staff, Ms. Lokelani Brandt conducted a telephone interview with Mr. Gary Rapozo. Born in Honoka'a, Mr. Rapozo worked for Parker Ranch between 1972 and 2002 where he performed and excelled in a variety of ranching duties including artificial insemination, pregnancy testing, livestock marketing, horseshoeing, and horse training to name a few. His work as a *paniolo* took him to various places on Hawai'i Island including (but not limited to) Waimea, Waikōloa, Ka'ū, and Pā'auhau. In 2011, after a long and successful career as a *paniolo*, Mr. Rapozo was inducted into the Paniolo Preservation Society's Hall of Fame to honor his many accomplishments.

In discussing the location of the proposed project area, Mr. Rapozo explained that while he did have some knowledge, he shared that there were former *paniolo* that knew that area well but most, if not all, have since passed. In sharing what he knew of the area, Mr. Rapozo recalled how the *paniolo* referred to the area as the Pu'upā Range and that the range was divided into three main areas. The area *mauka* of Pu'upā was Range 1 and the area *makai* of Pu'upā was Range 2. He added that Range 2 and the project area vicinity was the *makai*-most extent of where Parker Ranch ran cattle. Additionally, Mr. Rapozo pointed out that the project area was part of the former military target practice range and noted the presence of military ordinances.

Concerning the presence of cultural and Historic properties, Mr. Rapozo explained that in the Waikōloa area, most of the archaeological sites are located along the river bed and that rivers were the preferred settlement areas. Mr. Rapozo also noted that the old stone wall that extends from Kawaihae Road to Waikōloa Road was near the project area. When asked if he knew any history of the wall, he stated that aside from its location, he was not aware of any specific history.

When asked if he had any additional thoughts or concerns about the proposed project, Mr. Rapozo shared that his main concern would be if DWS plans to make a pond system reservoir. He explained that earthquakes can break the pond system walls which can cause water to spill out and affect people living below. If water needs to be discharged from the reservoir, he suggests that the water be diverted into a nearby gulch to minimize any impact.

4. IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include "...subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs" (OEQC 1997:1). The guidelines also identify the types of cultural resources, associated with cultural practices and beliefs that are subject to assessment. These include other types of historic properties, both man made and natural, submerged cultural resources, and traditional cultural properties. The origin of the concept and the expanded definition of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service (Parker and King 1998). An abbreviated definition is provided below:

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

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

It is however with the definition of "Property" wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because

it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often cosmologically tied to the rest of the landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. However offensive the concept of boundaries may be, it is nonetheless the regulatory benchmark for defining and assessing traditional cultural properties.

As the OEQC guidelines do not contain criteria for assessing the significance for traditional cultural properties, this study will adopt the state criteria for evaluating the significance of historic properties, of which traditional cultural properties are a subset. To be significant the potential historic property or traditional cultural property must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

- a Be associated with events that have made an important contribution to the broad patterns of our history;
- b Be associated with the lives of persons important in our past;
- c Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
- d Have yielded, or is likely to yield, information important for research on prehistory or history;
- e Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity.

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

SUMMARY OF CULTURE-HISTORICAL BACKGROUND INFORMATION

A review of the culture-historical background material reveals that the project area, at a minimum, must be contextualized within the more extensive sociocultural history of the Waikōloa Ahupua‘a and the broader region of Kohala Hema (South Kohala). Although Waikōloa is referred to as an *ahupua‘a* today, the area was traditionally known to be an *‘ili* (land section smaller than an *ahupua‘a*) of the *kalana* (sub-district) of Waimea. The area was referred to as Waikōloa Nui and noted for its abundance of birds (Soehren 2005b). The neighboring *ahupua‘a*, Lālāmilo, was referred to as Waikōloa Iki (Maly and Maly 2002). The name Waikōloa translates as “duck water” (Pukui et al. 1974:223) and “water-carried-far” (Maly 1999), with the prior translation referring to the abundance of *koloa* (ducks, *Anas wyvilliana*) that could be found in the streams of Waimea (Judd 1932:14). East of the project area is two significant coastal *‘ili kūpono* (a land division within but independent of an *ahupua‘a*) known for their *loko i‘a* (fishponds): ‘Anaeho‘omalū and Lāhuipua‘a. These *‘ili kūpono* have been extensively surveyed and studied by archaeologists and other researchers who have discussed the area’s numerous sites evidencing temporary habitation, extensive marine exploitation, and a lack of agricultural production near the coast (McEldowney 1983). Coastal residents in Waikōloa enjoyed an abundance of marine resources that could be traded for *kalo*, *‘uala*, and other agricultural produces with farmers from more fertile, upland regions, as Handy et al. (1991) has mentioned. In regards to *mo‘olelo* (traditional accounts), stories such as Ka-Miki, Kuapāka‘a, and Lonoikamakahiki offer a larger regional focus but did not offer specific information regarding the project area and the broader *ahupua‘a* of Waikōloa.

In the late 18th to early 19th centuries, Kamehameha came into power on Hawai‘i Island and gave control of Waikōloa Nui, with the exception of the *‘ili kūpono* of ‘Anaeho‘omalū and Lāhuipua‘a, to Isaac Davis, one of his trusted advisers. When Davis died in 1810, John Young, another foreign advisor, gained control of these lands, which eventually became a favored pasture for the cattle that Kamehameha received from Vancouver (Rosendahl 2000). A

wall called Pā of Kauliokamoa was constructed along the northern boundary of Waikōloa Nui to Pu‘u Huluhulu as a means to keep the cattle out of the agriculturally productive areas found in the northeastern region of Waimea. Like earlier periods, the coastal region extending from Waikōloa to Kawaihae remained populated in the early 19th century (evidenced through missionary and traveler accounts), compared to the barren upper regions of the *ahupua‘a*. This corridor was a center of politics, religion, and commerce at the peak of Kamehameha’s reign. More broadly, as Hawaiian populations in Kohala plummeted due to foreign diseases, emigration, and low birth rates, Tomonari-Tuggle (1988:33) suggested that the settlement patterns in the region changed as more people moved to the more fertile windward slopes of North Kohala and Waimea. In addition to the previously listed factors, the sandalwood trade, as well as the later establishment of missionary stations in Waimea and North Kohala, contributed to these shifting population estimates.

Later in the century, Waikōloa Nui was awarded to George David Hū‘eu, son of Isaac Davis, during the 1848 *Māhele ‘Āina*. Again, the *‘ili kūpono* of ‘Anaeho‘omalū and Lāhuipua‘a was not included in this award. The project area is within the lands that Hū‘eu was awarded, lands that were restricted to non-agricultural *pili* lands. In 1868 Hū‘eu, leased his lands, including Waikōloa Nui, to the Waimea Grazing and Agricultural Company (WGAC), which effectively made the company the largest ranching operation on Hawai‘i Island at the time. Decades of ranching activities, conflated with the destruction of native forests through the sandalwood trade, stripped bare previously forested regions (Maly and Maly 2005).

In the early 20th century, Parker Ranch expanded its operations and acquired a lease to roughly 95,000 acres of land in Waikōloa that included lands that Hū‘eu previously leased to WGAC. In later decades, the Ranch continued to expand, converting leasehold lands to fee simple title ownership and increasing their cattle holdings. Further dry stacked rock walls were built to contain livestock while older trail systems from Waimea to Waikōloa Nui remained as vital transportation corridors. With the rise of automobiles and other means of transportation, the Kona-Waimea Belt Road was completed in 1922, followed by Highway 190 in 1933. Ranching operations were intermittently disrupted in the 1940s during World War II as the U.S. Army established an infantry headquarters on Parker Ranch lands and acquired 123,000 acres of land for training exercises (included lands where the project area is located).

Following Hawai‘i’s statehood in 1959, Richard Palmer Smart, sixth-generation heir and proprietor of Parker Ranch initiated the \$300,000,000 resort and residential development of 10,000 acres of land along the South Kohala coastline (Honolulu Star-Bulletin 1968; The Honolulu Advertiser 1959). Twenty-five thousand five hundred acres of lands above ‘Anaeho‘omalū Bay were purchased by Boise Cascade Home and Land Corp, leading to the construction of Waikōloa Village. A thoroughfare leading *makai* from Māmalahoa Highway (currently the Waikōloa junction) to ‘Anaeho‘omalū was developed for transportation and commercial purposes. As coastal resort developments expanded in the mid-1980s, so too did Waikōloa Village to accommodate the growing number of visitors and laborers.

FINDINGS AND CONCLUSION

While no cultural impacts are anticipated with respect to the proposed project, Mr. Gary Rapozo shared his concern regarding potential water discharge. Mr. Rapozo noted that if water must be discharged from the reservoir, he recommended that it be diverted into a nearby gulch to avoid impacting residents that live *makai* of the proposed DWS reservoir facility. In summary, based on the information gathered as part of the culture-historical background research in conjunction with the results of the consultation process, no specific valued cultural or natural resources were identified. Likewise, no specific ongoing traditional cultural practices were identified in the project area or immediate vicinity. Additionally, the archaeological inventory survey conducted in the project area yielded no findings. Therefore, it is the findings of this study that the proposed development of the DWS 10MG Lālāmilo Reservoir will have no direct impact on any historic properties, valued natural and cultural resources, or traditional and customary Native Hawaiian practices.

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APPENDIX A.
***KA WAI OLA* PUBLIC NOTICE**

**CULTURAL IMPACT
ASSESSMENT - THE
DEPARTMENT OF WATER
SUPPLY LĀLĀMILO
10MG RESERVOIR**

ASM Affiliates is preparing a Cultural Impact Assessment (CIA) for the proposed County of Hawai'i Department of Water Supply Lālāmilo 10MG Reservoir located on a roughly 10-acre portion of TMK: (3) 6-8-001:001, Waikōloa Ahupua'a, South Kohala District, Island of Hawai'i. Please contact ASM Affiliates if you would like to participate or contribute to this study by sharing your mana'o about any cultural or historical resources or other information you believe may be relevant. This includes, but not limited to, knowledge of past land use, history, traditional cultural uses of the proposed project area; or those who are involved in any ongoing cultural practices that may be occurring on or in the general vicinity of the subject property. If you have and can share any such information please contact Lokelani Brandt (lbrandt@asmaffiliates.com); phone (808) 969-6066, mailing address ASM Affiliates 507-A E. Lanikaula Street, Hilo, HI 96720. Mahalo.

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Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 3

Archaeological Report

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DAVID Y. IGE
GOVERNOR OF
HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

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
KAILOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

June 15, 2021

Kurt Inaba, Engineering Division
Hawaii County Department of Water Supply
345 Kekūānaō‘a Street, Suite 20
Hilo, Hawaii 96720
Email: kinaba@hawaiidws.org

IN REPLY REFER TO:
Project No. 2021PR00496
Doc. No.: 2106SN07
Archaeology

Dear Mr. Inaba:

**SUBJECT: Chapter 6E-8 Historic Preservation Review –
Request for Concurrence with “No historic properties Affected”
Lālāmilo 10 MG Reservoir Project (DWS Job No. 2019-1107)
Archaeological Assessment Report
Waikōloa Ahupua‘a, South Kohala District, Island of Hawai‘i
TMK: (3) 6-8-001:001 (por.)**

This letter provides the State Historic Preservation Division’s (SHPD’s) review of the County of Hawaii, Department of Water Supply (DWS) request for the SHPD’s concurrence with the DWS’ determination of “no historic properties affected” for the proposed construction of the Lālāmilo 10 MG Reservoir project. The submittal includes a DWS cover letter requesting SHPD’s concurrence with the effect determination, photographs, and construction drawings. The submittal also includes a draft report titled, *An Archaeological Assessment for the Department of Water Supply Lālāmilo 10 MG Reservoir, Waikōloa Ahupua‘a, South Kohala District, Hawai‘i Island, TMK: (3) 6-8-001:001 (por.)* (Barna, April 2021). SHPD received the submittal on May 3, 2021.

The current project area encompasses a roughly 10-acre portion of TMK: (3) 6-8-001:001 at an elevation of 1,200 feet (366 meters) above sea level, roughly 6 kilometers from the coast. The project area is situated between two existing well sites and is accessed by a paved road that connects these and several other existing well and reservoir sites. Terrain gently slopes to the west, with two prominent mauka/makai trending ridgelines crossing diagonally through the northeast corner of the project area, and the mouth of a small dry drainage located in the southeastern corner. Soils are Hapuna-Waikui-Lālāmilo complex, 0 to 20 percent slopes.

The DWS proposes grading within a 3.0-acre portion of the project area for the proposed facility, a 20-foot-wide access road, and a 12-foot-wide perimeter road. One trench each for influent, effluent, and overflow waterlines. The influent line to the tank will connect to the waterline in the access road at the reservoir entrance. The 10-million gallon (MG) circular Prestressed Concrete Tank will be located on a 10-acre portion of a property currently owned by a division of Parker Ranch [PR Puu Pa LLC] and designated by TMK: (3) 6-8-001:001. The tank would be 36 feet high, with a 222 foot inside diameter and an 11-inch wall thickness. The tank footing would extend 3 feet beyond the outside face of the tank wall. The influent line to the tank will connect to the waterline in the access road at the reservoir entrance. The effluent line will be a separate waterline about 450 feet long that will be installed in the Lālāmilo Parker Access Road and connect to an existing waterline at the entrance to Parker Well No. 3. to the left of the Well Site access road. Communications equipment will also be mounted in enclosed cabinets. The project includes a gate, a 20-foot-wide access road, a 12-foot-wide perimeter road, and a six-foot-high chain-link fence.

ASM Affiliates (Barna 2021) completed the archaeological inventory survey’s (AIS) pedestrian survey on August 13, 2020. Fieldwork consisted of a 100% pedestrian survey consisting of systematic transects spaced at no more than

Kurt Inaba
June 15, 2021
Page 2

15 meters apart. Ground visibility was very good, and no subsurface testing was conducted based on observed soil accumulation. As a result of the fieldwork, no historic properties were observed within the current project area.

Due to the negative findings of significant historic properties during the AIS, this report was prepared as an Archaeological Assessment (AA) in accordance with HAR §13-275-5(b)(5)(A). Based on the information provided, **SHPD concurs** with the DWS's project effect determination of "No historic properties affected" for the project. Pursuant to HAR §13-275-7(e), when the SHPD agrees that the action will not affect any significant historic properties, SHPD hereby notifies the DWS that the HRS 6E historic preservation review process is ended. Project initiation may proceed.

The report meets the minimum requirements of HAR §13-275-5. **It is accepted.** Please send two hard copies of the report, clearly marked FINAL, along with a text-searchable PDF version, and an electronic copy of this acceptance letter to the Kapolei SHPD office, attention SHPD Library. Additionally, please upload a text-searchable PDF version of the document to HICRIS Project No. 2021PR00496 using the Project Supplement option and send a PDF copy to lehua.k.soares@hawaii.gov.

Attach to appropriate permits: In the unlikely event that subsurface historic resources, including human skeletal remains, structural remains, cultural deposits, sand deposits, or sink holes are identified during the demolition and/or construction work, cease work in the immediate vicinity of the find, protect the find from additional disturbance, and contact the State Historic Preservation Division at (808) 933-7651.

Please contact Sean Nāleimaile at (808) 933-7651 or at Sean.P.Naleimaile@hawaii.gov for any questions or concerns regarding this letter

Aloha,

Alan Downer

Alan S. Downer, PhD
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An Archaeological Assessment for the Department of Water Supply Lālāmilo 10 MG Reservoir

TMK: (3) 6-8-001:001 (por.)

Waikōloa Ahupua‘a
South Kohala District
Island of Hawai‘i

DRAFT VERSION



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ASM Project Number 34690.00

EXECUTIVE SUMMARY

At the request of Geometric Associates, on behalf of the County of Hawai‘i Department of Water Supply, ASM Affiliates (ASM) conducted an Archaeological Inventory Survey (AIS) of a roughly 10-acre project area within Tax Map Key (TMK): (3) 6-8-001:001 in Waikōloa Ahupua‘a, South Kohala District, Island of Hawai‘i. The project area is a portion of a 13,285.024-acre parcel owned by PR Puu Pa LLC. The Department of Water Supply intends to develop a 10MG above-ground water reservoir with appurtenant water line and road connections to existing infrastructure within the project area. The current study was conducted in support of environmental documentation being prepared to comply with Hawai‘i Revised Statutes (HRS) Chapter 343 and for the Department of Land and Natural Resources-State Historic Preservation Division’s (DLNR-SHPD) HRS Chapter 6E-8 review of the proposed project. The AIS was undertaken in accordance with Hawai‘i Administrative Rules (HAR) 13§13-275, and was performed in compliance with the *Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports* as contained in Hawai‘i Administrative Rules 13§13-276. Because no archaeological resources were identified, this report has been prepared as an Archaeological Assessment in accordance with HAR 13§13-275-5(b)(5)(A).

Fieldwork for the current study was conducted on August 13, 2020, by Lokelani Brandt, M.A., and Benjamin Barna, Ph.D. (Principal Investigator). During the archaeological field survey, the entire (100%) ground surface of project area was visually inspected by walking systematic transects oriented north-south, spaced no more than 15 meters apart. As a result of the fieldwork no historic properties of any kind were observed within the project area. Given the negative findings of the current study with respect to archaeological resources, it is concluded that the proposed project will have no effect on any historic properties. Therefore, the recommended determination of effect for the proposed project is “no historic properties affected.”

With respect to the historic preservation review process of the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD), our recommendation is that no further historic preservation work needs to be conducted within the current project area prior to or during project implementation. In the unlikely event that archaeological resources are discovered during ground disturbing activity associated with the proposed development, work should cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280.

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1. INTRODUCTION

At the request of Geometrician Associates, on behalf of the County of Hawai‘i Department of Water Supply, ASM Affiliates (ASM) conducted an Archaeological Inventory Survey (AIS) of a roughly 10-acre project area within Tax Map Key (TMK): (3) 6-8-001:001 in Waikōloa Ahupua‘a, South Kohala District, Island of Hawai‘i (Figures 1, 2, and 3). The project area is a portion of a 13,285.024-acre parcel owned by PR Puu Pa LLC. The Department of Water Supply intends to develop a 10MG above-ground water reservoir with appurtenant water line and road connections to existing infrastructure within the project area. The current study was conducted in support of environmental documentation being prepared to comply with Hawai‘i Revised Statutes (HRS) Chapter 343 and the Department of Land and Natural Resources-State Historic Preservation Division’s (DLNR-SHPD) HRS Chapter 6E-8 review of the proposed project.

The AIS was undertaken in accordance with Hawai‘i Administrative Rules (HAR) §13–275 and was performed in compliance with the *Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports* as contained in HAR 13§13–276. Because no archaeological resources were identified during the AIS, this report has been prepared as an Archaeological Assessment in accordance with HAR 13§13-275-5(b)(5)(A). This report contains background information describing the location and environment of the project area, a summary of the previous archaeological work conducted in the vicinity of the subject property, a detailed presentation of a culture-historical context for the project area, an explanation of the survey methods and results of the current fieldwork, and recommendations based on these results.

I. Introduction

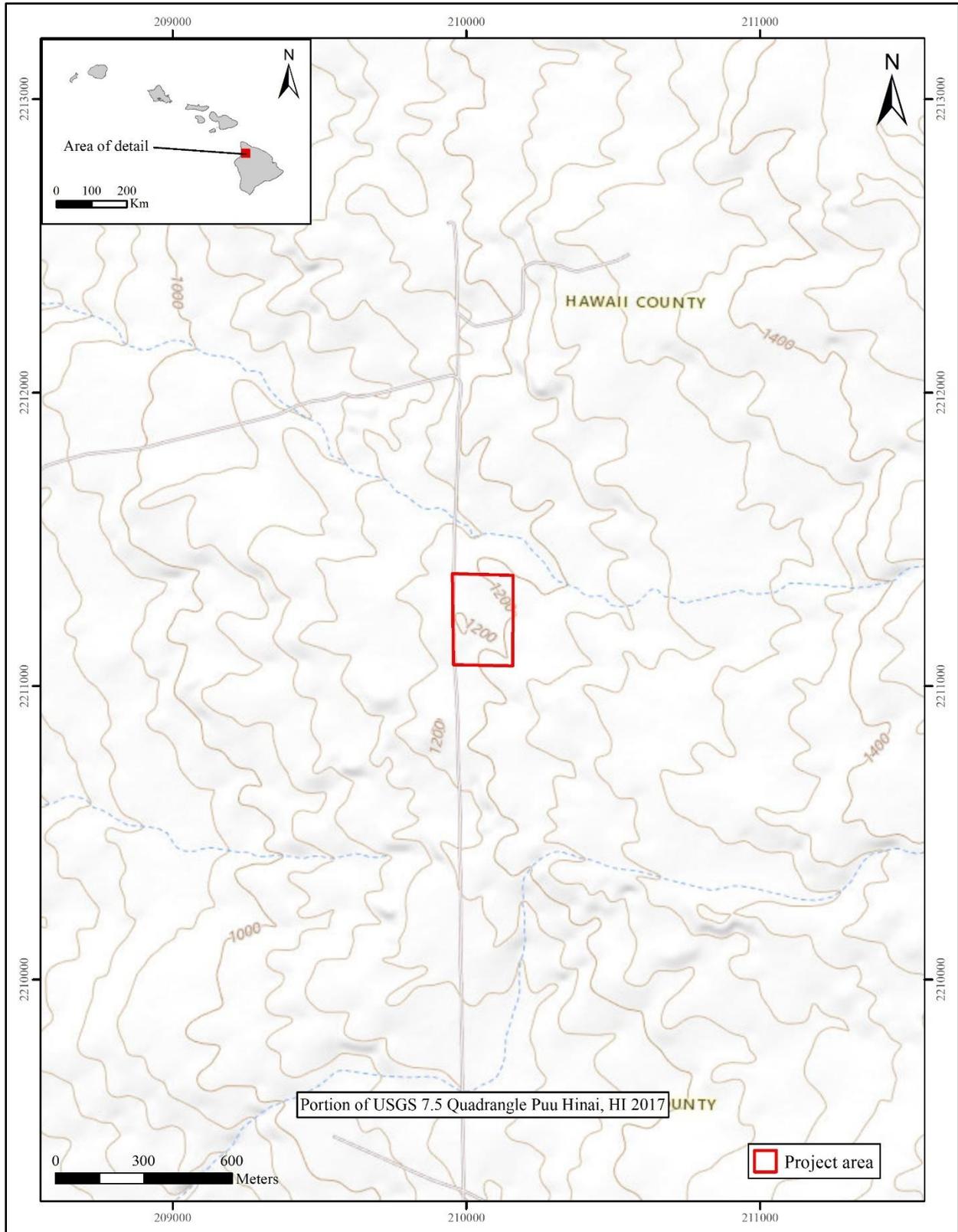


Figure 1. Project area location.

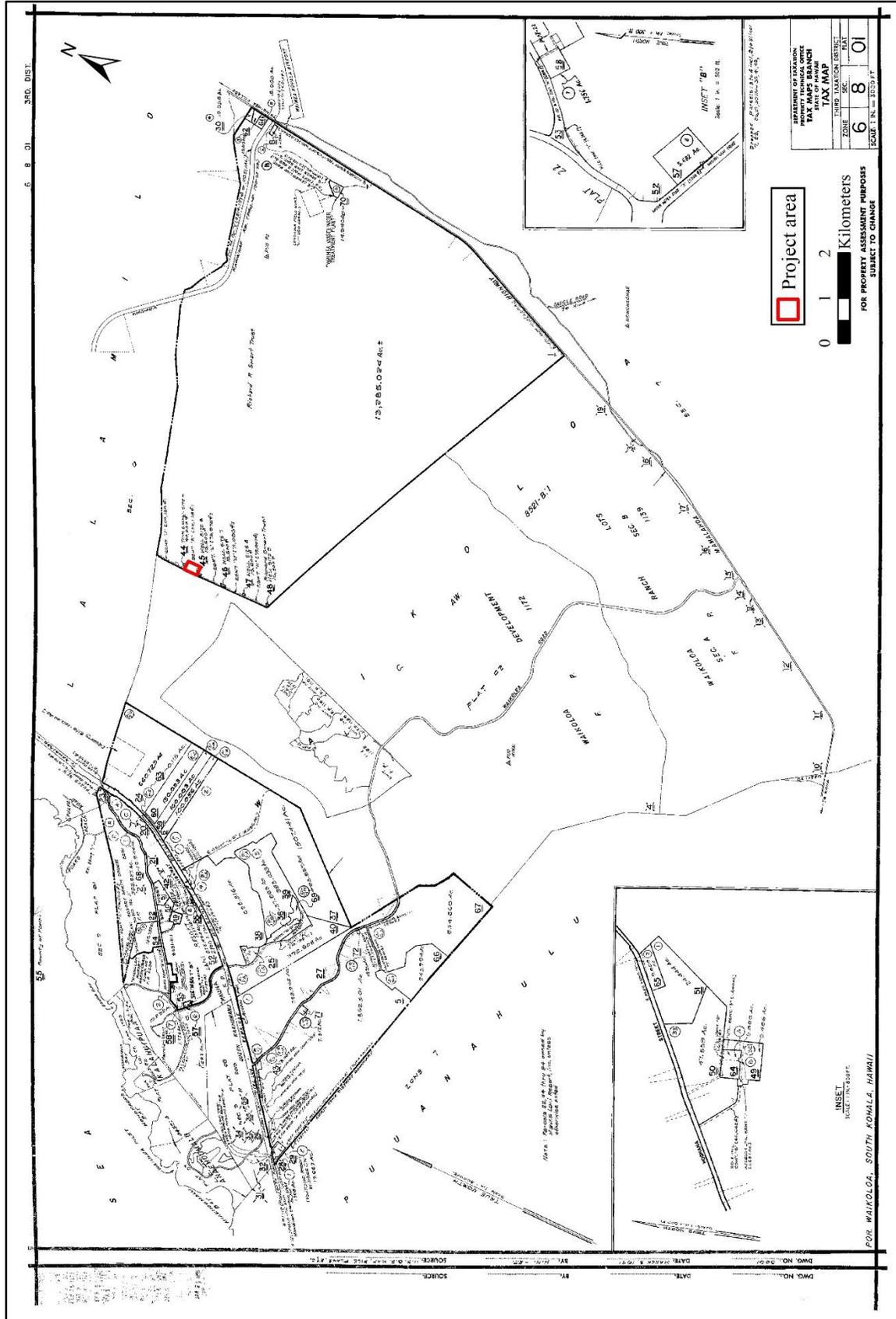


Figure 2. Tax Map Key plat (3) 6-8-001 with the project area indicated.

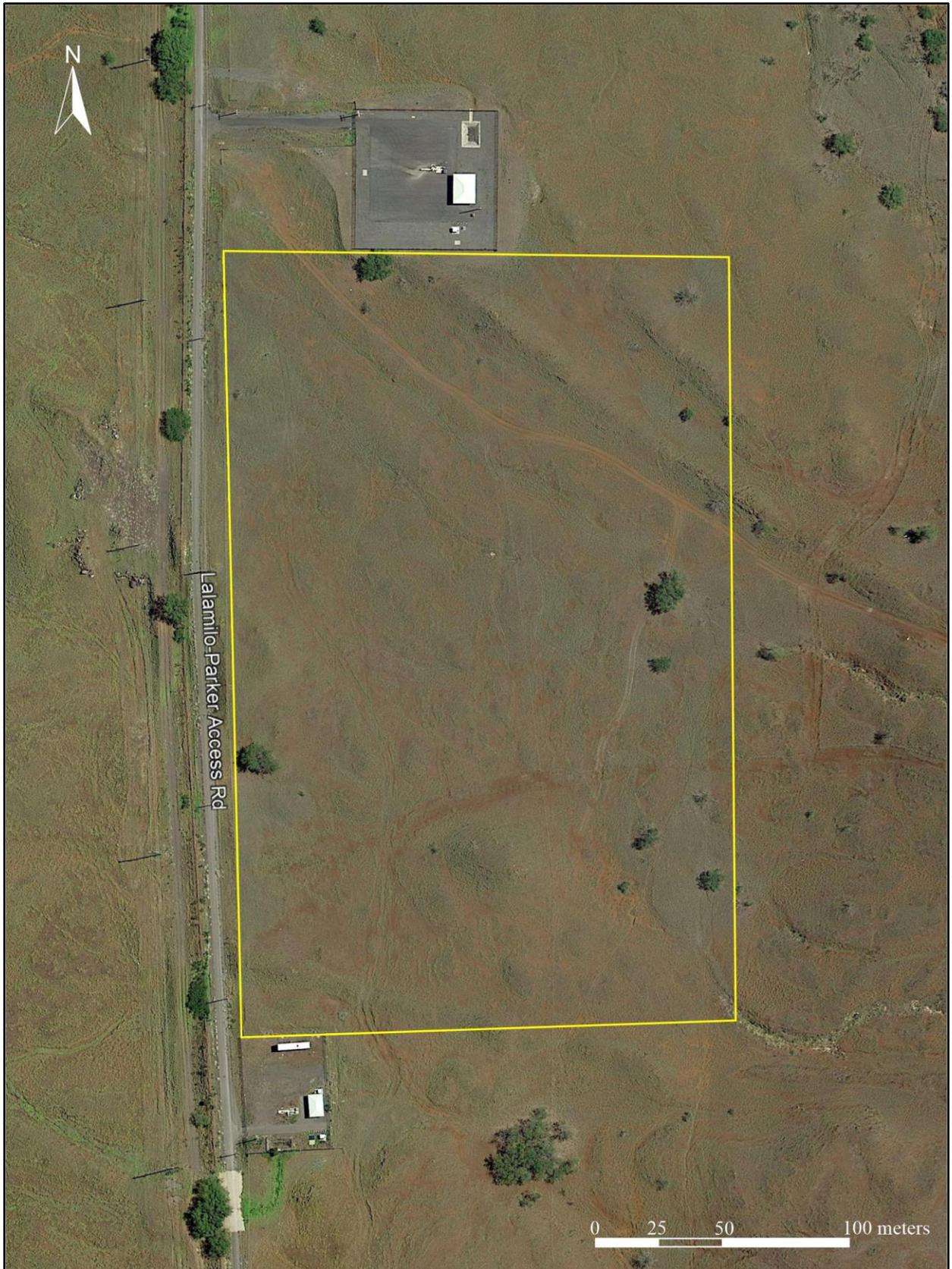


Figure 3. Aerial imagery of the project area ca. 2019 (Google Earth).

PROJECT AREA DESCRIPTION

The current project area encompasses a roughly 10-acre portion of TMK (3) 6-8-001:001 located within Waikōloa Ahupua‘a, South Kohala District, Island of Hawai‘i (see Figure 2). It is located at an elevation of 1,200 feet (366 meters) above sea level, roughly 6 kilometers from the coast (see Figure 1). The project area is situated between two existing well sites and is accessed by a paved road that connects these and several other existing well and reservoir sites with Queen Ka‘ahumanu Highway to the west. The terrain within the project area (Figures 4 through 6) gently slopes to the west, with two prominent *mauka/makai* trending ridgelines crossing diagonally through the northeast corner of the project area, and the mouth of a small dry drainage located in the southeastern corner. A small *pu‘u* rises in the south-central portion of the project area (Figure 7). Soils within the project area (Figure 9) are classified as belonging to the Hapuna-Waikui-Lalamilo complex, 0 to 20 percent slopes (Soil Survey Staff 2020). These soils consist of a mix extremely cobbly medial silt loam (Hāpuna and Waikui series) developed from volcanic ash and medial fine sandy loam (Lalamilo series) developed from alluvium over basic volcanic ash deposits overlying ‘a‘ā lava flows. The geology underlying these soils (Figure 10) that originated from Mauna Kea Volcano 64,000 to 300,000 years ago (Sherrod, 2007). The climate in the project area is generally warm with a mean annual temperature ranging between 67 to 74 degrees Fahrenheit (Giambelluca et al. 2014). Mean annual rainfall is approximately 13 inches (330 millimeters), with the majority of the rainfall occurring during the winter months of December and January, and the least occurring in July and August (Giambelluca et al. 2014). Typical prevailing easterly trade winds average between 7 and 14 miles per hour, but can blow down the mountains at speeds of 20-30 miles per hour during the nighttime. Daytime sea breezes, which blow on-shore, are often of similar strength (Juvik and Juvik 1998). As a result of the arid conditions, strong winds, periodic wildfires, and nearly two centuries of use as cattle pasture, vegetation within the project area is relatively sparse. These arid and slightly breezy conditions, along with historic and contemporary livestock grazing have resulted in sparse vegetation within the project area. Vegetation in the project area is limited to *kiawe* (*Prosopis pallida*), buffelgrass (*Cenchrus ciliaris*), fountain grass (*Pennisetum setaceum*), and an occasional but heavily grazed ‘*uhaloa* (*Waltheria indica*). Prior ground disturbance in the project area includes three unpaved ranch roads (Figure 8) and one bulldozed firebreak. A modern wire fence crosses the project area from north to south.



Figure 4. Project area overview, view to the north.



Figure 5. Project area overview, view to the south.



Figure 6. Project area overview, view to the west.



Figure 7. Small *pu'u* located in the project area, view to the northwest.



Figure 8. Road disturbance in the project area, view to the east.

1. Introduction

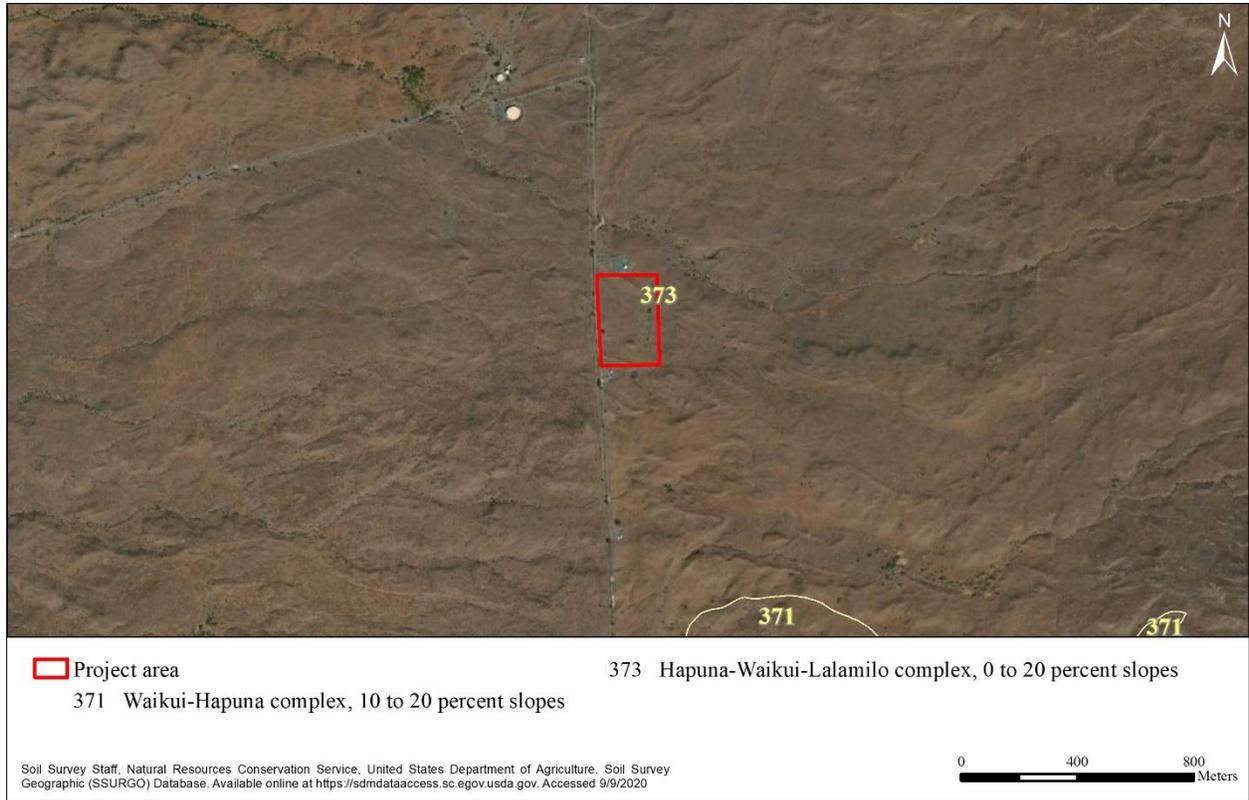


Figure 9. Soils in the project area (Soil Survey Staff 2020).

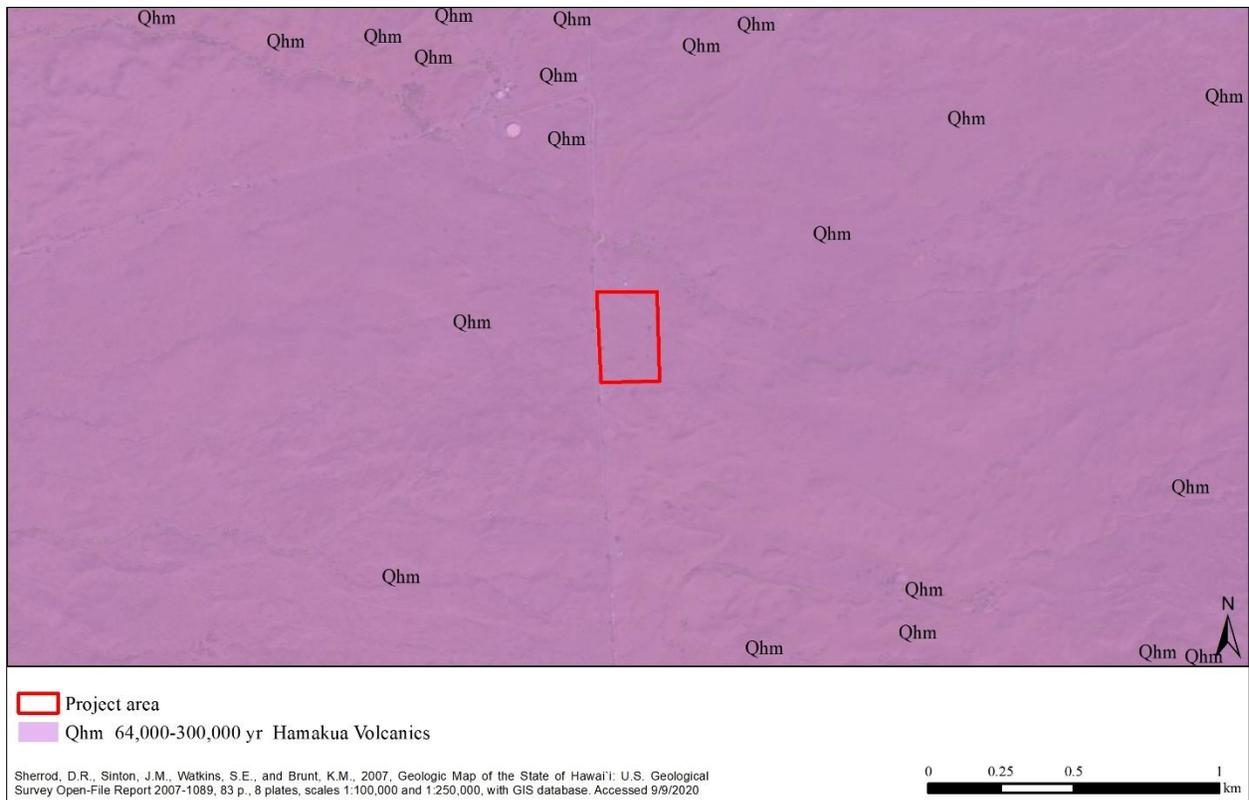


Figure 10. Surface geology in the project area(Sherrod et al. 2007).

2. BACKGROUND

As required by HAR 13§13-275-(b)(5)(A), this chapter provides a brief background discussing the former land use and types of sites that might have been previously present in the project area. This includes a culture-historical context for Waikōloa and summary of the results of previous archaeological studies conducted in the vicinity.

BRIEF CULTURE-HISTORICAL CONTEXT

Comprehensive and detailed culture-historical (both archival and oral) background information relative to the general project area can be found in a companion Cultural Impact Assessment (Brandt 2020) prepared for the current project, and also in several older archaeological reports (e.g., Barrera and Kelly 1974; Clark and Kirch 1983; Clark 1987; Jensen 1994; Kumu Pono Associates 1999). In general, prior to the nineteenth century, Waikōloa's population was concentrated in the uplands and along the coast. Initial occupation of the area probably began at small coastal settlements, where early inhabitants exploited the diverse marine resources (Jensen 1994). Upland habitation followed and likely focused on agricultural field systems, which undoubtedly provided much of the produce for the coastal inhabitants (Carlson and Rosendahl 1990). The earliest settlers in the region appear to have inhabited natural caves and overhangs, along with small, simple surface features. As populations increased and expanded, so did the occurrence of more permanent habitation structures in both the coastal and upland areas (Jensen 1994). A network of coastal and inland trails, over which the exchange of goods occurred, connected the coastal and upland population centers and resource areas (Hommon 1976; Maly 1999). The current project area occupies a dry environmental zone intermediate between the coastal *kula* (plain) and the fertile agricultural uplands.

The current project area is located within the *ahupua'a* of Waikōloa, which is one of some seventy *ahupua'a* that make up the traditional *moku-o-loko* or *moku* (interior district) of Kohala. The *moku* of Kohala is one of six on Hawai'i Island. Legislative acts passed in 1859 divided Kohala into the two modern districts of Kohala 'Ākau (North Kohala) and Kohala Hema (South Kohala) (King 1935). Waikōloa *Ahupua'a* is the southernmost land division within both the traditional *moku* of Kohala and the modern district of South Kohala. It is bound on the north by Lālāmilo *Ahupua'a*, to the east by Pā'auhau *Ahupua'a*, and to the south by the *ahupua'a* of Pu'u Anahulu, which is in the North Kona District.

The place name Waikōloa was translated literally to mean “duck water” by Pukui et al. (1974:223). The name Waikōloa has also been interpreted to mean “water-carried-far” and is the name of a wind goddess (Maly 1999). Traditional poetical expressions also refer to other geographical designations within Kohala. For example, one expression derived from an ancient chant titled *Kū e ho 'opi 'o ka lā* refers to:

<i>'O Kohala-iki, 'o Kohala-nui</i>	lesser Kohala, greater Kohala
<i>'O Kohala-loko, 'o Kohala-waho...</i>	inner Kohala, outer Kohala...
(Pukui and Korn 1973:188)	(Pukui and Korn 1973:190)

While Waikōloa is referred to today as an *ahupua'a*, it was traditionally an *'ili* (land section smaller than an *ahupua'a*) of the *kalana* (or *'okana*) of Waimea. As a *kalana*, Waimea was treated as a sub-district, smaller than a district (*moku-o-loko*), but was composed of several other land divisions, such as *ahupua'a* and the more independent *'ili kūpono*, all of which contributed to its wealth (Lucas 1995; Maly and Maly 2002). In ancient times, the modern *ahupua'a* of Waikōloa was referred to as Waikōloa Nui, and the neighboring area of Lālāmilo was referred to as Waikōloa Iki (Maly 1999). Bernice Judd (1932:14), a former librarian at the Hawaiian Mission Children's Society, explains that:

In the early days Waimea meant all the plateau between the Kohala Mountains and Mauna Kea, inland from Kawaihae. This area is from eight to ten miles long and from three to five miles wide. There was no running water on Mauna Kea, so the inhabitants lived at the base of the Kohala Mountains, where three streams touched the plain on their way towards the sea... The middle stream, which was famous for wild ducks, was named Waikoloa, or Duckwater. This and the most westerly stream, called Kahakohau, went towards Kawaihae, but neither reached the sea, except in times of flood.

In the District of Kohala, the long ridge of the Kohala Mountains extends perpendicular to the predominant northeasterly trade winds, creating an orographic rainfall pattern that separates the district into two distinct environmental zones; a wetter windward zone on the eastern (Hāmākua) side, and a drier leeward zone on the western (Kona) side. The first settlers of this district likely established a few small communities near sheltered bays with access

to fresh water primarily in the windward valleys and gulches. The communities would have shared extended familial relations and had an occupational focus on the collection of marine resources. Evidence for early occupation of leeward Kohala was speculated for Kapa'anui, where Dunn and Rosendahl (1989) reported radiocarbon dates as early as A.D. 461, and from 'Anaeho'omalū where Barrera (1971) reported A.D. 900 as the initial date for settlement; however, these early dates should be viewed with suspicion (c.f. Kirch 2011). Other early dates from windward Kohala were reported by Cordy (2000); these sites are believed to have been utilized in the early thirteenth century. Data recovered from Māhukona, along the leeward coast of North Kohala, suggest initial occupation taking place there around A.D. 1280 (Burgett and Rosendahl 1993:36). Permanent settlement in Kohala has been reported as early as A.D. 1300 at Koai'e, a coastal settlement, where subsistence primarily derived from marine resources, but was probably supplemented by small-scale agriculture as well (Tomonari-Tuggle 1988).

Rosendahl (1972a) proposed that settlement in leeward Kohala at this time was related to seasonal, recurrent occupation, and that coastal sites were occupied in the summer to exploit marine resources, while upland sites were being occupied during the winter months with a primary focus on agriculture. An increasing reliance on agricultural products may have caused a shift in social networks as well, according to Hommon (1976:118). Hommon argues that kinship links between coastal settlements disintegrated as those links within the *mauka-makai* settlements expanded to accommodate exchange of agricultural products for marine resources. This shift is believed to have resulted in the establishment of the *ahupua'a* system. The implications of this model include a shift in residential patterns from seasonal, temporary occupation, to permanent dispersed occupation of both coastal and upland areas.

According to Kirch's (1985, 2010, 2012) model, the concept of the *ahupua'a* and related land stewardship practices were established sometime during the A.D. 1400s, adding another component to an already well-stratified society. The *ahupua'a* was the principal land division that functioned for both taxation purposes and furnished its residents with nearly all subsistence and household necessities. *Ahupua'a* typically include multiple ecozones extending from the upland mountainous regions (*ma uka*) to the shore and near shore regions (*ma kai*), assuring a diverse subsistence resource base (Hommon 1986). The size and shape of an *ahupua'a* could vary greatly (Cannelora 1974). The *maka'āinana* (commoners, literally the "people that attend the land") who lived on the land had rights to gather resources for subsistence and tribute within their *ahupua'a* (Jokiel et al. 2011). As part of these rights, residents were required to supply resources and labor to *ali'i* (chiefs) of local, regional, and island chiefdoms. The *ahupua'a* became the equivalent of a local community with its own social, economic, and political significance and served as the taxable land division during the annual *Makahiki* procession (Kelly 1956). *Ahupua'a* were ruled by *ali'i 'ai ahupua'a* or chiefs who controlled the *ahupua'a* resources. Generally speaking, *ali'i 'ai ahupua'a* had complete autonomy over the *ahupua'a* they oversaw (Malo 1951). *Ahupua'a* residents were not bound to the land nor were they considered the property of the *ali'i*. If the living conditions under a particular *ahupua'a* chief were deemed unsuitable, the residents could move freely in pursuit of more favorable conditions (Lam 1985). This structure safeguarded the well-being of the people and the overall productivity of the land, lest the chief should lose the principal support and loyalty of his or her supporters. In turn, *ahupua'a* lands were managed by an appointed *konohiki*, oftentimes a chief of lower rank, who oversaw and coordinated stewardship of an area's natural resources (Lam 1985). When necessary, the *konohiki* took the liberty of implementing *kapu* (restrictions and prohibitions) to protect the *mana* of an area's resources from environmental and spiritual depletion.

While the *ahupua'a* was the most common and fundamental land division unit within the traditional Hawaiian land management structure, other kinds of land divisions were also incorporated into the system. One type of land division known as a *kalana* was smaller than a *moku* but contained multiple *ahupua'a* and smaller land divisions such as *'ili 'āina*, and *'ili kūpono*. *Ili kūpono* differed from *'ili 'āina* because they fell directly under the jurisdiction of the ruling paramount chiefs (*ali'i ai moku*) because of the highly valuable resources they contained (Handy et al. 1991). The relationships between *kalana* and *moku* are not well understood. Kamakau (1976) equates a *kalana* to a *moku* and uses a third term, the *'okana*, to describe a subdistrict subordinate to the *moku*. Others use the *kalana* and *'okana* interchangeably (Lucas 1995; Pukui and Elbert 1986). Waikōloa was also considered a *kalana* of Waimea. The lands subject to the *kalana* of Waimea were those that form the southern limits of the present-day South Kohala District including 'Ōuli, Wai'aka, Lālāmilo, Puakō, Kalāhuipua'a, 'Anaeho'omalū, Kananaka, Ala'ōhi'a, Paulama, Pu'ukalani (Pukalani), Pu'ukapu, and Waikōloa. An additional complication to understanding the internal structure of the *kalana* of Waimea is the fact that in ancient times Waikōloa was referred to as Waikōloa Nui, and the neighboring area of Lālāmilo was referred to as Waikōloa Iki (Maly 1999).

Traditional Land Use Practices

Only a few relatively small areas in the intermediate elevations of Waikōloa appear to have been suitable for cultivation. Drawing from early historic accounts, ground and aerial photography, and pedestrian surveys conducted during the early 1980s, Holly McEldowney (1983) provided a vegetation reconstructive model to represent predominant historic (1792-1850) native plant communities for the South Kohala region. Based on McEldowney's (1983:414-415) model, the project area falls within the "Pili land 1" zone, which is historically characterized as beginning at the coast and extending to roughly the 1500 foot elevation and described as a "barren, stoney, and dried landscape" with "very low shrubs, thistles, and dry looking grass." The current vegetation community, Hawaiian Introduced Perennial Grassland (Giambelluca et al. 2014) is a result of livestock grazing that was set into motion when the first cattle was introduced to the Waimea plateau of Hawai'i Island in 1793 by Captain George Vancouver (Vancouver 1984). Within decades, the relatively unchecked population growth of wild and feral herds severely degraded the native forest and plant life of this region (Bergin 2004; Kuykendall 1938). Boundary commission testimonies from the latter part of the nineteenth century, however, mention a cultivated plot of land on the northeastern side of Pu'uhina'i cinder cone, which was formerly cultivated in 'uala, ipu (gourds), and later, pumpkins and melons. Registered Map No. 574 (Figure 11), produced ca. 1867, depicts an "Aina Mahi"—farm land—on the southeast side of Pū'uhina'i. Oral histories collected by (Kumu Pono Associates 1999:153) indicate that another dry land planting area in Waikōloa called Makahonu "still used through the turn of the [twentieth] century." Makahonu was located near the intersection of Waikōloa Road and Queen Ka'ahumanu Highway, southwest of the Project area. There is no information in the oral histories of what was grown at Makahonu, although (Handy et al. 1991) state that 'Anaeho'omalū and other nearby locations were favorable for growing 'uala. Coastal residents in South Kohala relied heavily on the ocean for sustenance, and probably cultivated potatoes in small patches (Handy et al. 1991:532), augmenting their diet with produce procured through trade with the upland areas.

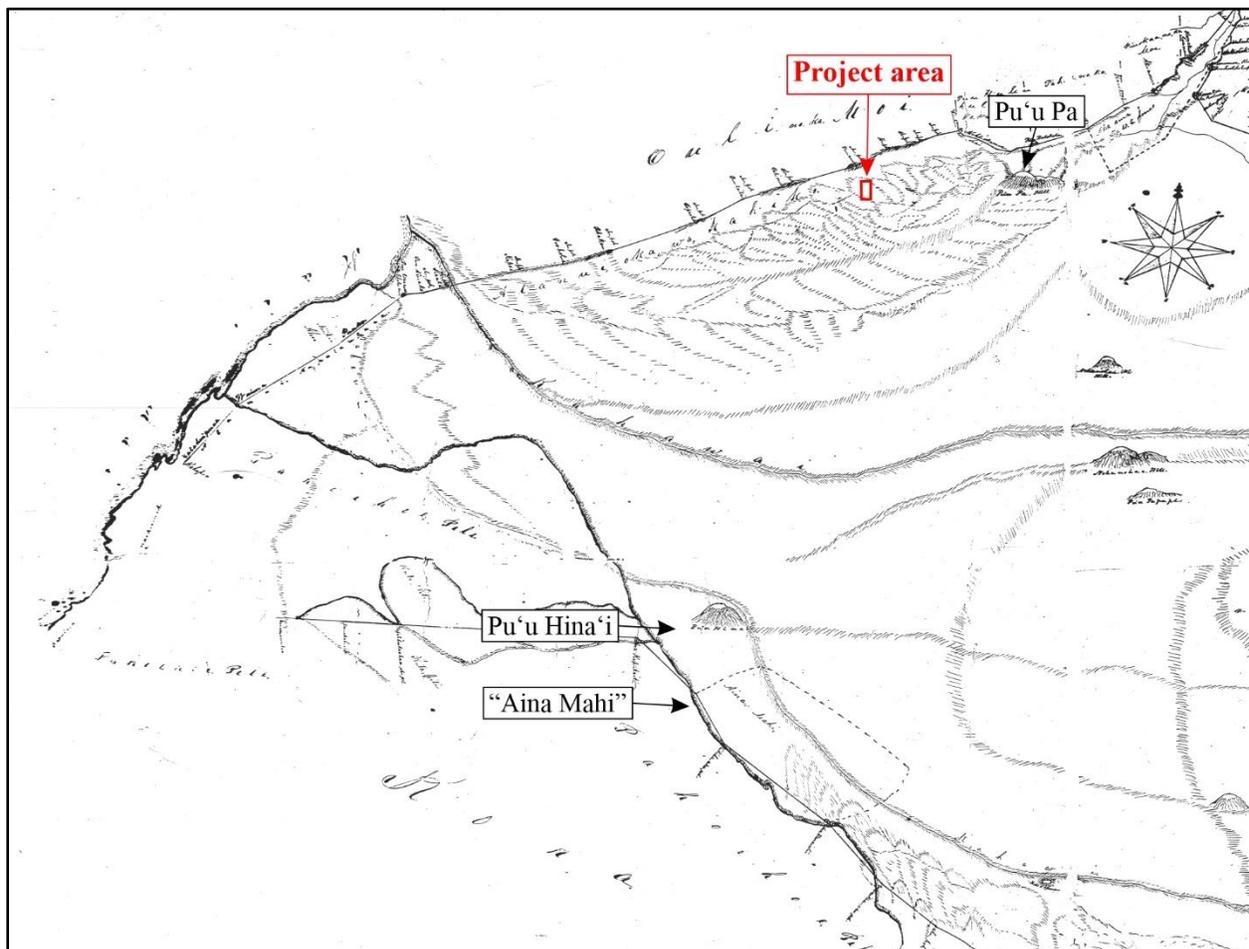


Figure 11. Portion of Hawai'i Registered Map No. 574 (Kaelemakule 1867).

Land Use in the Nineteenth and Twentieth Centuries

The current condition of the project area is largely a result of changes in land use during the nineteenth and twentieth centuries. The most influential of these was the introduction of livestock ranching around the 1830s served to transform the *pili* lands of Waikōloa into the open range covered with introduced forage grasses. The nearly two centuries of livestock grazing was punctuated during the 1940s by the use of the land for military training, which has also left its mark in the archaeological record. Most recently, resort, commercial, and residential development at ‘Anaeho‘omalua and Waikōloa Village has impacted the vicinity of the project area.

In 1792, Captain George Vancouver, who had sailed with Cook during his 1778-1779 voyages, arrived in Kealahou Bay with a small fleet of British ships, where he met with Kamehameha. Vancouver stayed only a few days on this first visit but returned in 1793 and 1794 to take on supplies. Vancouver introduced cattle to the Island of Hawai‘i during his 1793 and 1794 visits, giving them as gifts to Kamehameha I, who immediately made them *kapu*, thus preventing them from being killed (Kamakau 1992; Vancouver 1984). Waikōloa Nui would eventually become a favored pasture for the cattle given by Vancouver to Kamehameha. The *kapu* cattle quickly multiplied in the region, becoming a scourge for the native planters of the area, so much so that sometime between 1813 and 1819 their numbers necessitated that a wall be built from the northern boundary of Waikōloa Nui to near Pu‘u Huluhulu (Barrère 1983; Boundary Commission 1874:6-12). The wall was designed to keep wild cattle in Waikōloa Nui, and out of the more agriculturally productive areas on the Waimea side. The wall was called the Pā of Kauliokamoa after the *konohiki* who oversaw its construction (Wolforth 2000). Wild cattle were passively managed in this way until royally-commissioned bullock hunters began killing them for hides and tallow in the 1820s, and then *vaqueros* from Mexico were hired to train Hawaiians in proper herd management in the 1830s (Bergin 2004; Wellmon 1969).

Much of the population of South Kohala at this time resided near the shore or in the uplands of Waimea. Lorenzo Lyons, a minister in Waimea, visited the coastal fishing village of Puakō, located *makai* of the current project area, in 1835 (Doyle 1953). A trail from the uplands of Waimea to the shore at Puakō followed the boundary between Waikōloa and Lālāmilo to the shore at Puakō (Lyons 1875). Hawai‘i Registered Map Nos. 574 (prepared by Kaelemakule circa 1867; see Figure 11) and 1080 (prepared by C. J. Lyons and W.A. Wall in 1885; Figure 12) depict an “old trail” following the boundary between the two *ahupua‘a*, well to the north of the Project area. The trail passed through barren land, which:

... consists of a gradual descent of about 10 miles to the seaside. It is entirely composed of an uneven rocky waste, covered with long grass. This barren tract is untenanted and uncultivated. Rain seldom falls here and, besides the grass, nothing is seen to vary the monotony until you approach the coast, when the eye is relieved by the yellow blossoms of the Nohu [*Tribulus cistoides*]. (*Sandwich Island Gazette* September 10, 1836)

As a result of the *Māhele* of 1848, Waikōloa Nui (originally an *‘ili* of Waimea *kalana*) was awarded to George Davis Hū‘eu as an *ahupua‘a* based on Kamehameha I’s gift of the land to Hū‘eu’s father Isaac Davis. This award (LCAw. 8521-B:1) did not include the coastal areas of ‘Anaeho‘omalua and Kalāhuipua‘a, which were retained by the crown. The Davis Hū‘eu award was primarily restricted to the non-agricultural *pili* lands south of the agriculturally-productive Lālāmilo area and *mauka* of the rich coastal resource area. There were nine small residential *kuleana* awarded in the uplands of Waikōloa near the town of Waimea (Maly 1999). None were awarded within or near the current project area.

In 1859, Hū‘eu and John Palmer Parker began a dispute over the boundary between Hū‘eu’s *ahupua‘a* of Waikōloa and Parker’s holdings in Pā‘auhau. The boundary issue was quickly resolved, but the dispute prompted Lot Kamehameha, Minister of the Interior, to recommend to W. S. Spencer, Interior Department Clerk, that boundary testimony for all *ahupua‘a* be collected, which led to the work of the Boundary Commission throughout the islands (Maly and Maly 2002). In 1865, the boundaries for Waikōloa Nui were brought before the Boundary Commission and certified, based on testimony from several individuals (Boundary Commission 1874). The project area is near the boundary with Lālāmilo, but not on it.

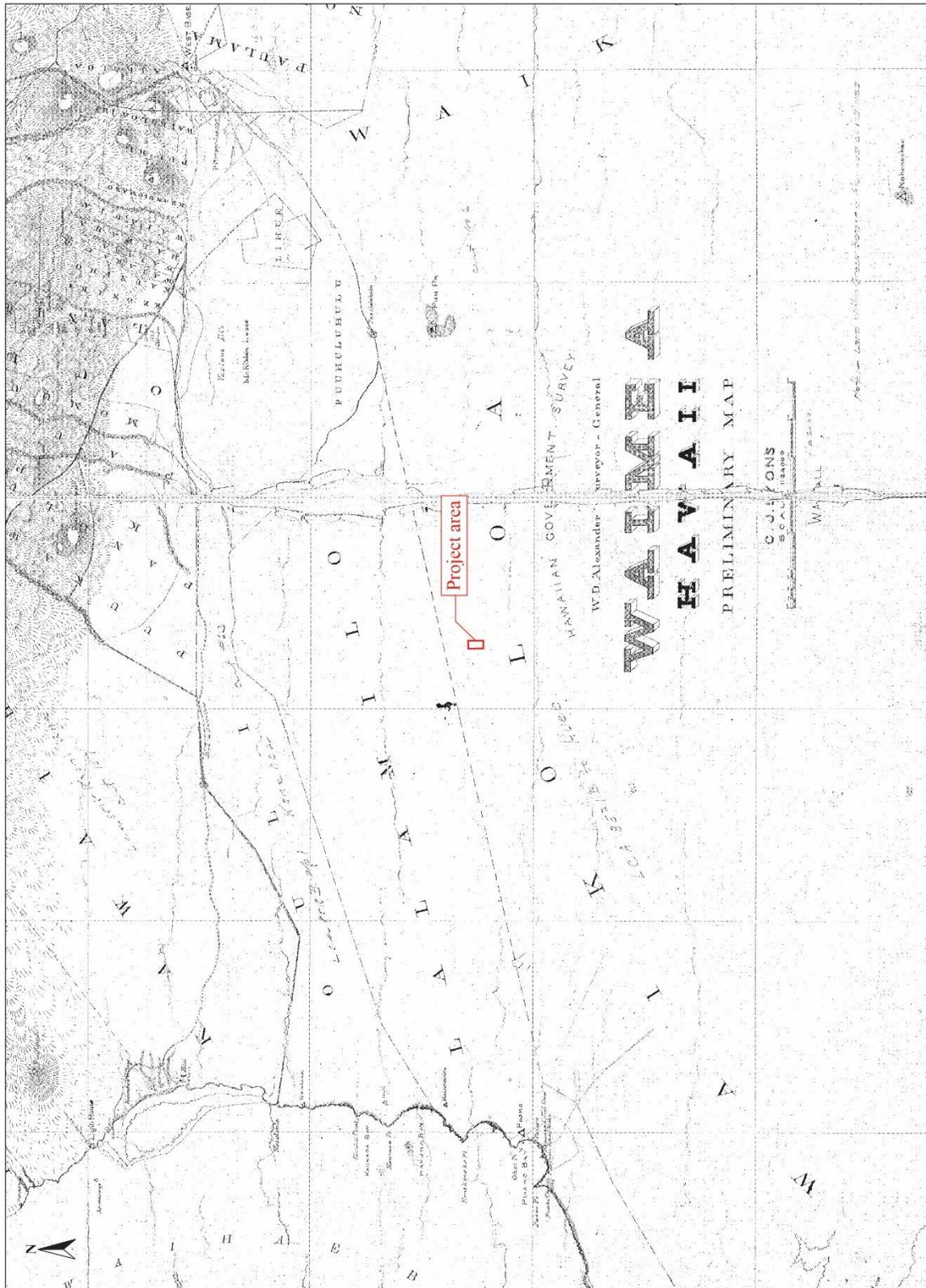


Figure 12. Hawai'i Registered Map No. 1080 with project area indicated (Lyons et al. 1885).

At stake in the boundary hearings for Waikōloa and the neighboring lands was acreage needed for fledgling commercial livestock ranching operations. By the mid-1860s the Waimea Grazing and Agricultural Company (WGAC) had acquired considerable strategic assets around Waimea in an attempt to monopolize the livestock industry at the expense of competitors like Parker Ranch (Bergin 2004). On July 2nd, 1868, G. D. Hū'eu leased his remaining lands in Waikōloa Nui to the WGAC for a twenty year period (Maly and Maly 2002). With the acquisition of this land, the WGAC became the largest ranching operation on the island, but their success was short-lived. By the late-1870s, largely due to persistent drought conditions within its grazing lands, the WGAC went out of business. Its herd was purchased by Parker Ranch (Bergin 2004). Frank Spencer, one of the former WGAC principals, formed Pu'uloa Sheep and Stock Company and continued to raise sheep in Waikōloa and neighboring lands until 1876. In that year, Spencer sold his interest in the sheep ranch and Waikōloa lease to George W. Macfarlane (Maly and Maly 2002). Meanwhile, Parker Ranch continued to expand their operations in the Waimea area throughout the 1870s and 1880s. The ranch eventually acquired the lease to roughly 95,000 acres in Waikōloa still held by G.D. Hū'eu, and in 1903, under the direction of Alfred W. Carter, the guardian and trustee for Thelma Parker, purchased a nine-tenths interest in the Waikōloa Nui lands (Bergin 2004).

Once ready for the market, cattle grazed in Waikōloa would be driven to Waimea for sorting and then down to Kawaihae for shipping. During these drives, the cowboys followed a well-used network of trails that connected the distant stations at Waiki'i, Kalai'ehā, and Ke'āmuku with the town of Waimea and shipping harbors on the Kohala coast (Maly and Maly 2002). One segment of this network, the Puakō-Ke'āmuku trail, is located near the current project area. This trail appears on a map drawn by J. Perryman in J.S. Emerson's Field Note Books from 1882 (Book 251:109, reproduced in Maly and Maly 2003:102). As seen from the top of Ahumoa *pu'u* (Figure 13), the Puakō-Ke'āmuku Trail departs from "Warren's Keamuku," which is located near the left-hand edge of the sketch. The trail proceed northerly, then diverges from another trail that leads to Waimea. The Puakō-Ke'āmuku trail is shown passing around the northern side Pu'uhina'i, and then curving westerly toward Puakō. Almost no other details are provided about the terrain or conditions along this trail. Changes to the trail are documented in more recent maps and aerial images and consist primarily of the addition of new road segments. The 1928 USGS Puako Quadrangle map (Figure 14) depicts the Puakō-Ke'āmuku trail beginning at a road (the former sugar mill railroad) near Puakō Harbor and ascending toward Pu'uhina'i well to the southeast of the current project area. A second trail, the Puakō-Waimea Trail, ascends through Lālāmilo more than 3 kilometers to the northwest of the current project area.

The use of the current project area and vicinity for cattle grazing was briefly interrupted during World War II. Several months before the bombing of Pearl Harbor in 1941, the U.S. Army established an infantry headquarters at Parker Ranch in the Pu'ukapu area of Waimea (Bergin 2006). This was in keeping with a spirit of cooperation between the military and the ranch that began in 1908 with the ranch participating in the U.S. cavalry's remount program. In December of 1943, the Second Marine Division arrived on Hawai'i Island for rest and relaxation after fighting in the Gilbert Islands (Chapman 2014). They were dispersed into three camps: one at Hāpuna Bay, one at Pōhakuloa, and one in Waimea, which became known as Camp Tarawa. The U.S. War Department leased approximately 123,000 acres of land in the Waimea and Waikōloa area for use as a training area. With this lease the current project area became part of the U.S. Navy's 91,000-acre Waikōloa Maneuver Area, which also included the 9,141 acre Lālāmilo Firing Range. This training area extended *mauka* from the coast to the Pohakuloa Training Area, and from the Waimea-Kawaihae Road to south of the Waikoloa Road.

The 2nd Marine Division was the first to train at Waikōloa, spending five months there in preparation for the invasion of Saipan and Tinian. The 5th Marine Division replaced the 2nd Division in August 1944 and used the Waikōloa Maneuver Area to prepare for the assault on Iwo Jima. While training, the marines resided at a military camp just outside of Waimea Town that came to be called Camp Tarawa. As the largest U.S. Marine training facility in the Pacific, Camp Tarawa covering an area of approximately 467 acres, and between 1943 and 1945 as many as 50,000 men passed through the camp on their way to the Pacific Theater (Escott 2008).

The last of the Marines of the 5th Division departed Camp Tarawa in June of 1946, and the Waikōloa Maneuver Area was returned to the Parker Ranch in September of 1946 (Haun et al. 2010). The Lālāmilo Firing Range, through a permit granted by the Territory of Hawai'i, was retained by the U.S. Marines as a training area and camp site until 1953 (Escott 2008). When the use permit was cancelled in December of that year, the lands once again reverted to leased cattle pasture administered by the Territory of Hawai'i. Clean-up of unexploded ordnance (UXO) within the former Waikōloa Maneuver Area is still ongoing.

Parker Ranch retained fee simple ownership of Waikōloa. The project area was included in the ranch's Pu'upā Range, specifically Range 2 which was the *makai*-most extent of where Parker Ranch ran cattle (Gary Rapozo in Brandt 2020). The use of the project area lands for military training exercises during World War II opened new access routes to inland and coastal locations that were previously unavailable, but that could now be traveled by motorized vehicle (Maly 1999). The 1956 USGS Pu'u Hīnai quadrangle (Figure 15) shows the Puakō-Ke'āmuku trail following roughly the same route inland from Puakō Bay through Waikōloa Ahupua'a. The Puakō-Waimea trail, on the other hand, now ascends nearly east from bay in the general direction of the current project area before forking at about the 720-foot elevation contour (about 1.5 kilometers *makai* of the current project area). At this fork, the trail to Waimea turns north-northeast, and a second jeep road continues toward a water tank located about 0.75 kilometers south of the current project area and onward to the uplands of Waikōloa Ahupua'a. It is likely that this road was built by the U. S. military during World War II to access lands within the Waikōloa Maneuver Area and then used as the road to Waimea and the rangelands *mauka* of the project area after the conclusion of the war.

Substantial changes of the Parker Ranch lands began to occur in the mid-twentieth century with the transfer to its sixth-generation heir, Richard Palmer Smart. Seeking to diversify the ranch's business interests, Smart initiated a \$300,000,000 resort and residential development on 10,000 acres of land in 'Anaeho'omalu and in along the South Kohala coastline *makai* of the project area, which the press referred to as the "Gold Coast" (Honolulu Star-Bulletin 1968; The Honolulu Advertiser 1959). Although the barren land, capable of supporting "only brush, scrubby trees, cactus and rocks," reportedly made it "difficult to envision. . . as a future resort or city," Smart's plans drew the interest of several resort developers (Honolulu Star-Bulletin 1969). Smart initially intended to offer 'Anaeho'omalu's 31,000-acres for lease, but in 1963 decided to sell the *ahupua'a* for roughly \$11 million. In May of 1968, the Boise Cascade Home and Land Corporation purchased 25,500 acres of land above 'Anaeho'omalu Bay (excluding select portions of the coastline) with visions of creating an amenity-rich resort dreamscape. In addition to the coastal resort development, Boise Cascade also developed of Waikōloa Village, a residential subdivision *mauka* of 'Anaeho'omalu Bay, located to the south of the current project area. Plans for this new community included construction of a vast water system to furnish future residents and businesses, as well as a golf course, a residential subdivision, equestrian center, condominiums, and a shopping center. The village was connected to Māmalahoa Highway by the newly constructed Waikoloa Road. June 27, 1970, Boise Cascade held their first open house to welcome the public and, as their promotional material boasted, to "celebrate the advances made by Boise Cascade and Morrison-Knudsen in reclaiming the Ahupua'a of Waikoloa for Man" (Boise Cascade 1970:1). By August of 1972, Waikōloa Village's first permanent resident had moved in (Boise Cascade 1972), and on July 7th, 1974, the extension of Waikoloa Road leading *makai* to 'Anaeho'omalu was formally dedicated (Waikoloa Office of Public Affairs 1974). By the mid to late-1970s, Waikōloa Village had been mostly built out, and within the next decade the coastal resorts became operational.

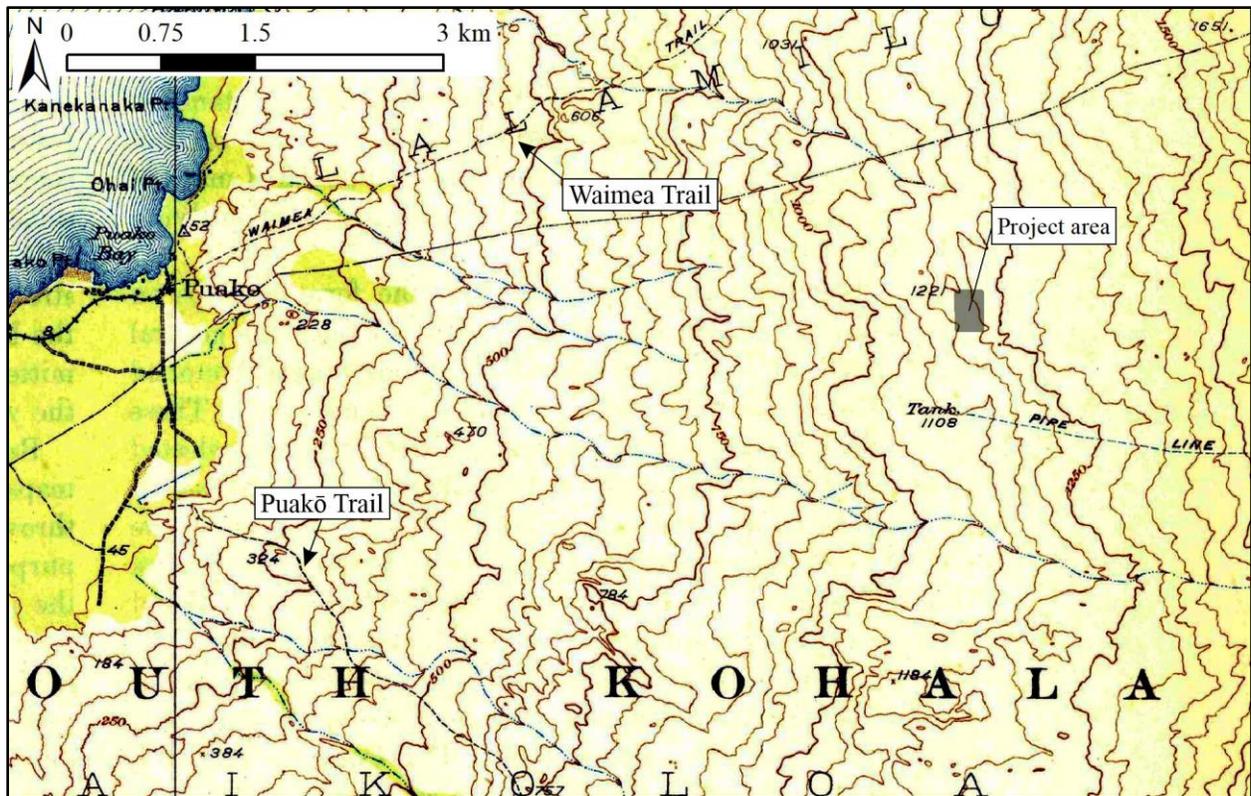


Figure 14. Portion of 1928 Puako USGS quadrangle.

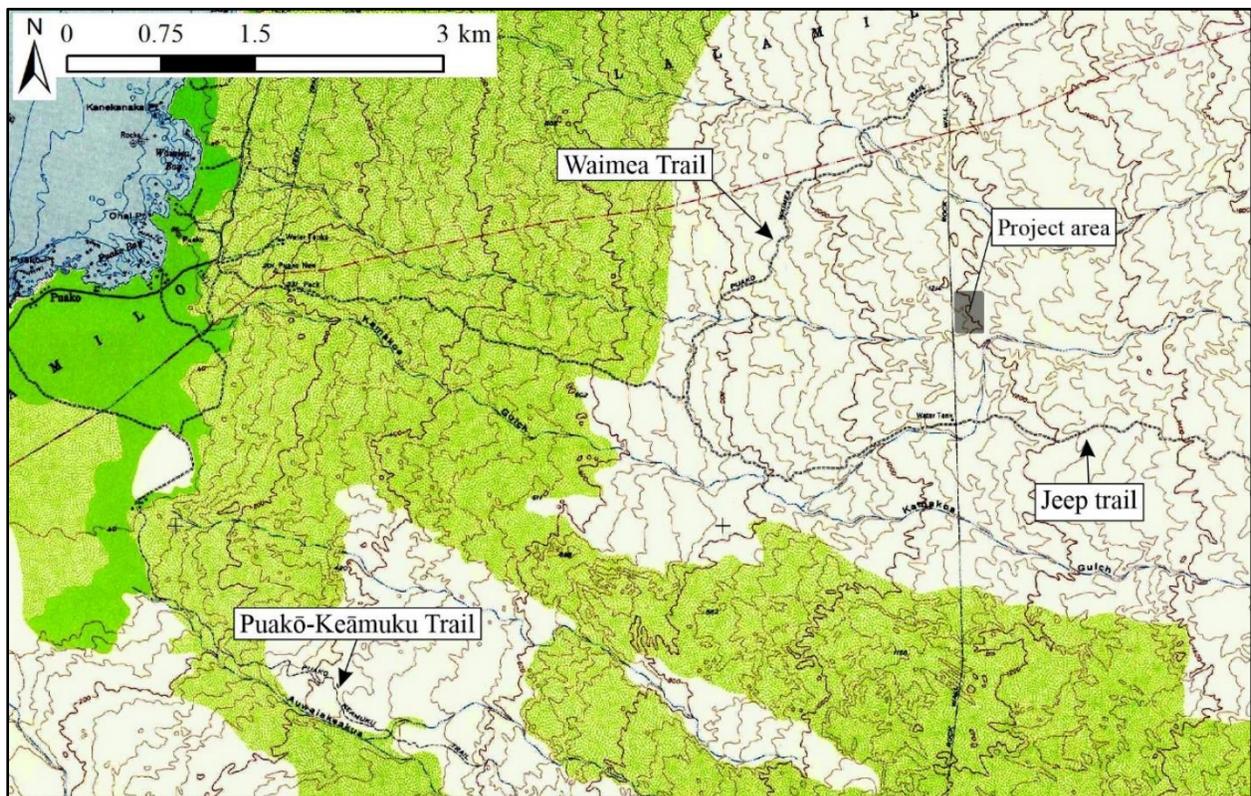


Figure 15. Portion of 1956 Pu'u Hina'i USGS quadrangle.

PREVIOUS ARCHAEOLOGICAL STUDIES

Many of the early archaeological and cultural studies conducted in Waikōloa have concentrated on the coastal areas in the vicinity of the large resort developments *makai* of Queen Ka‘ahumanu Highway, with the ‘*ili* of ‘Anaeho‘omalu being one of the most extensively investigated areas (Burgett and Rosendahl 1990; Ching 1971; Corbin 2011; Cordy 1987; Haun and Henry 2014, 2017; Jensen 1989a, 1989b, 1989c, 1989d, 1989e, 1989f, 1989g, 1990a, 1990b, 1990c, 1991a, 1991b, 1994; Jensen 1990d; Kirch 1979; Reinecke 1930; Rosendahl 1972b, 2000; Tam Sing and Barna 2019; Tam Sing and Brandt 2019; Walker and Rosendahl 1986; Yent 1991; Yent and Griffin 1978). Collectively, these investigations have documented a wide array of archaeological sites that represent permanent habitation, ritual activity, marine resource exploitation, and fishpond management within the immediate coastal zone (between the shoreline and about 100 meters inland), along with temporary habitation occurring along trails within the coastal zone.

Multiple studies have been conducted in the vicinity of the current project area within the intermediate inland portion of Waikōloa and neighboring Lālāmilo *mauka* of Queen Ka‘ahumanu Highway. Many of these studies have included small well parcels and access corridors (Clark and Rechtman 2005, 2011; Rechtman 2003, 2005, 2006, 2008a, 2008b, 2008c; Rosendahl 1992a, 1992b). Larger studies conducted near present-day Waikōloa Village (Bevacqua 1972; Clark and Kirch 1983; Clark et al. 2014; Clark et al. 2016; Kennedy 1987; Moore et al. 2002; Rieth and Morrison 2010; Schilz and Shun 1991; Sinoto and Dashiell 2004; Spear and Chaffee 1994) have identified a relatively sparse distribution of sites pre-dating the military training activities that occurred during World War II. The most common feature types recorded *mauka* of the Queen Ka‘ahumanu Highway have been C-shaped shelters and cairns, along with Historic military and ranching features. The findings of the previous studies agree that the dry, intermediate inland areas of Waikōloa Ahupua‘a were not extensively utilized during Precontact times, but were an area where small scale resource procurement was conducted on a limited basis. Previous archaeological studies conducted in this intermediate zone and near the current project area (Table 1, Figure 16) are discussed in more detail below.

Table 1. Previous archaeological studies conducted *mauka* of Queen Ka‘ahumanu Highway.

<i>Year</i>	<i>Author(s)</i>	<i>Type of Study</i>	<i>Relevant Findings</i>
1972	Bevacqua	Reconnaissance	Five sites in Area F
1983	Clark and Kirch	Survey	World War II military training features
1984	Soehren	Survey	World War II debris, rock alignments
1987	Kennedy	Reconnaissance	1 rock shelter
1991	Jensen and Burgett	Inventory Survey	5 sites (Alignments, terraces, modern hunting blinds)
1992a, b	Rosendahl	Inventory Survey	Cattle wall (Site 9012)
1992	Schilz and Shun	Inventory Survey	Lava tube burial, modern hunting blinds
1994	Spear and Chaffee	Inventory Survey	2 shell middens.
2002	Moore et al.	Inventory Survey	10 sites (C-shapes, <i>ahu</i>)
2003	Rechtman	Inventory Survey	No findings
2004	Sinoto and Dashiell	Inventory Survey Addendum	No findings
2005	Clark and Rechtman	Inventory Survey	C-shaped enclosure and small rock pile
2005	Rechtman	Inventory Survey	No findings
2006	Rechtman	Field Inspection	No findings
2008a	Rechtman	Field Inspection	No findings
2008b	Rechtman	Field Inspection	No findings
2008c	Rechtman	Field Inspection	No findings
2010	Rieth and Morrison	Inventory Survey	8 mounds, stone wall (Site 9012)
2011	Clark and Rechtman	Inventory Survey	Flume, 2 rock piles, dike, hunting blind, C-shape
2014	Clark et al.	Inventory Survey	Rock wall, World War II encampment/possible Precontact component, cairn complex
2016	Clark et al.	Inventory Survey	21 short-term/recurrent habitation complexes, trail segment, hunting blinds

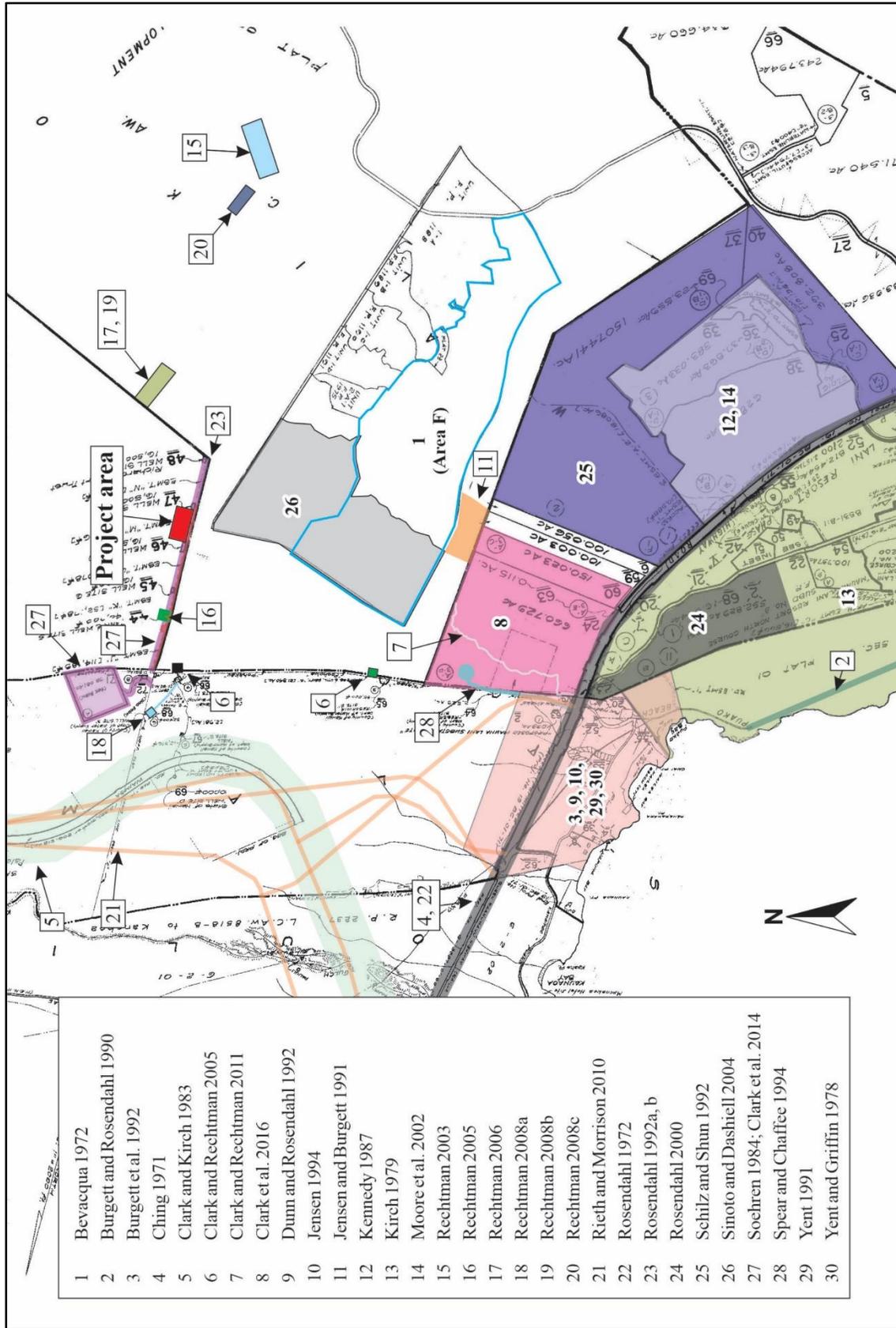


Figure 16. Previous archaeological studies conducted in the vicinity of the current project area

2. Background

The B. P. Bishop Museum conducted an archaeological study (Bevacqua 1972) of portions of Waikōloa Ahupua‘a to determine the nature and distributions of archaeological sites within areas that were slated for development at that time. Seven large areas (Areas A-G) dispersed throughout the *ahupua‘a* were examined. The most proximate of these, Area F, was located to the west/southwest of the current project area (see Figure 16). Five sites (Sites 17 through 21) were identified within Survey Area F, including a roughly circular enclosure, C-shaped shelters walls, and, a rectangular enclosure.

The Mudlane-Waimea-Kawaihae Road Corridor, which passes to the north of the current project area, was the subject of an archaeological survey conducted by the Bishop Museum (Barrera and Kelly 1974), with subsequent feature excavations and historic studies (Clark and Kirch 1983) (see Figure 16). As result of the Barrera and Kelly (1974) fieldwork 4,561 archaeological features were identified, with the majority situated along the coastal margin of Kawaihae and in the uplands of Lālāmilo. Archaeological investigations in Section 2 of the proposed road, a roughly 600 meter wide corridor extending from an elevation of 145 meters above sea level in ‘Ōuli Ahupua‘a to 620 meters above sea level in Lālāmilo Ahupua‘a and passing the current project area to the north, revealed the presence of sixty-four sites containing 381 features (Clark and Kirch 1983:138-179). Three main categories of features were identified at these sites including cairns, shelters, and alignments. Clark and Kirch (1983) indicate that the majority of structures in Section 2 appeared to have been built as defensive positions and wind shelters during World War II. Only a very few sites were located in the middle zone of Section 2 at elevations proximate to the current project area; subsurface testing of features within this zone revealed that all were likely of modern or military origins. Except for one rock wall at 1,200 feet above sea level (SIHP Site 9012), none of the archaeological features were still in use. Survey of areas outside of the road corridor indicated that Hawaiian occupation of the middle zone may have been limited to the banks of Waikoloa Stream and along Wai‘ula‘ula Gulch. Most of the features in Section 2 were concentrated in the upland zone nearest the more agriculturally productive soils. Radiocarbon dates indicated that Hawaiian use of the upland area may have begun as early as A.D. 1600 and lasted until ca. 1800-1850.

Soehren (1984) conducted an archaeological reconnaissance survey of approximately 80 acres located north of the current project area for the construction of the first Lālāmilo Wind Farm (see Figure 16). Soehren (1984) identified evidence of World War II era military training, and possibly nineteenth century ranching use, in the form of surface debris and a stacked stone alignment.

Archaeological Consultants of Hawai‘i conducted an archaeological reconnaissance survey (Kennedy 1987) of roughly 1,000 acres within Waikōloa Ahupua‘a extending inland from Queen Ka‘ahumanu Highway (see Figure 16). Only one site consisting of a shallow rock shelter, an *ahu*, and a low wall, was identified. Kennedy (1987) noted the presence of a single ‘*opihī* shell at the site and modern debris, but given the reconnaissance nature of the survey, did not investigate further. Moore et al. (2002) later conducted an archaeological inventory survey of this same study area (see Figure 16), identifying ten archaeological sites containing a total of thirteen features (SIHP Sites 22509-22518). The recorded sites included the rock shelter previously recorded by Kennedy (1987), seven C-shaped walls with associated *ahu*, four independent *ahu* (three of which were grouped together), and a stone covered hearth. With the exception of the individual *ahu*, which were interpreted as demarcating Historic pasturelands, the recorded sites were thought to have been “utilized for temporary habitation during the pre-Contact Period with the utilization of some sites potentially extending into the early post-Contact Period” (Moore et al. 2002:i). A radiocarbon date obtained from charcoal in the rock shelter returned a date of A.D. 1480, interpreted to represent the initial utilization of the site.

In 1991, PHRI conducted an AIS (Jensen and Burgett 1991) of an approximately 80-acre portion of TMK: (3) 6-8-002:019 located in Waikōloa Ahupua‘a to the west of the current project area (see Figure 16). Five archaeological sites (State Inventory of Historic Places [SIHP] Sites 15066-15070) containing twenty-two features were identified. These included three boulder alignments (possibly check dams) that spanned Kamakoa Gulch, terraces on the northwestern bank of Kamakoa Gulch, a wall, and seventeen hunting blinds. Jensen and Burgett (1991) interpret the boulder alignments and terraces within the Kamakoa Gulch drainage channel (Sites 15066, 15067, and 15068) as potential Precontact Period features, suggesting that intermittent water flow within the drainage may have been channeled and stored to provide water for agricultural pursuits along the gulch edges. A low wall (Site 15069), which extended along a meandering course across a flat area between two knolls south of Kamakoa Gulch, was interpreted as having a possible agricultural function. Seventeen hunting blinds (Site 15070) consisted of crudely constructed stacked stone structures located within a 150 by 50-meter area to the south of Site 15069. Expended shotgun shells (pre-dating 1965) were found at all of the blinds. The hunting blinds were interpreted as modern features by Jensen and Burgett (1991), who did not consider Site 15070 a historic property requiring further evaluation.

Rosendahl (1992b) conducted an AIS of a roughly 2,800-meter-long by 40-meter-wide corridor across a portion of TMK: (3) 6-8-001:001 adjacent to the western boundary of the current project area (see Figure 16). Extensive disturbance was noted throughout the corridor, although Rosendahl (1992b:5) did note the presence of a cattle wall along with “bulldozer berms, and recent trash.” Don Hibbard of DLNR-SHPD cited an earlier correspondence that indicated that the proposed wells were “adjacent to a long historic boundary wall (Site 9012) that divides Waikōloa and has been determined to be significant under criterion ‘a’ or for its association with events important to broad patterns in Hawaii’s history” and did not concur with Rosendahl’s findings (Hibbard 1991). In response to the letter, Rosendahl (1992a) conducted additional historical research to document the history of the wall. Following this, construction proceeded on two of the proposed wells (Parker wells No. 1 and 2) and a paved roadway along the *mauka* edge of the Site 9012 wall.

Schilz and Shun (1992) conducted an archaeological survey and evaluation of approximately 3,000 acres surrounding the area earlier surveyed by Kennedy (1987) and later by Moore et al. (2002) (see Figure 16). Schilz and Shun (1992) identified one burial site consisting of a lava tube containing human skeletal remains (SIHP Site 15033). They also noted twelve additional features in the survey area (cairns, wall shelters, rock mounds, and C-shapes) that they interpreted as modern. The four C-shapes were interpreted to be hunters’ blinds.

In 1994, Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey (Spear and Chaffee 1994) west of the current project area consisting of a transmission route for the Kohala Water System Project in the Districts of North and South Kohala (see Figure 16). The archaeological survey area extended south, following Akoni Pule Highway and then Queen Ka’ahumanu Highway, from Makapala Ahupua‘a in North Kohala to Lālāmilo Ahupua‘a *makai* of the current project area. Along the access route to the proposed reservoir location (the reservoir was never built), SCS identified two archaeological sites (SIHP Sites 19777 and 19778), both surface scatters of shell midden, located within Waikōloa Ahupua‘a, near the northern boundary of the current project area. The shell scatters were interpreted as rest stops (Precontact temporary habitation areas) utilized by travelers along a trail route that once followed the Lālāmilo/Waikōloa boundary between the coastal settlement zone and the inland agricultural zone. No trail route or surface architecture was identified near either site. A shovel probe excavated at Site 19777 revealed the absence of any subsurface cultural deposit. The marine shell fragments from the surface of both sites were collected by SCS. Sites 19777 and 19778 were deemed significant (under Criterion D) for information they contained, but no further work was recommended. Spear and Chaffee (1994) argued that sufficient data was gathered during the inventory survey to make the sites no longer significant; DLNR-SHPD concurred with this recommendation.

Rechtman (2003) conducted an AIS south of the current project area for a proposed access roadway and waterline corridor at approximately 1,200 feet to 1,320 feet (366–402 meters) above sea level, *mauka* of the current project area (see Figure 16). No archaeological resources were observed within that project area.

Sinoto and Dashiell (2004) conducted an archaeological inventory survey of TMK: (3) 6-8-02:022 encompassing roughly 860 acres west of the current project area within the Waikōloa Village development area (see Figure 28), a portion of which was previously surveyed as part of Bevacqua’s (1972) Area F. Sinoto and Dashiell (2004) reported no archaeological findings.

In 2005, Rechtman Consulting, LLC conducted an AIS (Clark and Rechtman 2005) of two proposed water tank locations near the Lālāmilo-Waikōloa boundary north and northwest of the current project area (see Figure 16). One archaeological site (Site 24396) consisting of a C-shaped enclosure (Feature A) and small rock pile (Feature B), were identified. A test unit was excavated within Feature A which yielded no cultural material. It was determined that this feature may have functioned as a temporary habitation shelter during Precontact times. Nearby Feature B was interpreted as a cairn that may have been associated with Feature A, but also potentially may have served as an *ahupua‘a* boundary or trail marker. Site 24396 were evaluated as significant under Criterion d, and no further work was the accepted treatment for the site.

That same year, Rechtman (2005) inspected an area within the Rosendahl (1992b) survey corridor for the proposed development of Parker well No. 3 and the stub road leading to it (see Figure 16). No archaeological sites, features, or deposits were observed.

Rechtman Consulting, LLC conducted three other archaeological studies at proposed well sites near the current project area (Rechtman 2008a, 2008b, 2008c). These studies reported no findings within their respective project areas. At Lālāmilo Well E (north of the current project area in Lālāmilo Ahupua‘a), Rechtman (2008a:3) noted:

. . . three small enclosures were noted outside the corridor near the existing Well D. Based on the presence of broken glass, bullets and bullet shell casings, the enclosures appear to be U.S.

Military WW II era training related features. All three features are located along the upper edge of a south facing slope, spaced four to fifteen meters west (outside) of the survey area. They were likely constructed by U.S. marines in the 1940s as defensive positions during training exercises.

Rieth and Morrison (2010) conducted an AIS of a roughly 1,548 acre area of potential road corridors located north of the current project area that extended from Māmalahoa Highway near Waimea Town to Highways 19 and 270, traversing Waikōloa, Lālāmilo, ‘Ōuli, and Kawaihae *ahupua‘a* (see Figure 16). In the general vicinity (at the same elevation) of the current project area they identified nine sites, eight of which were described as single mounds of undetermined age and function and the ninth was the prominent stone wall (Site 9012) that extends north/south through the greater area..

Clark and Rechtman (2011) investigated a *mauka-makai* oriented corridor located within the Spear and Chaffee (1994) project area. Five archaeological sites (SIHP 50-10-11-28682 to 28686) were identified: a portion of the old Puakō Sugar Plantation’s wooden flume from Waikōloa Stream , two rock piles that seemed to mark the former route of a World War II-era communications line, a Historic dike constructed for flood-control purposes, a circular enclosure containing a rock pile that may have been a Historic hunting blind or skeet shooting area, and a C-shaped enclosure.

To the west of the current project area, ASM Affiliates conducted an archaeological inventory survey (Clark et al. 2014) of approximately 87.5 acres for the Lālāmilo Wind Farm Repowering Project. Three archaeological sites, a rock wall (SIHP 50-10-11-9012), a World War II military encampment with a possible earlier Precontact component (SIHP 50-10-11-30109), and a complex of cairns marking the boundary between Lālāmilo and Waikōloa *ahupua‘a* (SIHP 50-10-11-30110), were recorded within the project area.

To the west of the current project area, Clark et al. (2016) conducted an AIS of roughly 810 acres extending inland from Queen Ka‘ahumanu Highway along the Lālāmilo boundary (see Figure 16). Archaeological inventory surveys of two corridors across this property had previously been conducted by (Spear and Chaffee 1994) and Clark and Rechtman (2011). All of the previously recorded sites in these two project areas, along with a portion of Site 21976, a Historic cart path, previously recorded by Rosendahl (2000), were incorporated into the findings of the Clark et al. (2016) study. Sites newly identified by Clark et al. (2016) (SIHP 50-10-11-30071 to 30083) included two C-shaped enclosures interpreted as Precontact Period shelters, three Precontact Period habitation complexes, two modified outcrops interpreted as Precontact Period shelters, a rock pile and modified outcrop that appear to have functioned as a Historic survey station, a short wall interpreted as a Precontact Period shelter, a surface scatter of marine shell, a rock pile with an associated trail segment that may have been a rest area along an old trail route, a complex of features used for Historic Period habitation and agricultural purposes, and a complex of eighty-nine twentieth century hunting blinds built by bird hunters. The Precontact Period sites, mostly indicative of short-term or recurrent habitation, were concentrated in the northern portion of the project area near the Lālāmilo boundary.

3. PROJECT AREA EXPECTATIONS

The results of previous historical and archaeological research indicate that the current project area is located in a dry intermediate zone between more intensively utilized coastal and upland resource/habitation areas. Prior results suggest that archaeological features predating the introduction of cattle ranching in the mid-nineteenth century are likely to be sparsely distributed, if present at all, in the current project area. Sites and features dating to this period, if encountered, are likely to be related primarily to the collection of specific resources (e.g., *pili* grass or birds such as *‘ua‘u* and *nēnē*) and to travel between the coastal and upland areas. These features could include trails, surface architectural remains of temporary habitations and shelters (e.g., C-shapes and similar rock features), and midden or marine shell scatters. Prior subsurface testing (Clark and Rechtman 2005; Moore et al. 2002; Spear and Chaffee 1994) has only identified buried cultural deposits inside shelter and habitation features. Archaeological features associated with ranching are expected to be more numerous and widespread than Precontact features, as the current project area was actively used as pasture beginning in the late nineteenth century until the present. Prior studies also indicate that military training during World War II has left behind numerous improvised firing positions that resemble low rock alignments or shelters. Modern reuse of these sites has also been indicated by the presence of modern cartridge casings found near them. Additional factors that will likely limit the expectations for surface and subsurface archaeological features and deposits is the extent of prior ground disturbance in the immediate vicinity of the project area, which has included the construction of a paved access road and two water well-related facilities.

4. FIELDWORK

Fieldwork for the current study was conducted on August 13, 2020 by Lokelani Brandt, M.A. and Benjamin Barna, Ph.D. (Principal Investigator). A total of four person-hours were expended during the fieldwork.

FIELD METHODS

During the archaeological field survey, the entire (100%) ground surface of project area was visually inspected by field technicians walking transects oriented north-south, spaced no more than 15 meters apart. Ground visibility was very good, with bare ground visible between low, patchy growths of buffel grass. All bedrock outcrops were given special attention and examined for evidence of modification or other human use. No subsurface sampling was conducted. This decision was made based on observed thin soil accumulation and the results of the prior studies in the area, which indicated such deposits are most likely to be found in the floor of protected temporary habitation/shelter sites.

FIELD RESULTS

As a result of the current fieldwork, no historic properties of any kind were observed within the project area. The only modifications to the project area include several two-track roads (Figure 17). The ground surface was bare and rocky with apparently thin soil accumulation and occasional patches of buffel grass (Figure 18). Metal fragments (shrapnel) were observed within the project area, but no other associated military training features were present. Site 9012, the Historic ranching wall, is located outside of the project area, across the paved well access road.



Figure 17. One of several two-track roads crossing the current project area, view to the northwest.



Figure 18. Bare ground and patchy buffel grass in the current project area, view to the west.

5. RECOMMENDED DETERMINATION OF EFFECT

Given the negative findings of the current study with respect to archaeological resources, it is concluded that the development of the proposed 10MG above-ground water reservoir with appurtenant water line and road connections will not affect any historic properties. The recommended determination of effect for the proposed project is “no historic properties affected.”

With respect to the historic preservation review process of the Department of Land and Natural Resources–State Historic Preservation Division (DLNR–SHPD), it is recommended that no further work needs to be conducted within the current project area prior to, or during, project implementation. In the unlikely event that archaeological resources are discovered during ground disturbing activity associated with the proposed development, work should cease in the area of the discovery and DLNR-SHPD contacted pursuant to HAR 13§13-280-3.

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Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 4

Ordnance and Explosives Assessment

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FINAL
ASSESSMENT REPORT

**OE Services for Lalamilo 10 MG Reservoir
Tax Map Key (3) 6-9-001: Parcel 001**

Prepared for:

**Geometrician Associates, LLC
10 Hina Street
Hilo, Hawai'i 96720**

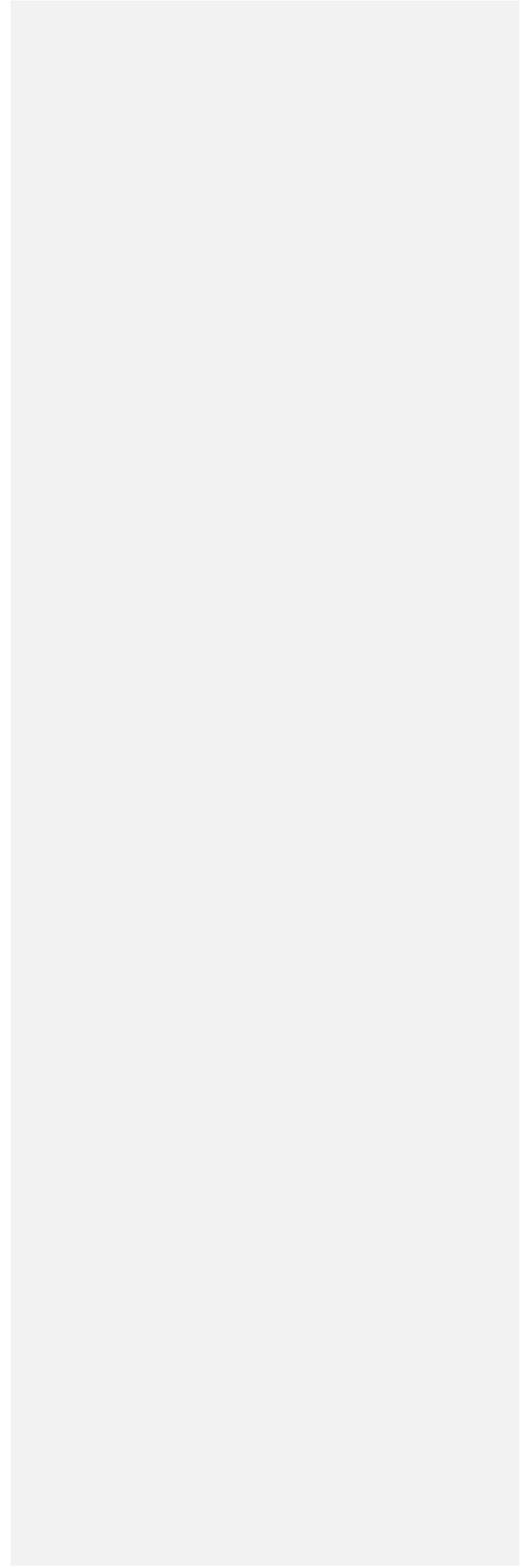
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September 2020
Revsion 01, June 2021

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Summary of Revisions
Final Assessment Report
OE Services for Lalamilo 10 MG Reservoir
Tax Map Key (3) 6-9-001: Parcel 001

The Final Assessment Report for Ordnance and Explosives Services for Lalamilo 10 MG Reservoir Tax Map Key (3) 6-9-001: Parcel 001 was finalized in September 2020. Subsequently, comments were provided and the following edits made.

<u>Description</u>	<u>UFP-QAPP Revision Number</u>	<u>Revision Date</u>	<u>Revised Sections and/or Pages</u>
<u>Edits per State of Hawai'i Department of Health comments provided in letter dated 5/21/21</u>	<u>Rev01</u>	<u>June 2021</u>	<u>Sections 3.1.1, 3.1.2, and 4.2.1.</u>

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Acronyms and Abbreviations

%	Percent
AOI	Area of Interest
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DDESB	Department of Defense Explosives Safety Board
DMM	Discarded Military Munitions
DoD	Department of Defense
EA	EA, Science, and Technology, Inc.
EE/CA	Engineering Evaluation/Cost Analysis
FUDS	Formerly Used Defense Sites
HDOH	State of Hawai'i Department of Health
HE	High Explosive
HIARNG	Hawai'i Army National Guard
IVS	Instrument Verification Strip
LTA	Local Training Area
MC	Munitions Constituents
MD	Munitions Debris
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
MG	Million Gallon
mm	Millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
Ogden	Ogden Environmental and Energy Services Company, Inc.
ORAP	Operational Range Assessment Program
OSHA	Occupational Safety and Health Administration
PTA	Pōhakuloa Training Area
RA	Remedial Action
RI	Remedial Investigation
TMK	Tax Map Key
U.S.	United States
USACE	U.S. Army Corps of Engineers
UXO	Unexploded Ordnance
WAA	Wide Area Assessment
WMA	Former Waikoloa Maneuver Area
WP	White Phosphorus

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Terms

Discarded Military Munitions

Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance (UXO), military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations (10 U.S.C. 2710[e][2]).

Munitions Constituents

Any material originating from UXO, discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.

Munitions Debris

Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions and Explosives of Concern

Specific categories of military munitions that may pose unique explosives safety risks; that is, UXO, DMM, or munitions constituents (MC) (e.g., explosives) present in high enough concentrations to pose an explosive hazard.

Material Documented as Safe

Material Potentially Presenting an Explosive Hazard (MPPEH) that has been assessed and documented as not presenting an explosive hazard and for which the chain of custody has been established and maintained. This material is no longer considered to be MPPEH.

Material Potentially Presenting an Explosive Hazard

Material owned or controlled by the Department of Defense (DoD) that, before determination of its explosive safety status, potentially contains explosives or munitions or potentially contains a high enough concentration of explosives that the material presents an explosive hazard. Excluded from MPPEH are munitions within the DoD-established munitions management system and other items that may present explosion hazards that are not munitions and are not intended for use as munitions.

Munitions Response Area

Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area (MRA) is composed one or more munitions response sites (MRSs).

Munitions Response Site

A discrete location within which a MRA that is known to require a munitions response.

Small Arms Ammunitions

Ammunition, without projectiles that contain explosives (other than tracers), that is .50-caliber or smaller, or for shotguns.

Unexploded Ordnance

Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, properties (Formerly Used Defense Sites), personnel, or material and remain unexploded either by malfunction, design, or any other cause (10 U.S.C. 101[e][5][A] through [C]).

Unexploded Ordnance Qualified Personnel

Personnel who meet the training requirements for UXO personnel and have performed successfully in military Explosive Ordnance Disposal positions or are qualified to perform in the following service contract act contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, and Senior UXO Supervisor. Refer to Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP) 18 for detailed information for approved contract titles and qualifications.

Unexploded Ordnance Technicians

Personnel who are qualified for (as defined by DoD) and filling Department of Labor, Service Contract Act, Directory of Occupations contractor positions of UXO Technician I, UXO Technician II and UXO Technician III. Refer to DDESB TP 18 for detailed information for approved contract titles and qualifications.

Section 1 Project Scope and Application

The scope of the project was to perform research and generate a report that provides a brief history of the problem, the cleanup effort, and the characteristics of the hazards (e.g., type of ordnance, distribution and depth, issues) in the general area of the Lalamilo 10 million gallon (MG) Reservoir project site.

Within the report, the contractor was to identify, with reasonable certainty, whether the area of interest (AOI) has been cleared of unexploded ordnance (UXO) and where the nearest cleared areas existed.

Assuming that the AOI has not been cleared, the contractor was to outline the process(es) by which a client can ensure that the area is fully evaluated and cleared of UXO (to their level of requirement), including hypothetical but realistic schedules and milestones. Various options were to be provided with their advantages and disadvantages. Also, if the area has been cleared, the contractor was to provide guidance to ensure compliance with the State of Hawai'i Department of Health's (HDOH) Area Wide Environmental Hazard Management Plan for the Former Waikoloa Maneuver Area (WMA).

The contractor was also to provide a rough order of magnitude for cleanup cost information on a per-acre basis. The limitations of the cleanup would include efficiency of detection, depth of detection, and any others associated which may affect the construction of a 10 MG reservoir.

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Section 2 Site Description and Problem Identification

The following sections describe the physical setting and history of the Pu'u Pā Munitions Response Site (MRS), including relevant environmental investigations previously conducted at the site.

2.1 Site Description

The Pu'u Pā MRS is located in the northwestern portion of the Island of Hawai'i, approximately 1.5 miles south of the town of Waimea in the South Kohala District (Figure 2-1). The MRS comprises approximately 13,722 acres of privately-owned land surrounded by the WMA. The WMA is currently undergoing investigation and cleanup as part of the Formerly Used Defense Sites (FUDS) program and is not addressed in this report. The land associated with the Pu'u Pā MRS (Tax Map Key [TMK] (3) 6-8-001-001) is owned by Parker Ranch. The Pu'u Pā MRS was transferred from the FUDS Military Munitions Response Program (MMRP) because it continued to be used by the Department of Defense (DoD) under lease from the private landowner Parker Ranch for non-live firing training until 2000, after the 1986 date that establishes eligibility for inclusion in the FUDS program.

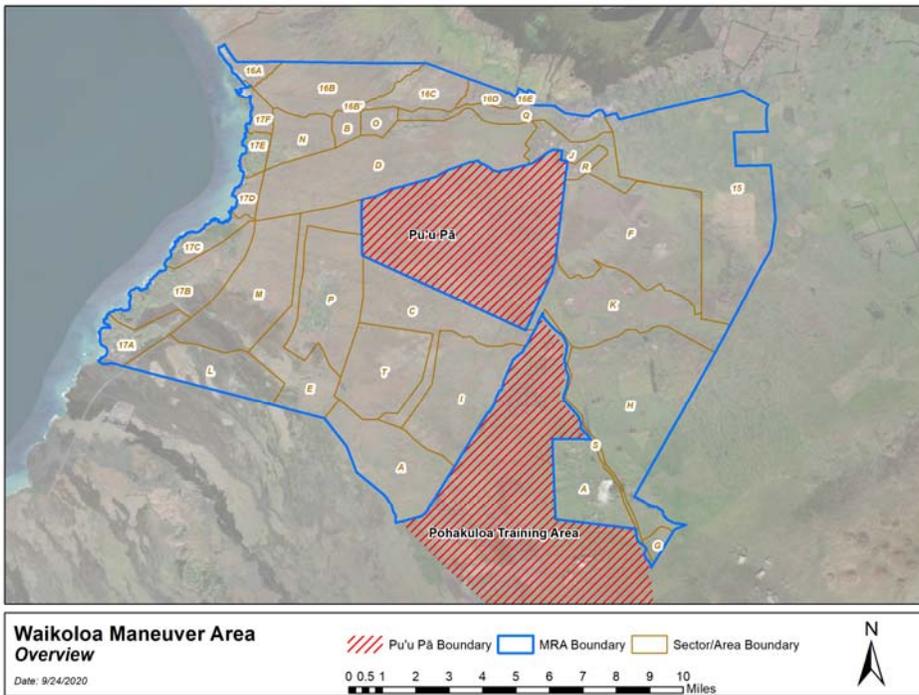


Figure 2-1: WMA Overview

Historically, the Pu'u Pā parcel has been used primarily for the grazing of livestock (including horses, sheep, and cattle). Four internal fence lines extend across the MRS, separating the ranch into five major corrals. The MRS also contains a commercial wastewater treatment plant operated by a tenant who uses it to treat pumped sewage. A rock wall of historic significance runs north-south along the western boundary of the MRS. Several municipal water wells and tanks are located along the western boundary and southwestern portion of the MRS.

An asymmetrical cinder cone (referred to as Pu'u Pā cinder cone hereafter) is located in the northern portion of the MRS. It is the primary geographic feature on the property. The Pu'u Pā cinder cone is surrounded by a number of smaller hills and shallow ravines that serve as intermittent drainage channels. A small grove of eucalyptus trees is present along the southerly base of the cinder cone. A trail established by the military to travel from the coast to the Pōhakuloa Training Area (PTA) located to the east of the MRS extends through the eastern third of the Pu'u Pā MRS (United States [U.S.] Army Corps of Engineers [USACE], 2002).

The MRS is bounded on the east by Māmalahoa Highway (State Highway 190) and additional Parker Ranch lands. To the south, it is bounded by multiple residential parcels owned by the Waikoloa Village Association and the Waikoloa Land and Cattle Company. To the west, it is bounded by parcels owned by the Waikoloa Village Association and various landowners. To the north, the MRS is bounded by a parcel owned by the State of Hawai'i.

A single-runaway airport, the Waimea-Kohala Airport, is located approximately one mile south of Waimea and east of the Pu'u Pā MRS. The airport consists of a passenger terminal, general aviation facilities, and an aircraft rescue and firefighting facility. The airport has no fueling or airport traffic control tower facilities. Air traffic approaching and departing the airport routinely flies at low altitude over the eastern portion of the Pu'u Pā parcel.

A 26-acre area used by Gary's Auto Service as an automobile repair shop and wrecking yard is located to the immediate northeast border of the MRS. A planted grove of eucalyptus trees is present on 21 acres of land located northeast of the MRS, adjacent to Māmalahoa Highway and the Waimea airport. There are also several small easements established within the property, one in the northeast corner of the parcel and the others along the western (makai) boundary. These easements total approximately 4 acres.

The entire property is enclosed with three-strand barbed-wire ranch fencing that restricts site access. There are multiple points of entry into the MRS through locked gates. The primary access is through a gate and cattle guard along Māmalahoa Highway at Mile Marker 3. The MRS can also be accessed via the following:

- The Cactus Gate in the northeastern portion of the MRS;
- A gate along Māmalahoa Highway near the Saddle Road intersection;
- A gate near Kamakoa Gulch along the eastern boundary;
- The Kamakua Gate located in the southwestern portion of the MRS;
- A gate near the northwestern corner of the parcel; and
- Other less-accessible gates along the property perimeter.

2.1.1 Project Site

The project site is located within the Pu'u Pā MRS on the western boundary (Figure 2-2 and Figure 2-3) and is approximately 10 acres.

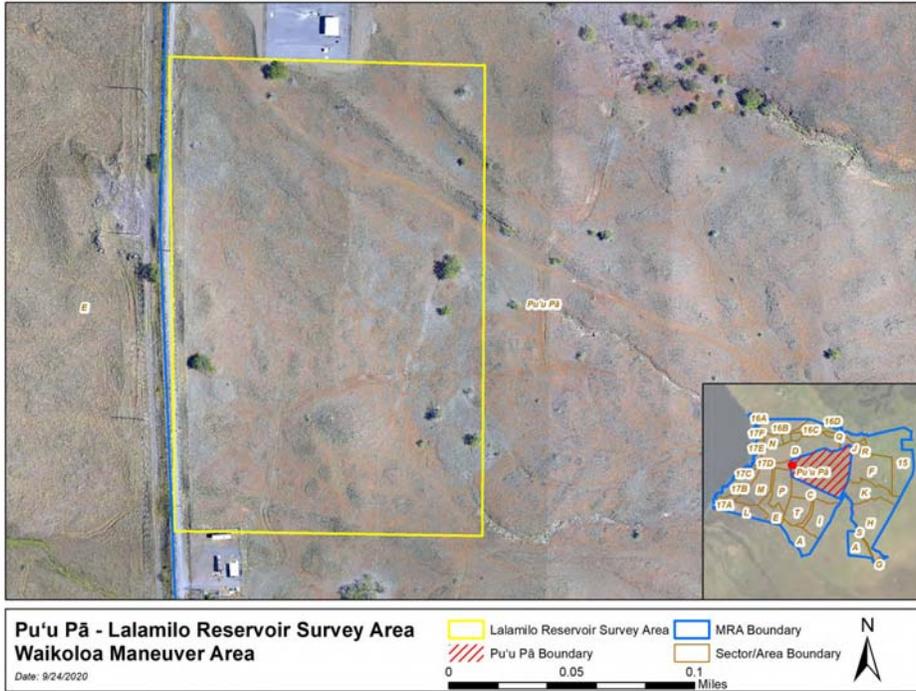


Figure 2-2: Project Site



Figure 2-3: Site Photo

2.2 *Current and Anticipated Future Land Uses*

The Pu'u Pā MRS occupies land almost entirely owned by Parker Ranch, except for a small strip of land located in the northeastern portion of the MRS, which is under an easement provided to the State of Hawai'i. Additional Parker Ranch lands are located to the east of the MRS. Waikoloa Village Association and Waikoloa Land and Cattle Company properties border the MRS on the west and south, respectively. To the north, the MRS is bounded by a 9,141-acre parcel of State of Hawai'i lands, and private homes and farms.

Current land uses of the Pu'u Pā MRS include agricultural use for grazing of livestock and operation of a commercial wastewater treatment plant. Parker Ranch permits hunting/shooting and horseback or all-terrain vehicle tours in some areas of the parcel on a limited basis.

The land surrounding the MRS is mainly used for agricultural purposes, military training, recreational, and residential purposes. Parker Ranch serves as a tourist destination by offering historic tours of the area, scenic horseback riding or all-terrain vehicle tours of Mauna Kea, and a popular museum and visitor center. Immediately to the south of the MRS is the Keamuku Local Training Area (LTA), which is part of the PTA installation. Recreational use of the shore west of the MRS across State Highway 19 (Queen Ka'ahumanu Highway) includes Hapuna Beach State Park, the Mauna Lani Resort, and the Ala Kahakai hiking trail. Private residences associated with the towns of Waikoloa Village and Waimea are scattered throughout the area.

The potential for additional commercial and future residential development exists adjacent to and within the Pu'u Pā MRS; however, Parker Ranch has indicated there are no plans to construct residential development(s) within the parcel. Some areas adjacent to Parker Ranch parcels may be developed to support residential use, and the residential development of Waikoloa Village increasingly extends toward the southwestern MRS boundary. Future development of the Pu'u Pā MRS could potentially include increased commercial/industrial use, including possible renewable energy generation. There are also discussions of a possible future easement in the northeastern corner of the MRS to facilitate construction of a new bypass road to connect Māmalaha Highway and Lālamilo (State Highway 190) and Kawaihae Road (State Highway 19).

2.3 *Site History*

The Pu'u Pā MRS was a portion of the overall WMA (Figure 2-1) used for live-fire training from 1943 to 1946. The parcel was leased by the Army until 1998 and by the Hawai'i Army National Guard (HIARNG) until 1999 or 2000. The northeastern area of the parcel also contained a portion of Camp Tarawa.

In December 1943, the Navy acquired more than 100,000 acres of land located in the northwest portion of the island of Hawai'i through a licensing agreement with Parker Ranch. This piece of land was later known as the WMA.

The WMA was used as an artillery firing range and for troop maneuvers and encampment. The Pu'u Pā MRS is centrally located in the northern section of the former maneuver area (Figure 2-1). As previously indicated, although once considered part of the WMA, the Pu'u Pā MRS was

transferred from the FUDS MMRP program to the Active Army MMRP program in 2009 because it was used as an operational training area until 1999 or 2000, well beyond the FUDS program eligibility end date of 1986.

Live-fire military operations were conducted within the former maneuver area, including the Pu'u Pā MRS, between 1943 and 1946. Non-live fire exercises continued after 1946. Live-fire exercises were conducted with carbines, miscellaneous-caliber rifles (including the Browning automatic rifle), bazookas, flame-throwers, mortars, and machine guns. Artillerymen learned how to load and unload howitzers from large amphibious trucks and practiced with hand grenades; 37millimeter (mm), 75mm, 105mm, and 155mm high explosive (HE) projectiles; and 4.2-inch mortar projectiles. Infantry regiments conducted continuous 72-hour maneuvers with fighter and dive-bomber support. Air observation was practiced from "light observation Cub-type" planes. There were constant training schedules with demolitions, mines, and other special equipment. Large numbers of heavy equipment were brought to the island for the training and included construction equipment (such as cranes, bulldozers, and tractors), M4A2 and M4A4 tanks, weapons carriers, trucks, and jeeps (USACE, 1999). There were 75mm guns mounted on M4A2 and M4A4 tanks which were used in live-fire training. In addition, Japanese munitions were brought to the WMA in support of troop training. Reportedly, the Pu'u Pā cinder cone was used as a live-fire target area for mortar and barrage rockets as well as infantry maneuvers (USACE, 2002). Intensive live-fire training was conducted in the forested areas, cane fields, and around the cinder cone from 1943 through 1946 (USACE, 2002).

Approximately 467 acres within the Pu'u Pā MRS were used for tents and Quonset huts at Camp Tarawa, a former U.S. Marine Corps encampment site (USACE, 1999). In December 1943, the 2nd Marine Division, Fleet Marine Force, was withdrawn from the Island of Tarawa and sent to the area for 4 months of rest, recuperation, and additional training. The tent city was named "Camp Tarawa" and was enlarged around the original camp, and eventually became home to more than 50,000 American soldiers. The 2nd Marine Division trained and refitted at Camp Tarawa until departing in June 1944 for the battles of Saipan and Tinian in the Marianas Islands.

The 5th Marine Division replaced the 2nd Marine Division at Camp Tarawa in late July 1944 and trained there in preparation for the planned assault on Iwo Jima. Between July and November 1944, Camp Tarawa expanded to include the 31st Naval Construction Battalion, the Army's 471st Amphibian Truck Company, the 6th Marine War Dog Platoon, the Army's 6th Section of the 726th Signal Aircraft Warning Company, the 11th Amphibian Tractor Battalion, and the 5th Joint Assault Signal Company. By January 9, 1945, all units had departed for the Pacific islands and only a Base Echelon remained at Camp Tarawa as of June 1946.

Use of the WMA ceased in 1946 and most of the associated land was returned to Parker Ranch. The property that comprises the Pu'u Pā MRS was retained for intermittent use by the DoD under a lease agreement with Parker Ranch. At that time, the site was identified by the DoD as the Pu'u Pā LTA.

From 1946 until the 1990s, maneuver activities at the Pu'u Pā LTA may have occurred as often as several times each year. When the area was not being used by the HIARNG, the land continued to be used for grazing livestock (USACE, 2002). Historical records indicate that the Pu'u Pā LTA was only used once by HIARNG for a non-live-fire air assault exercise sometime

between 1990 and 1993, and the lease agreement between Parker Ranch and HIARNG ended between 1999 and 2000 (EA, Science, and Technology, Inc. [EA], 2008). The Army last leased Pu'u Pā LTA for PTA use in March 1998 (EA, 2008). PTA use of the Pu'u Pā area included unit bivouac, tactical maneuver training, and assault operations. HIARNG and Army lease agreements for Pu'u Pā LTA use specified that live-fire exercises were not permitted (EA, 2008).

Inside the State-owned lands north of the Pu'u Pā MRS, a 9,141-acre area known as the former Lalamilo Firing Range was used as a campsite and training area by the U.S. Marines until 1953, through a permit granted by the Territory of Hawai'i. The area was used as a ground-artillery training area. The permit for the Lalamilo Firing Range was cancelled in December 1953, and since then the Territory of Hawai'i has used the land for grazing. Since 1959, the State of Hawai'i has owned the property. Artillery projectile fragments (frag); 4.5 barrage rockets; 81mm mortars; and 105mm and 155mm HE projectiles; munitions containing white phosphorus; small arms; and hand grenades have been found in this area (USACE, 2002).

At least two UXO clearances were performed at the former WMA, including portions of the Pu'u Pā MRS: one in 1946 when live-fire training activities ended, and a second effort in 1954. The second clearance was prompted following an accidental detonation of a dud fuze that killed two people and injured three others (USACE, 2002) during fence installation in the early 1950s.

2.4 Previous Investigations

Previous investigations relevant to the Pu'u Pā MRS include a Phase I Engineering Evaluation/Cost Analysis (EE/CA) (USACE, 1999), a supporting survey of natural and cultural resources (Ogden Environmental and Energy Services Company, Inc. [Ogden], 2000), an Operational Range Assessment Program (ORAP) assessment for potential offsite migration of munitions constituents (EA, 2008), and a Remedial Investigation (RI) (CH2M HILL, 2014). The following summarizes each of these investigations and the findings.

2.4.1 Phase I EE/CA

A Phase I EE/CA was conducted in 1997 for the WMA, including the Pu'u Pā MRS, under the FUDS program (USACE, 1999). The EE/CA was conducted before the removal of the parcel from the WMA FUDS program. The investigation focused on six discrete areas over a total of 521 acres, (Figure 2-4) as follows:

- Area A, 26 acres (Kamuela Industrial Park/Gary's Auto Service);
- Area B, 21 acres (Tree Plot);
- Area C, 48 acres (Wastewater Treatment Expansion Area);
- Area D, 222 acres (Pu'u Pā Cinder Cone);
- Area E, 189 acres (Waikoloa Fence Line); and
- Area F, 15 acres (Rock Wall).

A total of 96 grids were geophysical surveyed using a Geonics EM61-MK2 (EM61) and statistically sampled. Of these, 91 grids measured approximately 100 feet by 100 feet, and five

grids measured approximately 10 feet by 400 feet. Two UXO items were found: a 4.5-inch barrage rocket in Area D and a 60mm mortar projectile in Area C. Both items were located within the boundaries of the current Pu'u Pā MRS.

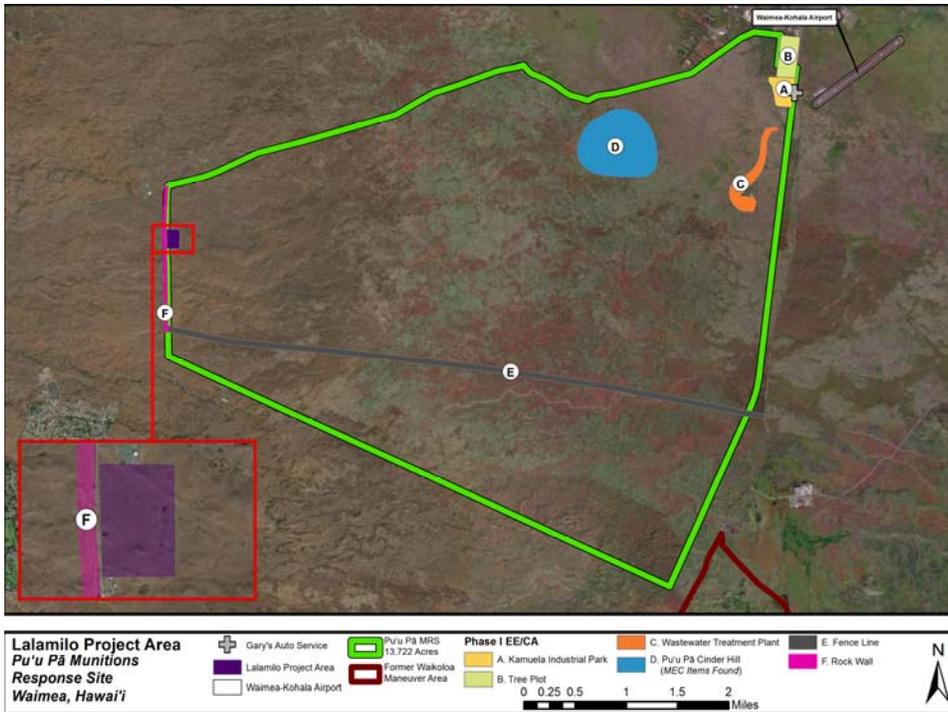


Figure 2-4: Phase I EE/CA Discrete Investigation Areas (Areas A-F)

At the 91 larger grids that were surveyed, 255 anomalies were identified, of which 215 were investigated to meet statistical requirements. Of the 215 anomalies that were investigated, 2 were UXO (as described in the previous paragraph), 96 were munitions debris (MD), and 117 were non-munitions-related items. MD included unspecified rocket motors, tail fins, tail booms, mortar and rocket finds, partial fuzes, a nose fuze of a 60mm HE projectile, a 37mm projectile, a 3-inch armor-piercing projectile, and a ballistic cap. In addition, practice land mine parts were found buried below the ground surface in Area B, where the tree plot is located. The Phase I EE/CA Report recommended that Institutional Controls and Construction Support be implemented at Areas A, B, and C while Institutional Controls be implemented at Areas D, E, and F.

2.4.2 Archaeological and Biological Monitoring of UXO Investigation

Because archaeological features were identified onsite during the Phase I EE/CA, the Army conducted a survey of natural and cultural resources potentially present at the six areas investigated (Ogden, 2000). The survey identified three previously unrecorded archaeological features and two endangered plant species at the Pu'u Pā MRS.

2.4.3 ORAP Assessment

In 2008, an assessment was completed for the Pu'u Pā LTA to determine whether further investigation was needed based on the potential for munitions constituents (MC) migrating offsite (EA, 2008). No sampling was conducted. The assessment results indicated that although munitions had been used at the Pu'u Pā LTA, offsite migration pathways were unlikely or incomplete because of limited annual precipitation, porous soils, and deep groundwater tables.

2.4.4 Remedial Investigation

The RI was initiated to determine the nature and extent of munitions and explosives of concern (MEC) and MC through the following actions:

- Identify potential impact/high use areas (or AOIs) across the entire MRS using a combination of airborne and ground-based wide area assessment (WAA) tools, perform ground-based EM61 surveys within the AOIs to determine the extent of MEC presence, and intrusively investigate a statistically significant number of geophysical anomalies within each AOI to determine the sources of the anomalies and establish MEC density;
- Establish a statistically meaningful number of grids to characterize non-AOI areas, perform analog instrument anomaly identification and intrusive investigation within each grid, including intrusive investigation of all detected anomalies, to determine the sources of the anomalies and to establish MEC and MD density;
- Access potential explosive hazards associated with MEC;
- Conduct soil sampling to locate potential MC contamination and (if present) define the nature and extent of the contamination; and
- Identify potential environmental hazards associated with MC and estimate the associated risk to current and future potential human and ecological receptors.

Based on site history, previous investigations, and the results of the RI, the Pu'u Pā MRS was used as a maneuver area for live fire training exercises. Previous investigations and the RI have found UXO and large quantities of material potentially presenting an explosive hazard (MPPEH) from a variety of munitions. UXO recovered during the RI field investigation included the following (Figure 2-5):

- M1 105mm HE (fuzed);
- M84 105mm smoke (no fuze);
- M63 37mm HE projectiles (fuzed and without fuze);

- M63 37mm Armor Piercing HE projectiles (fuzed);
- M48 75mm HE (fuzed and unfuzed);
- M61 75mm Armor-Piercing Capped Tracer (fuzed);
- M64 75mm white phosphorus (WP);
- M56/57 81mm HE Mortar (fuzed); and
- MK II Hand Grenade (filler missing, fuze booster intact).

UXO was found both on the surface and subsurface at a maximum depth of 91.44 centimeters (36 inches) below ground surface.

MPPEH found included, but was not limited to, empty and expended projectiles and cartridges; munitions components (such as fins) and frag associated with various munitions to include small arms ammunition up to .50 caliber; 105mm HE and illumination rounds; 2.36-inch., 3.5-inch, and 4.5-inch barrage rockets; 37mm and 75mm projectiles; 81mm and 60mm mortars (HE, illumination, and WP), and a variety of fuzes.

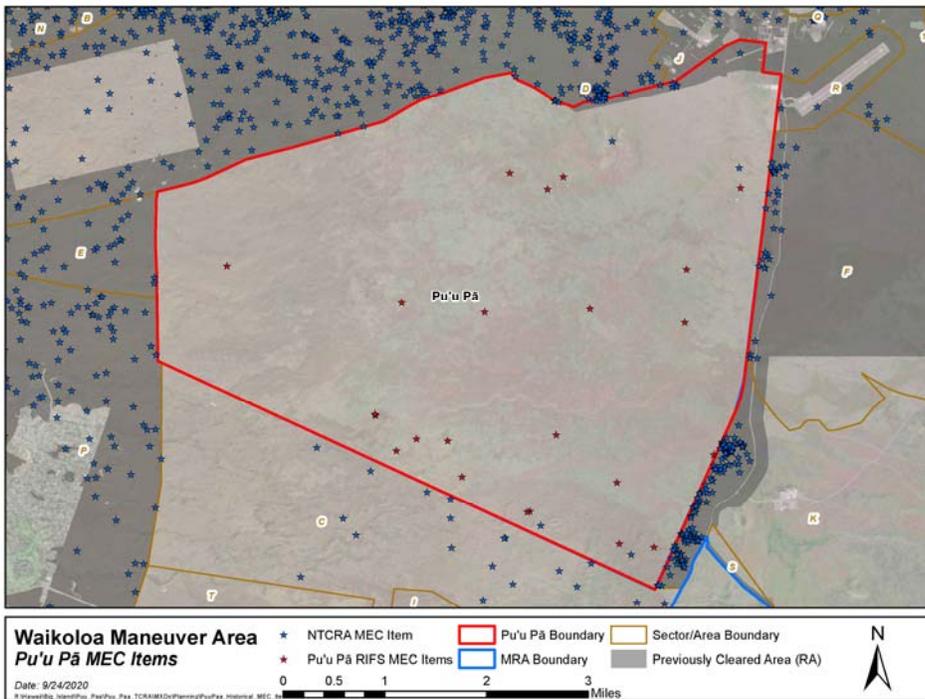


Figure 2-5: Pu'u Pā Overview

2.5 Problem Identification

Based on the historical military training activities at the WMA, it was concluded that there was a high potential for MEC and a moderate potential for MC to be present at the Pu'u Pā MRS (CH2M HILL, 2012).

Various types of munitions were identified as being present across the MRS, ranging in size from 37mm to 155mm projectiles, with specific types of munitions use appearing more prevalent in some areas as opposed to others. Minimal clustering was apparent across the site and no heavily targeted areas were identified. Although some areas appear to have been less impacted by munitions use, there are no areas within the site that appear to have the potential for being free of munitions-related items.

2.6 Previously Cleared Areas

To this date, no Removal Action, only investigations, were performed within the boundary of the Pu'u Pā MRS. The areas that border Pu'u Pā (Figure 2-5, shaded in grey) had a remedial action (RA) that was either partially completed or the sector was completed. MD can be found throughout the area (Figure 2-6). A Time Critical Removal Action is anticipated to be started in 2021 in the vicinity of the Lalamilo project area, however, the actual footprint has not been determined at this time.



Figure 2-6: Munitions Debris

Section 3 Project Activities and Operations

3.1 Planning and Documents

To ensure that the area is fully evaluated and cleared of UXO, the following processes described in the sections below must take place.

3.1.1 Work Plan

~~Before beginning the RA-As part of the UXO Construction Support~~ process, a Work Plan must be completed ~~before field activities begin~~. The Work Plan must have the following chapters:

Commented [SK1]: HDOH comment 2

- Introduction;
- Technical Management Plan;
- Field Investigation Plan;
- Quality Control Plan;
- Explosive Management Plan;
- Environmental Protection Plan (if necessary);
- Property Management Plan (if necessary);
- Interim Holding Facility Siting Plan (if necessary);
- Physical Security Plan; and
- References.

Supporting data provided in appendices includes:

- Scope of Work;
- Site Maps;
- Point of Contacts;
- Accident Prevention Plan/Site Safety and Health Plan;
- Munitions Constituents Sampling and Analysis Plan (if necessary);
- Forms; and
- Personnel Qualifications.

3.1.2 Project Activities

Once the Work Plan has been completed and approved by all parties, the ~~RA-UXO Construction Support process~~ ~~field activities~~ will ~~proceed and~~ include the following:

- Mobilization and Site Preparation;
- Biological and Archaeological Surveys and Monitoring;

- ~~Vegetation Clearance~~ (if necessary);
- ~~Install~~ Instrument Verification Strip (IVS) ~~installation~~;
- ~~Complete~~ Surface and Subsurface Clearance of MEC prior to any ground disturbing activities¹;
- ~~Perform any e~~Explosive disposal operations (Call 911);
- ~~Perform~~ MPPEH processing and management;
- ~~Perform m~~Material documented as safe (MDAS) processing, certification and transfer;
- ~~Perform~~ Waste Management (if necessary);
- ~~Complete~~ Data Management;
- Site Restoration; and
- ~~Demobilization~~.

Commented [SK2]: HDOH comment 2

¹ MEC clearance will be performed to the depth of detection. However, if the construction footprint exceeds the depth of detection, clearance will continue until the construction depth or bedrock is reached, whichever comes first.

Section 4 Proposed Milestone and Completion Schedule

4.1 Project Milestones

The key project milestones are presented in Table 4-1 below.

Table 4-1: Project Milestones

Project Milestones	Not-to-exceed Dates (Business Days)	Estimated % of Work Completed
Award	1 Day	0%
Submit Draft Work Plan/Sub Plans	30 Days after NTP	5%
Client Review Plans	15 Days	10%
Submit Comments on Plans	15 Days	15%
Client Reviews Comments	5 Days	20%
Submit Final Work Plan	5 Days	25%
Install IVS	14 Days After completion of Final Work Plan	30%
Start Field Activities	7 Days after IVS Installation	35%
Complete Field Activities	Est 1.5 weeks	75%
Submit Draft After-Action Report	30 days after completion of fieldwork	80%
Review Draft by the Client	15 Days	85%
Provide Comments to Client	15 Days	90%
Submit Final After-Action Report	5 Days	95%
Client Acceptance of Final Product	5 Days	100%

Note:
 % - Percent

4.2 Estimate Costing

Cost estimates are presented in Table 4-2.

Table 4-2: Project Cost Estimate

Activity	Units	Price
MEC Clearance		
Removal Action	Price Per Acre	\$24,014.77 (FFP/LS)
Construction Support		
Health and Safety Monitoring Services	Daily Rate	\$7,714.28 (FFP/LS)

4.2.1 Assumptions

- Only one mobilization will be required unless additional intrusive operations are required on site during any construction support operations;
- Delays in work, caused by other than UXO Contractor, will result in equitable adjustments to recoup personnel pay and associated costs (equipment, housing, etc.);

- Additional UXO Technicians IIs will be assigned depending on the number of heavy equipment used during intrusive operations at an adjusted daily rate;
- Developers, Landowner, Construction and subcontractor personnel will adhere to the UXO Safety guidance and directions from the UXO Technician. Failure to follow this guidance and directions can be cause for immediate withdrawal of support;
- The property must be **As part of the scope of work, the UXO contractor will cleared** of all equipment/rubbish/project material prior to the MEC Clearance;
- UXO Contractor will not perform MC sampling;
- UXO Contractor will not perform site rubbish removal;
- The Client is responsible to initiate the Call-Before-You-Dig and have all utilities located and marked prior to any intrusive operation;
- As required under the Occupational Health and Safety Administration (OSHA), UXO personnel will receive training on the Work Plan, site conditions, and site safety considerations (specific munitions safety training for anticipated munitions found within the boundary of Pu'u Pā). For training, a ½ day for site personnel has been estimated; and
- UXO or other explosive materials that require demolition will be inspected by the UXO team, if detonation is required, the UXO Contractor will move the item to a an out of the way location, if it is safe to do so, and the prime contractor will contact the police department for response. Contractor personnel can assist in the notification. Safeguarding of the community, e.g., guarding the item, is the responsibility of the prime contractor and not the liability of the Contractor.

Commented [SK3]: HDOH comment 3

Section 5 References

- CH2M HILL, 2012. *Final Work Plan, Remedial Investigation at Pu'u Pa'a Munitions Response Site, Pohakuloa Training Area (PTA-003-R-01), Waimea, Hawai'i.* February.
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Environmental Assessment

Lālāmilo 10 MG Tank Reservoir

APPENDIX 5

Threatened and Endangered Species Minimization Measures

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**Threatened and Endangered Species Minimization Measures to be Incorporated
In Lālāmilo 10 MG Tank Reservoir Project**

DWS will ensure that as part of construction contracts, mitigation for federally listed Hawaiian petrels, Newell's shearwaters, band-rumped storm petrels, Blackburn's sphinx moth, Hawaiian geese and Hawaiian hoary bats would be implemented. Specifically:

1. To minimize potential impacts to Hawaiian hoary bats, the DWS will:
 - Ensure that contractors do not remove or trim woody plants taller than 15 feet during the bat birthing and pup rearing season (June 1 through September 15).
 - Refrain from using barbed wire for fencing.

2. To avoid and minimize potential project impacts to seabirds, the following applicable measures will be taken:
 - Fully shield all permanent outdoor lights so the bulb can only be seen from below bulb height and only use when necessary. This measure is also required by the Hawai'i County Outdoor Lighting Ordinance (Hawai'i County Code Chapter 9, Article 14).
 - During operation the site would use lighting only where and when it is needed for safety purposes, and automatic motion sensors would be incorporated for appropriate fixtures. The use of energy efficient outdoor lamps with warmer colors (less blue light) and energy efficient fixtures will be implemented when the buildings are constructed.
 - Avoid nighttime construction altogether during the seabird fledging period, September 15 through December 15.

3. To avoid and minimize potential project impacts to Hawaiian geese, the following applicable measures will be taken:
 - The DWS will ensure that no construction personnel approach, feed, or disturb Hawaiian geese.
 - If Hawaiian geese are observed loafing or foraging within the project area during the breeding season (September through April), the DWS will ensure that work is halted that a biologist familiar with their nesting behavior surveys for nests in and around the project area prior to the resumption of any work.
 - The surveys will be repeated after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).
 - The DWS will ensure that the contractor posts and implements reduced speed limits, and that project personnel and contractors are informed about the presence of endangered species on-site.
 - The DWS will include a condition in the construction contract that if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins, all work will cease immediately and the Service will be contacted for further guidance.

4. To avoid and minimize potential project impacts to Blackburn's sphinx moth:
 - A biologist familiar with Blackburn's sphinx moth will survey areas of proposed activities for Blackburn's sphinx moth and its larval host plants prior to work initiation.
 - Surveys will be conducted during the wettest portion of the year (November-April) if possible, and in any case within 4-6 weeks prior to construction.

- Surveys will include searches for eggs, larvae, and signs of larval feeding (chewed stems, frass, or leaf damage).
- If moths or the native aiea or tree tobacco over 3 feet tall are found during the survey, the DWS will contact the Service for additional guidance to avoid take.

If no Blackburn's sphinx moth, aiea, or tree tobacco are found during surveys, measures will be taken to avoid attraction of Blackburn's sphinx moth to the project location and prohibit tree tobacco from entering the site. The DWS will ensure that the contractor or facility manager has trained personnel who will:

- Remove any tree tobacco less than 3 feet tall.
- Monitor the site every 4-6 weeks for new tree tobacco growth before, during and after the proposed ground-disturbing activity.

Biosecurity protocols including cleaning and inspection of construction equipment for invasive species including fire ants, frogs, rats, and mice would be applied during construction, as applicable.

Additionally, as part of maintenance, the DWS would ensure that the site is monitored for vectors that can pose risk to both humans and native biota, including T&E species, and treated, if required.